Creative Financing and Public Moral Hazard: Evidence from Medicaid Supplemental Payments*

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Abstract

Combining survey, audit, and administrative data on skilled nursing facilities (SNFs) from 1999-2017 with three complementary empirical approaches, we document that several states use creative funding schemes to divert federal Medicaid matching funds away from the intended purpose. These practices bias the intended subsidy effects of matching funds and distort the allocation of patients and resources across health care providers. Using the case study of Indiana, we document an increase in Medicaid dementia SNF stays and an associated increase in mortality pointing to a reduction in allocative efficiency in the matching of vulnerable patient to long term care providers.

Keywords: fiscal federalism, distortions, moral hazard, joint funding, Federal Medical Assistance Percentage, Upper Payment Limits, intergovernmental transfers, Medicaid, nursing homes, quality of care.

JEL Codes: H51, H75, I11, I13, I18, J14.

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1 Introduction

Joint funding of public programs has been a cornerstone of U.S. federalism. In 2019, the federal government provided states and local governments about $750bn in federal grants to fund a wide range of public policies, including health care, education, transportation, and environmental protection (Dilger and Cecire, 2019). In many instances, the joint funding involves federal matching grants to subsidize the spending decisions made by lower levels of government.[1] Inter-governmental matching grants maintain the benefits of local control to balance heterogeneous preferences over public goods while internalizing externalities across local jurisdictions (Oates, 1999). Whether and how these intended subsidies affect program resources and the quality and quantity of services is of central importance for the design of efficient policy in federal economies.

In this paper, we study these questions in the context of the Medicaid program which absorbs the lion's share (60%) of overall federal grants to states and local government. The federal government matches state spending through the Federal Medicaid Assistance Percentage (FMAP), which denotes the federal cost share of total spending. We argue that a significant fraction of federal Medicaid matching funds are not passed through to their intended recipients. Instead, several states use creative financing schemes to divert federal matching funds. These practices do not only lead to an unintended transfer of resources between programs, they also distort the intended subsidy effects and therefore health production and the allocation of patients to health care providers. In this paper, we document these creative funding schemes and study their distortionary effects on the allocation of health care.

We start with a basic theoretical point on how the presence of creative financing schemes can distort price setting and volume in opposing directions. When states can transfer matching funds across programs at no cost, on the margin, they internalize changes in provider reimbursement rates in full. The effective (marginal) FMAP for prices is reduced to 0% as already shown by Baicker and Staiger (2005). This provides incentives to transfer nominal reimbursements—jointly funded by states and the federal government—to other programs. It creates what we call a "public markdown" between the nominal and the real provider rate (effectively paid). By contrast, and

[1] Examples include the Medicaid program that we detail below as well as spending on transportation, including interstate highways, http://www.financingtransportation.org/funding_financing/financing/.

novel to our analysis, the ability to transfer funds increases the effective (marginal) FMAP on quantities beyond the nominal FMAP. This provides states with incentives to increase the volume of care in order to increase the (quantity) open-ended federal matching funds. We refer to this mechanism as "public moral hazard".

While, in principle, this conceptual point applies broadly, its practical importance remains an empirical question.[2] We quantify the diversion of federal matching funds, the associated public markdown, and the public moral hazard mechanism in an important, yet understudied, setting: Medicaid supplemental payments (SPs) for skilled nursing facilities (SNFs). Medicaid covers more than 6 in 10 nursing home patients and states can make SPs, in addition to per diem rate payments, as long as the combined rate—per diem, plus the supplemental rate—remains below the "Upper Payment Limit" (UPL). The UPL corresponds to the rate that Medicare would pay for the service and typically at least twice the Medicaid per diem rate.

To quantify the public markdowns and the role of public moral hazard, we combine survey, audit, and administrative data from 1999-2017 with three complementary empirical approaches. We start with a series of accounting exercises that combine compiled data from dozens of state audit reports. These reports indicate that, prior to 2003, at least 5 states used a system of inter-government transfers to redirect funds from government-owned nursing homes to the state budget. Accounting for these practices, we find an average public markdown of 20%, which implied that only 100%-20%=80% of nominal spending was effectively spent on nursing home care.

To provide a comprehensive assessment of these practices across states, we then study a national reform from 2003 to end these financing schemes. Using a difference-differences (DD) research design, we find that the 15 treatment states with creative financing schemes for nursing homes had an average public markdown of 20% prior to the reform, consistent with the audit evidence. At the same time, these practices provide extra incentives to increase the volume of care, as evidenced by an increased effective FMAP on quantities.In one state, we find an effective quantity FMAP exceeding 100% suggesting that, on the margin, the state may even turn a net revenue from expanding Medicaid volume.

Together, these findings suggest that the incentives created by the schemes may have a signif-

[2]Another example is transportation. When states can expropriate federal matching funds through a toll, they have an incentive to build or direct traffic through toll roads.

icant impact on the volume of Medicaid care provided. To investigate this possibility, next, we study a unique natural experiment in the context of Indiana's nursing home industry. In an effort to side-step the 2003 regulation, Indiana converted private nursing homes to county-owned entities, allowing the state to continue—and even further expand—their creative financing practices (mostly to finance public hospitals). Between 2002 and 2018, the share of county owned nursing homes in Indiana increased from less than 5% to about 90%. In fact, Indiana became a role model for several other states seeking to generate federal funding. The public acquisition of private nursing homes provides in itself first direct evidence on public moral hazard. As an important feature of these acquisitions, the management of the nursing homes remained largely unchanged. This helps us to isolate the effect of the financing scheme on the volume of care provided.

To test for changes in Medicaid volume as predicted by the theoretical model, we exploit the precise timing of the acquisitions in an event study framework. The findings confirm our volume predictions. Two years following the acquisition, Medicaid days significantly increase by 5% on average. We document an increase in the share of SNFs offering an Alzheimer unit, after the conversion, and that the increase in patient volume stems from newly admitted dementia patients.

We also find that the new patients were disproportionately admitted from acute care hospitals, providing us with an opportunity to quantify the counterfactual care choices and health outcomes among these dementia patients. To this end, we use Medicare claims data and identify dementia patients in acute care hospitals, who have a high probability of being discharged to a SNF for post-acute care. We estimate that acute care hospitals are more likely to discharge patients to a given SNF after the conversion took place. For dementia patients aged 85 and younger we find no increase in the probability of being discharged to any SNF suggesting that converted SNFs gain market shares from non-converted SNFs. For older dementia patients, on the other hand, we do find an increase in the probability of being discharged to any SNF and a decline in the propensity to be discharged home. We also find an increase in the one-year mortality in this population suggesting that, on average, these patients would have lived longer outside the SNF. Consistent with the notion of moral hazard, our findings suggest that the financing scheme in Indiana encouraged the expansion of lower value SNF care and reduced the allocative efficiency in the matching of vulnerable patient to long term care providers.

Our findings contribute to several literatures. First, we provide novel insights on creative financing schemes in Medicaid, which mostly received attention in the health policy literature (Coughlin and Zuckerman, 2003; Mitchell, 2018), law journals (Hatcher, 2017), and the popular press (Evans et al., 2020), but thus far very little attention in the economics literature. One important exception, and closely connected to our work, is the seminal paper by Baicker and Staiger (2005), who document the diversion of matching funds (through intergovernment transfers) and the consequences for patient mortality in the context of Disproportionate Share Hospital (DSH) payments.

We contribute to their work in two important ways. Fist, by combining administrative and survey data with a federal reform, we quantify the share of nominal Medicaid spending that is diverted away from nursing homes. We introduce the term "public markdown" to concisely capture that principle. Using provider-level data, we then show that a federal reform reduced nominal spending and transfers significantly, but find no effect on input use in private or public nursing homes. One important difference between our setting and the DSH hospital payments in Baicker and Staiger (ibid.) is that states have not only adopted creative financing instruments to expropriate funds from public nursing home (analogous to Baicker and Staiger (ibid.)), but also *private* nursing homes. This explains why the overall markdown (20% on all Medicaid payments) is large in our setting. Second, and more importantly, we derive theoretically and document empirically how the presence of creative financing schemes can result in an increase Medicaid volume and distort the allocative efficiency of patients and resources across long-term care providers.[3]

Second, our findings speak to the incidence of Medicaid funds. Existing work has shown that at least part of the incidence of Medicaid spending falls on providers, as opposed to beneficiaries, when providers hold market power (Hackmann, 2019) or provide charity care to underinsured patients (Garthwaite et al., 2018; Finkelstein et al., 2018). We show that a significant share of nominal Medicaid spending is not passed through to their intended recipients, because it is not spent on the intended providers in the first place.

[3]While public providers have been shown to operate under a soft-budget constraint (Duggan, 2000), we emphasize that in our setting, the conversion of nursing homes in our setting was motivated to increase revenues for public hospitals. Furthermore, the management of the SNFs was outsourced or remained unchanged, suggesting that the SNFs continued to operate largely as if they were private (mostly for profit) entities, which respond more elastically to financial incentives (Gupta et al., 2021; Gandhi et al., 2020).

Third, we contribute to a large literature on the relevance of patients' (and providers') financial incentives for health care utilization. The bulk of the existing evidence suggests that patients and providers respond to financial incentives. However, there is less evidence on how changes in spending are achieved and what these changes imply for patient health outcomes. Influential work has established that patient cost-sharing causes patients to cut back on needed (as well as wasteful) services (Newhouse et al., 1993; Finkelstein et al., 2012; Baicker et al., 2015; Brot-Goldberg et al., 2017). We contribute to this literature by showing how creative financing schemes may distort the quality-quantity tradeoff in health care utilization and result in an expansion of low-value care. Furthermore, we quantify how these tradeoffs translate into patient mortality, which has been difficult to capture empirically.[4] Our findings suggest that at least some inpatient dementia patients choose low-quality nursing homes over home with detrimental consequences for mortality. This may point to behavioral frictions in decision making, such as information frictions, that have been analyzed and demonstrated to be important across a broad range of elderly and non-elderly patients (Baicker et al., 2015; Handel and Kolstad, 2015; Abaluck et al., 2021).

Finally, our analysis highlights important intergovernmental interactions in the funding of public policies. The ability to transfer funds provides incentives to inflate nominal spending contributing to substantial growth in states' health and welfare spending as well as federal matching funds over the last decades (Baicker et al., 2012). It also provides states with an instrument to redistribute public spending across programs, mitigating the capacity of the federal government in redistribution (Gordon and Cullen, 2012).[5] We show that creative financing schemes distort price setting in health care markets and result in volume increases, that is state-induced over-servicing. These aspects relate to existing work on the impact of federal matching rates along the benefit and beneficiary margins (Baicker, 2001; Baicker, 2005). Our results contribute to an active debate on Medicaid financing reform, including increased monitoring (Federal Register, 2019) as well as changes in cost sharing (Rudowitz, 2017; Clemens and Ippolito, 2018), and their broader fiscal impact (Gruber and Sommers, 2020).

[4] A few recent papers have documented that insurance expansions can lower mortality among the non-elderly adults (Miller et al., 2021; Goldin et al., 2021). Similarly, Card et al. (2008) document a discontinuous decline in morality as patients become eligible for Medicare. Abaluck et al. (2021) document that different types of Medicare advantage plans differentially affect patient mortality.

[5] As detailed in Gordon and Cullen (2012), insights from a well-cited public finance literature suggests that the federal government should take primary responsibility for redistribution because the national government does not need to worry about mobility across regions in response to redistribution.

The next section summarizes several institutional details. Section 3 presents a simple conceptual framework to derive key predictions regarding public markdowns and public moral hazard. We then present our data main sources in Section 4 before turning to our empirical results in Section 5. We conclude with a discussion of broader implications in Section 6.

2 Institutional Setting

2.1 The Structure of Medicaid Funding

Medicaid is structured under the doctrine of federalism for health policy. States have ample discretion on the public health insurance program for low-income individuals, while the federal government shares some of the costs. The program is jointly funded by states and the federal government. Medicaid's financing rules require that states spend their own funds to receive federal matching funds. However, there are no spending limits and the financing structure is open-ended.

The Federal Medical Assistance Percentage (FMAP) denotes the federal share of Medicaid spending, which varies depending on per capita state income, and is annually updated (Federal Register, 2009). For Fiscal Year (FY) 2020, Mississippi had the highest rate at 77%, whereas the statutory minimum FMAP of 50% applied to ten states (Federal Register, 2018). An FMAP of 77% implies that the federal government pays 77 cents on every dollar of Medicaid spending; the remaining 23 cents are paid by the state. The FMAP rate is an important policy instrument and oftentimes the federal government approves enhanced matching rates to subsidize the expansion for select services and populations. For example, under the Affordable Care Act's Medicaid expansion, the federal government paid 100 percent of Medicaid costs of those newly eligible from 2014 to 2016.

2.2 Provider Reimbursement and Creative Financing Pre-2003

State Medicaid programs pay nursing facilities a daily rate (per patient and day)—the *per diem* rate. States have flexibility to design their Medicaid nursing home payment system. Typically, the *per diem* rate is derived from facilities' reported costs, up to a pre-determined ceiling. Most states risk-adjust their *per diem* rates, considering the acuity (case-mix) of the patient mix, which indicates differences in relative care needs and resources. For further details, see MACPAC (2019).

Two main instruments allows states to pay providers in addition to the regular Medicaid *per diem* rates. First, and relevant to hospital financing, states can authorize payments for Disproportionate Share Hospitals (DSH) who treat a high share of low-income and uninsured populations. DSH help offset hospital uncompensated care costs. Second, and relevant to our setting, states can authorize supplemental payments (SPs) in combination with an "Upper Payment Limit" (UPL) to nursing homes (and hospitals) to top up the standard per diem rate. The combined payments, per diem plus SP, are then matched by the FMAP, as long as the combined rate per service remains below the UPL (Mitchell, 2018). The UPL corresponds to the rate that Medicare would pay for the service. Typically, it is at least twice the Medicaid per diem rate.[6]

Although the size of the funds that classify as upper payment limit supplemental payments (UPL-SPs) are restricted, the provisions—especially before 2003—provided enough leeway for states to use them strategically and engage in "creative financing." This paper focuses on UPL-SPs which are most common in skilled nursing facilities (SNF).[7]

Before FY 2002, providers were grouped into: inpatient hospitals, SNFs, and mental health centers—in combination with their ownership status following two categories: state-owned, and non-state owned. Non-state owned includes private facilities and those owned by a local government entity. Within categories, the amount of allowable aggregate UPL-SPs was determined by summing over the differential in Medicare and Medicaid rates across providers. For instance, for every state and year, the maximum allowed aggregate UPL-SPs amount for private SNFs, denoted as $UPL^{SNF,p}$, is given by:

$$UPL^{SNF,p} = \sum_j \sum_k q_{jk} \left(\max \left\{ p_k^{Medicare} - p_k^{Medicaid}, 0 \right\} \right) \tag{1}$$

where j are private SNFs, k are provider services, q is the quantity of the service provided, $p^{Medicare}$ is what Medicare would have paid, and $p^{Medicaid}$ is what Medicaid pays for the service.

As, pre-2003, the UPL was only binding at the *aggregate* type-ownership level, no provisions

[6] In 2018, the average Medicare rate per patient day equaled \$515 (\$427 for managed Medicare) compared to only \$209 for Medicaid, see shorturl.at/htHJR, last accessed August 30th, 2021.

[7] DSH and the Managed Care Pass-Through Payments are mostly relevant for inpatient hospitals. For more details, see (Mitchell, 2018).

existed on how these funds shall be distributed within the providers of the group. That is, the total UPL funds generated by private nursing homes could be fully allocated (or redirected) to county-owned nursing homes. Further, as payments were not tied to specific services, the funds could either be used to reduce states' Medicaid expenditures and/or to directly funnel back money to the state via Inter-Governmental Transfers (IGTs).

Figure 1, Panel A, shows an example of such a scheme (Mangano, 2001; Coughlin and Zuckerman, 2003). In this case, the state of Pennsylvania paid $300M (figures rounded) in UPL-SPs to 23 county-owned nursing homes. Given the FMAP of 56%, this action triggered $400M in federal matching funds for a total of $700M in UPL-SPs to the county nursing facilities. However, in fact, only $1.5 million remained with the providers, while the rest was transferred to the Pennsylvania government via an IGT. The key component is the flow of funds from the provider, owned by a local government entity, via an IGT. Nonetheless, the reported figures to CMS stated state expenditures of $304 million and federal expenditures of $393 million, thus substantially overreporting what was *actually* spent on providers.[8]

2.3 The 2003 Reform of Supplemental Payments

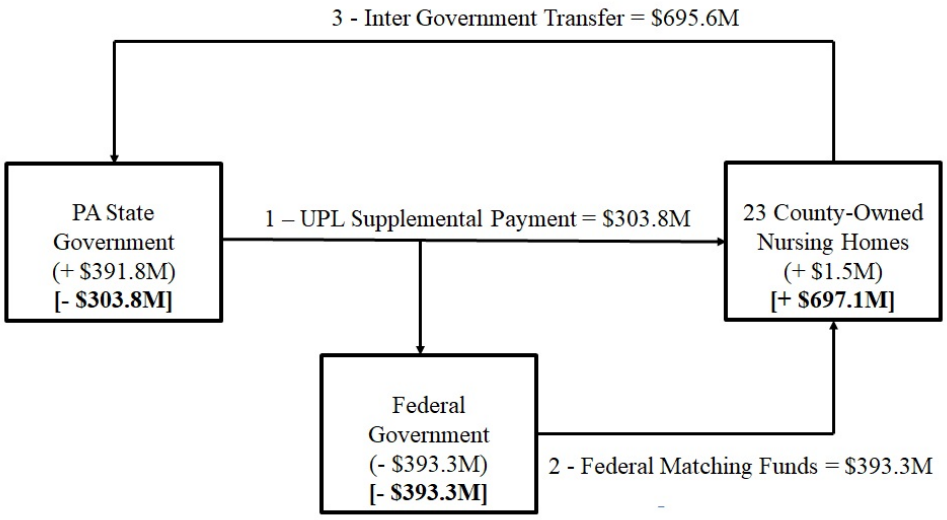
Twenty-nine states operated IGT programs in 2001 (U.S. Department of Health and Human Services, 2001), many for nursing homes. In 2000, in response to these creative financing schemes, Congress issued a directive to the Secretary of Health and Human Services (HHS) to limit federal Medicaid spending on SPs (Ku and Park, 2001; Federal Register, 2001; Coughlin and Zuckerman, 2003). The final rule was issued with a transition period by the end of FY 2002 (Mitchell, 2016). The main provision created an additional category for non-state government-owned facilities, dividing the existing category into public (county-owned) and private providers.[9] Henceforth, as an implication, UPL-SPs accrued by private providers could no longer be allocated to county-owned public providers. That measure significantly reduced the potential for funneling money back to the state via IGTs.

[8] Provider taxes are also a tool to channel resources from the providers to the state. It is common practice to use tax revenues to fund Medicaid expenditures. The difficulty with this tool is that taxes apply to all providers and the same tax must apply to all providers within a specified class of providers (Mitchell, 2016).

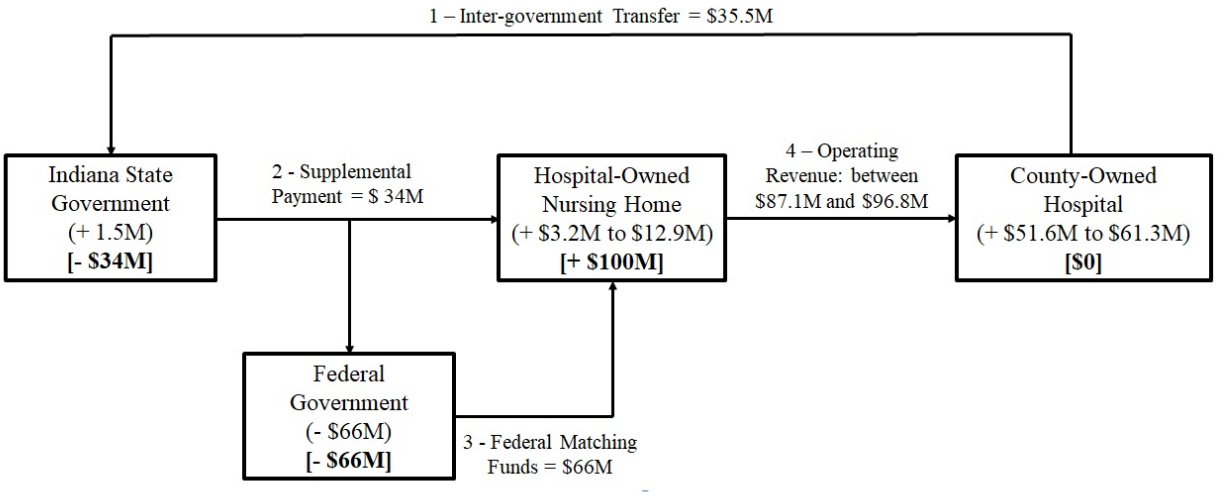
[9] Hence, there are now three groups, state-owned, county-owned, and private nursing homes. Prior to the reform, county-owned and private nursing homes were pooled into the same group (non-state government-owned nursing homes).

Figure 1: Schemes using UPL Supplemental Payments for Nursing Facilities

(a) Panel A: Pennsylvania in FY2002



(b) Panel B: Indiana after 2003

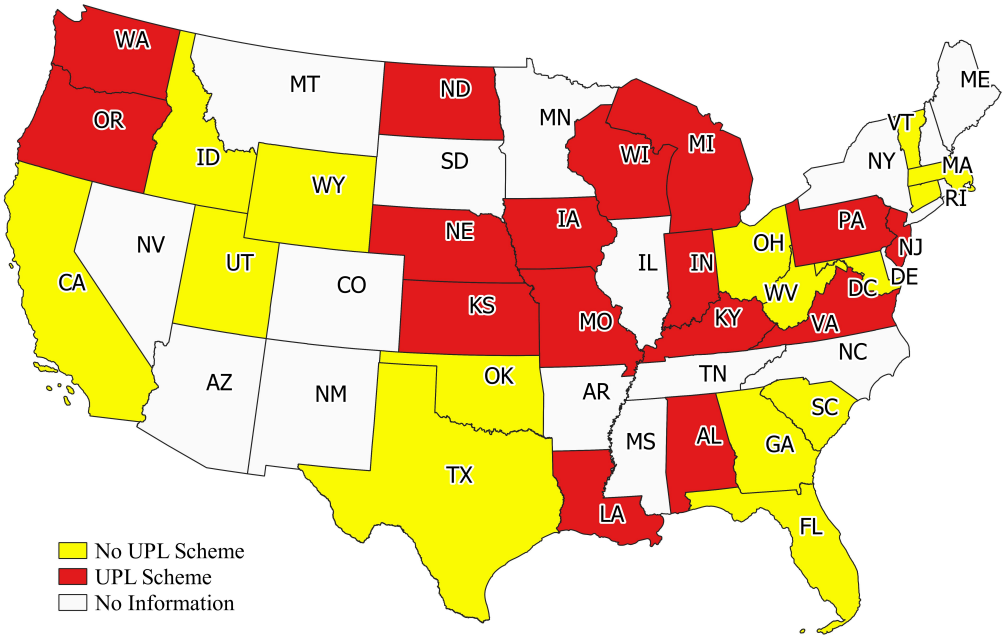


Notes: Figures in round brackets reflect the final net position of the UPL payments. Figures in bold and square brackets reflect what was reported as Medicaid expenditures in the CMS. Figures for Panel A are based on the data from Mangano, 2001 and depicted in Coughlin and Zuckerman, 2003. Figures for Panel B are based on Hatcher, 2017

Depending on whether states engaged in creative financing pre-reform, this reform affected the allocation of Medicaid funding in a large number of states. In FY 2002, of 34 states that responded to the survey by Coughlin et al., 2004, 23 reported use of UPL-SPs. Figure 2 shows all 15 states

that ran UPL-SPs schemes in the nursing home industry. The reported UPL-SPs ranged from 1% of total Medicaid spending in Kentucky to 18% in Wisconsin. Hence, this 2003 reform allows us to assess the incidence of UPL-SPs across many states in a difference-in-differences framework (Section 5).

Figure 2: States Use of UPL-SPs in Nursing Homes in FY 2002



Notes: This map illustrates which states used an upper payment limit supplemental payment (UPL-SP) scheme in FY 2002 based on the survey from Coughlin et al., 2004. Pennsylvania is marked as using a UPL-SP scheme based on the information in Coughlin and Zuckerman, 2003.

2.4 Creative Financing 2.0

While the 2003 reform made it more difficult for states to expropriate UPL-SPs intended for nursing home care, several states soon explored alternative creative financing instruments to redirect funds. For example, the number of states with a nursing home provider tax increased from 15 in 1999 to 33 in 2007 and further to 44 in 2017 (Miller and Wang, 2009).[10] States implement nursing home provider taxes quite differently (Grabowski et al., 2008; Miller et al., 2009), but they can generate

[10] See https://files.kff.org/attachment/fact-sheet-medicaid-provider-taxesfees-an-update.

substantial revenues to fund other programs of higher perceived priority. Moreover, states can transfer tax revenues to the state budget or increase provider rates, thereby generating additional federal matching funds.[11] Most recent examples include taxes on Medicaid managed care organizations as implemented in Oregon, Ohio, and Tennessee, as well as proposal by California which was later denied by CMS.[12] The Congressional Budget Office estimates that eliminating provider taxes as a creative financing scheme could save $344 billion in federal Medicaid spending between 2021 and 2028.[13]

Public Acquisition of Nursing Homes: Evidence from Indiana

Henceforth, we focus on an alternative creative financing scheme in Indiana. That scheme became the role model for several other states including Texas, Georgia, South Carolina, Mississippi, Utah, Virginia, Louisiana, Wyoming, Oklahoma, Michigan, Pennsylvania and Iowa (Pahud and Myers, 2016).[14] Specifically, Indiana encouraged the conversion of formerly private nursing homes in an effort to sidestep the transfer barriers introduced by the 2003 reform. Combining timing variation in nursing home acquisitions with detailed micro data on SNF inputs, volumne of care as well as patient mortality, this case study provides an ideal setting to document the distortionary effects of creative financing schemes.

In Indiana, the use of UPL-SPs to SNFs started before the national 2003 reform (Figure 2). In 2001, the State Senate passed bill 309 stating that "*in addition to reimbursement under the uniform rates of payment developed for all nursing facilities [...] may receive any additional payments that are permitted under applicable federal statutes and regulations*" (First Regular Session 112th General Assembly, 2001). Furthermore, it states that "*each governmental transfer or other payment*

[11] Examples include Michigans Quality Assurance Assessment Program, which collected $794 million from nursing homes in 2007, Illinois's Provider Tax Assessment Program, which collected $2.5 billion in tax revenues over 10 years, or Indiana's nursing home tax, the Quality Assessment Fee, which authorized $103 million in total annual collections in 2007 Miller and Wang (2009). Fosdick (2007) explains this for hospitals in Michigan. Here the state levied a tax of 1.8% on net patient revenue, generating tax revenues of $243 million in 2006/2007. Michigan kept $46 of that, which is called 'gainsharing'. the remaining $197 million were paid back to the hospitals through higher Medicaid rates, generating federal matching funds worth $257 million. On net, the hospital saw a revenue increase of $257 million+$197 million-$243 million=$210 million, while the state made a net gain of $47 million.

[12] See https://www.ncsl.org/research/health/health-provider-and-industry-state-taxes-and-fees.aspx and https://www.dhcs.ca.gov/services/Documents/CA-MCO-Tax-Modified-Model-2-10-2020.pdf

[13] See https://www.cbo.gov/budget-options/54727 for details.

[14] See Flynn (2020) for evidence in the state of Georgia and https://khn.org/news/chasing-millions-in-medicaid-dollars-hospitals-buy-up-nursing-homes/ for evidence in Michigan and Pennsylvania.

mechanism that the office implements under this chapter must maximize the amount of federal financial participation that the state can obtain through the intergovernmental transfer or other payment mechanism." While there was an attempt to include provisions requiring use of federal money for nursing homes exclusively, Governor Frank O'Brannon vetoed these provisions (Hatcher, 2016).

In 2002, Indiana operated 16 county-owned nursing homes. In 2003, the Health and Hospital Corporation (HHC) of Marion County—a government entity— purchased 17 nursing homes. By the end of 2009, it owned 40 SNFs throughout the state. The goal of these acquisitions was to make them government-owned, to increase the federal Medicaid funds through UPL-SPs, and then to reroute the money within HHC, mostly to support hospitals (Hatcher, 2017).

Panel B of Figure 1 illustrates the flow of SPs for a hypothetical nursing facility that generated $100 million in UPL payments with a FMAP of 66%. The transaction starts with an IGT of $36 million from the county hospital to the state government. These funds are then used to pay $34 million of the UPL state share (reported as state expenditure in the CMS), and $1.5 million to cover transaction costs. This triggers $66 million of federal matching funds while the nursing home is reported to receive $100 million in SPs. However, these funds are not fully used for operating the SNF. The total IGT amount ($36 million) flows back to the county hospital, whereas the remaining $64 million are divided between the nursing home and the hospital. In most cases, the county hospital would outsource the operations to a private supplier who keeps between 5% and 20% of the UPL payment (ibid.). Panel B uses this range in the division of payments between the SNF and the hospital. We return to these estimates in Section 5.

In 2010, Indiana adopted a series of amendments to their Medicaid State Plan that, although not explicitly stated, seemed intended for other hospitals to copy the HHC model. In many instances, county hospitals acquired SNFs using a "lease structure" instead of a straight acquisition (Pahud and Myers, 2016). Under the latter, for a change of ownership to take place, the acquiring company purchases the provider's entire assets required for operating the facility. Under the lease structure model, by contrast, the hospital just acquires the license for the nursing home and leases the assets to trigger a change of ownership. This means that a nursing home could be operated by a private, for-profit, firm that owns all of its assets, but is still declared "non-state government-owned" if its

license is owned by a county hospital. This helps us to isolate the effect of the financing scheme on the volume of care provided. This ownership and operation structure started in 2003 with the HHC of Marion County, but was adopted by 24 other hospitals starting in 2010.

3 Conceptual Framework

This section provides a simple conceptual framework to illustrate the economic incentives faced by states in their Medicaid spending decisions. The framework considers the role of federal cost-sharing in conjunction with creative financing mechanisms. A creative financing mechanism is an umbrella term for instruments enacted by state governments to obtain access to SNFs' revenue streams. These can consist of Intergovernmental Transfers (IGTs), provider taxes or the municipalization of formerly private facilities.

3.1 Baseline Model

We model the benefit of health care provision by private health care providers, as B, in dollars. To simplify, we assume that health care is entirely funded by Medicaid and that the health benefits depend on the net reimbursement rate paid to the provider, $\theta \geq 0$, which may be positively related to the quality of care inputs (e.g. the nurse to patient ratio). Health benefits also depend on the volume of services provided $Q \geq 0$. Specifically, we have $B(\theta, Q)$ and assume diminishing marginal benefits in θ and Q and $B(0, Q) > 0$ and $B(\theta, 0) > 0$. $B(\theta, Q)$ may include patient utility over nursing home care relative to their next best alternative care option as well as potential cost externalities (cost savings) from substitutes to nursing home care (e.g. hospital, formal and informal home care). $\theta \cdot Q$ denotes total funding, which is denoted in dollars as well.

States fund the share (1-FMAP) of total expenses as long as the reimbursement rate falls short of the UPL. To simplify the exposition, we ignore potentially binding price ceilings absent creative financing schemes. We also assume that states can influence the volume of care. Real world examples include state waiver programs for home-and-community based services (HCBS), entry and capacity regulations or minimum quality regulations. Below, we also allow states to alter the patient composition between private and public nursing homes through instruments like ownership conversions that increase their direct influence of the operations in public nursing homes. We turn to these additional instruments in Section 3.3, where we differentiate by ownership types. To derive

our model predictions as simply as possible, we assume that states choose Q directly.

We start with a model of private nursing homes. States choose Q and θ optimally according to:

$$\max_{\theta,Q} B(\theta, Q) - (1 - FMAP) \cdot \theta \cdot Q \ , \tag{2}$$

which implies

$$B_\theta(\theta, Q)/Q = 1 - FMAP \tag{3}$$

$$B_Q(\theta, Q)/\theta = 1 - FMAP \tag{4}$$

Absent creative financing mechanisms, states spend $1 - FMAP$ of every marginal dollar in Medicaid treatment quantities which, in the optimum, equals the marginal benefit of Medicaid rates per unit of quantity, as indicated in equation (3). This case is considered in Baicker and Staiger (2005). When B represents patient utility over nursing home care, then B_θ is the marginal utility of θ, which likely affects the quality of care, over the average consumer (including inframarginal consumers). In the optimum, $1 - FMAP$ also equals the marginal benefit of quantity per dollar of Medicaid rates, as indicated in equation (4).

As intended, the FMAP rate subsidizes the volume and the reimbursement of care and may therefore prevent a race to the bottom when states' benefit function falls short of the federal benefit function that internalize externalities between jurisdictions.

3.2 Joint Funding Under Creative Financing Mechanisms Pre 2003

We now allow for the possibility of creative financing mechanisms by introducing a separate nominal billing rate, P, which is billed to the federal government. In contrast, θ corresponds to the rate actually paid to the provider. We allow for $\theta \neq P$, and refer to $\mu = \frac{P-\theta}{P}$ as the "public markdown" and to $(P - \theta) \cdot Q$ as the transfer amount that is used for other purposes. The transfer amount could be an IGT or the volume of provider tax revenues. Now states optimize:

$$\max_{\theta,Q,P} B(Q,\theta) - Q \cdot \theta + FMAP \cdot P \cdot Q \quad , \tag{5}$$

subject to $P \leq \bar{P}$, where $\bar{P}$ denotes the upper payment limit (UPL). It is clear from this representation that $P = \bar{P}$. The optimality conditions are then:

$$B_\theta(\theta, Q)/Q = 1 \tag{6}$$

$$B_Q(\theta, Q)/\theta = 1 - FMAP \cdot \frac{P}{\theta} = 1 - \frac{FMAP}{1-\mu} \; . \tag{7}$$

The analysis yields two main predictions. First, states have an incentive to maximize the nominal rate if they can transfer unlimited amounts at no costs towards programs of higher perceived priority. Furthermore, the ability to transfer funds renders the FMAP's subsidy effect on rate setting ineffective. As indicated by equation (6), states internalize the full cost of rate increases on the margin, providing an incentive to lower the net rate paid to providers. Both predictions were developed and tested in Baicker and Staiger (2005). Put together, this yields our first testable prediction, which we explore in the data:

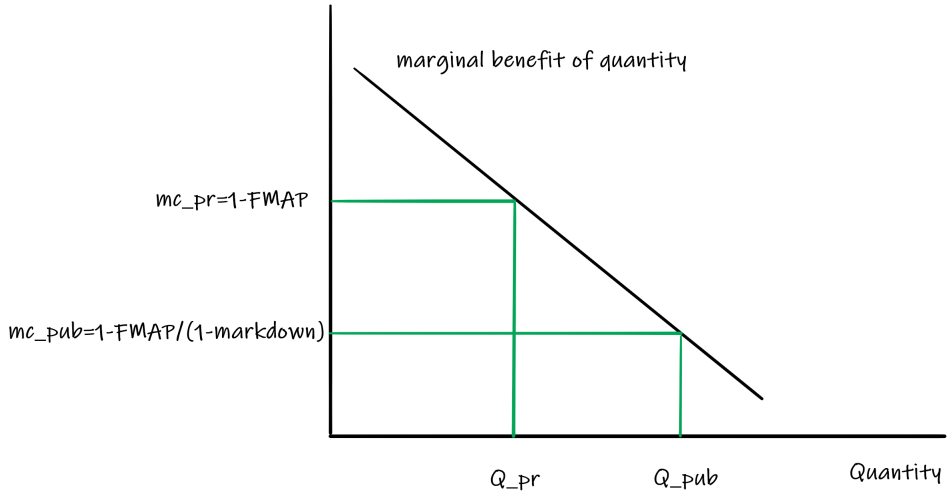
Hypothesis 1 (H1) *Public markdown: The ability to transfer funds yields a positive wedge between the nominal rate P and the effective rate θ such that the public markdown $\mu = \frac{P-\theta}{P}$ is greater than 0.*

Second, and in contrast to the rate setting tradeoff, the ability to transfer funds amplifies the federal subsidy effect on the volume of care. As indicated by equation (7), the ability to transfer funds increases the effective FMAP rate by $\frac{P}{\theta}$, providing incentives to increase the volume of care. This is illustrated graphically in Figure 3, which denotes the marginal costs and benefits of quantity on the vertical axis, and quantity on the horizontal axis. The change in marginal costs and quantity, denoted by private (pr) and public (pub), translate directly to differences in ownership as we explain in detail below.

The states' marginal share of costs could even become negative if $FMAP \cdot \frac{P}{\theta} > 1$. In this case, on the margin, the state can turn a net profit from raising the volume of Medicaid care.

Hypothesis 2 (H2) *Public moral hazard: The ability to transfer funds provides incentives to increase the volume of care. The volume distortion is captured by the inverse of 1 minus the public markdown, which increases the effective marginal FMAP rate on the volume of care to* $\frac{FMAP}{1-\mu} = FMAP \cdot \frac{P}{\theta}$.

Figure 3: Public Moral Hazard



3.3 Creative Financing Mechanisms by Ownership Type

The 2003 SP reform effectively prohibited the transfer of funds whose services were accrued by private providers. To capture the incentives created by the reform, we now introduce different ownerships, $\tau = \{pr, pub\}$ for private and public ownership. States can optimally choose the share of public nursing homes ,ρ, and choose different rates and quantities by ownership. States then maximize:

$$\max_{\theta^\tau, Q^\tau, P^\tau, \rho} \quad (1-\rho) \cdot \left[B(Q^{pr}, \theta^{pr}) - Q^{pr} \cdot \theta^{pr} + FMAP \cdot P^{pr} \cdot Q^{pr} \right] \tag{8}$$

$$+ \quad \rho \cdot \left[B(Q^{pub}, \theta^{pub}) - Q^{pub} \cdot \theta^{pub} + FMAP \cdot P^{pub} \cdot Q^{pub} \right] - \kappa(\rho) \ , \tag{9}$$

where the first line corresponds to private nursing homes and the second line to public nursing homes. The correction term $\kappa(\rho)$ denotes benefits from care access, net of cost inefficiencies from operating public nursing homes. We assume $\kappa'(1) > 0 > \kappa'(0)$ and $\kappa''(\rho) > 0$ meaning that cost inefficiencies eventually dominate on the margin. Prior to the 2003 reform, nominal rates, effective rates, and quantities are symmetric between public and private nursing homes ($\theta^{pr} = \theta^{pub}$, $Q^{pr} = Q^{pub}$, $P^{pr} = P^{pub} = \bar{P}$). See the discussion in Section 3.2. The optimal share of public nursing homes will be determined by $\kappa(\rho)$. In the optimum we have

$$\kappa'(\rho) = 0 \ . \tag{10}$$

3.4 Supplemental Payment Reform and Public Moral Hazard

Building on the extended framework, we now consider the effect of the 2003 SP reform on ownerships structures and quantities. We capture the reform effects by imposing the constraint:

$$P^{pr} = \theta^{pr} \ . \tag{11}$$

This constraint implies that, for private nursing homes, the optimality conditions outlined in the baseline model (Section 3.1) determine the rate and quantities. However, for public nursing homes, the optimality conditions in Section 3.2 determine the rate and quantities. As a result, the predictions from hypothesis **H**2 imply differences in the volume of care between public and private nursing homes, as indicated in Figure 3 and as articulated in the refined hypothesis:

Hypothesis 3 (H3) *Public moral hazard: The ability of states to transfer funds from public (but not private) nursing homes provides incentives to increase the volume of care in public beyond the volume of care in private nursing homes in the post-reform period. The volume distortion is captured by the inverse of 1 minus the public markdown, which increases the effective marginal FMAP rate on the volume of care to* $\frac{FMAP}{1-\mu} = FMAP \cdot \frac{P}{\theta}$.

The constraint also affects the incentives to municipalize private nursing homes. The optimal share of public nursing homes is now determined by:

$$\Delta\Pi(pr, pub) + \kappa'(\rho) \geq FMAP \cdot (\bar{P} - \theta^{pr}) \cdot Q^{pr} + \kappa'(\rho) = FMAP \cdot \bar{P} \cdot Q^{pr}(1 - \frac{\theta^{pr}}{\bar{P}}) + \kappa'(\rho) = 0\ . \quad (12)$$

where $\Delta\Pi(pr, pub)$ is the differences in net benefits between private nursing homes and public nursing homes, ignoring the correction term $\kappa(\rho)$.[15] The inequality states that the net benefit from conversion must be at least as large as the incremental federal matching funds that they would accrue—if public nursing would not optimally adjust rates and quantities as discussed. As $FMAP \cdot (\bar{P} - \theta^{pr}) \cdot Q^{pr} > 0$ and $\kappa''(\rho) > 0$, it follows that, compared to equation (10), the optimal share of public nursing homes will increase.

Hypothesis 4 (H4) *Public moral hazard: The ability of states to transfer funds from public (but not private) nursing homes provides incentives to municipalize private nursing homes. The incentive to municipalize is bounded from below by the federal share of nominal Medicaid spending multiplied by the public markdown:* $FMAP \cdot \bar{P} \cdot Q^{pr} \cdot (1 - \frac{\theta^{pr}}{\bar{P}}) = FMAP \cdot \bar{P} \cdot Q^{pr} \cdot \mu$.

4 Data

Naturally, measuring how states expropriate federal matching funds designated for vulnerable patient populations is very challenging. We adopt three different approaches that rely on audit reports, provider-level revenue information (provided by Long-Term Care: Facts on Care in the U.S. (2020) (LTC Focus)), and hospital financial statements. The latter are informative about the expropriation of funds in Indiana. To test for the effects of the 2003 reform on in health care delivery and patient volume, we pair the LTC Focus data with patient-level micro data from the Long-Term Care Minimum Data Set (MDS). To test for health outcomes and patient mortality, we use administrative Medicare data.

4.1 Digitized Audit Reports and CMS-64 Forms

One contribution of this paper is the systematic digitization and analysis of 24 audit reports from 18 states in the pre-reform era from 1997 to 2003. All reports were requested by the Centers for Medicare & Medicaid Services (CMS) and carried out by the Office of Audit Services (OAS)

[15] $\Delta\Pi(pr, pub) = \Big[B(Q^{pr}, \theta^{pr}) - Q^{pr} \cdot \theta^{pr} + FMAP \cdot \theta^{pr} \cdot Q^{pr}\Big] - \Big[B(Q^{pub}, \theta^{pub}) - Q^{pub} \cdot \theta^{pub} + FMAP \cdot P^{pub} \cdot Q^{pub}\Big]$.

of the Office of Inspector General (OIG). OIG has the mandate to protect the integrity of the Department of HHS programs and the well-being of their beneficiaries (Department for Health and Human Services, 2020). The reports provide information on the amounts expropriated and transferred back to the state.

We then combine the transfer amounts with information on total nominal Medicaid spending (*Total MHEX*) separately for states (*State MHEX*) and the federal government (*Total MHEX* - *State MHEX*), from CMS-64 forms. States submit CMS-64 forms to the CMS Data Center (Centers for Medicare & Medicaid Services, 2020a).[16] Finally, we construct the markdown and the effective (volume) FMAP as

$$\mu = \frac{P - \theta}{P} \quad = \quad \frac{Transfers}{TotalMHEX} \tag{13}$$

$$Effective\ FMAP \quad = \quad FMAP \cdot \frac{P}{\theta} = FMAP \cdot \frac{TotalMHEX}{TotalMHEX - Transfers} = \frac{FMAP}{1 - \mu} \tag{14}$$

4.2 LTC Focus, Nursing Home Compare and Consumer Reports

To complement the analysis on markdowns and to evaluate the effect of the national 2003 reform on Medicaid volume, patient composition, and inputs of nursing homes, we use data from (LTC Focus) at the facility and state level. We also use these data to identify the universe of nursing homes in Indiana.

Nursing Home Ownership

A major part of our empirical strategy leverages the timing of nursing home acquisitions both as an outcome to test hypothesis **H**4 as well as an input to test for consequences of ownership conversion, hypothesis **H**3. Thus, it is important to note that we rely on high quality administrative data regarding this information.

[16] The data are publicly available through the Medicaid Budget and Expenditure System/State Children's Health Insurance Program Budget and Expenditure System (MBES/CBES).

We compiled this information using CMS data from Nursing Home Compare (Centers for Medicare & Medicaid Services, 2020b) combined with Indiana Department of Health (2020) data and reports by the IndyStar newspaper for validation of the consumer report data.[17] The data sources cover all nursing homes in Indiana and allow us to identify which nursing home was "acquired" by which hospital and when. Our final database covers the time period from 2000 to 2017 and contains a total of 2,203 SNF-year observations.

Our definition of ownership by a local-government entity matches the official categorization for UPL payments. Specifically, if the license, operations, or assets are held by a county hospital, we define it as "owned" by a local government entity. For a typical municipalized Indiana nursing home, the following holds: while a private entity owns the buildings and runs the operations, the license is held by a county-owned hospital.

Descriptive Statistics

Table A.2 shows the summary statistic for all 2,203 SNF-year observations. Overall, 39% of all nursing homes are *county-owned*. Panel B describes the patient population in nursing homes as well as personnel ratios. For example, 63% of all nursing home residents have hypertension and the acuity index is 0.27. The *ratio of Registered Nurses (RN) to nurses* is 11.5% and, on average, the *direct care staff hours per resident day* are 3.5 where 2 are provided by certified nursing assistants, 1 by Licensed Practical Nurses (LPN) and 0.5 by RNs.

Panel A lists our outcome measures to test for the model predictions in Section 3. In particular, we will test whether the *number of beds* (102 on average) or the *occupancy rate* (76%) change after public conversion. Of particular relevance is the number of *Medicaid days* (18,590 per year and facility). That indicator provides a direct measure of volume changes, per Hypothesis 3. Shifts in the share of the resident composition are also worthwhile to study. On average, nursing homes have 63% *Medicaid*, 17% *Medicare* and 20% *privately insured* residents. Moreover, we will study input indicators and whether SNFs have *Nurse Practitioners (NPs)* or *Physician Assistants (PAs)* as well as *Special Care Units (SCUs)* and *Alzheimer SCUs*. For example, 38% of nursing homes have Alzheimer SCUs.

[17] The old nursing home compare portal was retired effective December 1, 2020 and replaced by a new version (Spanko, 2020).

Markdowns and Effective FMAP

We use the LTC Focus data to estimate the state-level markdowns and the effective FMAPs for the sample of states surveyed in Coughlin et al. (2004). First, we use the information on the total number of beds, the average occupation rate, and the percentage of Medicaid patients to assess the volume of Medicaid patients in each state. Then, we combine this information with the *diem rate* to estimate Medicaid spending actually received by the providers (*LTC MHEX*). This is the empirical representation of $\theta \cdot Q$. To infer the size of the transfers returned to the states, we compare this value to the reported expenditures (*Total MHEX*) in Centers for Medicare & Medicaid Services (2020a), corresponding to $P \cdot Q$. The markdown and effective FMAP are then calculated by:

$$\mu = \frac{P - \theta}{P} = \frac{TotalMHEX - LTCMHEX}{TotalMHEX} \tag{15}$$

$$Effective\ FMAP = FMAP \cdot \frac{P}{\theta} = FMAP \cdot \frac{TotalMHEX}{LTCMHEX} \tag{16}$$

4.3 Hospital Financial Statements

To provide an estimate of the markdown on the acquired nursing homes, we use Marison County's comprehensive annual HHC financial reports available between 2008 and 2019. As mentioned in Section 2.4, starting in 2003, HHC became the pioneer of nursing homes acquisitions in Indiana. In 2008 (2009), HHC owned the license of 29 (40) nursing homes and received more than 80% of UPL-SPs paid to SNFs in the state. By 2019, they held the license of 78 (out of the 450) nursing homes that had been acquired by a county hospital. We limit our analysis to the HHC of Marion county, as the other hospitals receiving UPL-SPs did not disclose the size of these transfers in their financial statements. In contrast to HHC, neither did they disclose how much of it was used for nursing home patients.

The HHC financial statements provide information on all these elements, which allows us to estimate the markdown of their Medicaid revenues. We approximate the regular Medicaid payments

on their nursing home patients (*Reg MHEX*) from the revenue that HHC received from their long-term care division and the share of Medicaid patients. They disclose the size of UPL-SPs to nursing homes under "Medicaid Special Revenue" for their long-term division (*Sup MHEX*), while they disclose transfers as "Returns to the General Fund."[18] We calculate the markdown and effective FMAP using:

$$\mu = \frac{P - \theta}{P} = \frac{Transfer}{RegMHEX + SupMHEX} \tag{17}$$

$$Effective\ FMAP = FMAP \cdot \frac{RegMHEX + SupMHEX}{RegMHEX + SupMHEX - Transfer} = \frac{FMAP}{1 - \mu} \tag{18}$$

4.4 Minimum Data Set

To explore potential mechanisms of changes in patient volume, we use patient-level assessment data from the Long-Term Care Minimum Data Set (MDS). We have data on all Medicaid and Medicare certified nursing homes in Indiana, spanning the time period 1999-2015. As we will see, of particular relevance are Alzheimer's and dementia patients, which we can identify from the assessment data at the initial assessment (at admission).[19]

4.5 Medpar

Finally, we use inpatient Medicare claims from Medpar to characterize hospital discharges to SNFs in Indiana and the effects on patient mortality. We have data on all traditional Medicare inpatient visits, spanning the years 1999-2015. We focus on stays in acute care hospitals in Indiana that are important in understanding the changes in Medicaid volume following the SNF acquisitions.[20]

[18] Between 2008 and 2019, none of the funds allocated to the General Fund were transferred back for use by the LTC division of HHC. The largest recipient of these funds (approximately 65%) is the inpatient hospital division under Wishard Health Services (before 2013) and Eskenazi Health Services (starting in 2013). The remainder the transferred funds was allocated to the Capital Protects and Debt Service Funds.

[19] We combine the MDS 2.0 and the MDS 3.0 and keep patients who have Section I disease diagnosis indicator I1q or I1u turned on (based on MDS 2.0 terminology).

[20] We focus on short-term (general and specialty) hospitals, defined by a provider number ranging from 0001-0879, see https://resdac.org/sites/datadocumentation.resdac.org/files/Provider%20Number%20Table.txt.

Specifically, we document an increase dementia patients admitted from acute care hospitals.

To study this population in more detail and to quantify counterfactual post-acute care and mortality outcomes, we identify (Medicare covered) dementia patient stays in Indiana's acute care hospitals based on the diagnosis codes.[21] Since distance to care providers is a key determinant of SNF providers (Hackmann, 2019), we match hospital stays to a unique SNF using the patient's former address. Specifically, we first construct a risk sample of patients that live within 5 miles of the SNFs that were acquired at some point. To guarantee a unique mapping between a hospital stay and an acquired SNF, we make several adjustments. First, we keep only the closest SNF if we match a hospital record to several acquisitions. This reduces the number of visits from 338,805 to 145,435. Second, we only keep the record whose matched SNF was acquired first, should we still match a hospital record to several acquisitions. This drops another 22,996 visits. Third, we drop the few remaining duplicate hospital visits at random, dropping another 18,114 visits and reducing the sample to 104,325 dementia-related hospital visits.

About 50% of these patients are discharged to any SNF. 8.6% are discharged to the matched SNF. We also construct the one-year mortality rate for each patient starting from the admission data of the index hospital stay. Finally, to ensure a balanced panel in event time, we restrict observations to those preceding the acquisition data by at most 5 years and following the acquisition date by at most 3 years reduces the sample to 53,933 observations.

5 Empirical Results

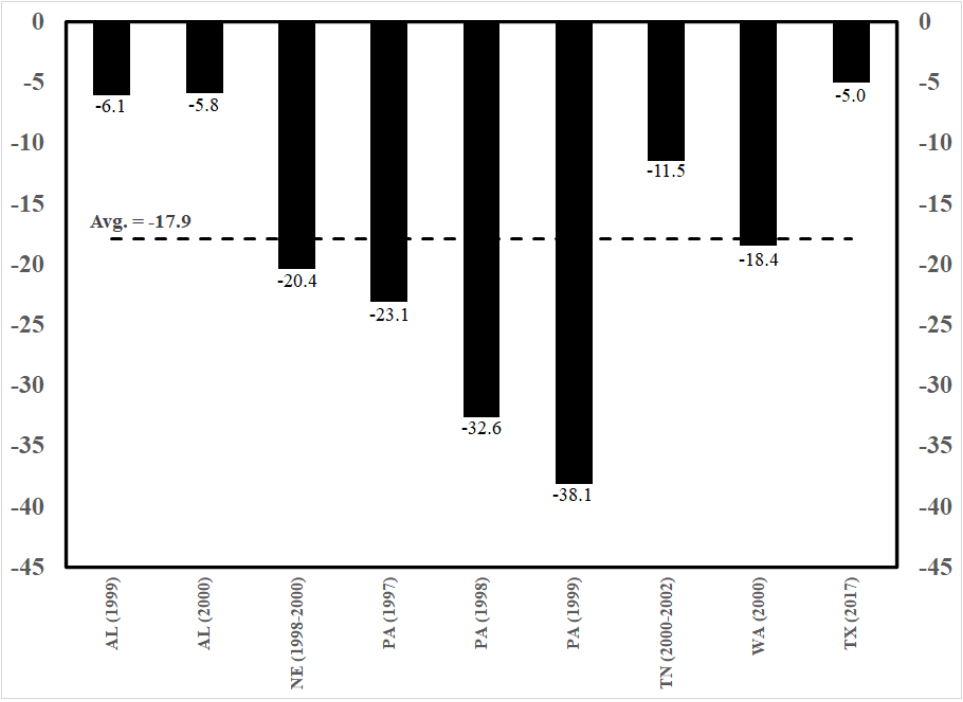
This section presents our empirical findings. We start with pre-2003 evidence from the audit reports before turning to the results from the 2003 SP reform. First, we study the state-level evidence on the 2003 reform. Then, we turn to the facility-level evidence from Indiana using an event study framework.

5.1 Evidence from Audit Reports

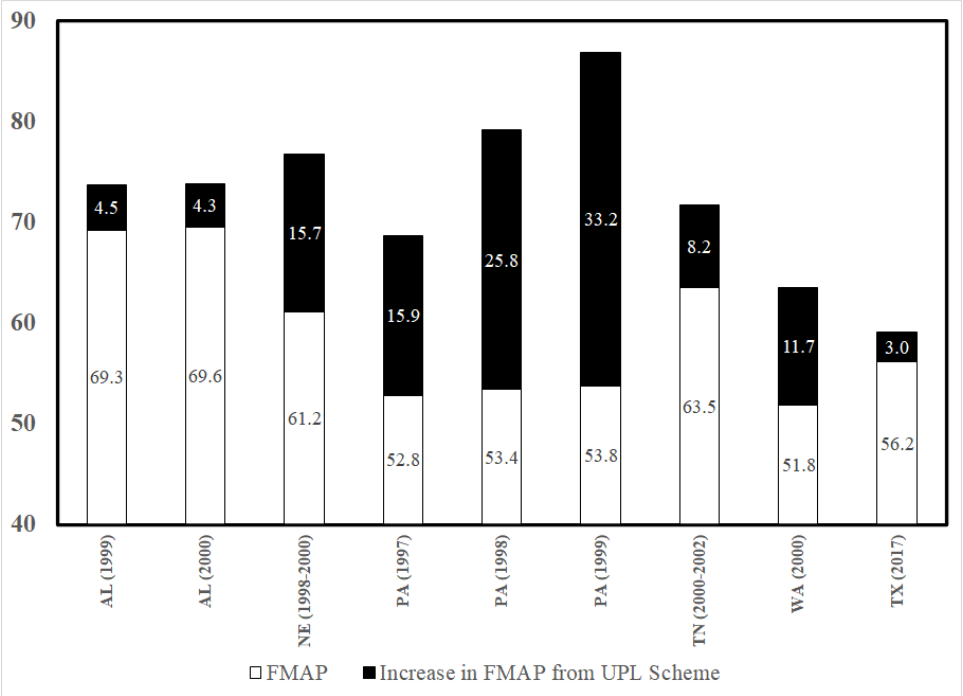
Figure 4a presents first estimates of the (negative) public markdown $-\frac{P-\theta}{P}$ based on the audit report information for a select set of states. Consistent with hypothesis **H**1, nominal prices are marked down in all audited state-years, ranging from a 6% mark-down in Alabama (2000) to a 38%

[21] We keep patient whose first three digits of any of the reported 10 diagnosis codes (icd 9 code) is 290 or 331.

Figure 4: Public Markdowns and the Effective FMAP: Evidence from Audit Reports



(a) Public Markdowns



(b) Effective vs. Nominal FMAP

Notes: Figure 4a presents the negative markdown, $-\frac{P-\theta}{P}$, which indicates the (negative) share of nominal SNF Medicaid funds diverted towards other uses. Figure 4b presents the nominal FMAP and the effective quantity FMAP: $FMAP * \frac{P}{\theta}$. The presented information was assembled from several audit reports: Department for Health and Human Services: Office of Inspector General (2001a), Department for Health and Human Services: Office of Inspector General (2001b), Department for Health and Human Services: Office of Inspector General (2001d), Department for Health and Human Services: Office of Inspector General (2001c), Department for Health and Human Services: Office of Inspector General (2004b), Department for Health and Human Services: Office of Inspector General (2004a), Department for Health and Human Services: Office of Inspector General (2005e), Department for Health and Human Services: Office of Inspector General (2005a), Department for Health and Human Services: Office of Inspector General (2005b), Department for Health and Human Services: Office of Inspector General (2005d), Department for Health and Human Services: Office of Inspector General (2005c), Department for Health and Human Services: Office of Inspector General (2014), and Centers for Medicare & Medicaid Services (2020a) using equations (13) and (14).

mark-down in Pennsylvania (1999). In other words, the states expropriated between 6 and 38% of nominal Medicaid funds and transferred those towards programs of higher perceived priority. The average markdown is 17.9%. In total, these states transferred $4.3 billion back to the state budget ($360 million per state and year) out of $17.2 billion in total nominal spending. This corresponds to an average markdown of even 25% when weighted by nominal spending.

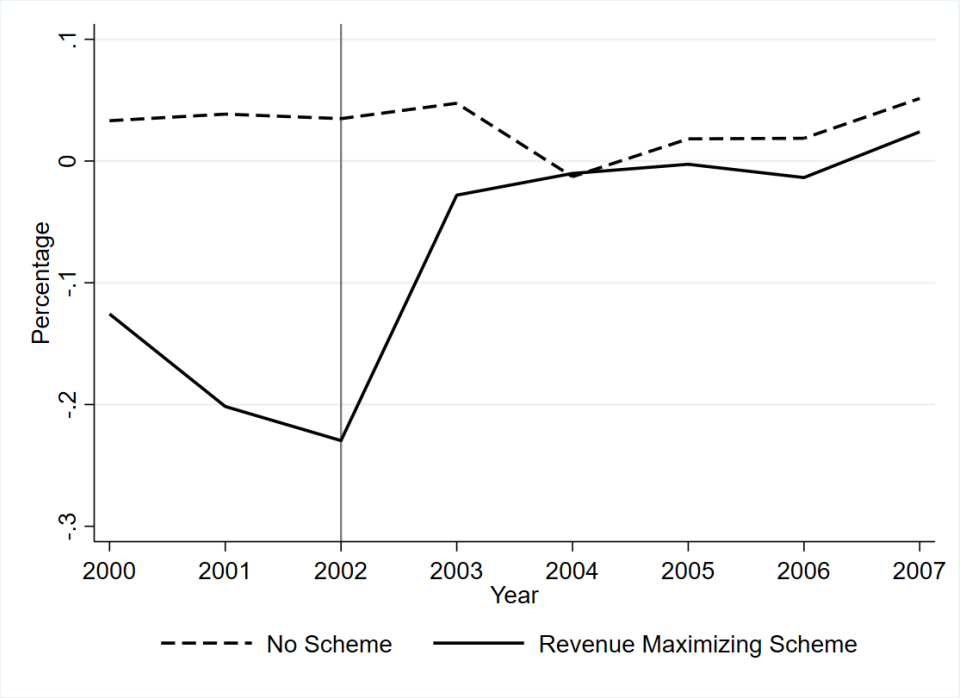
Figure 4b presents the analogues effective quantity FMAP estimates, $FMAP * \frac{P}{\theta}$. When considering the redirection of funds, the effective quantity FMAP rates increase by between 4.3 percentage points in Alabama (2000) and 33.2 percentage points in Pennsylvania (1999). Figure 4b illustrates that multiple states systematically expropriated a significant share of nominal Medicaid spending.

5.2 State-Level Evidence from the 2003 Supplemental Payment Reform

The purpose of the 2003 SP reform was to end creative financing as described above. We exploit this reform to estimate the relevance and average size of creative financing using the following approach: Flagging states with pre-reform creative funding schemes as "treated" (see Figure 2) and the remaining ones as "controls", we compare changes in the public markdown before and after the reform in a difference-in-differences setting.

Figure 5 displays the average (negative) public markdown, $-\frac{P-\theta}{P}$, across the 15 states with schemes in place (treatment group) and compares it to those 16 states that did not (control group). As seen, in the control group, the public markdown varies slightly around 0 throughout the sample period, as expected. In contrast, and consistent with hypothesis **H**1, we find an average public markdown of 20% in the pre-reform years among treatment states with a SP scheme. Concurrent with the timing of the reform, the markdown increases swiftly to 0, indicating that the reform was effective in containing the misuse of funds through transfers, at least in the short run.

Figure 5: Public Markdowns and the Supplemental Payments Reform



Source: This figure presents the negative markdown, $-\frac{P-\theta}{P}$, which indicates the (negative) share of nominal SNF Medicaid funds diverted towards other uses, for states with and without a supplemental payment scheme prior to the national reform, see Figure 2. The vertical line denotes the time of the supplemental payments reform. The presented findings build on the following data sources: Long-Term Care: Facts on Care in the U.S. (2020) and Centers for Medicare & Medicaid Services (2020a) using equation (15).

We now formally poinpoint the exact change in the public markdown using a simple difference-in-differences (DD) regression equivalent to Figure 5. The 15 states with an SP scheme comprise the treatment group and the 16 states without the control group. Table 1 (Appendix) shows that the markdown is reduced (negative markdown increases) by 19 percentage points (se=4.5 p.p.). The public markdown translates into an increased effective quantity FMAP. Our DD framework suggests that the reform reduced the effective FMAP by 15.7 percentage points (se=3.7 p.p.), and let to a convergence of effective and nominal FMAP.

This suggests an average pre-reform markdown of 19%, which is very similar to the 18% markdown in Figure 6a. Considering the nominal Medicaid spending of $58 billion on nursing home care between 2000 and 2002 among states with a SP scheme, this estimate suggests that 19%*$57 billion=$11 billion were diverted over the years. Consistent with this finding, Table 1 (Appendix)

shows no evidence for changes in staffing decisions following the reform, despite the fact that it significantly lowered nominal (federal and state) Medicaid. All these findings reinforce our conclusion that the marginal nominal funds were not effectively spent on nursing home care and were instead directed towards other public programs.

Table 1: Effects of 2003 Reform on Various SNF State-Level Outcomes

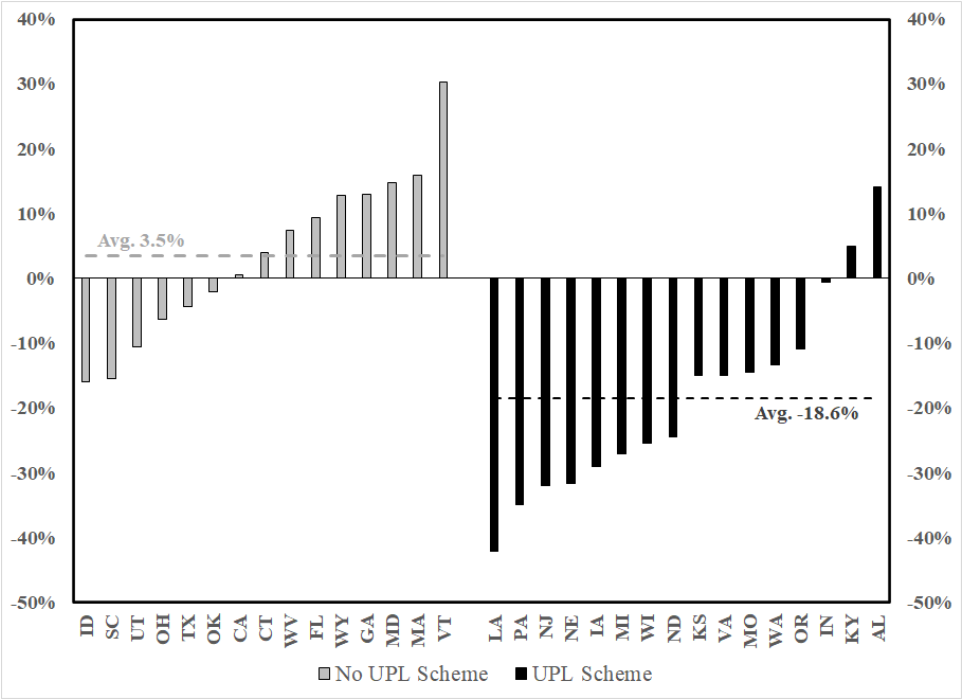
	Markdown	**Effective FMAP**	**Federal Expenditure**	**State Expenditure**
UPL Scheme × *Post*	0.1904***	-15.7243***	-149.80***	-111.50***
	(0.0453)	(3.6935)	(46.76)	(34.25)
R-squared	0.6361	0.7131	0.971	0.975
Year Fixed Effects	X	X	X	X
SNF Fixed Effects	X	X	X	X
	Direct Care Staff	**Registered Nurses**	**LPN**	**CNA**
UPL Scheme × *Post*	-0.0041	-0.0106	-0.0021	-0.0084
	(0.0576)	(0.0289)	(0.0260)	(0.0423)
R-squared	0.929	0.918	0.898	0.901
Year Fixed Effects	X	X	X	X
SNF Fixed Effects	X	X	X	X

Source: Long-Term Care: Facts on Care in the U.S. (2020) and Centers for Medicare & Medicaid Services (2020a), authors' calculation. Each column in each panel stands for one standard DD model. We present the difference-in-difference coefficient, which denotes the differential change in the outcome of interest in states with a UPL-SP scheme (compared to states without a UPL-SP scheme) between the pre- and the post-reform period. ***, **, and * = statistically different from zero at the 1%, 5%, and 10% level. Standard errors are clustered at the state level and reported in parentheses. All models have 248 state-year observations from 31 states. See main text for more details.

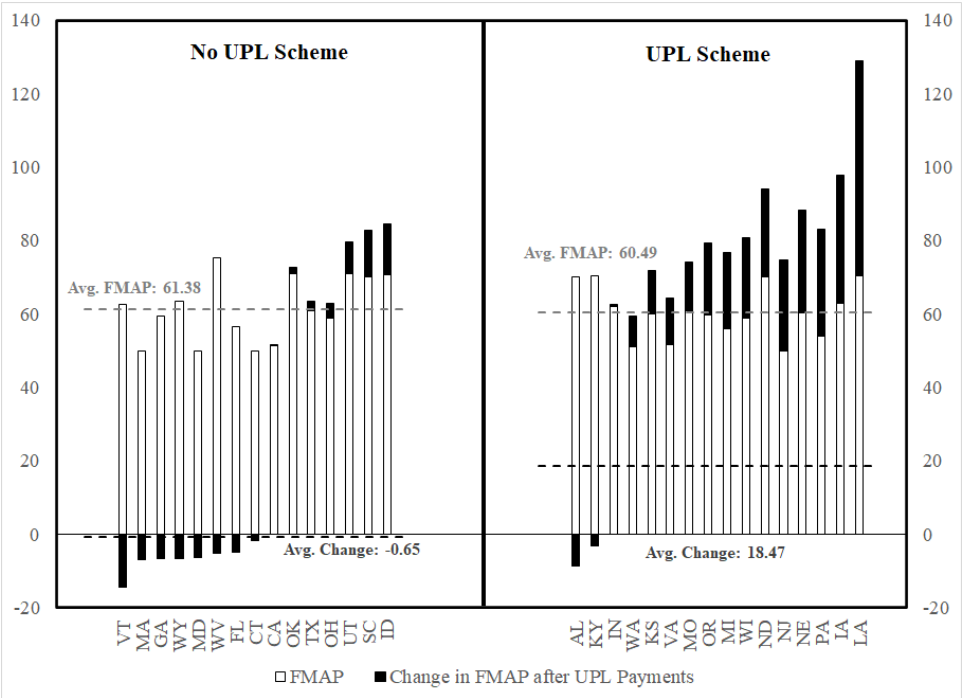
The pre-reform effective quantity FMAP, and the markdown, vary considerably between states as shown in Figures 6a and 6b. As seen, the effective FMAP exceeds the statutory maximum of 83% in PA, NE, ND, IA, and LA, and even exceeds 100% in the case of LA (Figure 6b). This finding suggest that, on the margin, LA may turn a net profit from expanding the volume of Medicaid SNF care.

To assess the potential quantity distortions of the creative financing schemes, as predicted by hypotheses **H**2-**H**4, next, we exploit the timing variation in the municipalization of private nursing homes in Indiana.

Figure 6: Public Markdowns and the Effective FMAP: Evidence from LTC Focus 2000-2002



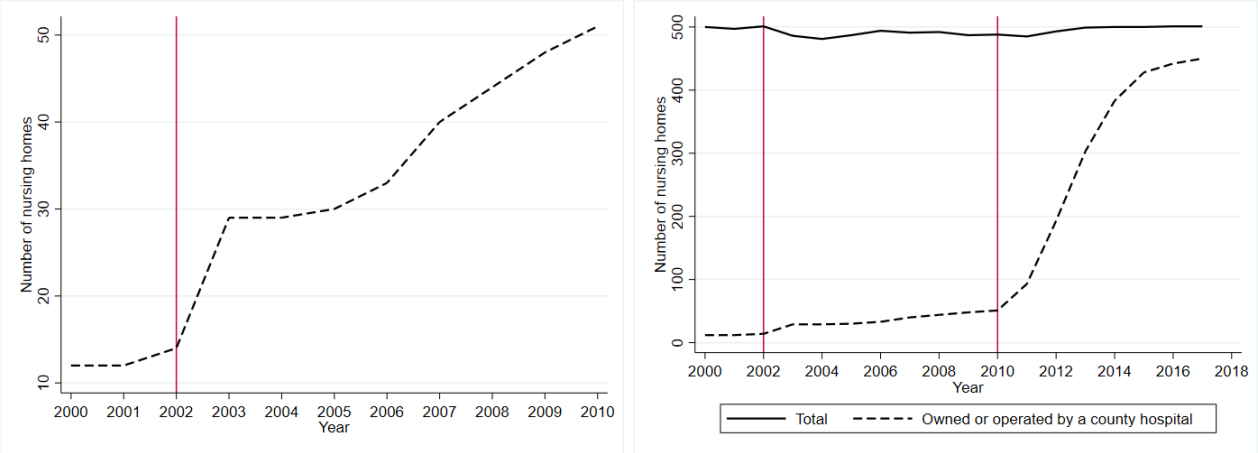
(a) Public Markdowns



(b) Effective vs. Nominal FMAP

Notes: Figure 6a presents the negative markdown, $-\frac{P-\theta}{P}$, which indicates the (negative) share of nominal SNF Medicaid funds diverted towards other uses. Figure 6b presents the nominal FMAP and the effective quantity FMAP: $FMAP * \frac{P}{\theta}$. The presented findings build on the following data sources from 2000-2002: Long-Term Care: Facts on Care in the U.S. (2020) and Centers for Medicare & Medicaid Services (2020a) using equations (15) and (16).

Figure 7: Effect of 2003 Reform on Number of County-Owned Nursing Homes



Notes: This figure presents the number of SNFs operated by a county hospital in Indiana over time. The solid line in the right graph denotes the total number of SNFs in Indiana over time. Source: Centers for Medicare & Medicaid Services (2020b) and Indiana Department of Health (2020).

5.3 Facility-Level Evidence from the 2003 Reform in Indiana

5.3.1 Effect on Nursing Home Municipalizations

Figures 7a and b show the number of county-owned nursing homes from 2000 to 2018 relative to all nursing homes in Indiana. As seen in Figures 7a, and consistent with hypothesis **H**4, right after the enactment of the reform at the end of FY 2002, the number of county-owned nursing homes more than doubled from 14 to 29 within a year because of acquisitions by HHC. It almost doubled again by 2010 to 51 county-owned nursing homes and then more than quadrupled to more than 400 county-owned nursing homes in 2018 largely because of amendments legislated by the state, which allowed other hospitals to copy the HHC model, see again Section 2. By 2018, 95% of all nursing homes in Indiana were municipalized. It is also clear from Figure 7b that the total number of nursing homes did not increase at all between 2000 and 2018. We further visualize the conversion of nursing homes in Appendix Figure A.1, which shows a map of all 92 counties in Indiana along with how the share of county-owned nursing homes increased from 2000 to 2017.

As outlined in Section 4, we explore annual HHC financial reports of Marion county to quantify the implied markdown and the effective quantity FMAP among nursing homes acquired by HHC. As indicated by Figure 8a, we find an average markdown of 32% between 2008 and 2019, which translates into an effective quantity FMAP of 102%, exceeding the statutory maximum of 83%.

In fact, our measure of transfers in the financial reports goes directly into the county hospital's general funds, providing the HHC of Marion County strong incentives to inflate the volume of Medicaid care in the acquired nursing homes. We also note that, according to HHC's financial statements, SNFs kept about 22% of the SPs, thereby aligning incentives between HHC and the SNF management.

5.3.2 Effect of Municipalizations on Patient Volume

Next, we now turn to the implications for patient volume. To test hypothesis **H**3, we use the variation in the timing of nursing home municipalization using an event study framework. Specifically, we estimate the following equation:

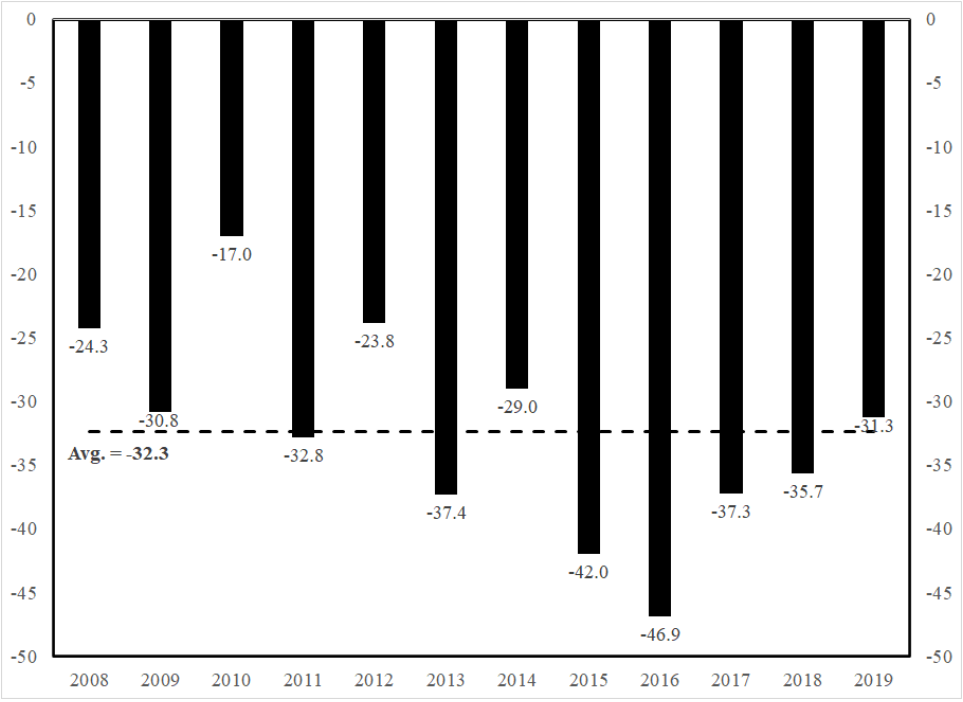
$$y_{s\tau} = \beta_0 + \sum_{\tau=-5}^{-2} \phi_\tau + \sum_{\tau=0}^{+5} \phi_\tau + \delta_s + \delta_t + \Gamma X_{s,t} + \varepsilon_{j\tau} \tag{19}$$

where s indexes a skilled nursing facility and τ the years relative to the public acquisition (with $\tau = 0$ denoting the acquisition year). δ_s and δ_t are SNF and calendar year fixed effects and Xs, t time varying county and SNF-level controls. Panel A of Table A.2 list the main outcome: *Medicaid patient days* ($y_{s\tau}$). In complementary analysis, we also explore the effects on *Total Number of Beds*, the *Occupancy Rate*, *Patient Mortality* and outcome related the underlying mechanisms.

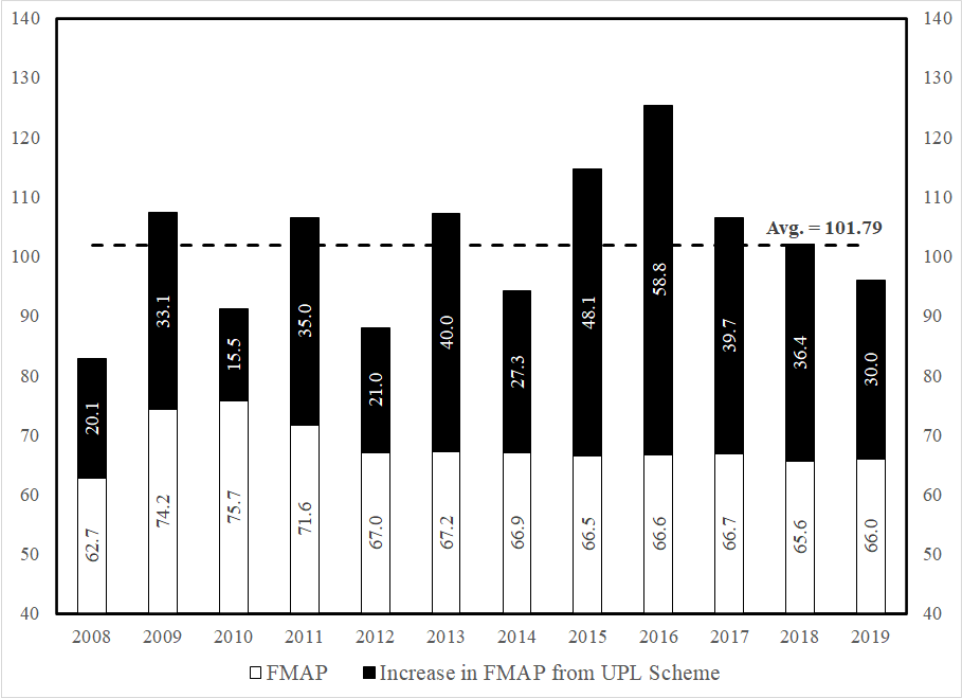
The key coefficients of interest are indicators for years relative to the Medicaid transition, ϕ_τ, where $\phi_{\tau-1}$ is the reference category. This event study approach allows for a graphical inspection of potential pre-trends, which could bias our main parameter estimates, and outcome dynamics of the municipalization over time. Specifically, the 'lead' coefficients, $\tau < 0$, are informative about potential pre-trends across patients. The 'lag' coefficients, $\tau > 0$, capture the dynamic effect of the municipalization on Medicaid volume.

Our main sample has 2,203 SNF-year observations. The sample is balanced on the event time to ensure that possible conversion-related changes in sample composition do not affect our estimates. Specifically, we observe every unit—a nursing home facility—for full five years prior to the conversion and for full five years after the conversion. That implies that we exclude the very early and very late converted SNFs and focus on those municipalized between 2005 and 2012, see Figures 7 and A.1.

Figure 8: Public Markdowns and the Effective FMAP: Evidence from the HHC of Marion County



(a) Public Markdowns



(b) Effective vs. Nominal FMAP

Notes: Figure 8a presents the negative markdown, $-\frac{P-\theta}{P}$, which indicates the (negative) share of nominal SNF Medicaid funds diverted towards other uses. Figure 8b presents the nominal FMAP and the effective quantity FMAP: $FMAP * \frac{P}{\theta}$. The estimates refer to SNFs operated by HHC of Marion County and build on the HHC's financial reports as well as equations (17) and (18).

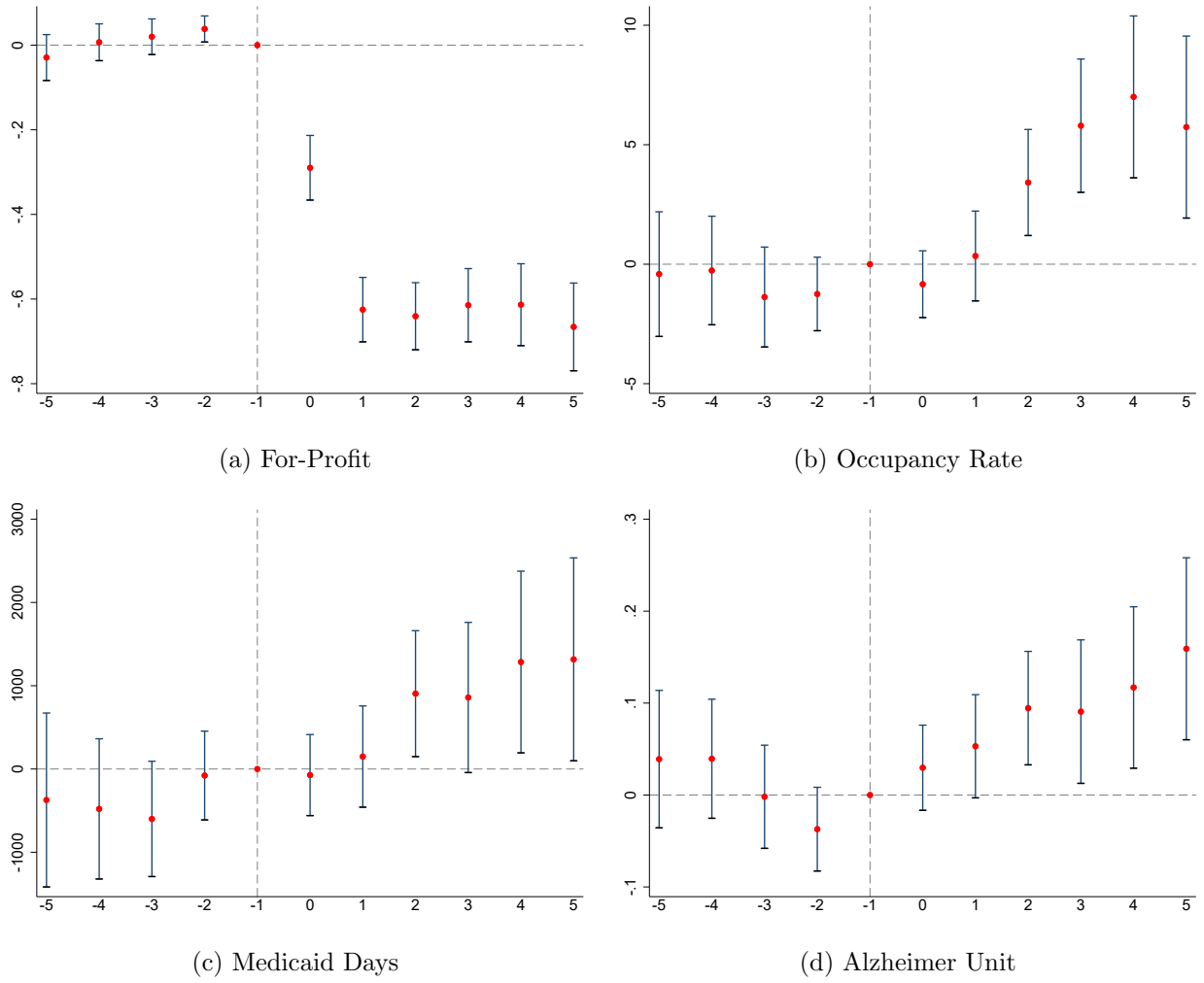
Table A.3 (Appendix) shows variable means, the t-statistics as well as the normalized difference for those SNFs that were converted between 2005 and 2010 vs. 2011 and 2012. As seen, the large majority of indicators show relatively comparable facilities; only 5 out of 22 indicators have normalized differences exceeding 0.25 which indicate more profound imbalances according to Imbens and Wooldridge (2009). In particular, facilities acquired in 2011 and 2012 were slightly smaller (104 vs. 108 beds), had higher occupancy rates (79% vs. 70%) but more favorable RN/Nurse ratios (21% vs. 18%). While the acuity index is almost exactly identical, late adopted SNFs have a higher share of residents with hypertension (55% vs. 43%) but fewer who needed to be restrained (3.6 vs. 6.6). Importantly, the large majority of important indicators, including the share of private payers, Medicaid days, for-profit status, being part of a chain or all other staff-to-resident ratios are very similar across early and late acquired SNFs. Finally, note that because 95% of all private SNFs were eventually converted and because our design already excludes very early and very late municipalized SNFs, our identification strategy essentially uses variation from all existent nursing homes. Below, we decompose the average, weighted, treatment effect through the Bacon Decomposition.

Figure 9 presents the results of ownership conversion on (a) for-profit status, (b) occupancy rates, (c) Medicaid volume, and (d) Alzheimer units. The top left graph documents the effect of conversion on for-profit ownership. As expected, we see a large drop in the year of acquisition. The post-acquisition estimates range around -0.6 suggesting that 60% of the acquired nursing homes were formerly for-profits, the remaining 40% were not-for-profits. The patterns also suggests that conversions are only fully realized one year after the official acquisition date.

The top right graph documents the effects on nursing home occupancy. Starting two years after conversion, we see noticeable increases in occupancy of about 5 percentage points. This suggests that it takes the nursing homes another year to increase patient volume.

The bottom left graph focuses on Medicaid patient days. Consistent with hypothesis **H**3, we find a significant increase in Medicaid days two years after the reform. The DD regression equivalents of Figure 9 are in Table A.4 (Appendix).

Figure 9: Effects of Public Acquisition on Medicaid Volume



(a) For-Profit

(b) Occupancy Rate

(c) Medicaid Days

(d) Alzheimer Unit

Notes: Long-Term Care: Facts on Care in the U.S. (2020). Each subgraph shows an event study as in equation (19) where the year before the SNF municipalization is the reference period. See main text for more details.

5.3.3 Mechanisms: Dementia Patients

To understand the mechanisms behind the increase in Medicaid volume, Figure 9 explores possible changes in nursing home characteristics.The bottom right graph of Figure 9 shows a significant increase in Alzheimer units attached to SNFs.[22] Building on this observation, we explore changes in the volume of care among Alzheimer's patients using MDS patient micro data from Indiana

[22]Potentially related, we also find an increase in the number of high skilled nurse practitioners, following the conversion (bottom left of Appendix Figure A.2). However, we find no evidence for systematic changes in nurse staffing, which is an important marker of nursing home quality (Hackmann, 2019).

between 1999 and 2015. Specifically, we focus on dementia patients, which includes Alzheimer's patients, and quantify the number of annual admissions, total days, and days covered by Medicaid per SNF and year.[23]

The top row of Figure 10 presents the effect on admissions and total days among dementia patients. Appendix Table A.5 shows the DD regression equivalent and average post-acquisition estimate. Starting in the first post-acquisition year, we see a statistically significant increase in both outcomes. Figure 10c documents the effect on Medicaid days among dementia patients. We see a qualitatively and quantitatively similar pattern when compared to overall patient days, which suggests that most days are covered by Medicaid. Furthermore, the increase in Medicaid days is similar in magnitude to the overall increase in Medicaid days, documented in Figure 9. This suggests that most of the increase in Medicaid patient volume stems from dementia patients.

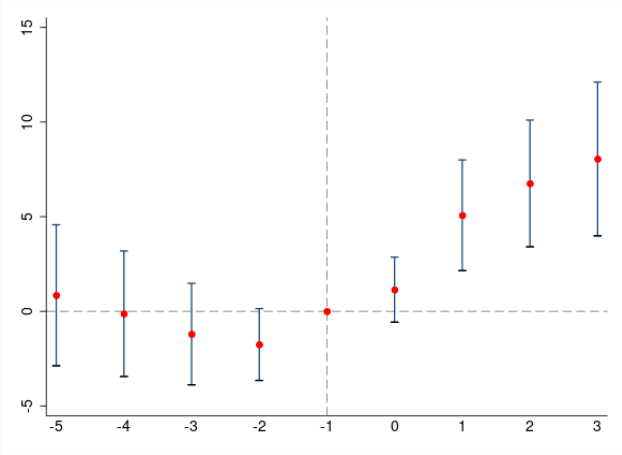
To assess potential changes in care quality following the acquisition, next, we start by investigating effects on mortality among nursing home patients. As evidenced in Figure 10d, we find no evidence for a decline in the one-year mortality. As such we find no evidence that the quality of care is improved within the acquired SNF after the acquisitions.

However, it is noteworthy to point out that the evidence from Figure 10d does not yield the counterfactual *mortality outcomes* had the patient not entered the SNF. Relatedly, the evidence presented thus far is not informative about the patient's counterfactual *care choices* had the SNF not been acquired. Hence, from our current approach we cannot infer how the quality of SNF care compares to the quality of care for alternative options that marginal patients would have chosen had the SNF not been acquired. However, such a counterfactual assessment is central to evaluating the patient welfare implications of the care expansion.

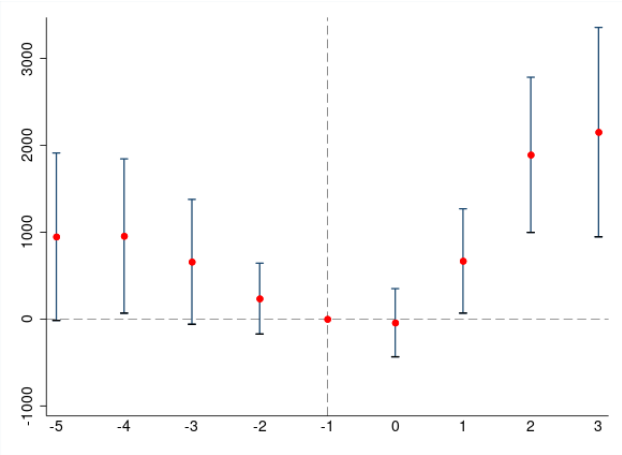
To make progress on these question, we start by exploring the *origins* for new admissions. The bottom two event studies of Figure 10 study the effects on admissions from hospitals and from the community. As seen, we find a significant increase in SNF admissions originating from acute care hospitals. In contrast, we find no evidence for an increase in admissions from the community.

[23] In contrast to the LTC Focus data, we only observe patient stays until the end of 2015. Therefore, we need to omit the last lag coefficients (ϕ_4, ϕ_5) to ensure a balanced panel.

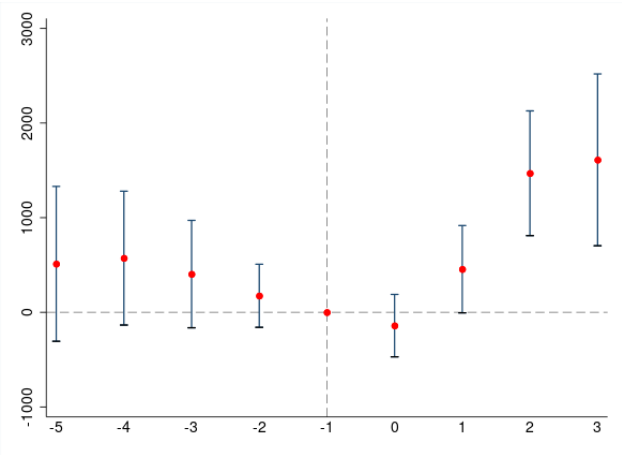
Figure 10: Mechanisms: Dementia Patients



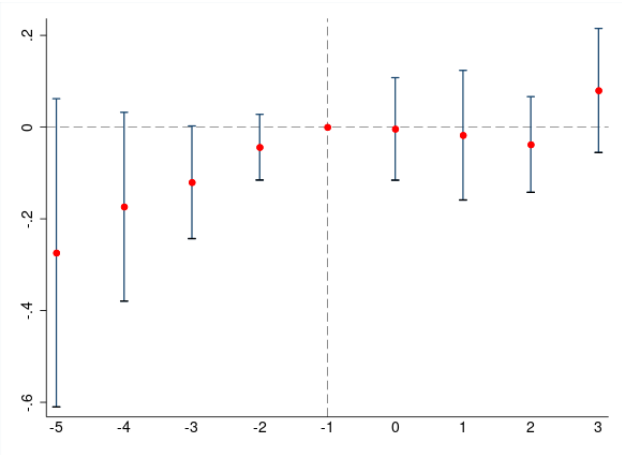
(a) Admissions



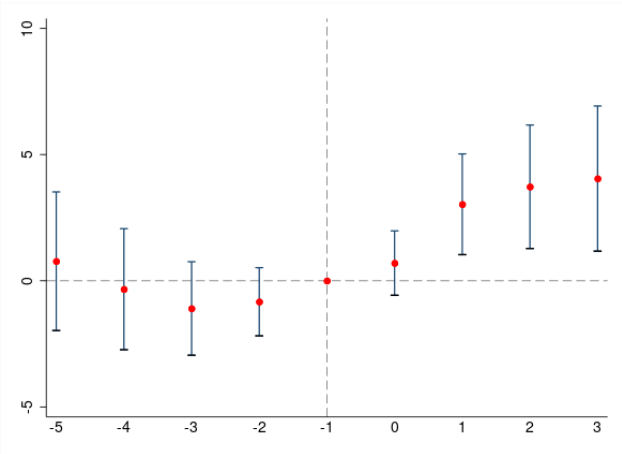
(b) Total Days



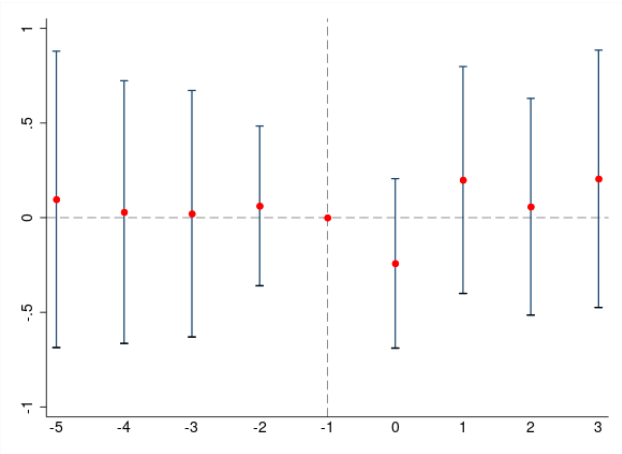
(c) Medicaid Days



(d) One Year Mortality



(e) Hospital Admissions



(f) Home Admissions

Notes: MDS (2015). Each subgraph shows an event study as in equation (19) where the year before the SNF municipalization is the reference period. The sample comprises SNF patients diagnosed with dementia, see main text for more details.

5.3.4 Mechanisms: Hospital to SNF Discharges

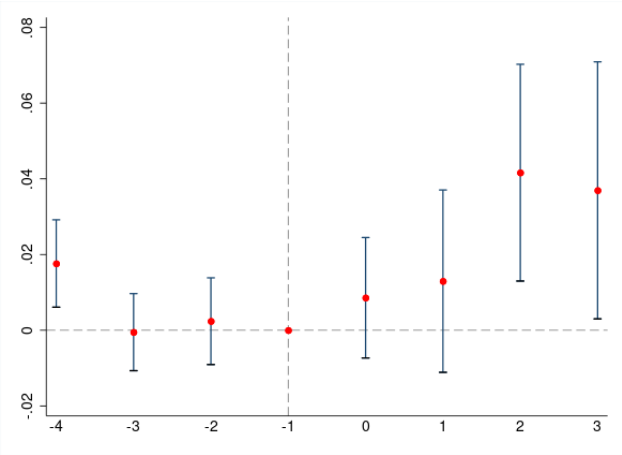
The evidence on admissions from acute care hospitals presents an opportunity to study the counterfactual care choices and health outcomes among patients who are at risk of being discharged to an acquired SNF. To this end, we study care choices and mortality outcomes among dementia patients in acute care hospitals, as described in Section 4.5.

We start by analyzing hospital visits among dementia patients aged 85 and younger. About half are discharged from the hospital to any SNF and 8% are discharged to an eventually acquired, SNF. Consistent with the evidence from above, we find that acute care hospitals are more likely to discharge dementia patients to the focal SNF once it is acquired by a county hospital, see Figure 11a. However, we find no evidence for an increase in overall SNF discharges (Figure 11b) and no evidence for changes in home discharges (Figure d). Instead, we find evidence for a decline in discharges to other non-acquired SNFs (Figure 11c). This suggests that for dementia hospital patients aged 85 and younger, acute care hospitals substitute between SNF care providers and towards acquired SNFs.

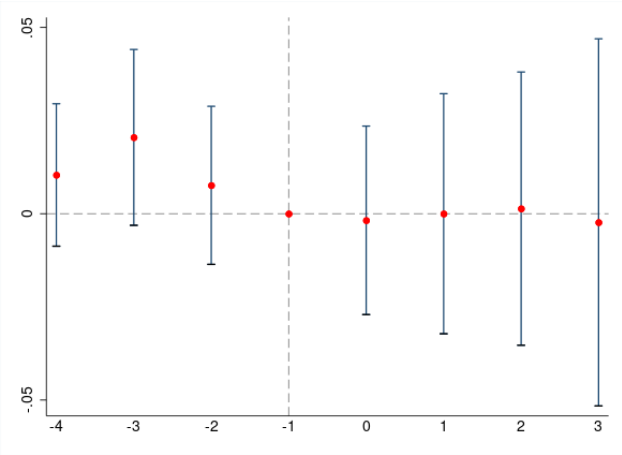
Next we turn to the effects of these substitution patterns on patient mortality. As we find no evidence for systematic changes in SNF quality following the acquisition, see Figure 10, this specification will primarily pick up quality differences between acquired and non-acquired SNFs. If acquired SNFs provide better quality of care then non-acquired SNFs then we expect a decline in mortality. Conversely, we expect an increase in mortality when acquired SNFs provide worse quality of care then non-acquired SNFs. However, as seen in Figure 10e, we find no systematic change in patient mortality. This finding suggests that the shift in market share towards acquired SNFs is neither an improvement nor a reduction in allocative efficiency among dementia patients 85 and younger. The pooled regression results are presented in Panel A of Table A.6.

Next, we turn to hospital dementia patients aged 86 and older, where we see quite different substitution patterns. Consistent with the former evidence, we again find that acute care hospitals are more likely to discharge dementia patients to the focal SNF once it is acquired by a county hospital, see Figure 12a. In contrast to Figure 11, however, we also find an *increase* in overall SNF discharges (Figure 12b) and a *decline* in home discharges (Figure 12d). But we do not find evidence for a systematic decline in discharges to other non-acquired SNFs (Figure 12c). These

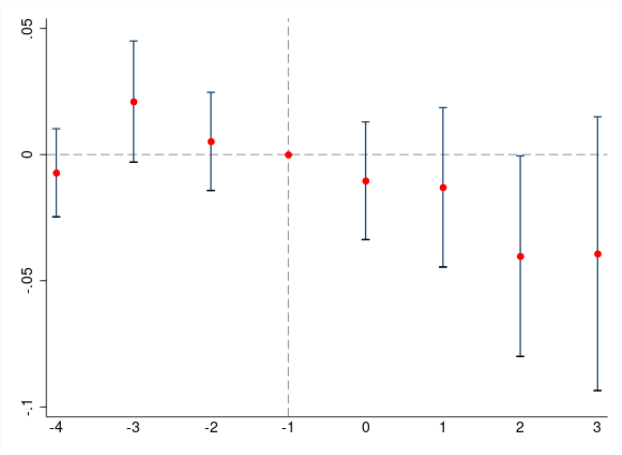
Figure 11: Mechanisms: Hospital to SNF Discharges Age 85 and Younger



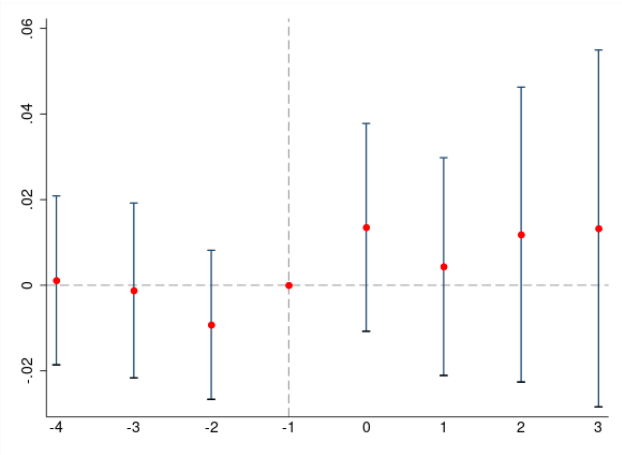
(a) Discharged to Acquired SNF



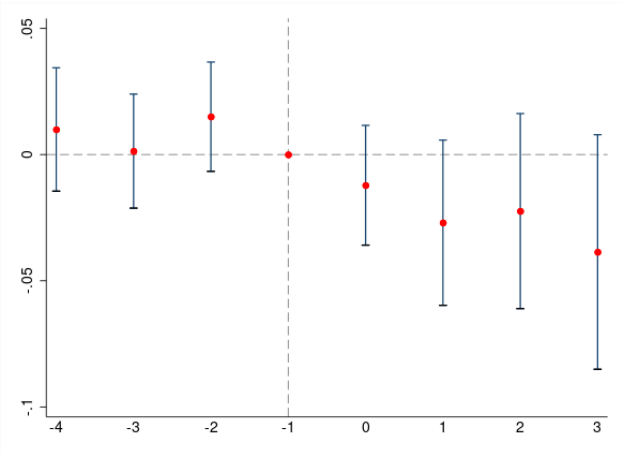
(b) Discharged to Any SNF



(c) Discharged to Non-Acquired SNF



(d) Discharged Home



(e) One Year Mortality

Notes: MEDPAR (2015). Each subgraph shows an event study as in equation (19) where the year before the SNF municipalization is the reference period. The sample comprises acute care hospital patients aged 85 and younger diagnosed with dementia, see main text for more details.

findings suggest that hospitals substitute away from home discharges and towards SNF discharges as the focal SNF gets acquired, pointing to an overall increase in SNF utilization. The difference in substitution patterns for old-age dementia patients is consistent with the results in Mommaerts (2018), which suggest that home care and nursing home care are closer substitutes for old-age patients above 85.

Finally, we turn to the effects on patient mortality. Because of the decline in home discharges and increase in overall discharge, the mortality evidence from Figure 12e corresponds to differences between the quality of SNF and the quality of home health care. As seen, starting in the year of the acquisition, we find a significant increase in the one-year mortality that increases over time. This implies that the marginal patients would have lived longer had they been discharged home. Further, the finding points to a significant misallocation of vulnerable dementia patients to the acquired SNFs and to a reduction in allocative efficiency in the matching of patients to long term caregivers and care providers.

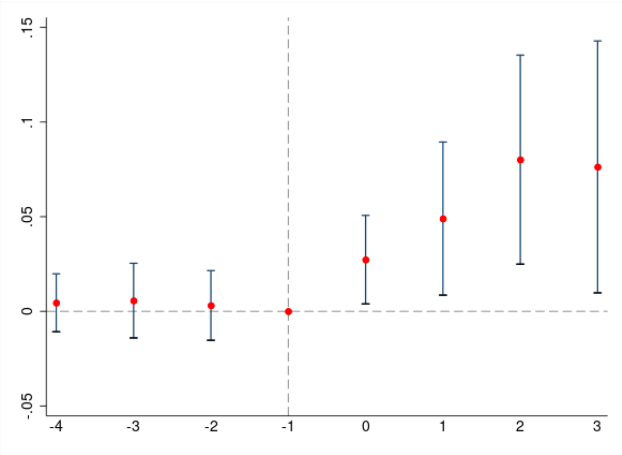
An interesting question is whether public hospitals self-refer patients to their newly acquired SNFs (Cutler et al., 2021). We don't find conclusive evidence for this mechanism in our setting, in parts because the acquired SNF and the acquiring hospital are often located in different hospital referral regions. Nevertheless, understanding the hospital's discharge incentives, and how they specifically misallocate patients to providers, is an important question for future research.

6 Discussion and Conclusion

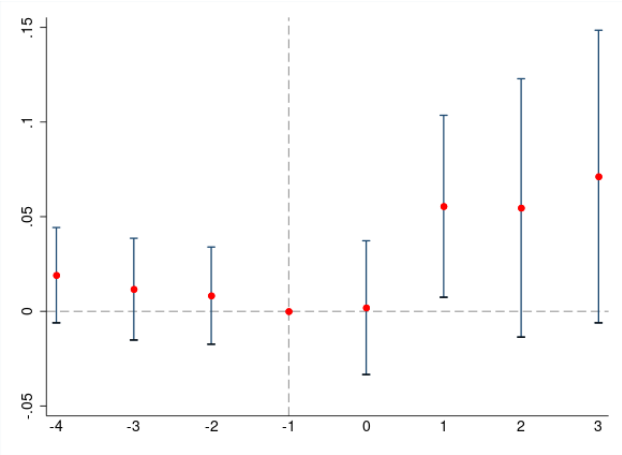
In this paper, we argues that a significant fraction of federal matching grants is not passed through to their intended recipients, using the example of the Medicaid program for skilled nursing facility (SNF) care. We first document that several states use creative funding schemes to divert federal matching funds. These practices do not only lead to an unintended transfer of resources between programs, they also distort the intended subsidy effects and therefore the allocation of patients and resources across health care providers.

Using a range of methods and datasets, we estimate that states with creative financing schemes redirect 20-30% of Medicaid spending away to fund, in the case of Indiana, public hospitals. Our simple theoretic framework suggests precisely that mechanism and also predicts an increase in the

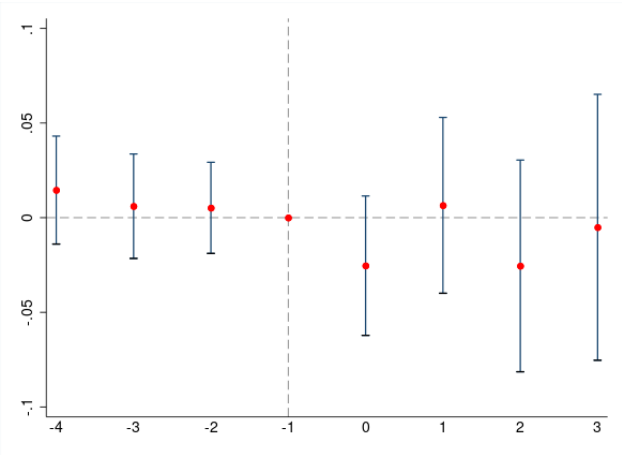
Figure 12: Mechanisms: Hospital to SNF Discharges Age 86 and Older



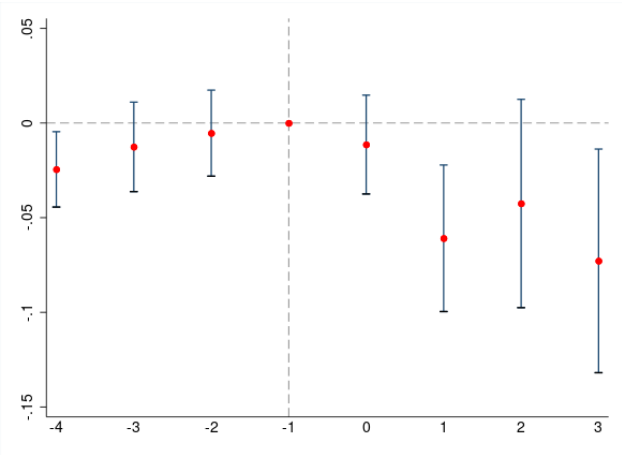
(a) Discharged to Acquired SNF



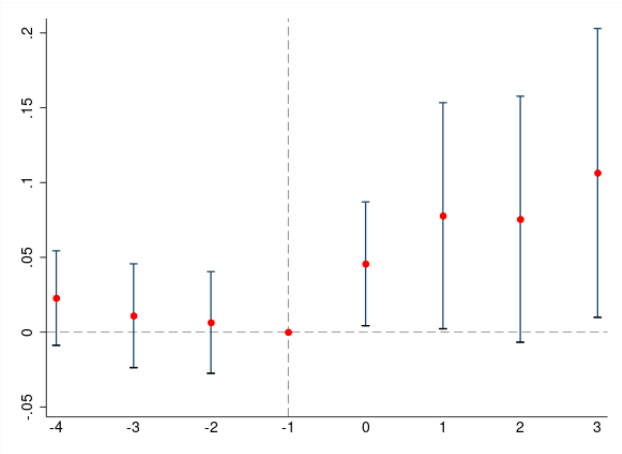
(b) Discharged to Any SNF



(c) Discharged to Non-Acquired SNF



(d) Discharged Home



(e) One Year Mortality

Notes: MEDPAR (2015). Each subgraph shows an event study as in equation (19) where the year before the SNF municipalization is the reference period. The sample comprises acute care hospital patients aged 86 and older diagnosed with dementia, see main text for more details.

volume of Medicaid patients. While these practices go against the stated program intentions and have important distributional implications, it is beyond the scope of this paper to assess whether the transfer of funds is necessarily welfare decreasing. On the one hand, existing work shows that higher SNF Medicaid reimbursement results in improved quality of care (Hackmann, 2019). On the other hand, existing work also shows that higher hospital spending increases access and the quality of care (Baicker and Staiger, 2005).

However, in the context of Indianas SNF industry, we confirm empirically that creative financing schemes result in an expansion of Medicaid care volume and in an expansion of low-value SNF care. Specifically, we find an increase in Medicaid dementia stays and an associated increase in mortality among the older dementia patients. This points to a reduction in allocative efficiency in the matching of vulnerable patient to long term care providers. Returning to the broader goal of matching grants, we conclude that the presence of creative financing schemes compromises the ability of the FMAP to internalize LTC externalities across local jurisdictions. Our results show that the underlying mechanisms consist of (a) significant leakage of matching funds between programs, and (b) volume distortion and institutional biases toward institutionalization as a result of creative funding mechanisms.

Overall, our empirical findings confirm the predictions of our theoretical model, with broader implications for the industry. Specifically, the ability to transfer matching funds provides an explanation for persistently low Medicaid reimbursement rates that have contributed to the chronic quality shortfalls in the nursing home industry (Grabowski, 2001; Hackmann, 2019). At the same time, the public moral hazard mechanism may bias states towards Medicaid policies that encourage nursing home utilization. This includes fee-for-service reimbursement that encourages provider moral hazard (Hackmann et al., 2020), generous Medicaid eligibility standards via spend-down policies (Grabowski and Gruber, 2007; Mommaerts, 2018), and a lack of home and community-based care alternatives to nursing home care (Muramatsu et al., 2007; Guo et al., 2015; Wang et al., 2020). The presence of these schemes may also provide an explanation for the relative small market share of Medicaid managed care plans in long term care that may help rebalance care delivery away from inpatient LTC (Kaiser Commission on Medicaid and the Uninsured, 2015; Reaves and Musumeci, 2015) and inpatient care more broadly (Duggan et al., 2018; Abaluck et al., 2021; Geruso et al.,

2020). Specifically, actuarial soundness rules prohibit states from making supplemental payments for services covered under a managed care contract. According to MACPAC (2020) this led some states to exclude certain services or populations from managed care.

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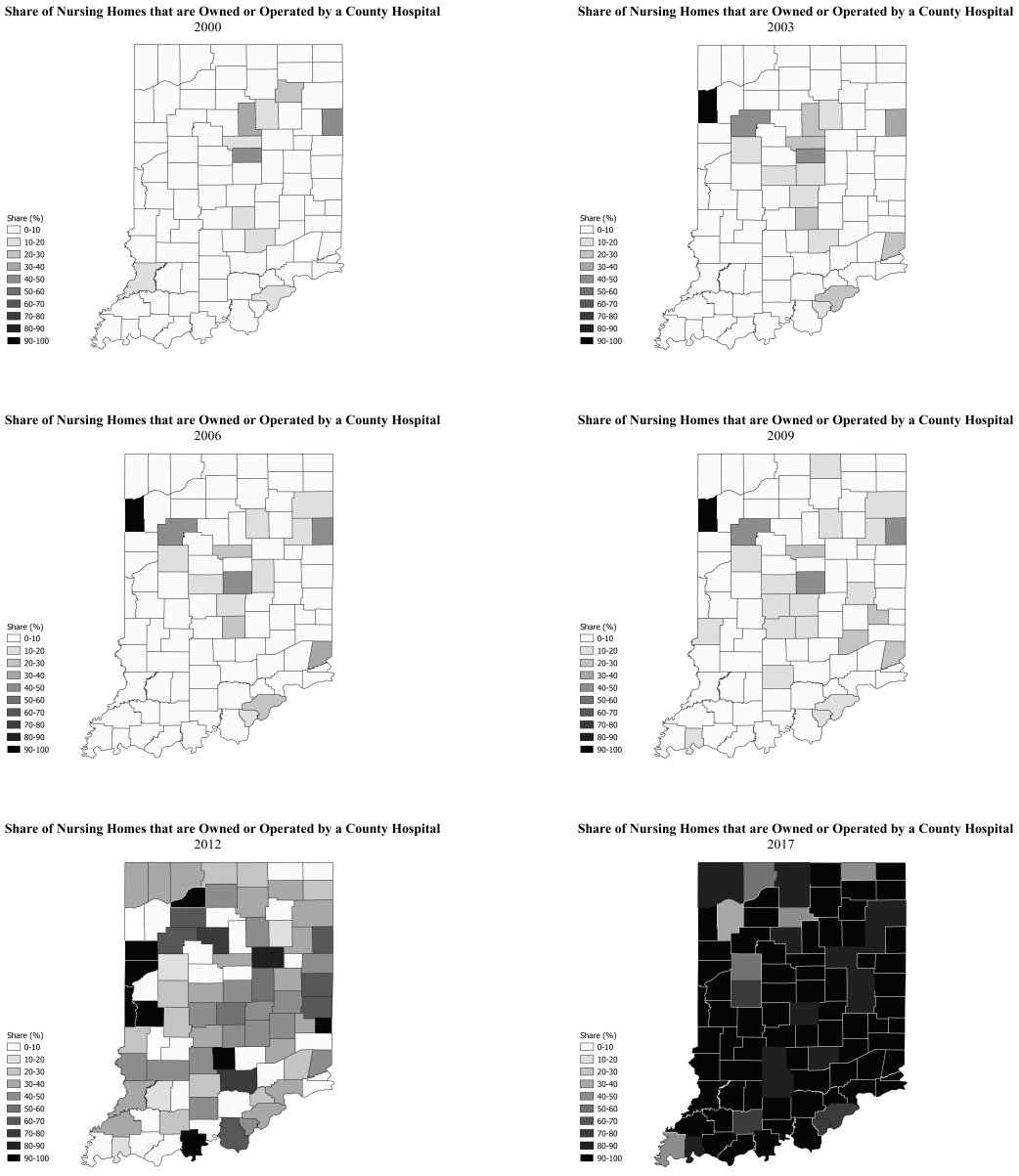
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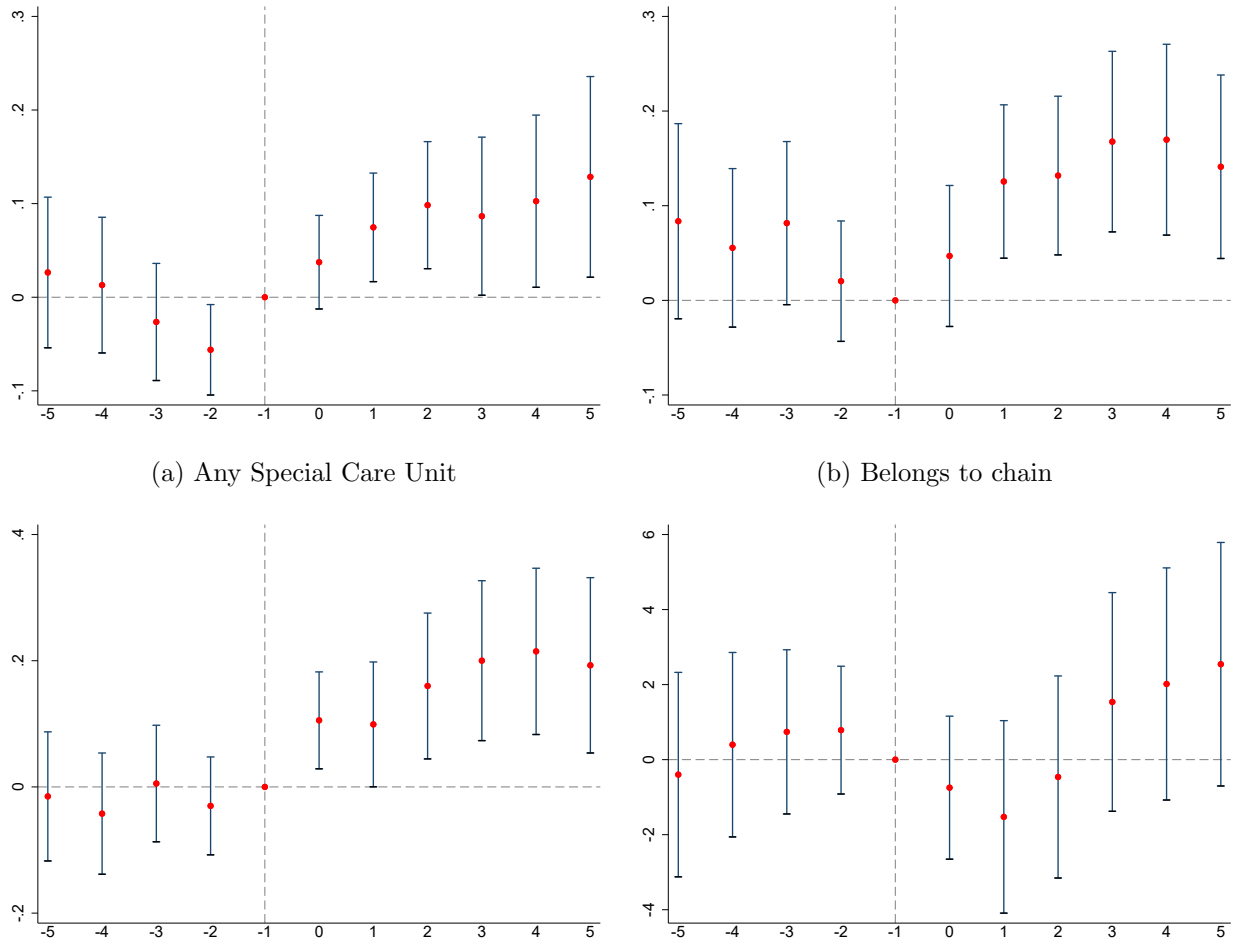
Figure A.1: Development of Shares of County-Owned Nursing Homes



Source: Centers for Medicare & Medicaid Services (2020b) and Indiana Department of Health (2020).

Appendix

Figure A.2: Effects of Public Acquisition on Patient Composition



(a) Any Special Care Unit

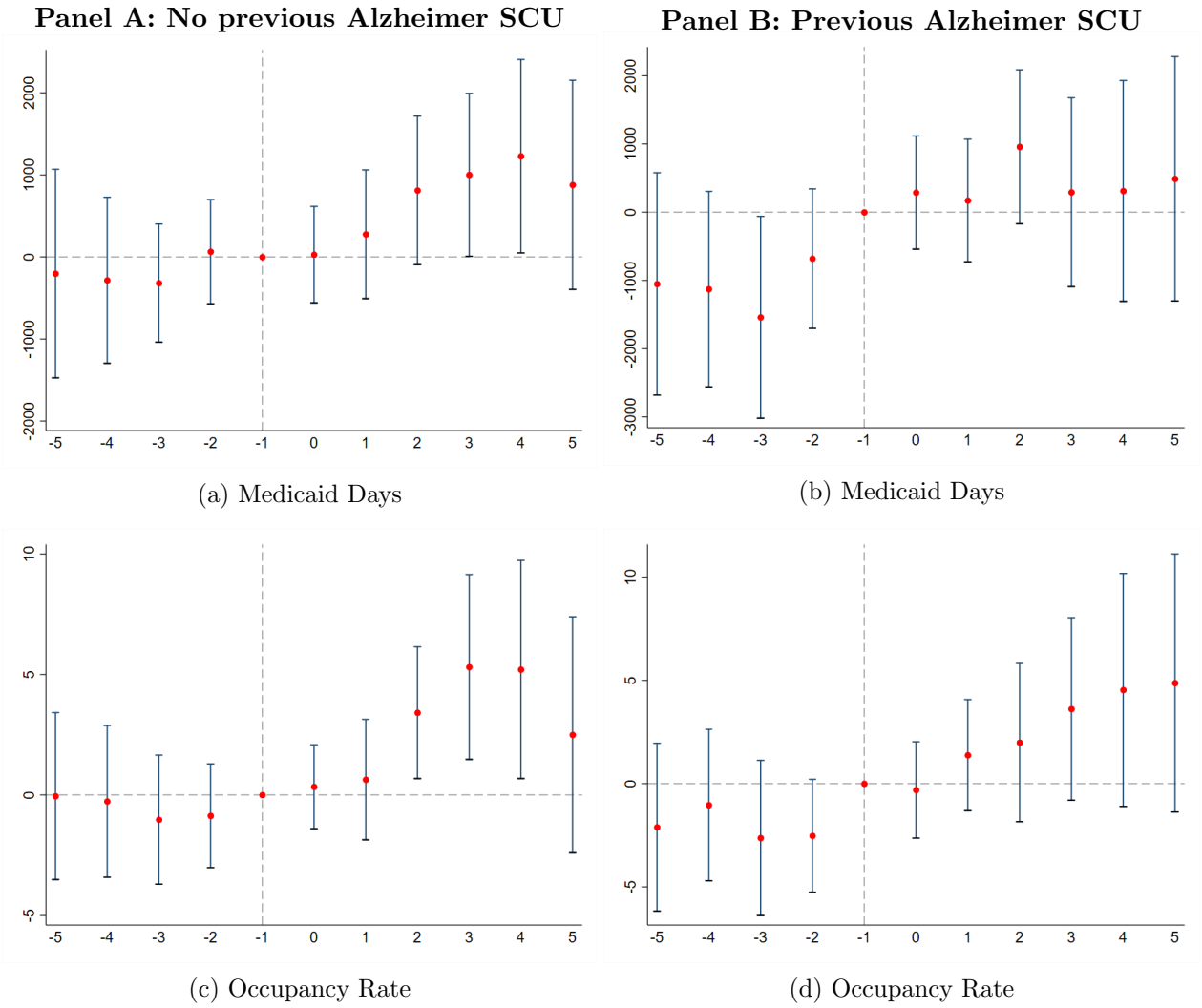
(b) Belongs to chain

(c) Has Nurse Practitioner

(d) Percent of Patients w/ Hypertension

Notes: Long-Term Care: Facts on Care in the U.S. (2020). Each subgraph shows an event study as in Equation (19) where the year before the SNF municipalization is the reference period. See main text for more details.

Figure A.3: Effects of Public Acquisition by Previous Alzheimer SCU



(a) Medicaid Days

(b) Medicaid Days

(c) Occupancy Rate

(d) Occupancy Rate

Notes: Long-Term Care: Facts on Care in the U.S. (2020). Each subgraph shows an event study as in equation (19) where the year before the SNF municipalization is the reference period. See main text for more details.

Table A.1: State-Level Indicators by Treatment and Control States

State	Nominal FMAP (2000-02)	Effective FMAP (2000-02)	Markdown Pre (2000-02)	Markdown Post (2003-07)	Diff.
No UPL Scheme					
WY	63.54	56.74	12.767	-0.945	-13.711*
		(6.14)	(11.272)	(2.150)	(6.578)
CA	51.44	51.49	0.482	-6.677	-7.159
		(4.63)	(9.621)	(4.727)	(5.944)
UT	71.00	79.49	-10.530	-16.205	-5.675
		(4.47)	(4.054)	(4.281)	(3.024)
TX	60.70	63.49	-4.306	-9.348	-5.042*
		(2.02)	(3.929)	(2.402)	(2.510)
MA	50.00	43.16	15.930	13.074	-2.857
		(1.31)	(3.578)	(4.485)	(2.879)
VT	62.57	48.20	30.213	28.311	-1.902
		(3.49)	(8.251)	(5.933)	(5.453)
GA	59.52	52.70	12.939	11.589	-1.350
		(0.31)	(0.796)	(25.812)	(11.553)
WV	75.13	69.95	7.466	7.847	0.381
		(2.04)	(3.522)	(3.934)	(2.689)
OH	58.83	62.84	-6.257	-5.614	0.643
		(2.82)	(4.120)	(5.204)	(3.328)
FL	56.56	51.74	9.333	10.168	0.835
		(0.78)	(1.442)	(2.780)	(1.496)
OK	70.92	72.54	-2.118	-0.454	1.663
		(3.23)	(3.857)	(4.105)	(2.886)
CT	50.00	48.11	3.953	6.398	2.445
		(1.02)	(2.218)	(6.732)	(3.272)
SC	69.91	82.67	-15.418	-11.973	3.446
		(1.70)	(1.521)	(4.577)	(2.228)
MD	50.00	43.55	14.828	18.778	3.950**
		(0.54)	(1.429)	(2.326)	(1.328)
ID	70.64	84.34	-16.041	-8.061	7.981**
		(4.75)	(5.203)	(2.341)	(3.181)
Avg. No UPL Scheme	**61.38**	**60.73**	**3.550**	**2.459**	**-1.090**
UPL Scheme					
KY	70.293	67.01	4.953	-5.955	-10.908***
		(1.63)	(2.990)	(4.156)	(2.536)
AL	70.003	61.43	14.094	13.209	-0.886
		(2.48)	(5.273)	(2.907)	(3.310)
IN	61.940	62.53	-0.672	4.526	5.199
		(4.14)	(6.202)	(23.604)	(11.147)
PA	54.030	83.01	-34.853	-28.642	6.211
		(3.19)	(2.409)	(9.880)	(4.632)
NE	60.270	88.28	-31.678	-24.709	6.969**
		(3.50)	(1.952)	(4.085)	(2.146)
ND	70.093	94.00	-24.448	-13.965	10.483
		(13.77)	(10.086)	(3.758)	(6.061)
IA	62.863	97.74	-28.985	-14.071	14.913
		(39.44)	(25.270)	(2.699)	(14.640)
VA	51.657	64.28	-14.959	0.051	15.010
		(19.94)	(22.633)	(1.906)	(13.095)
WA	50.967	59.32	-13.279	1.734	15.013*
		(6.94)	(10.242)	(6.184)	(6.528)
NJ	50.000	74.61	-32.005	-13.249	18.756
		(10.53)	(10.447)	(17.260)	(9.796)
MO	60.867	73.99	-14.463	6.892	21.356
		(16.95)	(21.517)	(11.325)	(13.416)
LA	70.383	128.92	-42.171	-14.733	27.437**
		(34.57)	(18.108)	(3.254)	(10.556)
WI	58.880	80.62	-25.532	2.409	27.941**
		(13.39)	(13.030)	(16.518)	(10.543)
MI	55.883	76.72	-27.097	11.833	38.930*
		(2.61)	(2.855)	(38.527)	(17.308)
KS	60.027	71.70	-14.986	27.655	42.641***
		(10.41)	(13.425)	(12.541)	(9.567)
OR	59.720	79.26	-10.871	37.282	48.153
		(42.08)	(39.928)	(25.561)	(25.731)
Average UPL Scheme	**60.49**	**78.96**	**-18.560**	**-0.608**	**17.951**

Table A.2: LTCFocus Summary Statistics

Variable	Mean	Std. Dev.	N
County-owned SNF	0.389	0.488	2203
Panel A: Main outcomes			
Total number of beds	102.487	45.691	2203
Occupancy rate	76.363	14.268	2203
For-profit	0.586	0.493	2203
Number Medicaid days	18590.507	10416.805	2203
Share Medicaid	63.026	22.538	2203
Share Medicare	17.427	17.37	2203
Share of privately insured	19.547	14.632	2203
Has Nurse practitioner or physician's assistant	0.385	0.487	2203
Alzheimer's Special Care Unit (SCU)	0.383	0.486	2203
Any SCU	0.398	0.49	2203
Part of chain	0.715	0.452	2203
Panel B: Controls			
Total county population	218,869	281,418	2203
County population above 65	26,962	31,511	2203
Share restrained	2.808	5.051	2203
Share w/ hypertension	62.666	17.047	2055
RN/Nurses Ratio	11.48	1.427	2203
Average Acuity Index	0.274	0.156	2203
Direct-care staff hours per resident day	3.518	1.471	2203
Registered Nurses hours per resident day	0.447	0.704	2203
Licensed Practical Nurse hours per resident day	0.976	0.426	2203
Certified Nursing Assistant hours per resident day	2.095	0.798	2203
SNF is hospital-based	0.037	0.189	2203

Source: Long-Term Care: Facts on Care in the U.S. (2020), authors' own calculation.

Table A.3: Characteristics of Early (<2011) vs. Late SNF Acquisitions (>=2011)

Variable Names	Early (mean)	Early (sd)	Late (mean)	Late (sd)	tstat	Norm Diff
Panel A: Main outcomes						
Total number of beds	117.989	38.312	104.174	43.687	3.139	0.238
Occupancy rate	69.572	14.236	78.523	12.587	-5.655	0.471
For-profit	0.889	0.316	0.854	0.353	0.953	0.073
Medicaid days	21,563	9,685	20,066	8,912	1.384	0.114
Share Medicaid	67.992	19.531	68.329	11.217	-0.160	0.015
Share Medicare	15.304	19.984	13.980	6.888	0.623	0.063
Share privately insured	16.705	10.380	17.691	9.256	-0.854	0.071
Has Nurse practitioner or physician's assistant	0.244	0.432	0.312	0.464	-1.373	0.107
Alzheimer's disease Special Care Unit (SCU)	0.422	0.497	0.394	0.489	0.512	0.041
Any SCU	0.467	0.502	0.398	0.490	1.210	0.097
Part of chain	0.711	0.456	0.730	0.445	-0.361	0.029
Share w/ hypertension	43.360	9.833	54.686	12.555	-9.438	0.710
Panel B: Controls						
Total county population	247,939	295,987	189,492	266,149	1.773	0.147
County population above 65	27,709	31,413	22,700	28,720	1.429	0.118
Average Acuity Index	11.115	1.147	11.112	1.344	0.019	0.001
RN/Nurses Ratio	0.175	0.071	0.207	0.109	-3.721	0.248
Direct-care staff hours per resident day	3.063	1.049	3.171	0.682	-0.946	0.086
Registered Nurses hours per resident day	0.224	0.210	0.250	0.146	-1.112	0.100
Licensed Practical Nurse hours per resident day	0.972	0.431	0.949	0.250	0.494	0.046
Certified Nursing Assistant hours per resident day	1.866	0.553	1.971	0.585	-1.677	0.131
Share restrained	6.638	7.129	3.485	4.556	4.078	0.373
SNF is hospital-based	0.056	0.230	0.000	0.000	2.288	0.241

Source: Long-Term Care: Facts on Care in the U.S. (2020), authors' own calculation. Early refers to the group of SNF that were acquired before 2011 and late the group of SNF acquired starting in 2011. The sample includes all the years before their acquisition and is done using the panel that is balanced on the observation and event period, and thus includes the SNF that have observations for all relevant variables between 2000 and 2017 and that were acquired by a county hospital between 2005 and 2012. See main text for more details.

Table A.4: Effects of Public Acquisition on SNF Structure and Patient Composition

	Medicaid days		**Occupancy rate**		**Alzheimer SCU**		**For-profit**	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$D_c \times T_t$	1,118.67*	1,352.57**	4.6694***	5.2026***	0.0947**	0.0962**	-0.6380***	-0.6331***
	(670.9675)	(684.1414)	(1.4819)	(1.4113)	(0.0423)	(0.0440)	(0.0434)	(0.0423)
R-squared	0.0447	0.0619	0.0938	0.1660	0.0311	0.0315	0.4253	0.4283
Year Fixed Effects	X	X	X	X	X	X	X	X
SNF Fixed Effects	X	X	X	X	X	X	X	X
County Fixed Effects	X	X	X	X	X	X	X	X
SNF controls		X		X		X		X

Source: Long-Term Care: Facts on Care in the U.S. (2020). Each column in each panel stands for one model similar to Equation (19), ***, **, and * = statistically different from zero at the 1%, 5%, and 10% level. Standard errors are clustered at the SNF level and reported in parentheses. All models have 2,203 SNF-year observations from 178 unique SNFs. See main text for more details.

Table A.5: Mechanisms: Alzheimer Patients

	(1) Admission	(2) Days	(3) Medicaid Days	(4) 1-Year Mortality	(5) Hospital Adm	(6) Home Adm
$D_c \times T_t$	6.88***	961.68	792.01*	0.11	3.83**	0.12
	(2.09)	(581.89)	(437.02)	(0.13)	(1.71)	(0.32)
lead0	-5.19***	-1298.85***	-1080.32***	-0.02	-2.83**	-0.40
	(1.55)	(423.97)	(324.56)	(0.03)	(1.09)	(0.27)
Observations	1882	1882	1882	1872	1882	1882

Notes: This table presents the pooled post-reform effects. We allow for an implementation effect, denoted by lead0. The table is structured as Figure 10. The first column refers to admissions, the second to total days, the third to Medicaid days, the fourth to the one-year mortality rate, the fifth to admissions form the hospitals and the last columns denotes admissions from home. Standard errors in parenthesis, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: Mechanisms: Hospital Discharges of Alzheimer Patients and Mortality by Age

	(1) Acq SNF	(2) Any SNF	(3) Non-Acq SNF	(4) Home Discharge	(5) 1-Year Mort
Panel A: Age 85 and Younger					
$D_c \times T_t$	0.02	-0.01	-0.02	0.01	-0.03
	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)
lead0	-0.01	-0.00	0.01	0.01	0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Panel B: Age 86 and Older					
$D_c \times T_t$	0.05**	0.05*	-0.00	-0.05**	0.07*
	(0.02)	(0.03)	(0.03)	(0.02)	(0.04)
$Lead_0$	-0.03	-0.05**	-0.03	0.05**	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)

Notes: This table presents the pooled post-reform effects. We allow for an implementation effect, denoted by lead0. The table is structured as Figure A.2. The first column refers to discharges to the acquired SNF, the second discharges to the any SNF, the third to discharges to a non-acquired SNF, the fourth to home discharges, the fifth to the one-year mortality. The regressions in Panel A contain 34,187 observations and in Panel B 19,746 observations. Standard errors in parenthesis, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.