Demand Shocks and Product Quality: Evidence from Hospitals*

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Abstract

We study the impact of demand shocks on product quality in the hospital sector. Exploiting staggered Paid Sick Leave (PSL) mandates as exogenous shocks to healthcare demand, we find significant improvements in hospital quality, proxied by lower mortality rates, higher patient ratings, and better timely and effective care outcomes. We argue that these quality improvements are primarily driven by the alleviation of financial constraints. The demand shocks improve hospitals' financial conditions, leading to lower borrowing costs, increased investment, and higher employment. Consistent with this financial channel, quality improvements are more pronounced among hospitals with tighter financial constraints and stronger governance.

Keywords: Demand shocks, product quality, hospitals, financial constraints, paid sick leave (PSL).

JEL classification: G32, I11, I18, H74, H75

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1 Introduction

Product demand is a fundamental determinant of firm value and real decisions. Recent studies have shown that demand shocks can influence a wide range of corporate outcomes, including innovation and technology investment, sales and growth, as well as labor market policies such as employment and wages (e.g., Hvide and Meling (2023); Clemens and Rogers (2025);Dhyne, Kikkawa, Komatsu, Mogstad, and Tintelnot (2025)). Yet one important dimension of performance remains comparatively less understood: how demand shocks affect product quality. The inherent endogeneity of the demand-quality relationship complicates causal inference. This paper addresses this gap by studying how demand shocks affect product quality in the healthcare industry.

We study healthcare quality responses to demand shocks in U.S. hospitals for two reasons. First, hospitals are economically large and societally consequential, accounting for nearly 6-7% of U.S. GDP, and the quality of care they deliver has direct implications for patient survival and social welfare. Second, the staggered adoption of Paid Sick Leave (PSL) mandates across the U.S. provides an identification strategy for estimating the causal effect of demand shocks on hospital quality.[1] By allowing workers to take paid time off for illness and medical appointments, PSL reduces the effective cost of seeking care and increases healthcare utilization.[2] While recent research shows that healthcare demand significantly influences hospital financial performance and borrowing costs (Gao, Lee, and Murphy (2022); Cornaggia, Li, and Ye (2024)), its impact on healthcare quality remains poorly understood.

Ex-ante, the effect of demand shocks on hospital quality is theoretically ambiguous. On the one hand, such shocks could improve quality by alleviating financial constraints. Many U.S. hospitals operate on thin margins, limiting their ability to invest in technology, infrastructure, and staff.[3] Financial distress has real effects on the service quality of hospitals, i.e., negatively impacting patient outcomes (Adelino, Lewellen, and McCartney (2022); Aghamolla, Karaca-Mandic, Li, and Thakor (2024)). A positive demand shock can directly improve a hospital's financial health by increasing cash flow (Duggan, Gupta, and Jackson (2022); Gao, Lee, and Murphy (2022)), which is particularly important given the sector's high revenue volatility

[1] In the absence of a federal mandate, PSL laws were adopted by states and localities through legislative actions and voter-approved ballot initiatives, reflecting broader political and labor-market considerations rather than hospital- or healthcare-sector-specific conditions.

[2] Hospital service prices are largely determined by administered government rates (e.g., Medicare and Medicaid) and negotiated contracts with private insurers, so that demand shocks primarily manifest as changes in patient volume rather than endogenous price adjustments. See https://www.kff.org/health-costs/key-facts-about-hospitals/?entry=national-hospital-spending-spending-by-payer

[3] https://www.kaufmanhall.com/insights/research-report/national-hospital-flash-report-june-2023

and burden of unpaid care (Dranove, Garthwaite, and Ody (2016)). Therefore, by boosting revenue and stabilizing finances, a demand shock is expected to improve hospital service quality.

Conversely, demand shocks may lower quality through congestion effects. The U.S. healthcare system faces a persistent shortage of providers, and a sudden increase in demand could overwhelm capacity, deteriorating access and the timeliness of care.[4] Evidence from major insurance expansions shows that such surges in utilization can lead to longer wait times and delayed emergency response (Miller and Wherry (2017); Courtemanche, Friedson, Koller, and Rees (2019)). Furthermore, even with improved finances, weak governance may prevent hospitals from efficiently allocating new revenues toward quality-enhancing investments (Fangwa, Flammer, Huysentruyt, and Quélin (2024)).

To adjudicate between these competing channels, we leverage the staggered adoption of PSL mandates described above as a source of policy-driven variation in local healthcare demand. Consistent with prior work, PSL adoption is associated with higher healthcare utilization (Chen, Meyerhoefer, and Peng (2020); consistent evidence showing increases in hospital visits is reported in Online Appendix Table OA1). Crucially, the timing and location of PSL adoptions are shaped by broader political and social processes, making them plausibly orthogonal to pre-existing trends in hospital quality, operations, and financial conditions.[5] Consequently, PSL implementation provides a source of exogenous variation in healthcare demand, which we use to estimate its causal effect on hospital quality.

Following the literature, we measure healthcare quality using 30-day patient mortality rates for heart failure, pneumonia, and Chronic Obstructive Pulmonary Disease (COPD). These are widely recognized indicators that reflect treatment effectiveness and the timeliness of medical interventions. To estimate the causal effect of the demand shock, we employ a staggered difference-in-differences design on comprehensive hospital-level data from 2005 to 2019, comparing quality outcomes between hospitals in counties that adopt PSL mandates and those that do not.[6]

Our baseline results indicate that the PSL-induced demand shocks lead to a statistically significant and economically meaningful improvement in quality: hospitals in treated coun-

[4] See FTI Consulting (2025) and AMN Healthcare (2022) for supporting evidence.

[5] In the absence of federal legislation, states and localities have adopted PSL mandates to address equity and labor-market stability. These policies have been enacted through two channels: (i) legislative actions by state legislatures or county councils and (ii) direct-democracy mechanisms such as voter-approved ballot initiatives, reflecting broader political and social processes rather than healthcare-sector-specific considerations.

[6] We assign treatment at the county level based on a hospital's physical location. If a county is covered by multiple mandates, the treatment start date is the earlier effective date. Sub-county level mandates result in the entire county being classified as treated.

ties experience, on average, a 10% reduction in the mortality rate relative to the sample standard deviation. Importantly, mortality rates from CMS Hospital Compare primarily cover patients aged 65 and older, who are largely outside the working-age population. This group is unlikely to alter their care-seeking behavior in response to PSL mandates; therefore, observed reductions in mortality are more plausibly driven by hospital-level adjustments associated with increased demand. Consistent with the mechanism being driven by increased demand, we find that the quality improvement is increasing in the generosity of the PSL mandates and the share of the local workforce gaining coverage.

We validate our main findings with a series of robustness checks. First, we employ two alternative quality measures: patient-reported satisfaction scores and procedural timeliness and effectiveness. Results using these metrics show significant improvements following PSL mandates, corroborating our mortality-based findings. Second, our results are robust to alternative empirical specifications. Using the method in Callaway and Sant'Anna (2021) and a stacked DID model to address heterogeneous treatment effects, our findings remain consistent. The results also hold when using matched samples, ruling out that hospital heterogeneity drives the documented patterns. Finally, we verify that our results are not sensitive to the definition of treatment exposure. When aggregating county-level PSL mandates to the Hospital Service Area (HSA) and Hospital Referral Region (HRR) levels to account for cross-county patient flow, the beneficial effects of the mandates on hospital service quality remain statistically significant.

Next, we rule out several alternative explanations. First, it is unlikely that local economic or political conditions drive our results. Our results remain similar after controlling for an extensive set of county-level characteristics, including measures of regional growth, public health resources, and political composition. Second, we find that the improvements are not mediated by an increase in preventive care (e.g., routine checkups, flu shots), as controlling for its utilization does not alter our findings. Third, we test and reject the hypothesis that PSL mandates improve outcomes by altering hospital case mix, as we observe no significant change in the average severity of admitted patients.

We trace the quality improvements to a financial channel, whereby the demand shock strengthens hospital finances. This is evidenced by a 1.84% increase in net patient revenue and a 5.70% rise in net wealth, driven by both higher revenues and a decline in bad debt. These internal financial gains, in turn, lower borrowing costs, i.e., a 16-basis-point reduction in municipal bond spreads and credit rating upgrades, and enhance overall institutional stability, significantly reducing the risk of hospital closure.

More importantly, this enhanced financial capacity facilitates real investment. Hospitals

increase capital expenditures and expand their investment in human capital, particularly among core medical staffs. This pattern of investment, which includes facility upgrades as well as staff recruitment and retention, directly supports the operational expansions and improvements in care quality that we observe. Taken together, these results suggest that demand shocks enhance product quality by providing hospitals with the financial capacity to undertake quality-improving investments.

Cross-sectional evidence further corroborates the financial channel. The reduction in mortality rates is significantly more pronounced, by 0.07 to 0.15 percentage points, at hospitals that are financially constrained. In particular, hospitals with lower liquidity and standalone institutions, which lack the financial backing of hospital systems and are more reliant on internal cash flows, exhibit the strongest quality improvements following PSL mandates.

Incentives and hospital governance also play a pivotal role in allocating new financial resources in response to PSL-induced demand shocks. Hospitals with weaker profit incentives, particularly government-owned facilities, exhibit greater improvements in quality. This pattern suggests that these hospitals are more likely to direct marginal revenue toward patient care rather than alternative uses. Furthermore, among nonprofit hospitals, those in states with stricter regulatory oversight experience larger quality gains, indicating that external governance encourages a more efficient and quality-focused use of funds. The economic magnitude of these governance-related differentials is substantial, amounting to an additional 0.04–0.64 percentage point decline in mortality rates.

Our study contributes to several strands of literature. First, it contributes to the literature on the effects of demand shocks. Prior work shows that demand shocks have important and persistent effects on firm behavior and outcomes. For example, Dhyne, Kikkawa, Komatsu, Mogstad, and Tintelnot (2025) study the effects of foreign demand shocks on firm responses and real wages, while Hvide and Meling (2023) exploit close procurement auctions and show that temporary demand shocks generate persistent increases in startups' sales, employment, and profitability. Other studies examine how demand shocks affect innovation (Belenzon and Cioaca (2025)), industry structure (Hubbard and Mazzeo (2019)), or income and productivity growth (Bold, Kaizzi, Svensson, and Yanagizawa-Drott (2022)). However, how demand shocks affect product quality is largely underexplored. Existing research primarily studies how quality affects consumer demand (e.g., Jin and Leslie (2003); Pope (2009); Hottman, Redding, and Weinstein (2016)), with far less evidence on the reverse relationship. Leveraging the exogenous increase in healthcare demand induced by PSL mandates, we provide evidence that demand shocks improve healthcare quality, primarily through a financial channel. In the hospital sector, prior studies show that policies that raise demand improve hospitals' financial conditions and stimulate investment (Finkelstein (2007); Duggan, Gupta,

and Jackson (2022); Gao, Lee, and Murphy (2022)). We extend this work by showing that demand shocks translate into real improvements in patient outcomes.

Second, our study speaks to research on how financial constraints shape firm behavior and real outcomes. Corporate finance literature shows that financing frictions materially affect investment and other high-stakes operational decisions, including product pricing, environmental performance, product recalls, and workplace safety (e.g., Rose (1990); Chevalier and Scharfstein (1994); Matsa (2011); Phillips and Sertsios (2013); Cohn and Wardlaw (2016); Kini, Shenoy, and Subramaniam (2017); Bartram, Hou, and Kim (2022); Ge (2022)). More recently, related work extends these insights to the healthcare sector, documenting that financial distress constrains hospital investment and can deteriorate care quality (e.g., Adelino, Lewellen, and Sundaram (2015); Adelino, Lewellen, and McCartney (2022); Aghamolla, Karaca-Mandic, Li, and Thakor (2024)). Building on this line of research, we show that demand shocks induced by PSL mandates enhance healthcare quality by alleviating financial constraints and stimulating investment and employment. In doing so, we provide new evidence on the real effects of financial constraints in hospitals and highlight a demand-driven channel through which financial slack can translate into improved quality.

Third, our study relates to the broader literature at the intersection of healthcare and finance. Prior work shows that public policies, such as the Affordable Care Act (Gao, Lee, and Murphy (2022)) and municipal bankruptcy laws (Rossi and Yun (2024)), affect hospitals' financing costs and investment decisions. Technological changes, such as the expansion of remote service delivery (Cornaggia, Li, and Ye (2024)), also influence hospital financial performance. Other studies document that ownership changes, including private equity acquisitions, have important effects on operations and care quality in nursing homes and hospitals (Gupta, Howell, Yannelis, and Gupta (2024); Gao, Kim, and Sevilir (2025)). Our findings complement this literature by showing that demand-induced improvements in financial conditions translate into higher quality of care. These effects are also stronger among hospitals subject to tighter oversight, connecting to the literature on how governance and market-based disciplinary mechanisms shape health provider performance (e.g., Bloom, Propper, Seiler, and Van Reenen (2015); Lewellen, Phillips, and Sertsios (2023); Lewellen (2025)).

Finally, our paper relates to the literature on the effects of paid sick leave (PSL). Chen, Meyerhoefer, and Peng (2020) and Maclean, Pichler, and Ziebarth (2025) provide evidence that PSL mandates increase coverage rates and work absences. A growing body of research further documents that PSL mandates improve employee welfare, including reductions in workplace injuries (Asfaw, Pana-Cryan, and Rosa (2012)), improvements in mental health (Stoddard-Dare, DeRigne, Collins, Quinn, and Fuller (2018)), and increased time devoted

to childcare (Maclean and Pabilonia (2025)). We extend this literature by examining the spillover effects of PSL-induced demand shocks on the quality and provision of public goods, with a particular focus on hospitals.

The rest of the paper proceeds as follows: Section 2 provides an overview of the institutional background of PSL. Section 3 presents the data and empirical methodology. Sections 4 and 5 report the main results and the underlying mechanisms, respectively. We discuss cross-sectional tests in Section 6. Section 7 concludes.

2 Paid Sick Leave

Paid Sick Leave (PSL) is a policy that allows workers to take time off from work due to illness while still receiving their regular wages. Unlike other high-income countries, the U.S. lacks a national PSL mandate.[7] According to the U.S. Bureau of Labor Statistics (BLS) estimates, in 2008, when the first state initiated PSL mandates, 39% of private-sector workers did not have access to paid sick leave, implying that roughly 42 million out of an approximately 108 million private workforce lacked paid sick leave at that time.[8] Access was highly unequal across worker and firm characteristics: 73% of full-time versus 26% of part-time workers had access, and coverage was 80% in large establishments (>500 employees) versus 52% in small establishments (<100 employees). Access was also far more prevalent among civil servants (87%) than among private-sector workers (61%).[9] These disparities indicate substantial policy headroom and underscore the existence of significant pre-mandate heterogeneity in worker coverage and in the opportunity cost of seeking healthcare.

In the absence of federal legislation, states and localities have enacted PSL mandates through two channels: (i) legislative actions by state legislatures or county councils; and (ii) direct-democracy mechanisms such as voter-approved ballot initiatives, reflecting broader political and social processes rather than healthcare-sector-specific considerations. Online Appendix Figure OA1 plots the staggered adoption of state and local PSL mandates. Once enacted, most mandates apply to all employers within the covered areas, although smaller firms may have different accrual rates, caps, or occasional exemptions. Typical laws allow workers to earn one hour of paid sick leave for every 30–40 hours worked, with an annual

[7] https://cepr.net/publications/contagion-nation-2020-united-states-still-the-only-wealthy-nation-without-paid-sick-leave/

[8] https://www.bls.gov/opub/ted/2009/mar/wk1/art04.htm

[9] https://www.bls.gov/opub/btn/archive/program-perspectives-on-paid-sick-leave.pdf https://www.bls.gov/opub/mlr/cwc/beyond-basic-benefits-employee-access-to-other-types-of-benefits-1979-2008.pdf

cap on accrual. These laws generally cover part-time and temporary workers, though some set a minimum threshold of hours worked. Under PSL mandates, employers are typically responsible for fully covering employee wages during short-term illnesses. The cumulative effect of these provisions has been a marked expansion in PSL coverage across the workforce.[10] As of 2019, the end of our sample period, 75% of private-sector workers had access to PSL.[11]

Conceptually, PSL operates on the leave–wage margin: by providing legally protected paid time off, it lowers the effective price of seeking healthcare and raises income security.[12] Economically, PSL relaxes an income-risk constraint and a time-scheduling constraint, which otherwise deters workers from seeking healthcare. These mechanisms predict outward shifts in healthcare demand. On the extensive margin, more workers initiate care that would otherwise be deferred to avoid lost pay; on the intensive margin, those initiating care consume more visits and services. Consistent with these mechanisms, prior work documents an increase in the utilization of healthcare services following the mandate adoption (e.g., DeRigne, Stoddard-Dare, and Quinn (2016); Chen, Meyerhoefer, and Peng (2020); Maclean, Pichler, and Ziebarth (2025)), and in Online Appendix Table OA1, we show that hospital visits rise significantly after PSL mandates. Importantly, PSL does not alter hospital reimbursement schedules, prices, or capacity; the pathway runs through patients' opportunity cost rather than the healthcare provider-side fundamentals. Moreover, PSL statutes are durable once enacted, implying sustained rather than transitory shifts in local healthcare demand. Taken together, the labor-market locus and the legal durability of PSL statutes imply a plausibly exogenous and persistent positive demand shocks to hospitals.

3 Research Design

3.1 Data and Summary Statistics

3.1.1 Hospital Data

We obtain hospital financial data from the Healthcare Provider Cost Reporting Information System (HCRIS) maintained by the Centers for Medicare & Medicaid Services (CMS). Medicare-certified hospitals, which include almost all hospitals in the U.S., are required to

[10] In the U.S., workers may qualify for leave under the Family and Medical Leave Act (FMLA). Still, coverage is limited, and the leave is unpaid. Thus, PSL mandates help bridge gaps in paid leave coverage.

[11] https://www.bls.gov/news.release/archives/ebs2_09242020.pdf

[12] In contrast to insurance-side reforms such as the ACA—where coverage expansions and reimbursement adjustments jointly move demand and payment schedules—PSL primarily affects patients' opportunity cost and income security while leaving payment regimes intact.

file annual cost reports to CMS. The cost report data covers financial variables at the hospital level, including total assets, total liabilities, revenue, and expenses, among others. It also includes hospital operational measures, including patient volume (e.g., the number of discharges), capacity (e.g., available beds), and the number of employees.

Our sample includes hospital-year observations from 2005 to 2019. The sample period begins in 2005, corresponding to the initial year in which our primary measures of hospital-level healthcare quality became available. We end our sample period in 2019 because the introduction of the Federal-level Families First Coronavirus Response Act (FFCRA) on April 1, 2020, provides universal PSL to employees for COVID-19-related reasons. Moreover, the pandemic introduced substantial changes in patient behavior, hospital capacity utilization, and government interventions, which could obscure the effects of PSL on hospitals. Our sample includes 6,348 unique hospitals.

To assess hospital healthcare quality, we combine the above information with healthcare quality metrics. Our main healthcare quality outcome variable is patient mortality. Mortality rates are commonly used by both government agencies and researchers as key indicators of hospital healthcare quality (e.g., Ho and Hamilton (2000); Beaulieu et al. (2020); Aghamolla, Karaca-Mandic, Li, and Thakor (2024); Gao, Liu, Malik, and Sevilir (2025)). Lower mortality rates indicate improved healthcare quality, insofar as more effective protocols and timelier interventions during the initial hospitalization reduce preventable deaths. Our mortality data is from the CMS Hospital Compare program, where mortality is defined as death occurring within 30 days of admission to an acute care hospital. We focus on three widely studied diseases: heart failure, pneumonia, and Chronic Obstructive Pulmonary Disease (COPD). As defined by the CMS Hospital Compare program, these mortality measures primarily pertain to Medicare beneficiaries aged 65 and older.[13]

We also assess quality along two complementary dimensions. First, patient ratings from the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS), a standardized post-discharge survey mandated by CMS and administered to a representative sample of adult inpatients 48 hours to six weeks after discharge. It captures core dimensions of patients' experiences, including overall satisfaction, pain management, and quality of communication with doctors and nurses. Second, timely and effective care measures from CMS Hospital Compare, which capture the operational performance of care delivery, such as adherence to guideline-recommended treatment timelines and appropriate clinical protocols.[14]

[13]See the official CMS and measure steward documentation: https://p4qm.org/measures/0229, https://www.p4qm.org/measures/0468, and https://p4qm.org/prmr-measures/muc2025-040.

[14]Specifically, these measures include the share of acute myocardial infarction patients receiving PCI within guideline-recommended time windows and the share of patients receiving blood cultures before initial antibiotics, among other domains.

All hospital variable definitions are included in Appendix Table A1, Panels A through D. Summary statistics for the hospitals are presented in Table 1, Panels A through D.

3.1.2 Municipal Bond Data

We obtain municipal bond data from several sources. Information on primary market offerings and bond-level characteristics is drawn from the Mergent Municipal Fixed Income database (Mergent). In the primary market, underwriters group individual bonds (i.e., facilities) into issues; following prior municipal bond research, we collect facility-level data for county bonds. For each bond, Mergent provides the offering yield and key characteristics, including issuance details, maturity and coupon terms, offering amount, credit ratings, and information for general obligation status, insurance, and callability. We collect the county location and the type of municipal issuers from Refinitiv Eikon. Following prior literature (e.g., Cornaggia, Li, and Ye (2024); Gao, Lee, and Murphy (2022)), we identify healthcare municipal bonds based on stated use of proceeds, classifying bonds whose proceeds are designated for hospitals, hospital equipment, or other healthcare purposes. We restrict the sample to bonds with a positive offering amount and a fixed coupon rate. We adjust primary market offering yields using interpolated Treasury rates with matching maturities obtained from the Federal Reserve Bank of St. Louis. Definitions of all bond variables are provided in Appendix Table A1, Panel E, and summary statistics are reported in Table 1, Panel E.

3.2 Empirical Specification

For our main specification, we examine a staggered difference-in-differences (DID) regression to explore the effect of demand shocks on hospital outcomes:

$$Y_{h,c,t} = \alpha + \beta PSL_{c,t} + Controls_{h,t} + \delta_h + \tau_t + \varepsilon_{h,t} \tag{1}$$

In equation (1), $PSL_{c,t}$ is an indicator variable that takes a value of one if hospital h is located in county c that has enacted a PSL mandate in or after year t and zero otherwise. We conduct the analysis at the hospital level and assign treatment at the county level. Hospitals are mapped to the county of their physical location. If a county is covered by both local and state PSL mandates, the treatment start date is the earlier effective date. If a mandate applies to a sub-county jurisdiction, we classify the entire county as treated. $Y_{h,c,t}$ is the outcome variable, which includes measures of hospital healthcare quality, financial performance, and other outcome variables. $Controls_{h,t}$ includes hospital size, hospital beds, and total liability. The parameters δ_h and τ_t denote hospital and year fixed effects, respectively. We include hospital fixed effects to account for unobserved differences at the hospital

level and year fixed effects to control for time-varying factors that may affect all hospitals similarly across years. The coefficient of interest in equation (1) is β, which captures the effect of demand shocks on hospital outcomes.

4 Demand Shocks and Hospital Healthcare Quality

4.1 Baseline Results

As an initial step, we establish that the adoption of PSL mandates constitutes a valid demand shock for hospitals. Prior studies show that PSL mandates increase healthcare utilization (e.g., Chen, Meyerhoefer, and Peng (2020)). We empirically test this implication in our sample. Online Appendix Table OA1 shows that PSL mandates are associated with a statistically significant increase in hospital visits, indicating higher healthcare utilization. These findings are consistent with the adoption of PSL mandates serving as a credible source of exogenous positive demand shocks to local healthcare markets.

Having established PSL mandates as a valid demand shock, we examine their impact on hospital healthcare quality. We measure hospital healthcare quality using mortality rates, defined as death within 30 days of admission to an acute care hospital. Mortality rates are commonly used by both government agencies and researchers as key indicators of hospital healthcare quality (e.g., Beaulieu et al. (2020); Aghamolla, Karaca-Mandic, Li, and Thakor (2024)). Lower mortality rates may reflect improved healthcare quality, insofar as more effective protocols and timelier interventions during the initial hospitalization reduce preventable deaths. Importantly, under the CMS Hospital Compare framework, these mortality measures are defined and reported primarily for Medicare beneficiaries aged 65 or older. Because this population largely falls outside the working-age group, their hospital care–seeking behavior is unlikely to respond directly to paid sick leave mandates. Consequently, these mortality outcomes are unlikely to reflect changes in patients' healthcare-seeking behavior, such as earlier hospital visits, and instead more plausibly reflect hospital-level responses.

We report our baseline results in Table 2. The outcome variables in Column (1) to Column (3) are 30-day patient mortality rates of heart failure, pneumonia, and COPD, respectively. In Column (1), the coefficient for the key variable $PSL_{c,t}$ indicates that the heart failure mortality rate decreases by 0.26% for hospitals located in treated counties, equivalent to 17.33% of its standard deviation (SD = 1.50%). This magnitude is both economically and statistically significant. Similarly, Column (2) shows that treated hospitals experience a 0.25% decrease in pneumonia mortality rate, which represents 9.62% of its standard deviation

(SD = 2.60%). Moreover, we observe a 0.13% reduction in COPD mortality rate, amounting to 13% of its standard deviation (SD = 1.00%). These results demonstrate the positive impact of PSL-induced demand shocks on hospital healthcare quality.

4.2 Parallel Trends

The validity of our DID approach rests on the parallel trends assumption. This analysis addresses the concern that our findings may be driven by fixed or persistent trends in patient outcomes that differ by hospitals or counties. To examine whether a pre-trend exists before the PSL adoption, we estimate the variant of equation (1) as follows:

$$Y_{h,c,t} = \alpha + \sum_{s=-4}^{-2} \beta_s PSL_{c,t}^{s} + \sum_{s=0}^{4} \beta_s PSL_{c,t}^{s} + Controls_{h,t} + \delta_h + \tau_t + \varepsilon_{h,t} \tag{2}$$

In equation (2), $PSL_{c,t}^{s}$ equals one if hospitals located in county c adopted PSL mandates in year t-s and is equal to zero otherwise. For example, $PSL_{c,t}^{-3}$ equals one for the year t that is three years before when hospitals located in county c initiated PSL mandates ("year 0"). When estimating equation (2), we omit $PSL_{c,t}^{-1}$, setting year t-1 as the reference year. The interpretation of β_s is that it captures the relative difference between hospitals in treatment counties and hospitals in control counties in each year, relative to the reference year t-1.

Figure 1 depicts parallel trends estimation of β_s for our main outcomes related to hospital mortality rates. In each panel, the dots represent point estimates of the coefficients, while the solid lines represent 95 percent confidence intervals. In all three panels, patient mortality trends are similar between hospitals in treatment and control counties before the implementation of PSL mandates. However, after the PSL mandate year, the mortality rates exhibit a significant decline in treated hospitals relative to controls. Evidence in Figure 1 shows that the parallel trends assumption holds in our setting.

4.3 Robustness Checks

4.3.1 Alternative Healthcare Quality Measures

To validate our main findings, we use alternative measures of hospital healthcare quality that complement our outcome-based mortality indicators along two distinct but related dimensions: (i) patient-reported ratings, which provide insights into healthcare quality from the patient's perspective, and (ii) timely and effective care outcomes, which capture the operational effectiveness of care delivery.[15] Considering these dimensions jointly allows us

[15](i) Patient-reported ratings are based on survey responses collected from adult patients shortly after discharge. The survey includes questions on critical dimensions of hospital healthcare, such as the overall

to assess whether improvements in hospitals' clinical outcomes are also reflected in patients' evaluations of their healthcare experience and in process-oriented measures of quality.

The results of patient ratings are presented in Table 3. We can see that across all question categories, patient satisfaction increases significantly at hospitals located in treatment counties relative to hospitals located in control counties. For example, the average patient rating for overall healthcare quality increases by 0.0048, which is 3.58% of the sample standard deviation. These results align with the observed improvements in healthcare quality and support the idea that medical staff in affected hospitals are more attentive and responsive to patient needs. We also examine the parallel trends of PSL on hospital patient ratings and report the results in Figure 2. We find no significant differences in hospital patient ratings between hospitals in counties with PSL mandates and those without in the pre-period. After the adoption of PSL mandates, in contrast, we observe an apparent increase in the treatment effect. Based on the average coefficient estimates before and after PSL adoption, we find that the parallel trend assumption holds.

To provide further evidence that PSL-driven demand contributes to improvements in hospital healthcare quality, we examine the impact of PSL mandates on timely and effective care outcomes. The results are presented in Table 4. Our analysis reveals significant enhancements in timely and effective care across a diverse range of medical procedures following the implementation of PSL mandates. These improvements reflect reductions in treatment delays and optimization of resource utilization, which are critical dimensions of healthcare quality as defined by established frameworks such as the Institute of Medicine's six aims for quality care. The observed enhancements in timely and effective care suggest that PSL-driven alleviation of financial constraints enables hospitals to allocate more resources and better coordinate clinical processes, ultimately resulting in higher healthcare quality.

Taken together, the patient-experience evidence and the process-oriented evidence deliver a coherent robustness pattern: PSL mandates, as plausibly exogenous demand shocks, are associated with improved healthcare quality. These effects are unlikely to reflect broader trends or pre-existing hospital characteristics. The evidence instead suggests a demand-driven mechanism: greater patient volume strengthens hospital finances and operations, thereby improving healthcare quality. Section 5 examines these channels.

hospital rating, the likelihood of recommending the hospital, the effectiveness of pain management, communication with nurses and doctors, the cleanliness and noise levels in the hospital, and the clarity of discharge instructions. (ii) Timely and effective care measures from CMS Hospital Compare, which capture the operational performance of care delivery, such as adherence to guideline-recommended treatment timelines and appropriate clinical protocols. Specifically, these measures include the share of acute myocardial infarction patients receiving PCI within guideline-recommended time windows and the share of patients receiving blood cultures before initial antibiotics, among other domains.

4.3.2 Alternative DID Approach

As noted by Baker, Larcker, and Wang (2022), when treatment effects vary across groups or over time, using earlier-treated units as controls for later-treated ones may introduce bias. In such cases, observed differences in outcomes may reflect evolving treatment effects rather than causal impacts. To address the potential bias, we conduct stacked regressions following Cengiz, Dube, Lindner, and Zipperer (2019) and apply the Callaway and Sant'Anna (2021) estimator. These approaches allow us to estimate the static average treatment effect of the treated (ATT). In these estimations, the control groups are "clean" or "good" in the sense that we use the set of control hospitals that are not treated at all.

We report the corresponding estimation results in Online Appendix Table OA2. In columns (1)-(3), we use stacked regressions. We construct a "clean" cohort for each time-specific PSL implementation, where we observe each cohort in a $[-4, 4]$ window (i.e., 4 years before to 4 years after the adoption year) and stack these cohorts together. We estimate the regression on the stacked dataset, and we include cohort-hospital and cohort-year fixed effects and cluster standard errors at the cohort-hospital level. The resulting coefficients are smaller in magnitude than those in Table 2, but remain significantly negative. Columns (4)–(6) report results obtained using the Callaway and Sant'Anna (2021) estimator. We include hospital and year fixed effects, implying that the coefficient estimate is best compared with the estimate from Table 2. Consistent with the stacked regression results, the estimated effects remain negative and statistically significant. Overall, these alternative estimators reinforce the robustness of our main findings by mitigating biases arising from heterogeneous treatment effects and staggered treatment adoption (Baker, Larcker, and Wang (2022)).

4.3.3 Matched Sample Analysis

We conduct two matched-sample analyses to mitigate potential differences between treatment and control hospitals. First, we implement a propensity score matching (PSM) procedure. Specifically, for each hospital located in a treatment county in the year before the enactment of PSL mandates, we identify five control hospitals located in non-mandate counties that are similar in observable characteristics used in our baseline regressions, including hospital size, number of beds, total liabilities, and pneumonia patient mortality rate. This matching strategy enables a more comparable sample between treated and control hospitals prior to policy adoption. We then re-estimate our main specification using the PSM-matched sample and include cohort-matched group fixed effects, hospital fixed effects, and year fixed effects. Cohort-matched group fixed effects are separate indicators for each group of matched treated and control hospitals in each time-specific PSL implementation. Including these fixed effects helps us compare within a group of treated and control hospitals. We report the re-

sults in Columns (1)-(3) of Online Appendix Table OA3. Our main results remain valid in this matched sample. Next, we employ entropy balancing using the full sample as an alternative matching approach. This method reweights the observations to ensure that the covariate distributions between treatment and control groups are balanced while retaining all available data. The results, shown in Columns (4)–(6) of Online Appendix Table OA3, are consistent with our baseline estimates. Taken together, the evidence in Online Appendix Table OA3 alleviates concerns that our main results are driven by sample selection or covariate imbalance, thereby reinforcing the robustness and validity of our findings.

4.3.4 Alternative Treatment

To verify that our results are not sensitive to the definition of treatment exposure, we construct alternative measures at different levels of the healthcare market. Although we sign treatment at the county level, patients could receive hospital care across county boundaries, within broader healthcare markets defined by patient flows and referral patterns. To capture these patterns, we follow the Dartmouth Atlas of Health Care and aggregate county-level PSL policies to the hospital service area (HSA) and hospital referral region (HRR) levels. HSAs represent local hospital markets, typically consisting of one or several neighboring counties whose residents mainly seek inpatient care from the same hospitals. HRRs, in contrast, are larger regional markets composed of multiple HSAs, defined based on where patients travel for specialized or tertiary care services such as cardiovascular surgery.

A hospital is classified as treated if any county within its HSA (or HRR) enacted a PSL mandate in or after year t. Columns (1)–(3) of Online Appendix Table OA4 report results using the HSA-based definition, while Columns (4)–(6) use the HRR-based definition. Across both specifications, PSL exposure is associated with statistically and economically significant reductions in mortality rates. The consistent results across these alternative definitions of treatment support the robustness of our baseline findings and suggest that the beneficial effects of PSL mandates extend across broader healthcare market boundaries.

4.4 Alternative Explanation

4.4.1 The Potential Effect of the Local Economy

An alternative explanation could be that local economic conditions may simultaneously influence both the adoption of PSL mandates and hospital healthcare quality. For instance, a thriving local economy could independently improve healthcare quality, confounding the observed relationship. Similarly, higher local healthcare spending may lead to better outcomes, and Democratic-leaning areas—which are more likely to adopt PSL mandates—may also prioritize healthcare investments. In addition, broader insurance expansions under the

Affordable Care Act (ACA) may coincide with PSL adoption and affect hospital outcomes.

To address these potential confounding factors, we include additional controls in our main regression, including regional GDP, local personal income, population growth, local government healthcare expenditure per capita, the political status of the county (democratic or republican), and the Medicaid insurance rate. The results, reported in Online Appendix Table OA5, show that our findings remain robust after accounting for these variables.[16] This suggests that the improvements in hospital healthcare quality are not driven by economic or political confounders, but are attributable to the demand shocks created by PSL mandates.[17]

4.4.2 Preventive Care

Another possible explanation for our main findings is that PSL mandates enable individuals to take more preventive care services, thereby reducing the severity of illnesses and leading to decreased hospital mortality rates. For example, Callison, Pesko, Phillips, and Sosa (2023) and Jeung, Lee, and Gimm (2021) find that PSL mandates lead to increased utilization of preventive care, such as routine checkups and cancer screenings. To address this concern, we reestimate equation (1) and add the local routine checkup rate and the flu shot rate as additional controls.[18] The results are reported in Online Appendix Table OA6 and our findings remain robust. This suggests that the observed improvements in hospital healthcare quality are attributable to the demand shocks associated with PSL mandates, rather than increases in preventive care usage.

4.4.3 Change in Patient Severity

Another potential concern is that PSL mandates may encourage more timely hospital visits, allowing patients to receive earlier treatment and thereby reducing the average severity of admitted cases. This mechanism could also lead to lower hospital mortality rates. To examine this possibility, we investigate whether the overall severity of hospitalized patients decreases following the adoption of PSL. We measure patient severity using the Case Mix Index (CMI), defined as the average diagnosis-related group (DRG) relative weight for each hospital. The CMI reflects the diversity, complexity, and clinical severity of patients treated at a healthcare facility.[19] The results, reported in Online Appendix Table OA7, show no

[16]The Medicaid insurance rate became available in 2008, so we present separate results that include this rate in columns (4)-(6) of Online Appendix Table OA5.

[17]To further control for the potential impact of a county's political status on healthcare outcomes, we conduct a propensity score matching (PSM) analysis by matching hospitals within counties that share the same political leaning, and the results remain consistent with our main findings.

[18]The data is from BRFSS: https://www.cdc.gov/brfss/questionnaires/index.htm.

[19]See https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/acute-inpatient-files-for-download-items/cms022630.

significant change in the CMI. This finding suggests that the observed improvements in hospital healthcare quality are primarily driven by demand-side effects associated with PSL mandates, rather than changes in the composition or severity of hospitalized patients.[20]

4.5 Variation in Treatment Intensity

In our baseline analysis, we capture PSL mandates using a binary indicator. However, these laws vary in intensity, both in the maximum number of guaranteed sick days and in the proportion of workers expected to gain coverage. We expect larger impacts on healthcare quality when treatment intensity is greater. To test this prediction, we interact the PSL indicator with treatment intensity measures. We first examine heterogeneity in the maximum number of annual paid sick days guaranteed to employees under each mandate. In our sample, statutory requirements exhibit substantial heterogeneity, ranging from 3 to 9 days. [21] Column (1) to Column (3) of Table 5 reports the results. The coefficient on the interaction term is negative and statistically significant, indicating that mortality declines are larger in counties where mandates provide more paid sick leave days. Next, we explore variation in the proportion of workers expected to gain coverage under each mandate. We construct a Mandate Coverage Ratio, defined as the number of newly covered workers divided by county employment, with the numerator obtained from the National Partnership for Women and Families. Broader mandate coverage implies a greater expansion in healthcare demand. Columns (4) to (6) of Table 5 present the results. The interaction term is again negative and significant, showing that hospital quality improves more in counties where a larger fraction of workers becomes eligible for PSL benefits. Taken together, these findings demonstrate that the intensity of PSL mandates differentially affects healthcare demand and, in turn, shapes the magnitude of hospital quality improvements.

5 Underlying Mechanism

In this section, we investigate the mechanisms through which demand shocks improve hospital healthcare quality. U.S. hospitals face significant financial challenges due to revenue volatility and the burden of uncompensated care (Duggan, Gupta, and Jackson (2022);

[20] We further split the hospital sample into two groups based on the share of Medicare patient discharges. Medicare patients are typically aged 65 or older or are disabled, and thus are unlikely to be directly affected by PSL mandates in their healthcare-seeking behavior. We find that the estimated effects are slightly stronger among hospitals with a higher proportion of Medicare patients, further suggesting that our results are unlikely to be driven by changes in patient severity associated with more timely treatment induced by PSL. These results are available upon request.

[21] Washington is omitted from the analysis, as its PSL law does not establish an annual cap.

Dranove, Garthwaite, and Ody (2016)). Prior research establishes that financial constraints can undermine healthcare quality by limiting hospitals' ability to invest in staff and facilities (Adelino, Lewellen, and McCartney (2022); Aghamolla, Karaca-Mandic, Li, and Thakor (2024)). Recent evidence (Gao, Lee, and Murphy (2022)) suggests that increased healthcare demand, particularly among patients who would otherwise delay or ration healthcare due to financial concerns, can enhance hospital financial performance. If PSL-induced demand shocks strengthen hospitals' financial positions, the improved financial conditions can enable greater investment in human capital and physical infrastructure, thereby improving healthcare quality.

5.1 Enhanced Cash Flow and Financial Conditions

We begin by examining how PSL-induced demand impacts hospital financial conditions, focusing on three key dimensions: revenue, unpaid bills and bad debts, and net wealth.

First, we examine hospital revenue, measured as inpatient revenue growth, outpatient revenue growth, total hospital revenue growth, and net patient revenue growth. As reported in Columns (1)–(4) of Table 6, PSL mandates are associated with statistically and economically significant increases in hospital revenue growth rates. Specifically, hospitals located in counties subject to PSL mandates experience 2.10%, 1.41%, 1.58%, and 1.84% higher inpatient, outpatient, total, and net patient revenue growth, respectively. Notably, the increase in net patient revenue growth is particularly important because this measure reflects the actual financial inflow to hospitals—after accounting for contractual allowances and reimbursement adjustments from private insurers, Medicare, Medicaid, and patients—rather than the billed amount at discharge. Thus, the improvement in net patient revenue growth suggests that the increased healthcare utilization induced by PSL mandates translated into realized payments rather than mere accounting changes. These results suggest that PSL policies facilitate greater patient access to healthcare, resulting in higher service utilization and increased revenues.[22]

We then assess hospitals' short-term liquidity and financial efficiency by examining unpaid patient bills, which serve as a proxy for accounts receivable. Column (5) indicates a 3.25% reduction in the ratio of unpaid bills to hospital assets, suggesting that PSL mandates improve hospitals' ability to collect payments and strengthen their cash flow positions. To capture the financial burden more directly, we further examine bad debt, representing accounts that hospitals are unable to recover.[23] As shown in Column (6), PSL mandates

[22]Our analysis in Online Appendix Table OA8 reveals that hospital profit margins did not rise, indicating that hospitals did not capitalize on increased demand by raising profit margins.

[23]The CMS revised hospital disclosure requirements in 2010, and from this year onward, the bad debt

are associated with a significant decline in the ratio of bad debt to hospital assets. Overall, these results highlight that PSL policies alleviate hospitals' exposure to unpaid healthcare costs and enhance their financial stability by improving liquidity and reducing uncollectible receivables.

Next, we examine the impact on hospital net wealth by analyzing fund balances, which reflect cumulative financial surpluses available for future operations and investments. Column (7) shows that PSL-driven demand shocks lead to significant increases in total fund balance growth. The total fund balance growth rises by 5.70%. These results suggest that PSL-driven demand shocks contribute to the long-term financial sustainability of hospitals, potentially reducing financial distress risk and enhancing access to external financing.

Finally, consistent with the improved financial conditions documented above, we also find that PSL mandates enhance hospital viability. Using county-year data from the AHA Annual Survey, we estimate Poisson regressions of hospital closures and total exits (closures or mergers/acquisitions) on PSL mandates. As shown in Online Appendix Table OA9, the coefficients on PSL are -0.698 and -0.835, respectively, and are statistically significant. The estimates imply that PSL mandates reduce hospital closures by approximately [exp(-0.698)-1 = -50%] and exits by [exp(-0.835)-1 = -56%]. These results suggest that the improved financial positions induced by PSL policies ultimately translate into greater hospital viability and a lower risk of market exit.

Overall, the results provide evidence that hospitals' financial conditions improve following the adoption of PSL mandates. These improvements align with the conjecture that PSL mandates reduce financial and temporal barriers to healthcare access, thereby increasing patient utilization, enhancing hospital financial conditions, and contributing to stronger hospital financial performance.

5.2 Reduced External Borrowing Costs

Having established that PSL-driven demand shocks enhance hospitals' internal cash flows and overall financial health, we next examine whether these positive financial effects extend to the cost of external financing. Given that hospitals are highly reliant on external borrowing (Aghamolla, Karaca-Mandic, Li, and Thakor (2024)), a reduction in borrowing costs attributable to PSL-induced demand could further alleviate financial constraints and enhance hospital performance. Specifically, we estimate the following equation using primary-market healthcare municipal bonds to measure the impact of demand shocks on hospital borrowing costs:

variables are consistently defined.

$$Y_{b,c,t} = \alpha + \beta PSL_{c,t} + X_{b,t} + Z_{c,t} + \delta_c + \tau_t + \varepsilon_{b,c,t} \tag{3}$$

where the outcome variables $Y_{b,c,t}$ include measures of municipal bond offering yield spread and bond rating at issuance. $PSL_{c,t}$ is an indicator variable that takes a value of one if county c has enacted a PSL mandate in or after year t and zero otherwise. $X_{b,t}$ is a vector of bond-level characteristics that include the following: (1) the number of years until maturity and the inverse number of years until maturity; (2) the natural log of the issuance size of the bond; (3) indicator variables for whether the bond is insured, callable, and tax exempted; (4) indicator variables for whether the bond is issued through competitive bidding; (5) indicator variables for the bond credit rating. $Z_{c,t}$ is a vector of county-year-level economic factors that include county-level annual population and income per capita. We include county fixed effects δ_c and year fixed effects τ_t.

The results are reported in Table 7. The coefficient for the key explanatory variable $PSL_{c,t}$ reported in Column (1) is 16.46 bps, indicating a significant decrease in the healthcare municipal bond offering yield in treated counties compared to healthcare municipal bonds issued by hospitals in control counties. These basis points translate to approximately one hundred thousand dollars of interest expense for a typical affected hospital over the life of the bond. The economic magnitude is substantial, given that the standard deviation of the average offering spread for healthcare municipal bonds is 81.10 bps. Since default risk is the primary determinant of municipal bond spreads (e.g., Schwert (2017); Novy-Marx and Rauh (2012)), we further investigate whether PSL mandates affect healthcare municipal bond credit ratings. Column (2) in Table 7 reports the results. We find the coefficient for the key explanatory variable $PSL_{c,t}$ reported in Column (2) is significantly positive. These findings suggest that bond credit ratings improve following PSL mandates, indicating that PSL has a positive impact on the credit quality of healthcare municipal bonds as evaluated by credit rating agencies. Taken together, the results in Table 7 provide evidence that PSL-induced demand shocks enhance hospital credit quality and lower external borrowing costs.

5.3 Increased Hospital Real Investment

Building on our previous findings that PSL-driven increases in patient demand enhance hospital revenue, reduce bad debt, and lower borrowing costs, we next examine real investment responses as a mechanism linking demand to quality of care. The production of high-quality hospital services is capital- and skill-intensive, requiring sustained investment in fixed assets, clinical technology, and human resources. If demand-driven financial relief relaxes financing frictions, hospitals should be able to allocate resources toward quality-

enhancing investment.

To investigate the underlying mechanism, we analyze the impact of PSL mandates on hospital investments in both fixed assets and human capital. We first assess hospital capital expenditures, calculated as fixed asset investment normalized by total assets. As shown in Column (1) of Table 8, PSL mandates are significantly and economically associated with increased hospital investments. Specifically, hospitals located in counties subject to PSL mandates exhibit a 1.59% increase in fixed asset investment relative to their total assets.

Next, we examine the effects on hospital human capital, with particular focus on core medical workers.[24] Columns (2) to (4) show that PSL mandates significantly increase total hospital staff, core medical workers, and administrative personnel, with the most potent effect on core medical staff. Columns (5) to (7) reveal notable salary growth driven mainly by higher pay for core medical workers. Additionally, Columns (8) and (9) indicate rising average salaries for core medical staff, while average salaries for administrative workers slightly decline. The growth in core medical personnel—physicians, nurses, and frontline clinical staff—is crucial, as they directly provide diagnosis, treatment, and healthcare. Expansion in the core medical workforce is closely tied to better healthcare quality.

Collectively, Table 8 shows that PSL-induced cash flow gains are followed by increased investment in both infrastructure and human capital, including expanding equipment and facilities, hiring more core clinical staff, and raising salaries to attract and retain skilled workers. These changes indicate reductions in staff shortages, improvements in diagnostics, and enhancements in patient care. By easing financial constraints, PSL-induced demand strengthens hospital capacity and efficiency, supporting the improvements in healthcare quality shown in Tables 2, 3, and 4.

6 Cross-sectional Tests

Our previous analysis is consistent with a financial-channel interpretation: PSL-induced demand is associated with stronger operating revenues, lower borrowing costs, and subsequent increases in investment in fixed assets and human capital, alongside the improvements in hospital quality of care. To further substantiate the underlying mechanism, we examine cross-sectional heterogeneity in hospital responses to PSL-induced demand shocks, focusing on how financial constraints and hospital governance shape the quality effects.

[24] We define core medical workers following the methodology in Gao, Kim, and Sevilir (2025). Hospital core employees include nurses, physicians, and pharmacists.

6.1 Hospital's Internal Liquidity

To further validate that the observed improvements in healthcare quality are driven by alleviation of financial constraints related to demand shocks, we examine whether hospitals facing greater financial constraints exhibit larger quality gains following PSL mandates. Specifically, we use the ratio of current assets to total assets as a proxy for internal liquidity. Hospitals with lower internal liquidity face greater financial constraints and more difficulty in funding operations and capital investments. We divide the sample into two subsamples based on the median of hospital current assets to total assets. Hospitals with higher than median internal liquidity are classified as the "High Liquidity" group, while hospitals with lower than median internal liquidity are classified as the "Low Liquidity" group.

The results are presented in Panel A of Table 9. In Columns (1) and (2), we observe that the "High Liquidity" group experiences a 0.20% decrease in heart failure mortality rate, while the "Low Liquidity" group experiences a more pronounced 0.33% decrease in heart failure mortality rate. The differences in coefficients between the two groups are also statistically significant. Columns (3) to (6) demonstrate similar patterns for pneumonia and COPD mortality rates, indicating larger quality gains among lower-liquidity hospitals following PSL implementation. Taken together, the evidence is consistent with demand-induced easing of financing frictions, under which more liquidity-constrained hospitals experience larger gains in quality of care.

6.2 Health System Affiliation

In the previous subsection, we show that the quality improvement effect of PSL-driven demand shocks is more pronounced for hospitals with lower internal liquidity. Next, we explore the role of external financial support, as hospitals with more financial backing may be less sensitive to PSL-induced demand shocks. Specifically, we investigate whether hospitals are part of a health system, as these systems function as internal capital markets, and hospitals within a health system are typically in better financial standing (Cornaggia, Li, and Ye (2024); Andreyeva, Gupta, Ishitani, Sylwestrzak, and Ukert (2024)). Therefore, we expect the quality-enhancing effects of PSL-induced demand to be larger among independent hospitals, which rely more on internal cash flows and are thus more financially exposed to changes in demand.

Following Cornaggia, Li, and Ye (2024), we identify whether a hospital is part of a chain from lines 141-143 of hospital cost reports. We classify hospitals affiliated with health systems as the "System" group and the others as the "Non-system" group. Then, we repeat our baseline analysis for the two groups, respectively. Panel B of Table 9 presents the results.

While PSL-driven improvements in healthcare quality are observed in both groups, the effects are substantially stronger among independent hospitals. This evidence is consistent with our financial mechanism hypothesis: hospitals with limited external financial support benefit more from the demand-driven financial relief resulting from PSL mandates.

6.3 Profit-seeking and Governance in Hospitals

We provide evidence that PSL-driven demand shocks lead to improvements in hospital financial performance, resulting in increased cash flow. However, profit-oriented hospitals may prioritize maximizing financial returns over reinvesting in patient healthcare. This profit-seeking behavior can undermine the potential benefits of increased financial resources. Moreover, this influx of funds may introduce governance challenges and managerial discretion issues. For instance, the classic agency problems associated with discretionary cash flow in for-profit organizations (e.g., Jensen (1986)) may also be relevant in the hospital setting. We expect that quality improvements following PSL mandates will be more pronounced in hospitals with weaker profit-seeking incentives and stronger governance structures.

Ownership structure plays a critical role in shaping the incentives and behavior of hospitals. Prior studies have shown that hospitals with different ownership types exhibit distinct profit-seeking behaviors (Horwitz and Nichols (2009); Bayindir (2012)). Government-owned hospitals tend to prioritize social welfare over profit maximization, making them more likely to offer unprofitable but socially beneficial treatments. Therefore, we hypothesize that government-owned hospitals are more likely to allocate additional cash flows toward improving healthcare quality when PSL mandates generate demand shocks. To test this hypothesis, we divide our sample into two subsamples: government-owned hospitals ("GO" group) and non-government-owned hospitals ("Non-GO" Group). We then conduct our baseline analysis separately for each group. The results, presented in Panel A of Table 10, show that the effects are stronger for government-owned hospitals, consistent with our hypothesis.

Monitoring nonprofits is crucial to prevent expropriation, and significant variations exist among states in terms of the extent and rigor of local oversight. The primary legal oversight of nonprofits is typically delegated to the state level (Fisman, Hubbard et al. (2003); Malani, Philipson, and David (2003)). This disparity in state-level governance mechanisms presents an opportunity to examine the heterogeneous effects of state oversight on nonprofit hospitals. Specifically, we investigate how variations in state oversight influence the impact of PSL mandates on healthcare quality among nonprofit hospitals. We use the score of State-Level Oversight by Attorneys General developed by Fisman, Hubbard et al. (2003) to measure the strength of state oversight. We divide our sample into two subsamples based on state oversight: hospitals located in states with an oversight score above the median of our sample

states are classified as the "High Monitor" group, while the others are classified as the "Low Monitor" group. We then repeat our baseline analysis for these two groups separately. The results presented in Panel B of Table 10 indicate that the quality effects of PSL-driven demand shocks are significant only among hospitals operating under stronger state oversight.

The findings in Table 10 suggest that weaker profit motives and stronger governance amplify the positive impact of PSL-driven demand shocks on hospital healthcare quality.

7 Conclusion

In this study, we examine how demand shocks affect product quality in the hospital sector. By leveraging the staggered adoption of local PSL mandates as positive shocks to healthcare demand, we demonstrate that demand shocks lead to notable improvements in hospital health quality, as evidenced by lower mortality rates, higher patient satisfaction ratings, and better timely and effective care outcomes. Our findings are robust after accounting for potential confounding factors related to local economic conditions, political factors, preventive care utilization, and change in patient severity, confirming that the observed improvements in hospital healthcare quality are primarily driven by PSL-induced demand shocks rather than other factors.

The results are consistent with a financial channel. Our mechanism analysis shows that PSL-induced demand strengthens hospital financial performance, reduces borrowing costs, and enables greater investment in physical infrastructure and human capital. Cross-sectional evidence indicates larger quality gains among hospitals with lower liquidity, less external financial support, weaker profit motives, and stronger governance. These results highlight that the quality gains from demand shocks are most pronounced where financial constraints bind and resource allocation is more efficient. The risk of hospital closure also declines after PSL mandates, further supporting a financial channel in which stronger financial performance translates into greater institutional stability.

Overall, our study demonstrates that positive demand shocks induced by the staggered adoption of PSL mandates can significantly improve hospital healthcare quality. These findings underscore that labor market policies, through their impact on healthcare demand, can generate substantial spillover benefits across sectors and provide new insights for policymakers seeking to improve healthcare delivery and hospital resilience.

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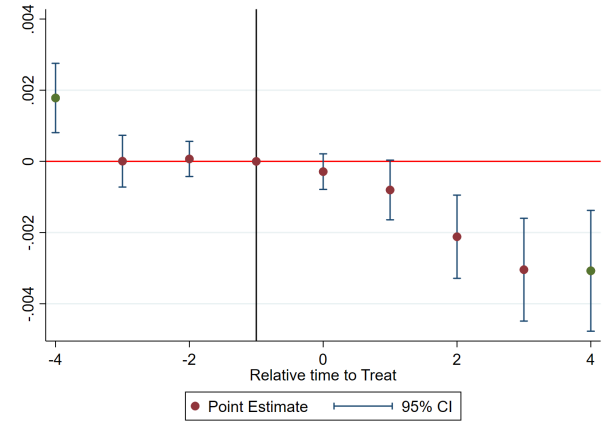
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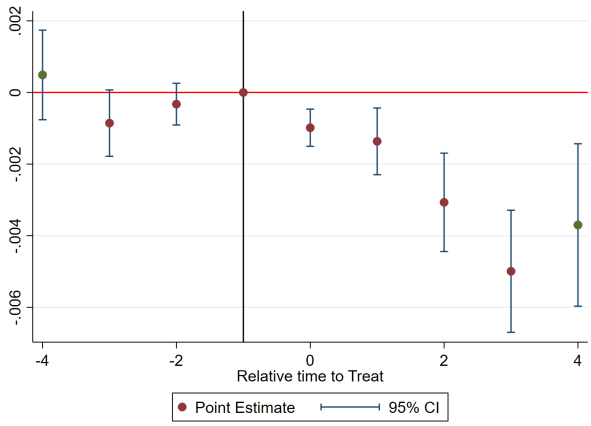
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Figure 1. Parallel Trend of Hospital Healthcare Quality

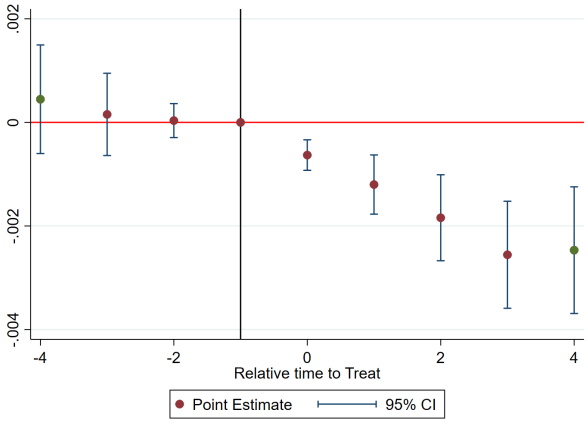
This figure plots the dynamic effects of PSL mandates on hospital healthcare quality over a 9-year window following the method in Equation (2). Circles in the middle represent annual estimated coefficients; short horizontal lines above and below the point estimates indicate the 95% confidence interval.



(a) HF_Mortality



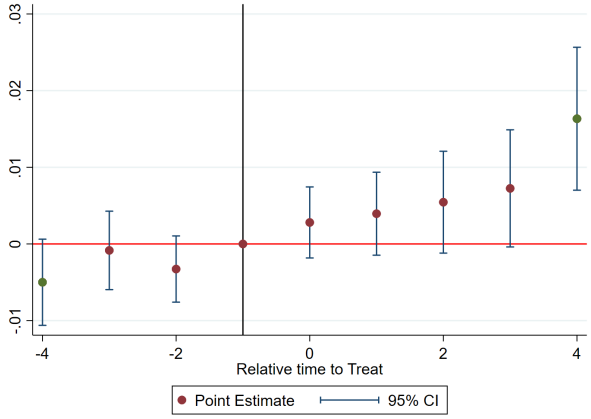
(b) PN_Mortality



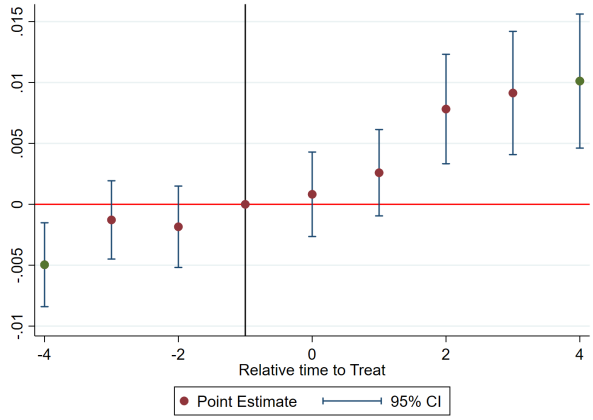
(c) COPD_Mortality

Figure 2. Parallel Trend of Hospital Patient Ratings

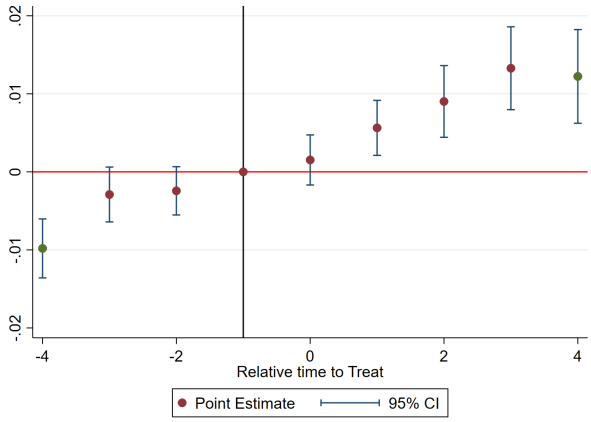
This figure plots the dynamic effects of PSL mandates on hospital patient ratings over a 9-year window following the method in Equation (2). Circles in the middle represent annual estimated coefficients; short horizontal lines above and below the point estimates indicate the 95% confidence interval.



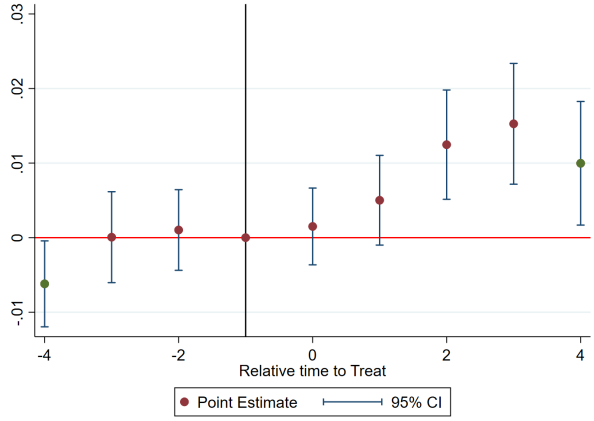
(a) Clean



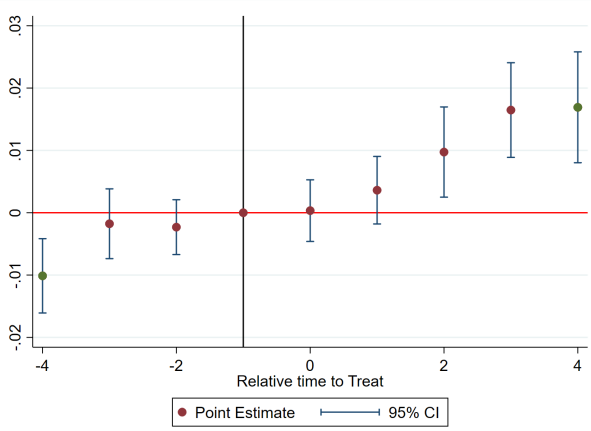
(b) Commdoc



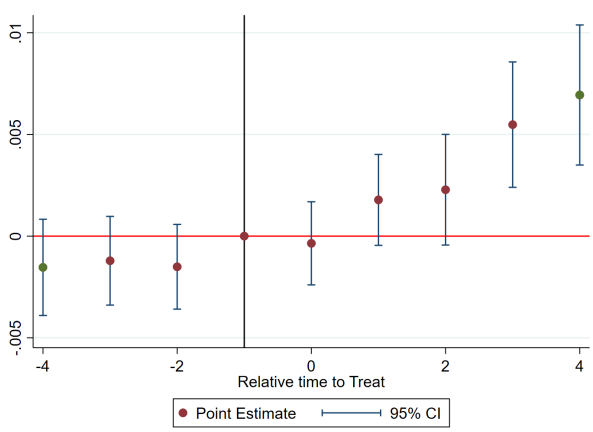
(c) Comnurse



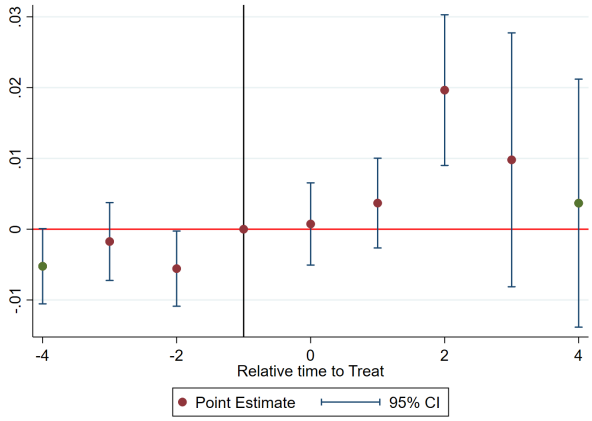
(d) Explain



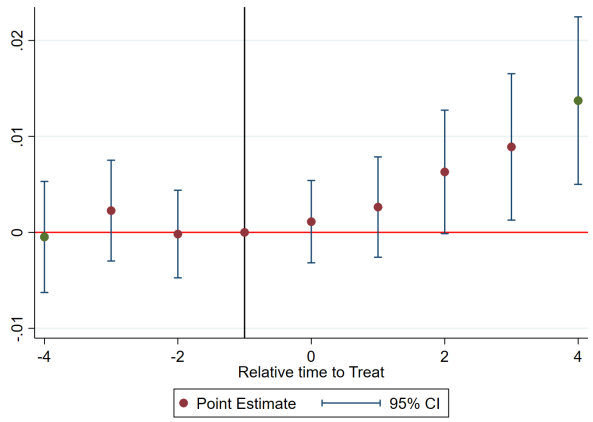
(e) Help



(f) Info



(g) Pain



(h) Overall

Table 1. Summary Statistics

This table shows the summary statistics of key variables. Panel A displays the results of hospital-level data, Panel B displays the results of patient healthcare outcomes, Panel C displays the results of hospital patient ratings, Panel D displays the results of hospital timely and effective care, and Panel E displays the results of healthcare bond data. Panels A, B, C, and D are at the hospital-year level. Panel E is at the bond level. The sample period is from 2005 to 2019. Detailed variable definitions are in Appendix Table A1.

Panel A: Hospital Variables						
Variable	N	Mean	SD	P25	P50	P75
InRevGR	77,028	0.069	0.263	-0.021	0.042	0.106
OutRevGR	71,154	0.112	0.295	0.025	0.082	0.143
TotRevGR	77,028	0.085	0.206	0.015	0.064	0.115
NetRevGR	76,918	0.062	0.226	-0.008	0.041	0.090
UPBillAT	75,826	0.436	0.525	0.151	0.270	0.501
BadDebtsAT	36,062	0.117	0.155	0.030	0.062	0.136
FundbalGR	76,413	0.098	1.073	-0.070	0.054	0.173
Size	77,028	17.636	1.702	16.395	17.609	18.892
Bedtfac	77,028	4.252	1.110	3.219	4.189	5.134
Totliab	77,028	16.776	1.846	15.470	16.827	18.126
Invest	77,020	0.131	0.472	-0.007	0.045	0.128
Employee	51,155	0.017	0.439	-0.029	0.007	0.040
Core_Worker	50,350	0.077	0.788	-0.092	0.011	0.112
Admin_Worker	50,717	0.036	0.604	-0.060	0.006	0.067
Wage	51,092	0.066	0.517	0.000	0.037	0.074
Core_Wage	51,214	0.120	0.990	-0.080	0.037	0.151
Admin_Wage	51,937	0.064	0.596	-0.040	0.041	0.115
Core_Awage	48,442	0.055	0.343	-0.031	0.024	0.084
Admin_Awage	48,789	0.053	0.232	-0.020	0.033	0.091
Panel B: Patient Healthcare Outcomes						
HF_Mortality	51,049	0.116	0.015	0.106	0.115	0.125
PN_Mortality	55,323	0.134	0.026	0.114	0.132	0.153
COPD_Mortality	22,123	0.083	0.010	0.076	0.082	0.089

Panel C: Hospital Patient Ratings						
Clean	44,821	2.649	0.121	2.570	2.650	2.730
Commdoc	44,821	2.769	0.076	2.720	2.770	2.820
Commnurse	44,822	2.740	0.087	2.690	2.750	2.790
Explain	44,776	2.446	0.129	2.370	2.440	2.520
Help	44,817	2.578	0.142	2.490	2.580	2.670
Info	44,820	0.849	0.053	0.820	0.860	0.880
Pain	34,042	2.633	0.086	2.590	2.640	2.680
Overall	44,822	2.622	0.134	2.540	2.630	2.710
Panel D: Hospital Efficient Care						
PCI	12,977	0.817	0.215	0.730	0.900	0.970
VTE–1	8,963	0.897	0.145	0.880	0.940	0.980
VTE–5	7,687	0.892	0.161	0.850	0.950	1.000
BCBA	28,169	0.916	0.103	0.890	0.950	0.980
TimelyAbx	25,594	0.898	0.118	0.860	0.940	0.980
UCRQ	14,798	0.938	0.091	0.920	0.970	0.990
Panel E: Bond Variables						
Offering_Spread	8,169	0.419	0.811	-0.130	0.377	0.890
Size	8,169	13.377	1.387	12.367	13.218	14.166
Maturity_Year	8,169	9.134	6.223	4.000	8.000	13.000
I_Maturity_Year	8,169	0.213	0.232	0.077	0.125	0.250
Competitive	8,169	0.492	0.500	0.000	0.000	1.000
Tax_Exmp	8,169	0.959	0.199	1.000	1.000	1.000
Callable	8,169	0.457	0.498	0.000	0.000	1.000
Insured	8,169	0.177	0.382	0.000	0.000	0.000
Rating	8,169	13.595	7.742	12.000	17.000	19.000

Table 2. Paid Sick Leave and Hospital Healthcare Quality

This table reports the effects of PSL mandates on hospital healthcare quality using Equation (1). The unit of observation is at the hospital-year level. $HF_Mortality$ is the heart failure patient mortality rate. $PN_Mortality$ is the pneumonia patient mortality rate. $COPD_Mortality$ is the COPD patient mortality rate. Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019 for heart failure and pneumonia, and from 2013 to 2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1) $HF_Mortality$	(2) $PN_Mortality$	(3) $COPD_Mortality$
PSL	-0.0026***	-0.0025***	-0.0013***
	(-5.25)	(-3.86)	(-4.21)
Controls	YES	YES	YES
Hospital FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	51,049	55,323	22,123
Adj. R^2	0.598	0.778	0.712

Table 3. Paid Sick Leave and Hospital Patient Ratings

This table reports the effects of PSL mandates on hospital healthcare quality using Equation (1). The unit of observation is at the hospital-year level. *Clean* is the average patient rating for hospital cleanliness. *Commdoc* is the average patient rating for doctor communication. *Commnurse* is the average patient rating for nurse communication. *Explain* is the average patient rating for how well doctors and nurses explained medical information, treatments, and care instructions in a way that patients could easily understand. *Help* is the average patient rating for the responsiveness and helpfulness of hospital staff during their stay. *Info* is the average patient rating for recovery information. *Pain* is the average patient rating for pain control. *Overall* is the average patient rating for overall healthcare quality. Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1) *Clean*	(2) *Commdoc*	(3) *Commnurse*	(4) *Explaine*	(5) *Help*	(6) *Info*	(7) *Pain*	(8) *Overall*
PSL	0.0089***	0.0077***	0.0126***	0.0101***	0.0127***	0.0034***	0.0070***	0.0048*
	(3.51)	(5.10)	(7.39)	(4.19)	(5.13)	(3.50)	(2.86)	(1.91)
Controls	YES	YES	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	44,821	44,821	44,823	44,764	44,818	44,821	33,936	44,822
Adj. R^2	0.723	0.713	0.755	0.638	0.794	0.686	0.594	0.764

Table 4. Paid Sick Leave and Hospital Timely and Effective Care

This table reports the effects of PSL mandates on hospital healthcare quality using Equation (1). The unit of observation is at the hospital-year level. *PCI* is the share of heart attack patients receiving PCI treatment at arrival. *VTE*-1 is the share of patients receiving VTE Prophylaxis treatment. *VTE*-5 is the share of patients receiving VTE Warfarin therapy discharge instructions. *BCBA* is the share of patients receiving blood culture tests before antibiotics. *TimelyAbx* is the share of patients receiving timely antibiotics. *UCRQ* is the share of patients with timely removal of urinary catheter. Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	*PCI*	*VTE*-1	*VTE*-5	*BCBA*	*TimelyAbx*	*UCRQ*
PSL	0.0235*	0.0096**	0.0175*	0.0146*	0.0864***	0.0116*
	(1.80)	(2.03)	(1.80)	(1.67)	(6.18)	(1.68)
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	12,977	8,963	7,687	28,169	25,594	14,798
Adj. R^2	0.628	0.816	0.536	0.456	0.650	0.560

Table 5. Paid Sick Leave and Hospital Healthcare Quality: Variation in Treatment Intensity

This table reports the effects of PSL mandates on hospital healthcare quality conditional on the treatment intensity of the PSL mandate. The unit of observation is at the hospital-year level. $HF_Mortality$ is the heart failure patient mortality rate. $PN_Mortality$ is the pneumonia patient mortality rate. $COPD_Mortality$ is the COPD patient mortality rate. $\#Days$ is the minimum number of annual paid sick days guaranteed to employees under each mandate. *Cover Ratio* is defined as the number of newly covered workers divided by county employment, with the numerator obtained from the National Partnership for Women and Families. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	$HF_Mortality$	$PN_Mortality$	$COPD_Mortality$	$HF_Mortality$	$PN_Mortality$	$COPD_Mortality$
$PSL \times \#Days$	-0.0015***	-0.0012***	-0.0009***			
	(-4.25)	(-2.61)	(-4.18)			
$PSL \times CoverRatio$				-0.0081***	-0.0081***	-0.0046***
				(-4.70)	(-3.72)	(-3.85)
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	50,322	54,481	21,757	49,427	53,602	21,360
Adj. R^2	0.598	0.778	0.710	0.598	0.778	0.713

Table 6. Paid Sick Leave and Hospital Financial Performance

This table reports the effects of PSL mandates on hospital financial performance using Equation (1). The unit of observation is at the hospital-year level. $InRevGR$ is the growth of inpatient revenue. $OutRevGR$ is the growth of outpatient revenue. $TotRevGR$ is the growth of total revenue. $NetRevGR$ is the growth of net revenue. $UPBillAT$ is the ratio of total unpaid patient billings to total assets. $BadDebtsAT$ is the ratio of bad debt to total assets. $FundbalGR$ is the growth of the fund balance (net wealth). Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1) *InRevGR*	(2) *OutRevGR*	(3) *TotRevGR*	(4) *NetRevGR*	(5) *UPBillAT*	(6) *BadDebtsAT*	(7) *FundbalGR*
PSL	0.0210***	0.0141***	0.0158***	0.0184***	-0.0325**	-0.0176***	0.0570**
	(4.40)	(2.59)	(4.11)	(4.35)	(-2.53)	(-5.73)	(2.53)
Controls	YES	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES
Observations	77,028	71,143	77,086	77,012	76,023	36,041	76,630
Adj. R^2	0.116	0.135	0.147	0.123	0.522	0.737	0.0270

Table 7. Paid Sick Leave and Healthcare Bonds in the Primary Market

This table reports the effects of PSL mandates on healthcare bonds in the primary market using Equation (3). The unit of observation is at the bond-issuance level. $OfferingSpread$ is the offering yield adjusted by the interpolated Treasury rates for corresponding maturity terms. *Rating* is the bond rating at issuance, which is converted to a numerical scale by assigning a value of 21 to the highest credit rating (AAA), 20 to the next-highest rating (AA+), and so forth. Bond controls include: (1) years to maturity and its inverse; (2) the natural log of issuance size; (3) indicator variables for insured, callable, and tax-exempt bonds; (4) an indicator for competitive bidding; and (5) bond credit rating dummies. County controls include annual population and income per capita. The sample period is 2005–2019. We include county and year fixed effects. Standard errors are clustered by bond issue and year-month, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1) *OfferingSpread*	(2) *Rating*
PSL	-0.1646**	0.8796**
	(-2.30)	(2.06)
Bond Controls	YES	YES
County Controls	YES	YES
County FE	YES	YES
Year FE	YES	YES
Observations	8,169	8,175
Adj. R^2	0.840	0.852

Table 8. Paid Sick Leave and Hospital Real Investment

This table reports the effects of PSL mandates on hospital real investment using Equation (1). The unit of observation is at the hospital-year level. *Invest* is fixed asset investment divided by total assets. *Employee* is the growth of total hospital employees. *Core* is the growth of hospital core employees (nurses, physicians, and pharmacists). *Admin* is the growth of hospital administrative and general employees. $Wage$ is the growth of total hospital employee wages. $CoreTwg$ is the growth of total wages of core employees. $AdminTwg$ is the growth of total wages of administrative and general employees. $CoreAwg$ is the growth of the average wages of core employees. $AdminAwg$ is the growth of average wages of administrative and general employees. Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1) *Invest*	(2) *Employee*	(3) *Core*	(4) *Admin*	(5) *Wage*	(6) *CoreTwg*	(7) *AdminTwg*	(8) *CoreAwg*	(9) *AdminAwg*
PSL	0.0159**	0.0178**	0.0268**	0.0198*	0.0210**	0.0376***	0.0030	0.0103**	-0.0074*
	(2.08)	(2.45)	(2.23)	(1.86)	(2.42)	(2.59)	(0.31)	(2.33)	(-1.74)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	77,020	51,254	50,446	50,813	51,174	51,204	51,937	48,503	48,863
Adj. R^2	0.177	0.122	0.0684	0.0774	0.130	0.0691	0.103	0.0360	0.0857

Table 9. Cross-sectional Tests: Hospital Financial Constraints

This table presents the effects of PSL mandates on hospital healthcare quality across hospitals with different levels of financial constraints using Equation (1). The unit of observation is at the hospital-year level. Panel A reports the effects for hospitals with high internal liquidity and low internal liquidity. Panel B reports the effects for system-affiliated hospitals and non-system-affiliated hospitals. The unit of data is an annual hospital observation. $HF_Mortality$ is the heart failure patient mortality rate. $PN_Mortality$ is the pneumonia patient mortality rate. $COPD_Mortality$ is the COPD patient mortality rate. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p $<$ .1, **p $<$ .05, ***p $<$ .01.

Panel A: Internal Liquidity Reserves

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*HF_Mortality*	*PN_Mortality*	*PN_Mortality*	*COPD_Mortality*	*COPD_Mortality*
	High LR	Low LR	High LR	Low LR	High LR	Low LR
PSL	-0.0021***	-0.0031***	-0.0020**	-0.0028***	-0.0012***	-0.0013***
	(-3.40)	(-4.14)	(-2.53)	(-2.94)	(-2.89)	(-2.69)
PSL Coefficient Diff.	Low LR − High LR		Low LR − High LR		Low LR − High LR	
	-0.0010**		-0.0008**		-0.0001	
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Cluster	Hospital	Hospital	Hospital	Hospital	Hospital	Hospital
Observations	25,386	24,421	28,567	26,162	10,746	10,510
Adj. R^2	0.629	0.625	0.796	0.799	0.730	0.735

Panel B: Health System Affiliation

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*HF_Mortality*	*PN_Mortality*	*PN_Mortality*	*COPD_Mortality*	*COPD_Mortality*
	System	Non-system	System	Non-system	System	Non-system
PSL	-0.0013**	-0.0028***	-0.0018**	-0.0017*	-0.0007*	-0.0019***
	(-2.07)	(-3.57)	(-2.30)	(-1.67)	(-1.79)	(-3.83)
PSL Coefficient Diff.	Non-system − System		Non-system − System		Non-system − System	
	-0.0015***		0.0001		-0.0012**	
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Cluster	Hospital	Hospital	Hospital	Hospital	Hospital	Hospital
Observations	23,005	27,135	24,182	30,241	12,476	9,310
Adj. R^2	0.656	0.615	0.810	0.787	0.724	0.714

Table 10. Cross-sectional Tests: Profit-seeking and Governance of Hospitals

This table reports the effects of PSL mandates on hospital healthcare quality for hospitals with different levels of profit-seeking and governance. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. The unit of data is an annual hospital observation. $HF_Mortality$ is the heart failure patient mortality rate. $PN_Mortality$ is the pneumonia patient mortality rate. $COPD_Mortality$ is the COPD patient mortality rate. In panel A, we divide the sample into government-owned hospitals and non-government-owned hospitals. In panel B, we divide the nonprofit hospitals into two groups based on state-level nonprofit institution monitoring. Controls include hospital size, bed counts, and total liability. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p $<$ .1, **p $<$ .05, ***p $<$ .01.

Panel A: Government-owned versus Non-government-owned Hospitals

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*HF_Mortality*	*PN_Mortality*	*PN_Mortality*	*COPD_Mortality*	*COPD_Mortality*
	Non-GO	GO	Non-GO	GO	Non-GO	GO
PSL	-0.0021***	-0.0044***	-0.0024***	-0.0031**	-0.0012***	-0.0017**
	(-4.16)	(-2.83)	(-3.38)	(-2.04)	(-3.57)	(-2.14)
PSL Coefficient Diff.	GO − Non-GO		GO − Non-GO		GO − Non-GO	
	-0.0023***		-0.0007**		-0.0005*	
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Cluster	Hospital	Hospital	Hospital	Hospital	Hospital	Hospital
Observations	40,620	10,301	42,908	12,282	17,913	4,149
Adj. R^2	0.609	0.581	0.783	0.774	0.715	0.713

Panel B: State Oversight of Nonprofit Institutions

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*HF_Mortality*	*PN_Mortality*	*PN_Mortality*	*COPD_Mortality*	*COPD_Mortality*
	Low Monitor	High Monitor	Low Monitor	High Monitor	Low Monitor	High Monitor
PSL	-0.0002	-0.0021***	0.0032**	-0.0022**	-0.0008	-0.0016***
	(-0.21)	(-3.22)	(2.16)	(-2.48)	(-0.94)	(-3.63)
PSL Coefficient Diff.	High Monitor − Low Monitor		High Monitor − Low Monitor		High Monitor − Low Monitor	
	-0.0023***		-0.0064***		-0.0007**	
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Cluster	Hospital	Hospital	Hospital	Hospital	Hospital	Hospital
Observations	12,449	20,278	13,407	21,271	5,617	8,894
Adj. R^2	0.607	0.623	0.784	0.782	0.697	0.723

Appendix

Table A1. Variable Definition

This shows the definition of key variables.

Variable	Definition
Panel A: Hospital Variables	
InRevGR	The growth of inpatient revenue.
OutRevGR	The growth of outpatient revenue.
TotRevGR	The growth of total patient revenue.
NetRevGR	The growth of net patient revenue.
UPBillAT	The ratio of unpaid patient billings to total assets.
BadDebtsAT	The ratio of bad debt to total assets.
FundbalGR	The growth of the fund balance (net wealth).
Size	Total assets.
Bedtfac	Total number of hospital beds.
Totliab	Total liabilities.
Invest	Fixed asset investment divided by total assets.
Employee	The growth of hospital employees.
Core_ Worker	The growth of hospital core employees. Hospital core employees include nurses, physicians, and pharmacists.
Admin_ Worker	The growth of hospital administrative and general employees.
Wage	The growth of total hospital employee wages.
Core_ Wage	The growth of total hospital core employee wages.
Admin_ Wage	The growth of total hospital administrative and general employee wages.
Core_ Awage	The growth of average hospital core employee wages.
Admin_ Awage	The growth of average hospital administrative and general employee wages.
Panel B: Patient Healthcare Outcome	
HF_ Mortality	Heart failure patient mortality rate.
PN_ Mortality	Pneumonia patient mortality rate.
COPD_ Mortality	COPD patient mortality rate.
Panel C: Hospital Patient Rating	
Clean	The average patient rating for hospital cleanliness.
Commdoc	The average patient rating for doctor communication.
Commnurse	The average patient rating for nurse communication.

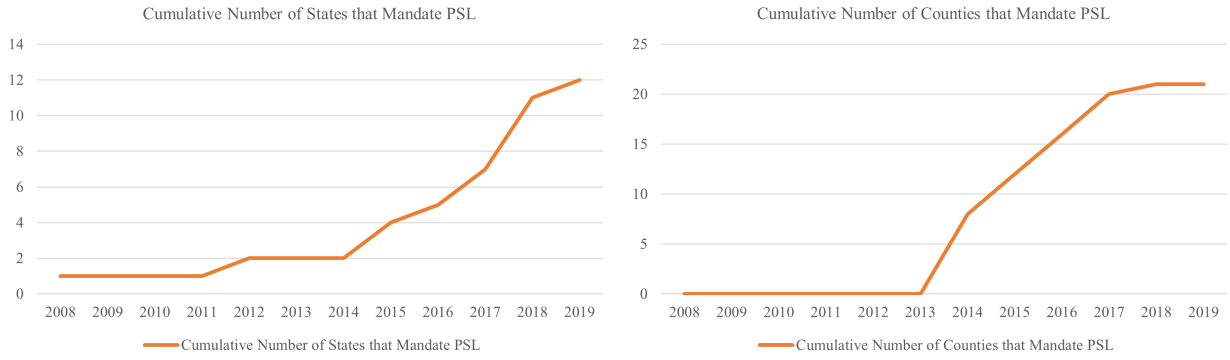
Explain	The average patient rating for how well doctors and nurses explained medical information, treatments, and care instructions in a way that patients could easily understand.
Help	The average patient rating for the responsiveness and helpfulness of hospital staff during their stay.
Info	The average patient rating for recovery information.
Pain	The average patient rating for pain control.
Overall	The average patient rating for overall healthcare quality.
Panel D: Hospital Efficient Care	
PCI	The share of heart attack patients receiving PCI treatment at arrival.
VTE-1	The share of patients receiving VTE Prophylaxis treatment.
VTE-5	The share of patients receiving VTE Warfarin therapy discharge instructions.
BCBA	The share of patients receiving blood culture tests before antibiotics.
TimelyAbx	The share of patients receiving timely antibiotics.
UCRQ	The share of patients with timely removal of urinary catheters.
Panel E: Bond Variables	
Offering_ Spread	Offering yield adjusted by the interpolated treasury rates for corresponding maturity terms.
Size	Bond's issue amount; the log transformation of this amount is used in the regressions.
Maturity_ Year	Number of years between the bond's issuance date and its maturity date.
I_ Maturity_ Year	The inverse of the number of years between the bond's issuance date and its maturity date.
Competitive	Indicator that equals one if the bond is sold to underwriters through competitive bidding, and zero otherwise.
Tax_ Exmp	Indicator that equals one if the bond's interest is not subject to federal income tax, and zero otherwise.
Callable	Indicator that equals one if the bond has an embedded call option, and zero otherwise.
Insured	Indicator that equals one if the bond is insured, and zero otherwise.
Rating	Bond ratings at issuance, converted to numerical values by assigning 21 to the highest credit rating (AAA), 20 to AA+, and so forth.

Online Appendix

Figure OA1. Timeline of Paid Sick Leave Mandates

Figure OA1 presents a timeline of U.S. paid sick leave mandates passed between 2008 and 2019. Panel A shows the number of local and state paid sick leave mandates during the sample period. Dates are based on the effective year. In Panel B, we plot the cumulative number of treated counties over the sample period. A county is considered treated if a local or state paid sick leave mandate is effective for the year.

Panel A: Local and State Paid Sick Leave Mandates



Panel B: Treated Counties

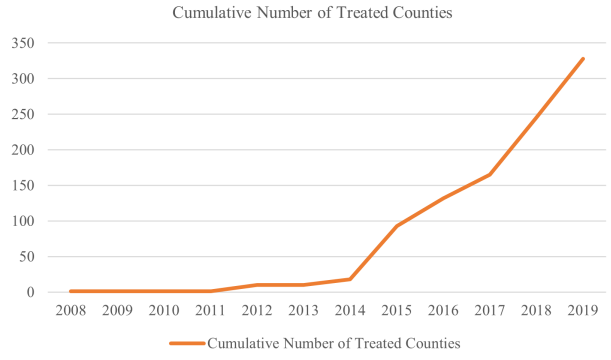


Table A2. Paid Sick Leave and Hospital Visits

This table reports the effects of PSL mandates on hospital visits using Equation (1). The unit of observation is at the hospital-year level. *Admtot* is the total inpatient admission. *DC* is the total number of patient discharges. *DC_Medicare* is the total number of Medicare patient discharges. *DC_Medicaid* is the total number of Medicaid patient discharges. Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)	(2)	(3)	(4)
	Admtot	*DC*	*DC_Medicare*	*DC_Medicaid*
PSL	0.0515***	0.0683***	0.0860***	0.2502***
	(6.36)	(7.61)	(7.92)	(9.14)
Controls	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	59,964	78,732	78,369	69,439
Adj. R^2	0.976	0.970	0.960	0.901

Table A3. Paid Sick Leave and Hospital Healthcare Quality: Alternative Estimators

This table reports the effects of PSL mandates on hospital healthcare quality using the stacked regression approach and the Callaway and Sant'Anna estimator. The unit of observation is at the hospital-year level. Columns (1)–(3) report the results using the stacked regression approach. Columns (4)–(6) report the results using the Callaway and Sant'Anna estimator. The estimation procedures in the table address possible Type 1 and Type 2 errors that arise from estimating staggered DiD effects using OLS when heterogeneous treatment effects and/or variation in treatment timing are present. The control groups in these regressions are never treated hospitals. *HF_Mortality* is the heart failure patient mortality rate. *PN_Mortality* is the pneumonia patient mortality rate. *COPD_Mortality* is the COPD patient mortality rate. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Cohort_Hospital FE is the cohort-hospital fixed effect, and Cohort_Year FE is the cohort-year fixed effect. Standard errors are clustered by cohort-hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	Stacked Regressions			**Callaway & Sant'Anna Estimator**		
	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*PN_Mortality*	*COPD_Mortality*	*HF_Mortality*	*PN_Mortality*	*COPD_Mortality*
PSL	-0.0013***	-0.0013**	-0.0015***	-0.0012***	-0.0015***	-0.0014***
	(-2.88)	(-2.48)	(-4.66)	(-2.63)	(-2.78)	(-3.94)
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	NO	NO	NO	YES	YES	YES
Year FE	NO	NO	NO	YES	YES	YES
Cohort_Hospital FE	YES	YES	YES	NO	NO	NO
Cohort_Year FE	YES	YES	YES	NO	NO	NO

Table A4. Paid Sick Leave and Hospital Healthcare Quality: Matched Sample Analysis

This table reports the effects of PSL mandates on hospital healthcare quality using different sample matching methods. The unit of observation is at the hospital-year level. Columns (1)–(3) report the results using the propensity score matching (PSM) method. Columns (4)–(6) report the results using the entropy balancing matching method. *HF_Mortality* is the heart failure patient mortality rate. *PN_Mortality* is the pneumonia patient mortality rate. *COPD_Mortality* is the COPD patient mortality rate. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Cohort_Group FE is the cohort-matched group fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	PSM			**Entropy Balance**		
	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*PN_Mortality*	*COPD_Mortality*	*HF_Mortality*	*PN_Mortality*	*COPD_Mortality*
PSL	-0.0013**	-0.0015**	-0.0011***	-0.0018***	-0.0018***	-0.0008**
	(-2.45)	(-2.29)	(-2.78)	(-3.73)	(-2.89)	(-2.23)
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Cohort_Group	YES	YES	YES	NO	NO	NO
Observations	30,211	31,702	24,463	51,049	55,323	22,123
Adj. R^2	0.735	0.829	0.748	0.736	0.826	0.805

Table A5. Paid Sick Leave and Hospital Healthcare Quality: Alternative Treatment

This table reports the effects of PSL mandates on hospital healthcare quality using alternative treatments. The unit of observation is at the hospital-year level. Columns (1)–(3) report the results using the PSL treatment defined at the hospital service area (HSA) level, and Columns (4)–(6) report the results using the PSL treatment defined at the hospital referral region (HRR) level. Paid sick leave (PSL) mandates are enacted at the county level; treatment is assigned to hospitals by aggregating county policies to the HSA or HRR that contains them. A hospital is considered treated if its HSA (or HRR) contains at least one county that implemented a PSL mandate in or after year t. PSL_HSA equals one if the hospital is located in an HSA exposed to any PSL mandate in or after year t, and zero otherwise. PSL_HRR is defined analogously at the HRR level. $HF_Mortality$ is the heart failure patient mortality rate; $PN_Mortality$ is the pneumonia patient mortality rate; $COPD_Mortality$ is the COPD patient mortality rate. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE denotes hospital fixed effects; Year FE denotes year fixed effects. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*PN_Mortality*	*COPD_Mortality*	*HF_Mortality*	*PN_Mortality*	*COPD_Mortality*
PSL_HSA	-0.0028***	-0.0024***	-0.0011***			
	(-5.95)	(-3.84)	(-3.51)			
PSL_HRR				-0.0026***	-0.0019***	-0.0010***
				(-6.12)	(-3.42)	(-3.71)
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	51,010	55,284	22,109	51,049	55,323	22,123
Adj. R^2	0.598	0.778	0.712	0.598	0.778	0.712

Table A6. Paid Sick Leave and Hospital Healthcare Quality: Additional County Controls

This table reports the effects of PSL mandates on hospital healthcare quality using Equation (1). The unit of observation is at the hospital-year level. $HF_Mortality$ is the heart failure patient mortality rate. $PN_Mortality$ is the pneumonia patient mortality rate. $COPD_Mortality$ is the COPD patient mortality rate. $Read_GDP$ is regional GDP. Democratic is an indicator that equals one if the county has a Democratic political status and zero if it is Republican. $Population_growth$ is the local population growth rate. $Personalincome$ is the local personal income. $HealthEP$ is the local government healthcare expenditure per capita. $Medicaid$-insured Rate is the Medicaid insurance rate. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p $<$ .1, **p $<$ .05, ***p $<$ .01.

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_ Mortality	*PN_ Mortality*	*COPD_ Mortality*	*HF_ Mortality*	*PN_ Mortality*	*COPD_ Mortality*
PSL	-0.0025***	-0.0032***	-0.0014***	-0.0012**	-0.0015**	-0.0013***
	(-4.52)	(-4.43)	(-3.92)	(-2.24)	(-2.19)	(-3.69)
Read_ GDP	0.0004	-0.0008	0.0008	0.0011	0.0004	0.0007
	(0.35)	(-0.66)	(0.58)	(0.91)	(0.34)	(0.54)
Democratic	-0.0010**	-0.0004	0.0004	-0.0012**	0.0001	0.0004
	(-2.54)	(-0.70)	(0.71)	(-2.08)	(0.21)	(0.72)
Population_ growth	0.0124	-0.0084	0.0239**	0.0355***	0.0038	0.0238**
	(1.11)	(-0.68)	(2.17)	(2.78)	(0.28)	(2.16)
Personalincome	-0.0012	0.0013	-0.0020	-0.0025*	-0.0005	-0.0019
	(-0.91)	(0.79)	(-1.15)	(-1.71)	(-0.28)	(-1.12)
HealthEP	0.0003**	-0.0002	-0.0001	0.0000	-0.0003	-0.0001
	(2.45)	(-1.22)	(-0.77)	(0.17)	(-1.42)	(-0.77)
Medicaid-insured Rate				-0.0090	-0.0249**	-0.0056
				(-1.14)	(-2.51)	(-0.85)
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	46,741	50,896	20,399	36,271	40,386	20,399
Adj. R^2	0.593	0.777	0.711	0.633	0.791	0.711

Table A7. Quality Effects and Preventive Care

This table reports the effects of PSL mandates on hospital healthcare quality by preventive care using Equation (1). The unit of observation is at the hospital-year level. *HF_Mortality* is the heart failure patient mortality rate. *PN_Mortality* is the pneumonia patient mortality rate. *COPD_Mortality* is the COPD patient mortality rate. *Checkup* is the local routine checkup rate. *Flushot* is the local flu shot rate. Controls include hospital size, bed counts, and total liability. The sample period is 2005–2019 for heart failure and pneumonia, and 2013–2019 for COPD. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)	(2)	(3)	(4)	(5)	(6)
	HF_Mortality	*PN_Mortality*	*COPD_Mortality*	*HF_Mortality*	*PN_Mortality*	*COPD_Mortality*
PSL	-0.0025***	-0.0031***	-0.0013***	-0.0026***	-0.0031***	-0.0013***
	(-4.91)	(-4.69)	(-3.91)	(-4.93)	(-4.63)	(-3.87)
Checkup	0.0008	-0.0011	-0.0122***			
	(1.03)	(-1.02)	(-2.92)			
Flushot				-0.0003	-0.0006	0.0006
				(-0.41)	(-0.63)	(0.20)
Controls	YES	YES	YES	YES	YES	YES
Hospital FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	47,500	51,238	18,806	47,500	51,238	18,806
Adj. R^2	0.610	0.783	0.737	0.610	0.783	0.737

Table A8. Paid Sick Leave and Hospital CMI

This table reports the effects of PSL mandates on hospital CMI using Equation (1). The unit of observation is at the hospital-year level. CMI is the case mix index. Controls include hospital size, bed counts, total liability, inpatient discharges, and interest expense to revenue. The sample period is 2005–2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)
	CMI
PSL	-0.0041
	(-0.84)
Controls	YES
Hospital FE	YES
Year FE	YES
Observations	44,580
Adj. R^2	0.883

Table A9. Paid Sick Leave and Hospital Profit Margin

This table reports the effects of PSL mandates on hospital profit margin using Equation (1). The unit of observation is at the hospital-year level. *Profit Margin* is the hospital profit margin. Controls include hospital size, bed counts, and total liability. The sample period is from 2005 to 2019. Hospital FE is the hospital fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by hospital, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)
	Profit Margin
PSL	0.0036
	(1.34)
Controls	YES
Hospital FE	YES
Year FE	YES
Cluster	Hospital
Observations	77,265
Adj. R^2	0.516

Table A10. Paid Sick Leave and Hospital Closure

This table reports the effects of PSL mandates on local hospital closure using Poisson regression. The unit of observation is at the county-year level. *Closure Event* is the total number of hospitals closed within a county-year. *All Exit Event* is the total number of hospitals exiting the market via closure, merger, or consolidation. Controls include county population and county GDP. The sample period is from 2005 to 2019. County FE is the county fixed effect, and Year FE is the year fixed effect. Standard errors are clustered by county, and t-statistics are reported in parentheses. *p < .1, **p < .05, ***p < .01.

	(1)	(2)
	Closure Event	*All Exit Event*
PSL	-0.6955*	-0.7660**
	(-1.73)	(-2.55)
Controls	YES	YES
County FE	YES	YES
Year FE	YES	YES
Observations	1,980	2,761
Pseudo R^2	0.098	0.097