The private option: Trade shocks and hospital reliance on private healthcare insurance

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Abstract

We investigate the impact of trade liberalization on hospital operations, quality, and community access to healthcare. Consistent with the decline in manufacturing employment following trade shocks, we document a reduction in employer-sponsored health insurance coverage in affected communities and a corresponding decline in the intake of privately insured patients at local hospitals. This decline in privately insured admissions, which typically provide the highest reimbursement rates for hospital services, has a substantial negative impact on hospital finances. Moreover, hospitals in manufacturing-dependent areas are more likely to close or merge with other hospitals and experience a significant decline in quality of care. The effects are more pronounced for hospitals that relied more on private insurance reimbursements and in areas experiencing greater outmigration and firm closure following trade liberalization. Our findings highlight an overlooked effect of trade liberalization—community access to healthcare—and illustrate the extent to which the healthcare system relies on reimbursements from private insurance.

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1 Introduction

Private insurance is the largest single payer of hospital care. Payments by private insurers accounted for 37% of all hospital-care spending in 2023, despite privately insured patients comprising only 24% of hospital discharges. In contrast, Medicare and Medicaid payments respectively represented 25% and 19% of hospital spending but together accounted for 67% of hospital discharges (Levinson et al. (2025)). Private insurance reimbursements to hospitals typically far exceed public insurance rates, with commercial rates for hospital services averaging 200–400% of Medicare prices but going as high as 800%.[1] Private insurer payments for hospital services can therefore be vitally important for hospitals. At the same time, private insurance is the primary insurance for 66% of the U.S. population, covering an estimated 220 million people.[2] Understanding hospital sensitivity to shocks in private reimbursement and how this shapes the provision and access to care can thus have important policy implications and social considerations. Indeed, the recent expiration of Affordable Care Act (ACA) premium tax credits, which is estimated to have thus far left three million previously privately-insured people without healthcare coverage (Lo et al. (2026)), highlights the need to understand how private insurance dependence shapes the healthcare landscape.

To study hospital reliance on private healthcare insurance and the consequences to shocks in private insurer reimbursements, we utilize China's 2001 entry into the World Trade Organization (WTO) as a shock to the portion of privately insured individuals in affected areas. China's WTO entry had sizable and negative effects on manufacturing employment in sectors specializing in production that faced import competition from China (Autor et al. (2013)). Workers impacted by employment loss at these firms in turn lost their access to their employer's healthcare insurance plan. The losses are nontrivial given that 97% of manufacturing firms offer employer-sponsored insurance and 82% of employees at these firms received this coverage in the year 2000 (AHRQ (2000)). The impact of the trade shock on non-publicly insured admissions is evident in Figure 1, where hospitals located in more affected areas experienced a precipitous decline in non-publicly insured admissions relative to less exposed hospitals following China's entry to the WTO (Panel A). In contrast, we do not observe a similar pattern with publicly-insured admissions (Panel B). We examine the indirect spillover effects on hospitals located in affected areas, particularly on hospital finances, operability, and quality of care, through a difference-in-differences design.

[1] See, for example, Cooper et al. (2019), Chino et al. (2021), White and Whaley (2021), CBO (2022), and Blavin and Holahan (2025), among others.

[2] This statistic is provided by U.S. Census Bureau (2025) and includes employer-sponsored, direct-purchased, and marketplace exchange-purchased coverage.

We begin by validating that the trade shock transmitted to hospitals through a loss in ESI coverage for individuals. Using inpatient data from the Healthcare Cost and Utilization Project, we document a significant decrease in privately insured inpatient admissions for all age groups under 65. In contrast, we do not find any effect on Medicare admissions and patients over 65. For affected hospitals, this decrease amounts to 177 fewer inpatient admissions a year, tantamount to approximately $1.60 million in lost revenues per year. For medium-sized hospitals, which are more prevalent in manufacturing-dependent areas, the effects are amplified, with a 14.1% reduction in privately-insured inpatient admissions across all ages under 65, representing 558 fewer admissions and $5.04 million in lost revenue. We note that these estimates only include the direct revenue losses from fewer private insurance reimbursements; these previously-insured patients can receive emergency hospital care without insurance, raising costs and leading to further losses for the hospital. Indeed, we find a contemporaneous increase in uninsured patient admissions, but only for riskier conditions, suggesting that previously-insured patients raise the threshold under which they seek hospital care.

We find that these declines in privately-insured patient admissions are reflected in hospital finances. Affected hospitals experience declines in net patient revenues per patient and net income per patient, indicating that average profitability per patient declines as publicly insured patients comprise a larger share of the hospital's patient composition. Consequently, affected hospitals exhibit a sizable decline of $566,060 in net income generated from patient services per year, representing an 11.7% decrease relative to net income per year. The propensity of hospital closure—a major concern in the U.S.—increases by nearly 35%, with a 0.31 percentage point increase relative to the mean failure rate of 0.89%. These effects are exacerbated for medium-sized hospitals, with larger percentage declines in net income and greater closure propensities. Furthermore, we observe a 27.8% increase in the likelihood of hospital mergers, which can be an attractive alternative to shutting down for hospitals in financial distress.

The impact on income from patients leads hospitals to improve cost efficiency and tighten spending. Affected hospitals exhibit reductions in fixed asset values, including equipment and buildings, and declines in investments, consistent with hospitals postponing capital investments, such as equipment purchases and improvements in facilities. At the same time, we observe a significant reduction in operating expenses per patient following the trade shock. Using our inpatient database, the results show that hospitals scale back the number of procedures provided to patients during inpatient stays. Inpatient stays for the majority of

private payers and for all public payers are reimbursed according to a fixed payment scheme based on the admission diagnosis code. As such, hospitals can improve cost efficiency by reducing the services provided to patients while continuing to receive the same reimbursement for the admission from insurers.

To examine whether hospital quality of care is affected by the cost efficiency shifts noted above, we examine inpatient mortality rates. We find a significant increase of 0.07 percentage points in the likelihood that a patient dies during hospitalization, which equates to 6.5 additional patient deaths per affected hospital per year. This finding is consistent with affected hospitals and patients paying a price for the improvements in operating expenses and cost efficiency through a lower quality of care provided.

As an additional mechanism test, we examine healthcare insurance premiums using Form 5500 data, filed by employers with the U.S. Department of Labor regarding insurance benefits provided for employees. We first consider the amount of premiums paid by businesses and find an increase in premiums for ESI coverage in areas affected by the shock. This result is consistent with insurers demanding higher rates to account for greater risk following decreases in the insured population after the trade shock. We next consider the number of insured individuals and find a significant decrease in covered individuals for a given insurance plan, where this decrease occurs only for manufacturing firms. These findings are consistent with the previously documented employment losses following the entry of import competition in manufacturing areas. Moreover, these results reinforce our primary mechanism of a decrease in ESI coverage for workers in affected areas.

In additional analyses, we consider a number of heterogeneity and robustness tests. We find that the results are stronger among hospitals that served a greater share of privately-insured patients prior to the shock. Likewise, we find amplified effects for hospitals that saw greater outmigration and higher business closures after trade liberalization. In robustness analyses, we see that our effects are consistent across various definitions of the hospital market in addition to our main unit, hospital referral regions, such as counties, commuting zones, and hospital service areas.

The contribution of this study is two-fold. First, we shed light on how reliance on privately-insured patients shapes hospital operations and quality of care. We see that hospitals are highly sensitive to decreases in private insurance reimbursements, with economically meaningful increases in closure propensity and changes in operating and investing decisions. Second, we show how trade liberalization impacts access to care and indirectly contributes to the healthcare landscape in the U.S. This includes hospital closures and mergers, as well

as the quality of care, which highlights a negative spillover effect of trade expansion.

Furthermore, our findings have implications regarding access to hospital care in the U.S. Areas that are impacted by import competition face greater inequality in access to care; more hospitals shut down in these areas and hospital care that individuals receive from hospitals that remain open is worse. At the same time, insurance premiums rise for businesses, which can further propagate health access inequality, as these increases can be met with higher deductibles and larger employee contributions. Our results therefore highlight an unanticipated social consequence from trade liberalization—greater inequality to access to medical care—which can be damaging for communities.

With respect to the extant literature, our study relates to the recent stream of research at the intersection of healthcare and finance. Adelino et al. (2015) analyze the sensitivity of capital expenditures to returns from hospital investments. Dranove et al. (2017) consider price adjustments by hospitals following the 2008 financial crisis and its consequent reductions in hospital endowment values. Adelino et al. (2022) likewise study the financial crisis and investigate changes in discretionary operations. Both Dranove et al. (2017) and Adelino et al. (2022) find mixed evidence with heterogeneity in hospital behavior after the financial crisis. Aghamolla et al. (2024) examine negative shocks to credit supply and find that hospitals respond with increased resource utilization and cost efficiency. In contrast to these papers, we examine a direct revenue shock in the form of a decrease in privately insured patients in the population that hospitals serve. As such, our study investigates an important channel through which hospital operations are financed and illustrates the repercussions following a negative shift in the hospital's payer mix.

Relatedly, a number of papers explore the possibility of cost-shifting by hospitals, such as Dranove (1988) and Cutler (1998) (see Frakt (2011) for a review). This literature considers whether decreases in public insurer reimbursements are met with increases in private insurer prices. Our study considers a different angle than this broad literature by examining hospital responses and consequences to decreases in *private* insurer payments. We find that hospitals respond by cost efficiency measures and reductions in capital investment, while also facing a greater risk of closure. As such, our results suggest that private insurance indirectly supports the hospital's ability to serve publicly insured patients.

Garthwaite et al. (2018) examine the cost of uninsurance to hospitals and estimate that hospitals lose about $800 per uninsured patient that receives treatment. Duggan et al. (2022) relatedly analyze the expansion of Medicaid through the ACA in California and find increases

in hospital revenues and utilization by patients.[3] Collectively these studies show that service to the uninsured population within a region can impose significant costs on hospitals. As such, our documented loss of privately insured patients can have dual negative effects—a loss of revenue from private insurer reimbursements and an increase in costs through unpaid patient charges. We contribute to this literature by showing that private insurer payments are vital for hospitals, the loss of which hampers hospital operability through lower capital investment, less intensive treatment, a higher rate of closure, and worse quality of care. Consequently, we analyze a relatively unexplored dimension of hospital finances—private insurance—whereas the extant literature has largely focused on public insurance programs.

The present study also builds on the literature examining the impact of trade liberalization. Several papers examine labor market outcomes, such as, among others, Menezes-Filho and Muendler (2011), Autor et al. (2013), Autor et al. (2014), Dix-Carneiro and Kovak (2017), Acemoglu et al. (2016), and Pierce and Schott (2016), and find negative employment and worker income effects. On the health side, Pierce and Schott (2020) find an increase in opioid overdose deaths in regions most affected by trade liberalization. We contribute to this literature by documenting a vital externality of trade entry: the negative impact of trade liberalization on healthcare access and quality, which critically affects community living standards.

The paper is structured as follows. In Section 2, we discuss in more detail China's entry into the WTO and the link to healthcare insurance coverage. We present the research design and discuss the data in Section 3, while the main results of the study are presented in Section 4. Sections 5 and 6 respectively discuss heterogeneity and robustness, while the final section concludes.

2 Institutional Background

China's Trade Liberalization

China began its shift from collectivization to a market-oriented economy in 1979. The following two decades saw several economic reforms, including the migration of 150–250 million agricultural workers to cities (Chen et al. (2010), Li et al. (2012)), entry of multinational corporations in special economic zones (Naughton (2018)), and major improvements in in-

[3] In a similar vein, Finkelstein et al. (2012) utilize an experimental design at the patient level and find that Medicaid access to previously uninsured individuals leads to greater healthcare utilization and lower medical debt for patients.

frastructure, including roadways and telephone lines.

Trading relationships with developed economies—and thus the export economy and manufacturing industries of China—reached a major breakthrough with China's induction into the World Trade Organization (WTO) in December 2001. WTO membership granted China most-favored nation (MFN) status among 142 countries, and moreover made such status permanent in the United States, where MFN access was previously subject to annual reauthorization by Congress (Autor et al. (2016), Pierce and Schott (2016), Handley and Limão (2017)). Membership in the WTO also changed much of China's prior approach to trade and access to global markets. WTO provisions compelled China to drop previously mandated export barriers for private companies (such as the use of state intermediaries) and also limited favoritism given to state-owned entities, thereby increasing productivity for private companies (Hsieh et al. (2015), Bai et al. (2017)). At the same time, induction into the WTO granted China access to the global market of intermediate inputs (Manova and Yu (2017), Brandt and Morrow (2017)).[4]

China's WTO inclusion was followed by a period of rapid ascension in manufacturing exports. Manufacturing productivity increased by a sizable 8% annually from 1998–2007 (Brandt et al. (2012)). Moreover, China experienced a six-fold increase in the share of the world's manufacturing value from 1991–2012, reaching 24% by 2012, and a corresponding eight-fold increase in the world's share of manufacturing export value over the same period, from 2.3% to 18.8% (Autor et al. (2016)). This rise was also prevalent in the U.S., with Chinese imports accounting for 89% of the growth in imports from low-income countries from 2000–2007 (Autor et al. (2013)).

The dramatic rise in import competition from China had marked and persistent effects on employment in the U.S. manufacturing sector. Autor et al. (2013) document that a $1,000 per-worker increase in Chinese import exposure raises the number of unemployed workers in affected areas by about 4.9%, and reduces the manufacturing employment-to-population rate by 0.596 percentage points—amounting to a 5–11% decease in manufacturing employment. Pierce and Schott (2016) find a similar decrease of 7.7% in manufacturing employment in U.S. industries impacted by China's WTO accession. Autor et al. (2014) establish related findings at the worker-level, documenting increased non-employment and an average 46% decrease in cumulative earnings for affected workers between the bottom and top quartiles of exposure. Acemoglu et al. (2016) consider aggregate direct and indirect effects (such as impacts on suppliers) and estimate a reduction in manufacturing employment of 2.4 million

[4]China agreed to adhere to other WTO provisions to receive membership, such as opening other sectors to foreign competition and following global WTO trade and intellectual property standards.

workers.

Hospitals and Health Insurance Coverage

Employer-sponsored health insurance (ESI) plans are the most common type of private insurance for healthcare. Federal and state governments provide tax exemptions to compensation for health insurance plans, permitting contributions to employee health plans to not be treated as taxable income. Moreover, the diverse risk profile of enrollees on employee plans allows insurers to better manage the overall risk profile of covered participants, implying lower costs for coverage. These features have led ESI plans to become pervasive in the U.S.

In the year 2000, 63% of workers received coverage through their employer, and ESI plans covered 154 million people (KFF (2000)). The manufacturing industry saw higher coverage than average with 79.8% enrollment among all manufacturing workers in 2000, with 97.3% of manufacturing workers employed in companies that offered ESI and 82% choosing to enroll (AHRQ (2000)).[5]

The prices paid for hospital services under ESI plans are negotiated between hospitals and insurers and agreed upon contractually. Negotiated prices are typically lower than the hospital list (chargemaster) prices, which are charged to uninsured and sometimes out-of-network patients. Reimbursement rates for inpatient care are typically determined either prospectively as a fixed payment structure based on the diagnosis related group (DRG) coded at the time of hospital admission, or as a percentage of the hospital's list prices (or through a combination of the two). Using proprietary data, Cooper et al. (2019) find that the former is more common, with up to 77% of contracts based on prospective rates and 23% as a share of list prices. Among the prospective reimbursement schemes, 74% of these are determined as a percentage of Medicare rates.[6] Regardless of the payment scheme, private insurer rates typically far exceed Medicare rates. Indeed, Cooper et al. (2019) find that payments for inpatient services by insurers were 220% of Medicare payments in 2011. Average payments for other hospitals services were even higher, with private rates for lower limb MRIs amounting to 395% of Medicare rates. This is consistent with other studies

[5]Workers can choose not to enroll in an employer's plan; 72% of workers in the general worker population that chose not to enroll had received coverage elsewhere, such as through a spouse's plan (KFF (2000)). Recent coverage statistics are similar to those in 2000, with 60% of the non-elderly population, or 165.6 million people under 65, receiving healthcare benefits through ESI in 2025 (KFF (2025)). Likewise, 66% of manufacturing/mining workers received healthcare coverage through ESI in 2024, with 93.2% of workers employed by a firm that offered ESI and 76% of employees enrolling (AHRQ (2024)).

[6]For reference, Medicare reimburses inpatient stays through the Inpatient Prospective Payment System (IPPS), which set predetermined fixed reimbursement rates based on DRG codes.

that document private rates of over 240% of Medicare rates for the same services at the same facilities, with some hospital systems receiving 500–800% of Medicare rates (White and Whaley (2021), CBO (2022)).[7]

Private insurance is thus the largest single payer of hospital care, accounting for 37% of all hospital-care spending in 2023, despite privately insured patients comprising only 24% of hospital discharges. In contrast, Medicare and Medicaid payments accounted for 25% and 19% of hospital spending, but together accounted for 67% of hospital discharges (Levinson et al. (2025)). Moreover, hospitals operate on thin profit margins. A decrease in the privately insured population that the hospital services can therefore severely impair hospital finances.

3 Research Design

3.1 Data Sources

Our sample spans 1997 to 2006, covering five years before and after the China trade shock while avoiding confounding effects from the 2007–2009 financial crisis. We also examine several longer-run outcomes by extending the sample beyond 2006. We combine hospital- and patient-level data from several sources.

3.1.1 Hospital Finances and Operations

We obtain hospital-level financial and operational information from the Healthcare Cost Report Information System (HCRIS) maintained by the Centers for Medicare and Medicaid Services (CMS). Nearly all U.S. hospitals participating in the Medicare program are required to file annual cost reports with a Medicare Administrative Contractor. The data provide detailed information on hospital finances, utilization, employment, and operating and investment activities.

Because hospitals are not required to follow a common calendar year and may use different fiscal-year reporting periods when filing cost reports, we construct a synthetic hospital-calendar-year dataset following Aghamolla et al. (2024). Specifically, we allocate flow variables, such as net patient revenue, operating income, and employee hours, across calendar years based on the fraction of report days falling within each year. For stock variables, such as bed days, assets, and cash holdings, we take the weighted average of all reports covering

[7] There is also geographic variation in the gap between commercial and Medicare rates, with the highest state, Vermont, having average commercial prices equal to 690% of Medicare rates Blavin and Holahan (2025).

that year, with weights equal to the fraction of the calendar year covered by each report. This approach allows us to produce homogeneous reporting periods across hospitals and align hospital outcomes with calendar-year economic conditions. To address concerns that the year 2001 may contain a mixture of pre- and post-WTO outcomes due to the fiscal-year reporting structure of the HCRIS data, and therefore contains a mix of both pre-treatment and post-treatment data, we exclude 2001 from all regressions using HCRIS-related outcomes.[8]

We restrict the sample to short-term acute care hospitals, which are the primary providers of general inpatient care in the U.S. healthcare system and provide a relatively comparable sample for analysis. In doing so, we exclude special facilities such as long-term care, rehabilitation, psychiatric, children's, and cancer hospitals. We also exclude government-owned hospitals, including Veterans Affairs hospitals and clinics and other federal, state, and local public hospitals, as well as hospitals with missing identifiers. Our final sample includes 3,680 unique hospitals across 304 hospital referral regions.

3.1.2 Hospital Referral Regions

We define hospital markets based on hospital referral regions (HRRs) (see, e.g., Chandra and Staiger (2007), Chandra et al. (2016), Finkelstein et al. (2016), Cooper et al. (2019), Gupta et al. (2024)), developed by the Dartmouth Institute for Health Policy and Clinical Practice through the Dartmouth Atlas Project. HRRs are defined based on patient referral patterns for hospital services, with each HRR typically encompassing at least one major referral center. We examine a number of alternative geographic units in Section 6.

Figure 2 shows the geographic distribution of exposure to the China trade shocks across HRRs. Exposure is constructed using Equation 3.2 and primarily concentrated in areas that historically dependent on manufacturing, such as Detroit and parts of the Midwest and Southeast. This geographic variation highlights how trade liberalization may affect hospitals indirectly through local labor market conditions. Panel B presents the density distribution of manufacturing specialization across HRRs in 1991, measured using Equation 4. Our identification thus comes from variation in Exposure (Panel A) that is not explained by manufacturing specialty (Panel B).

Appendix E.2 further illustrates the geographic distribution of residual exposure to the China trade shock after removing the component explained by manufacturing specialization. Because our Exposure measure captures both a region's ex-ante dependence on manufacturing and industry composition, our empirical specification thus controls for manufacturing

[8] We provide results including 2001 for robustness, as discussed in Section 6.3.

specialization and leave the residual component as the identifying variation. The areas with high residual exposure to the China shock include Detroit and parts of the Midwest and Southwest, but are also broadly distributed across HRRs.

3.1.3 Treatment Procedures, Patient Characteristics, and Quality of Care

To explore the mechanisms through which trade shocks affect hospital outcomes and to isolate changes in hospital behavior from changes in patient demand and composition, we complement the above data with patient-level discharge records from the Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS). These data provide a nationally representative sample of inpatient discharges with detailed information on patient demographics, diagnoses, payer type, admission source, and treatment procedures from twenty-five reporting states.[9] As above, we drop government-owned hospitals. Using these data, we study measures such as admissions, procedure intensity, and inpatient mortality. We aggregate discharge records to the hospital-DRG-year level and control for average patient characteristics within each hospital-DRG-year cell along with hospital characteristics.

3.1.4 Hospital Closures and Acquisitions

One limitation of the HCRIS data is that it does not include information on hospital closures and acquisitions. To examine how trade-induced hospital financial distress affects local healthcare market structure and access to healthcare, we construct two measures for hospital closures and acquisitions using information from the Dartmouth Atlas and the American Hospital Directory (AHD). Both of these datasets cover nearly all hospitals in the U.S. The first measure, *Probability of Hospital Closure*, is a dummy variable equal to one in the final year a hospital is observed operating in the data. We identify hospital closures when a hospital stops reporting data and verify its closure status using records from the AHD. The second measure, *Probability of Hospital Acquisition*, equals one if there is a change in hospital system ownership. Specifically, we classify a hospital as acquired in a given year if it transitions from independent status to membership in a hospital system in that year, or if its system affiliation changes from one system identifier to another in that year.

[9] The twenty-five reporting states during our sample period include Alaska, Arkansas, Arizona, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Illinois, Indiana, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, Mississippi, Montana, Nebraska, and Nevada. The NIS dataset prior to 2012 includes unique hospital identifiers and is therefore suitable for our sample period.

3.1.5 Health Insurance Premiums

We obtain data on employer-sponsored health insurance premiums through Freedom of Information Act (FOIA) requests containing scanned historical files. The data are constructed from Form 5500 filings, which U.S. firms with more than 100 employees are required to submit annually to the Department of Labor (DOL) and Internal Revenue Service (IRS). These forms contain detailed information on different employee benefit programs. We focus specifically on employer-sponsored health insurance plans. These data allow us to examine how changes in patient mix affect insurance premium pricing.

3.1.6 International Trade Flows, Household Mobility, and Firm Closures

We use international trade flow data from the United Nations Comtrade Database (UN Comtrade), as well as county-level employment data from the U.S. Census County Business Patterns (CBP), to construct healthcare market exposure to the China trade shock, following Autor et al. (2013). The UN Comtrade data provide detailed information on bilateral imports and exports between countries at the six-digit Harmonized System (HS) product level. We use this data to construct time-series measures of U.S. imports from China before and after China's entry into the WTO.

We also use several additional data sources to examine the effect of the China shock on household mobility and firm closures. To examine the effects of trade shock on household mobility, we obtain data on labor mobility from the IRS Statistics of Income database. The data track annual county-to-county migration flows based on address changes reported in tax returns. Because our analysis is conducted at the HRR level, we aggregate the migration flows from counties to HRRs using population-weighted county-to-HRR mappings. We then construct measures of migration outflows and the associated income loss resulting from outmigration. We obtain data on firm closures and job losses from the U.S. Census Business Dynamics Statistics database.

3.2 Defining Healthcare Markets Exposure to the China Shock

For each Hospital Referral Region (HRR) h and sector j, we construct the exposure measure using shift-share approach, closely following Autor et al. (2013) and Federico et al. (2025):

$$Exposure_h^{\text{CHN}\to\text{USA}} = \sum_{j\in\text{manufacturing}} \left(\frac{L_{h,j,1991}}{L_{h,1991}}\right) \left(\frac{\overline{Imports}^{\text{USA}}_{j,2002\text{–}2007} - \overline{Imports}^{\text{USA}}_{j,1994\text{–}2001}}{L_{j,1991}}\right) \quad (1)$$

where $L_{h,j,1991}$ denotes the employment in sector j within HRR h in 1991. $L_{h,1991}$ is the total employment in HRR h in 1991. $L_{j,1991}$ is the national employment in sector j in 1991. $\text{Imports}_j^{\text{USA}}$ represents the value of U.S. imports from China in sector j. We measure import growth as the difference between average imports during 2002–2007 and 1994–2001.

The exposure measure $Exposure_h^{\text{CHN}\to\text{USA}}$ captures the extent to which a HRR's labor market was affected by import competition. The first component of the measure, $\frac{L_{h,j,1991}}{L_{h,1991}}$, captures the *share* of the HRR's labor market that is in a manufacturing industry j in 1991. The second component of the measure, $\frac{\overline{Imports}^{\text{USA}}_{j,2002-2007} - \overline{Imports}^{\text{USA}}_{j,1994-2001}}{L_{j,1991}}$, captures the per-worker *shift* in US imports pre-and-post WTO entry, measured in terms of thousands of dollars per worker. Combining the two components, the exposure measure is therefore a shift-share or "Bartik" exposure variable (Goldsmith-Pinkham et al., 2020). Given a large number of markets h and a large number of industries j, Goldsmith-Pinkham et al. (2020) suggests that the Bartik measure in Equation (1) leads to consistent inference if *either* the 1991 labor shares are exogenous or the shift in imports are exogenous, with explicit formalization of the shares case. We believe that the 1991 labor shares are plausibly exogenous to shifts in hospital quality post-and-post China's WTO entry, as there are limited alternative explanations for the large-scale cross-sectional changes in hospital outcomes we observe. Therefore, we examine the impact of the exposure variable in Equation (1) directly in our main specifications. We also examine parallel pre-trends when using this exposure variable, whose presence implies that any endogeneity correlated with the 1991 labor shares would also have to be correlated with the timing of China's entry into the WTO in order to be a confounder for our analysis.

In addition to exogeneity in shares, another avenue through which the shift-share instrument can be valid is if the number of industries j is large and the shifts in imports are exogenous (Goldsmith-Pinkham et al., 2020). Borusyak et al. (2022) develops this econometric framework in more detail. As defined in Equation (1), the shifts in USA imports are unlikely to be exogenous as is, and therefore this avenue of identification requires an additional instrumental variables (IV) approach. To address this issue, the pioneering work of Autor et al. (2013) instruments for the shift component of the measure in Equation (1) by using the shift in the Chinese imports of 8 non-US developed countries, rather than the shift from USA. This alternative exposure variable, which we label $Exposure_h^{\text{CHN}\to\text{OTH}}$, addresses concerns about the exogeneity of the shifts. Federico et al. (2025) implements a IV-DID version of this approach. We test the robustness of our results to this IV-DID strategy in Appendix B.1. Our results are nearly identical when using the IV-DID identification strategy

compared to using Equation (1) directly. This similarity is reasonable because it is sufficient for *either* the shift or the shares to be exogenous for consistent estimation under large j and large h, and if the shares are already plausibly exogenous for our setting, then additionally instrumenting for shifts should lead to little change in the coefficient estimates as they are still consistently estimated, which we observe empirically. In addition to establishing the impact of the China syndrome on hospitals, the similarity between the two sets of results also add to the evidence on the robustness of the China syndrome in the literature.

3.3 Regression Specifications

For each hospital i, hospital referral region (HRR) h, and year t, we estimate the following specifications, based on Federico et al. (2025):

Static effect:

$$Y_{i,h,t} = \beta \left(\text{Exposure}_h \times Post_t\right) + \gamma \left(\theta_{h,1991} \times \text{Post}_t\right) + \alpha_i + \lambda_h + \delta_t + \varepsilon_{i,h,t}. \tag{2}$$

Dynamic effect:

$$Y_{i,h,t} = \sum_{k \neq -1} \beta_k \left(\text{Exposure}_h \times \mathbf{1}\{t = k\}\right) + \sum_{k \neq -1} \gamma_k \left(\theta_{h,1991} \times \mathbf{1}\{t = k\}\right) + \alpha_i + \lambda_h + \delta_t + \varepsilon_{i,h,t}. \tag{3}$$

Our coefficients of interest are β and β_k. We also include controls for $\theta_{h,1991}$ interacted with time, where $\theta_{h,1991}$ denotes HRR h's manufacturing specialization, constructed as the share of total employment within manufacturing industries of HRR h in 1991:

$$\theta_{h,1991} = \frac{\text{Employment}_{h,\text{manufacturing},1991}}{\text{Employment}_{h,\text{total},1991}}. \tag{4}$$

Following Autor et al. (2013); Federico et al. (2025), we control for this initial manufacturing specialization interacted with time to account for differential trends across regions with greater dependence on manufacturing and isolate variation in exposure to Chinese import competition based on within-manufacturing variation. Manufacturing industries correspond to SIC codes 2000–3999.[10] As explained in Section **??**, we exclude 2001 for HCRIS outcomes and use 2000 as the reference year due to overlapping fiscal-year reporting periods. For

[10] To mitigate the influence of extreme observations, we winsorize all hospital financial outcomes, insurance premiums, labor mobility measures, and the exposure measure at the 1st and 99th percentiles. We also winsorize bed days and inpatient discharges at the 5th and 95th percentiles, as they exhibit substantially greater dispersion than the other outcomes.

all other outcomes, we use 2001–the year China joined the WTO in December 2001–as the reference year.

To examine the mechanisms through which the China trade shock affects hospital behavior and patient outcomes, we also use hospital-DRG-year level data and estimate the following specifications:

$$\begin{aligned} Y_{i,d,h,t} =& \beta \left(\text{Exposure}_h \times \text{Post}_t \right) + \gamma \left(\theta_h \times \text{Post}_t \right) \\ &+ X'_{i,d,h,t}\Gamma + Z'_{i,h,t}\Pi + \alpha_i + \lambda_h + \delta_{d \times t} + \varepsilon_{i,d,h,t}, \end{aligned} \tag{5}$$

where $X_{i,d,h,t}$ is a vector of patient characteristics within each hospital–DRG–year, which includes average patient age and the shares of female, White, Black, and Hispanic patients. $Z_{i,h,t}$ is a vector of hospital characteristics, including hospital bed size, location, and ownership type. α_i, λ_h, and $\delta_{d \times t}$ are hospital, HRR, and DRG-by-year fixed effects, respectively. We control for DRG-by-year fixed effect to account for time-varying trends in treatment practices or disease-specific shocks that affect all hospitals within a given DRG-year. This specification thus allows us to isolate hospital behavioral responses (supply–driven) from changes in underlying patient demand and risk composition at the DRG level (demand–driven). Lastly, for all analyses, we cluster standard errors at the HRR-by-year level, which corresponds to the level of variation in exposure to the China trade shock interacted with time (Abadie et al., 2023).

3.4 Summary Statistics

The summary statistics of our sample is shown in Table 1. The primary independent variable of interest is the HRR-level exposure to trade liberalization, $Exposure_h^{\text{CHN}\to\text{USA}}$, defined in equation (XX). As shown in the first row of Table 1, this variable has a standard deviation of 0.83. This suggests that our regression coefficients defined in Section 3.3, which represents the effect of a unit increase in $Exposure_h^{\text{CHN}\to\text{USA}}$ post-WTO entry, represents the effect of an approximately 1 standard deviation increase in $Exposure_h^{\text{CHN}\to\text{USA}}$ post-WTO entry to the outcome variable of interest. The other variables in Table 1 show the summary statistics for the outcomes we examine as independent variables using the specification in Section 3.3.

4 Results

4.1 Patient admissions and demographic effects

As a validation exercise of the trade shock to hospital operations through private insurance, we begin by examining the effect of trade liberalization on the privately insured patient populations of exposed hospitals. We employ specification (5) with our inpatient data to examine any changes in inpatient admissions by payer type. The results, reported in Table 2, show a significant decline of 3.8% in hospital admissions of privately insured patients per DRG group, as indicated in column (1). This result is consistent with a drop in private insurance coverage of local populations. The economic magnitude is also sizable, with a one-standard deviation increase in a given hospital's exposure to the trade shock amounting to a decline of 177.12 inpatient admissions of privately insured patients per year.[11] A back-of-the-envelope calculation implies that this decline in payments from insurers to hospitals for inpatient admissions amounts to about $1.60 million in lost patient revenue for a given affected hospital per year in the post period.[12] In Appendix Table A.1, we examine the effect for small, medium, and large hospitals separately. For medium-size hospitals—which are the types of hospitals that most commonly serve manufacturing dependent areas—we find a larger decrease of 14% in private admissions. This represents 558.08 fewer privately-insured inpatient stays, amounting to roughly $5.04 million in private insurer payments for a given hospital per year with a one-standard deviation increase in *Exposure*.

We note that our estimated revenue loss from private admissions belies the total financial impact for affected hospitals; newly uninsured patients who require emergency hospital care are unlikely to be able to pay the same amount as private insurers (if at all). As such, affected hospitals can incur similar costs to providing treatment while receiving a lower or zero payment, thus further pushing down margins (discussed further below).

In columns (2)–(6) of Table 2, we examine privately insured admissions by age and find declines in all age groups below 65, consistent with decreases in private insurance coverage for working-age populations through manufacturing layoffs. We additionally observe that

[11] Hospitals in our sample operate in 365.59 unique DRGs on average, with an average of 15.361 privately insured patients admitted per DRG per year. The calculation is therefore $0.038 \times 0.83 \times 15.361 \times 365.59 = 177.12$.

[12] Cooper et al. (2019) report that the average price of inpatient cases for privately insured admissions is $14,200 in 2011 in their sample. We transform this 2011 amount to hospital prices from 2002–2006 using the Bureau of Labor Statistics Consumer Price Index (CPI) for hospital services. Hospital prices grew by about 79% from 2002 to 2011, 67% from 2003, 57% from 2004, 49% from 2005, and 40% from 2006, implying that the average price of privately insured inpatient cases from 2002–2006 is about $9,025. This estimate is similar to those derived using survey data from MEPS during the same period.

the dependents of these workers are also likely affected, with a decline in privately insured admissions of patients aged 0 to 17. In column (7), we consider Medicare-insured patient admissions and do not observe a decline, consistent with the shock to manufacturing primarily impacting privately insured workers. A similar pattern of admissions declines is found in both medium and large hospitals, as shown in Table A.1.

Workers who lose their private insurance can respond by shifting from where they receive care for themselves and their dependents, such as substituting emergency hospital care for treatment at public clinics or urgent care centers. Likewise, workers can delay receiving care (such as postponing treatment or elective procedures) or using a higher threshold for which they seek emergency hospital care. At the same time, workers can also receive hospital treatment but without insurance. We investigate this possibility in Table 3. In column (1), we find an insignificant increase of 3.7% in uninsured admissions. However, admissions might be more clustered in cases where hospital treatment is more urgent or necessary. As such, we interact our treatment with an indicator for admissions coded under riskier diagnosis-related group (DRG) classifications.[13] We see in column (2) a significant increase of 7.3% in uninsured admissions in riskier DRGs. This increase is primarily driven by admissions from visits to the hospital emergency department (ED), where uninsured admissions increase significantly only for more severe conditions (column 3). We find a similar pattern for inpatient admissions for elective treatment or procedures (column 5) and admissions arising from transfers from clinics (column 6)—both sources show increases in only among patients with more severe conditions. These results collectively illustrate that previously insured patients scale back hospital utilization following the loss in coverage and raise the threshold under which they seek hospital care.

Workers affected by the trade shock can also look for employment in other areas. We explore possible migration effects in Table 4 and find increases in both the total and net outmigration rates and number of individuals migrating outward (columns 1–4). Individuals that migrate out also appear to be younger, while in-migrants are older, as reflected in columns (5)–(6), with both the fraction and number of elderly individuals within the region increasing after the trade shock. Finally, the tax revenue for the region is also impacted, with a positive and significant loss in adjusted gross income per capita of out-migrants. These results highlight that the composition of patients the hospital serves shifts following trade liberalization, with a greater portion of residents on Medicare.

Put together, these results establish that the trade shock impacted hospitals through the

[13]We define high risk DRGs to be those in which admissions have an above-median mortality rate.

insurer mix of patients, with hospitals seeing declines in privately insured admissions and more uninsured patients seeking care with severe conditions. At the same time, communities experience an increase in out-migration of working-age adults, altering the age and risk profile of patients served by affected hospitals.

4.2 Hospital Financial and Operational Outcomes

We now examine the impact of trade liberalization on hospital financial and operational outcomes, utilizing specification (2). As discussed previously, hospital finances are based to a large extent on the payments they receive from private and public insurers. In Panel A of Table 5, we observe negative and sizable decreases in hospital operating performance. Column (1) indicates a decrease of 0.53 fewer non-publicly insured patients per hospital bed following the trade shock. This measure includes both privately insured and uninsured (i.e., self-pay) patients and the decrease indicates that previously privately-insured individuals seek alternative care to hospital stays following the trade shock, consistent with our earlier results. Moreover, column (1) indicates that publicly insured patients become a larger potion of the hospital's patient mix. This decline in private admissions is reflected in financial performance, as shown in columns (2)–(6). Affected hospitals earn less revenue and total income per inpatient admission (columns 2 and 3). This is consistent with hospitals becoming more reliant on public payers following trade liberalization, as public insurance payments are typically lower than private reimbursement rates (see Section 2 for details).[14] Correspondingly, profit (or net income) per patient exhibits a significant decline, which includes profit just from patient services (column 4) and total net income for the hospital (column 5). These profitability decreases reflect the hospital's loss of more profitable privately insured patients.

To provide texture to these results, in Column (6) we examine raw net income from patient services (net patient revenues minus operating expenses) and find an economically sizable decline of $566,060 per year for a one-standard deviation increase in a given hospital's exposure to the trade shock. Average total net income for hospitals in our sample is $4.85 million and thus the decline in income from patient services represents an 11.7% decrease relative to net income for a given affected hospital per year. This estimate is also reflected in the decline of total net income per patient shown in column (5), which shows a 13.5% decrease for a one-standard deviation increase in *Exposure*. These results underscore hospital financial reliance on privately insurer reimbursements and that changes in the payer mix can

[14]Net patient revenues reflects amounts collected after accounting for discounts, insurance adjustments, deductions, and write-offs. Total income is net patient revenues plus other comprehensive income.

lead to significant reductions in hospital earnings.

As many hospitals operate under tight margins, the loss of internally generated funds from fewer private admissions can be damaging for hospital operability, particularly for hospitals that are operating with negative margins. As such, we consider the likelihood of hospital closure—where a hospital ceases operations and shuts down—in column (1) of Table 5, Panel B. The results show a significant increase in hospital closure, with a one-standard deviation increase in *Exposure* leading to a 0.31 percentage point increase in the likelihood that the hospital shuts down. This estimate represents an economically meaningful increase of 34.8% relative to the mean failure rate of 0.89%. Moreover, this result implies that the loss of private insurer reimbursements for a hospital can significantly contribute to its closure and thus limit the access to healthcare within affected communities. Consequently, our findings suggest that trade liberalization is a contributor to and can help explain the rise of hospital closures in the U.S. (see, e.g., Carroll (2019)). We examine longer time windows for closure in Appendix Table D.2 and find similar (albeit larger) effects on hospital closure propensity, indicating that the effects are persistent for affected communities.

An attractive alternative to shutting down for hospitals in financial distress is to merge or be absorbed by another hospital or system. We examine merger likelihood in column (2) of Table 5, Panel B. We see that affected hospitals are more likely to merge with another hospital, with a one-standard deviation increase in *Exposure* resulting in a 0.75 percentage point increase in merger likelihood, a sizable 27.8% increase relative to the estimation mean. As above, these effects are also persistent over longer horizons, suggesting that continued financial pressure from a change in the hospital's payer mix contributes to greater consolidation in the healthcare system.

Furthermore, hospitals can make internal adjustments to mitigate the financial impact of fewer reimbursements from private insurers. As revenues become tighter, hospitals can adjust spending behavior and incorporate cost efficiency measures. We explore spending and cost adjustments in Panel C of Table 5. We find that hospitals scale down investing activities, through fewer equipment purchases and internal improvements: columns (1)–(4) indicate that affected hospitals exhibit declines in the value of total fixed assets, investments, buildings, and equipment. As resources become more constrained, hospitals redirect capital towards operating activities and away from investments and expenditures. Affected hospitals also utilize space more efficiently, by adding more beds (column 5). At the same time, hospitals improve cost efficiency and lower expenses per patient, as evidenced in columns (6) and (7). Finally, we observe in column (8) that hours per employee for the medical staff

significantly increase by 77.3 hours, suggesting that hospitals scale back hiring and instead increase employee workloads.

To better understand the cost efficiency gains that arise in Panel C of Table 5, we utilize our inpatient data to investigate the provision of services to patients. As noted in Section 2, hospitals are typically paid for inpatient stays prospectively using a fixed reimbursement scheme based on the patient's coded DRG. This reimbursement structure is used for Medicare reimbursements and a large majority of private insurer reimbursements (Cooper et al. (2019)). Hospitals can therefore improve cost efficiency by scaling back on services provided for admitted patients. We examine this possibility by considering the number of procedures provided to admitted patients using specification (5). The results, reported in Table 6, show that affected hospitals reduce the number of procedures provided to admitted patients across payer types, with the strongest reduction among Medicare-insured patients. In column (1), the coefficient estimate implies 251.28 fewer procedures provided per year at a given hospital for a one-standard deviation increase in exposure. Hospitals can thus scale back on treatment intensity while receiving the same payment from insurers, thereby increasing margins. These results are consistent with and help explain the decreases in operating expenses observed in Table 5.

4.3 Quality of Care

The decline in resources and cost efficiency measures described can have repercussions for patient care quality. For example, reducing treatment intensity or delaying equipment upgrades can lead to worse outcomes for patients. Likewise, greater workloads for the medical staff can reduce attentiveness to patients. To measure quality of care, we consider patient mortality rates at the DRG-hospital-year level using specification (5). A patient mortality in our sample is a death that occurs during hospitalization (i.e., an in-hospital death). We note that this is in contrast to mortality measures used by the Centers for Medicare and Medicaid (CMS), which include patient deaths that also occur 30 days following discharge. As such, our estimates can be viewed as a lower bound relative to the broader CMS mortality measures.[15]

The results are presented in Table 7. Columns (1) and (2) exclude patient or hospital controls while column (3) includes all control variables. Across all specifications, we observe a significant increase in the likelihood a patient dies in the hospital for a given DRG of 0.070–0.076 percentage points. Using the estimate in column (3), this equates to an additional 6.5

[15]CMS did not begin publicly reporting 30-day mortality rates until June 2007, after our sample period.

patient deaths for a one-standard deviation increase in *Exposure* for a given hospital per year. These findings illustrate the indirect negative spillover effects that changes in the payer mix can have on the quality of care that hospitals deliver.

4.4 Health Insurance Premiums

As an additional mechanism test, we examine possible changes in the healthcare insurance premiums—the cost of insurance plans—paid by firms for ESI coverage. These data are collected from Form 5500 data that insurers file with the U.S. Department of Labor regarding insurance benefits and are mandatory filings for firms with 100 employees or more. We therefore conduct our analysis using Form 5500 data at the firm-year-level,

The reasoning for this test is as follows. Because insurers can mitigate the risk of coverage through a diverse and large pool of participants, a decrease in the pool of workers, especially if this includes younger participants, could lead to insurers demanding higher premiums from firms to provide coverage. We examine average premiums in Panel A of Table 8 and find a significant increase in average premium per insured individual in areas affected by the trade shock. This result holds for all firms and for manufacturing firms separately.

We additionally examine if there is a decrease in covered participants for manufacturing firms following the trade shock in affected areas. Panel B of Table 8 shows that there is a significant decrease in covered lives following entry of import competition and that this negative effects holds only for manufacturing firms. These findings provide additional support for our mechanism of a decrease in ESI coverage following the trade shock.

4.5 Parallel Trends

Our difference-in-differences design relies on the assumption that more and less exposed areas would have followed similar trends in the absence of the trade shock. We assess this assumption by examining the dynamic effects of trade liberalization on our main outcomes using Equation 3.

Figures 3, 4, and 5 present the dynamic effects on hospital financial and operational outcomes, hospital closures and acquisitions, and health insurance premiums, respectively. Across the figures, the pre-treatment coefficients are small and statistically indistinguishable from zero, which indicate no differential pre-trends. Following China's accession to the WTO in December 2001, however, the outcomes begin to diverge in the directions documented in our main results. The timing of these effects is consistent with our proposed mechanism:

trade-induced manufacturing employment losses lead to a reduction in employer-sponsored insurance coverage and the privately insured patient base, which weakens local hospital finances and subsequently affects hospital survivals and quality of care. These results provide support for the parallel trends assumption underlying our DID design.

4.6 Long-run Effects

Do the adverse effects of trade liberalization on local healthcare systems and community access to care persist in the long run? We examine this question by extending the post-treatment window and estimating dynamic effects over a longer horizon. Appendixes D.1 and D.2 show that the effects on health insurance premiums and hospital closures and acquisitions extend well beyond our main sample period. These patterns suggest that local healthcare markets do not quickly recover from the initial trade shock, and highlight the unintended consequences of trade liberalization for community access to healthcare are persistent rather than transitory.

5 Heterogeneity

Our results thus far indicate that trade liberalization eroded hospitals' privately insured patient base, impairing hospital finances, investment, and survival. If this mechanism is operative, the effects should be concentrated where the transmission of the shock to the local community was most severe, and among hospitals whose revenues depended most heavily on private insurance reimbursements. We examine both dimensions of heterogeneity in this section. Section 5.1 splits healthcare markets by the intensity of local economic distress following the shock, while Section 5.2 splits hospitals by their ex-ante reliance on private insurance.

5.1 Heterogeneity by Treatment Intensity

We first examine whether the effects of trade liberalization are stronger in healthcare markets that experienced greater economic distress following the trade shock. We consider two proxies for the intensity of local distress: labor mobility, measured as the average fraction of out-migrants in each HRR over 2002–2006, and business closures, measured as the average firm closure rate over the same period. In each case, we divide HRRs into high and low groups based on the median value and re-estimate the specifications from Equation (2) separately

for each group.

The results are reported in Table 9. Panel A presents the results by labor mobility. For hospitals in HRRs with high outmigration (Panel A.1), we find significant declines in net patient revenue, total income, net income, and total expenses per patient, as indicated in columns (1) through (4). These hospitals also exhibit a statistically probability of closure of 0.41 percentage points (column (5)), relative to a subsample mean closure rate of 0.72 percentage points. In contrast, for hospitals in HRRs with low outmigration (Panel A.2), the estimates are economically small and statistically insignificant across all outcomes except for a modest decline in fixed assets. Panel B presents the results by business closures and shows a similar pattern. Hospitals in HRRs with high firm closure rates (Panel B.1) experience significant declines in revenues, income, and expenses, an increased probability of closure, and reduced fixed assets, while the corresponding estimates for HRRs with low firm closure rates (Panel B.2) are generally statistically insignificant. Overall, the results indicate that the effects of trade liberalization on hospital outcomes are concentrated in areas that experienced greater outmigration and firm closures following the trade shock.

5.2 Heterogeneity by Hospital Reliance on Private Insurance

We next examine whether the effects of trade liberalization are concentrated among hospitals that relied more heavily on private insurance reimbursements prior to the trade shock. Hospitals that derive a greater share of their revenues from privately insured patients are likely more vulnerable to a loss of private insurance coverage among residents in their communities. We consider two proxies for reliance on private insurance: hospital-level Medicare revenue and the HRR-level share of elderly population. In each case, hospitals are divided into high and low groups based on the median of pre-period (1997–2001) values. Hospitals with low Medicare revenue, and hospitals in HRRs with low elderly population shares are likely to be more reliant on private insurance reimbursements.

The results are reported in Table 10. Panel A presents the results by Medicare revenue. Hospitals with high Medicare revenue (Panel A.1) exhibit no significant changes in revenues, income, expenses, or closure probability, whereas hospitals with low Medicare revenue (Panel B.1) exhibit significant changes in financials and closure probabilities. Panel B presents the results by the share of elderly population and shows a similar pattern: hospitals in HRRs with high elderly population shares (Panel B.1) are largely unaffected by the China shock, whereas hospitals in HRRs with low elderly population shares (Panel B.2) experience significant declines in revenues and income and an increased probability of closure. These

results are consistent with the loss of privately insured patients as the mechanism through which trade liberalization affects hospital outcomes, and further illustrate the extent to which hospitals rely on reimbursements from private insurance.

6 Robustness Tests

We conduct several robustness checks to our analysis. Section 6.1 presents results using $Exposure_h^{\text{CHN}\to\text{OTH}}$ to instrument for $Exposure_h^{\text{CHN}\to\text{USA}}$. We defined those exposure variables in Section 3.2. Section 6.2 presents results using the Commuting Zone (CZ), Hospital Service Area (HSA), and County as alternative geographical units. Finally, Section 6.3 presents results when we include 2001 in our analysis using the HCRIS sample.

6.1 Alternative Empirical Strategy

Following the discussion in Section 3.2 as well as Federico et al. (2025), we estimate the following IV-DID specification for each hospital i, DRG d, hospital referral region h, and year t:

First stage:

$$\text{Exposure}_h^{\text{CHN}\to\text{USA}} \times \text{Post}_t = \pi \left(\text{Exposure}_h^{\text{CHN}\to\text{OTH}} \times \text{Post}_t \right) + \gamma \left(\theta_h \times \text{Post}_t \right) + \alpha_i + \lambda_h + \delta_t + \nu_{i,h,t} \tag{6}$$

Second stage:

$$Y_{i,h,t} = \beta \left(\widehat{\text{Exposure}_h^{\text{CHN}\to\text{USA}}} \times \text{Post}_t \right) + \gamma \left(\theta_h \times \text{Post}_t \right) + \alpha_i + \lambda_h + \delta_t + \varepsilon_{i,h,t} \tag{7}$$

As explained in Section 3.2, this IV-DID identification strategy is not strictly required if the geographical variation in 1991 labor shares in exposed manufacturing industries is exogenous to changes in hospital quality that coincide with China's entry into the WTO. Nevertheless, by utilizing the IV as an alternative method of identification, this approach can increase the credibility of our results in the case where the 1991 labor shares may be confounded. Appendix B.1 shows that our point estimates and dynamic plots remain very similar under this IV-DID identification strategy, which adds to the robustness of our analysis.

6.2 Alternative Geographical Unit

Our main analysis defines healthcare markets at the hospital referral region (HRR) level. This is reasonable because a hospital referral region is a natural geographic unit for analyzing hospital markets since patients within the region may be referred to hospitals within that region. Appendix C.1 shows that the results are robust to several alternative geographic units. Specifically, Panel A of Appendix C.1 shows that our results on hospital financial outcomes are very similar when examined at the commuting zone (CZ) level. Similarly, Panel B of Appendix C.1 shows that these results are also similar at the Hospital Service Area (HSA) level. HSAs have less precedence in the literature, but is "a collection of ZIP codes whose residents receive most of their hospitalizations from the hospitals in that area," whereas HRRs are larger in size and contain at least one hospital for major cardiovascular procedures and neurosurgery.[16] Finally, Panel C of Appendix C.1 shows our results at the county level.

6.3 Including 2001 for HCRIS

Our main analysis excluded the year 2001 when using the HCRIS data. As discussed in Section 3.1.1, this is because data from the year 2001 includes observations from both treatment and control periods due to hospital financial reporting periods that span more than one year. Therefore, it is unclear how to classify that year in our regression framework. Appendix B.2 shows that re-running our analysis including 2001, with the year being classified as a "pre-policy" period, yields very similar results.

7 Concluding Remarks

In this paper, we examine the undesired consequences of trade liberalization for local healthcare systems and community access to care. Exploiting variation in local exposure to the China trade shocks, our findings highlight an important channel through which local labor market shocks spill over to healthcare markets: the reliance of hospitals on private insurance reimbursements. Consistent with a reduction in manufacturing employment following trade shocks–and thus a loss in employer-sponsored healthcare insurance coverage among residents in affected communities–hospitals in more exposed areas experience a reduction in the intake of privately insured admissions. These declines are concentrated among working-age patients

[16] A further description of HRRs and HSAs can be found at the Dartmouth Atlas website.

and their dependents, consistent with our finding that employer-sponsored health insurance coverage declines among manufacturing firms in affected areas.

The loss of privately insured patients has important consequences for local hospitals and quality of care. Privately insured patients represent an important source of hospital revenue due to substantially higher reimbursement rates than public insurers. As a result, hospitals in more exposed areas experience sizable declines in patient revenues and profitability. Hospitals respond to these financial pressures by reducing investment and operating expenditures, including spending on equipment and facilities, and by cutting patient treatment procedures to save costs. Consistent with this channel, the effects are substantially stronger among hospitals that were more reliant on private insurance reimbursements before the shock and in communities experiencing greater outmigration and firm closures.

These financial pressures on hospitals and their cost-cutting responses ultimately affect both the structure of local healthcare markets and the quality of care that patients receive. We document that hospitals in more exposed areas are more likely to close or be acquired following the trade shock, and these effects persist beyond our main sample period. Among hospitals that remain open, reductions in investment and treatment intensity are accompanied by a deterioration in patient outcomes, including higher inpatient mortality. Our findings therefore extend the consequences of trade liberalization beyond its well-documented effects on employment and income by highlighting an important channel through which economic shocks outside the healthcare sector can spill over to hospitals and the communities they serve.

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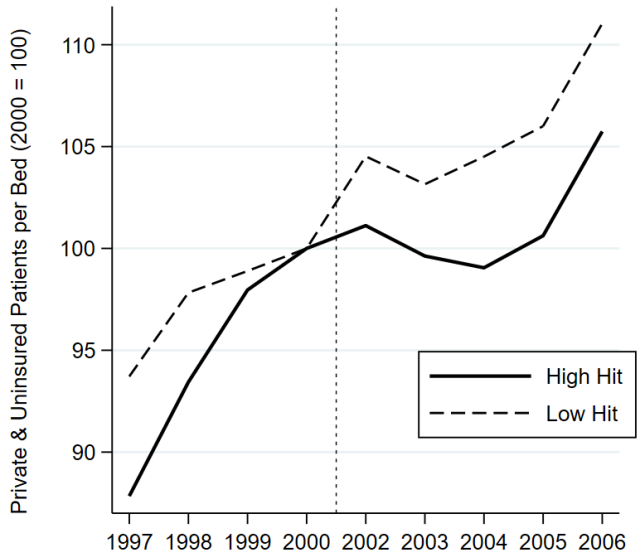
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FIGURE 1. The China Shock on Hospital Discharges by Insurance Type

This figure presents the evolution of hospital discharges across Hospital Referral Regions (HRRs) with high versus low exposure to trade liberalization.Panel A plots privately insured and uninsured patients per available bed, while Panel B plots Medicare and Medicaid patients per available bed. *High-Hit* and *Low-Hit* denote hospitals located in HRRs above and below the median exposure to the China trade shock, respectively. Exposure is constructed using Equation (1). Outcomes are normalized to 2000 = 100 for each hospital, and averaged across all hospitals. The vertical dashed line marks 2001, when China joined the WTO in December 2001.

(a) Non-Publicly Insured Discharges



(b) Medicare and Medicaid Discharges

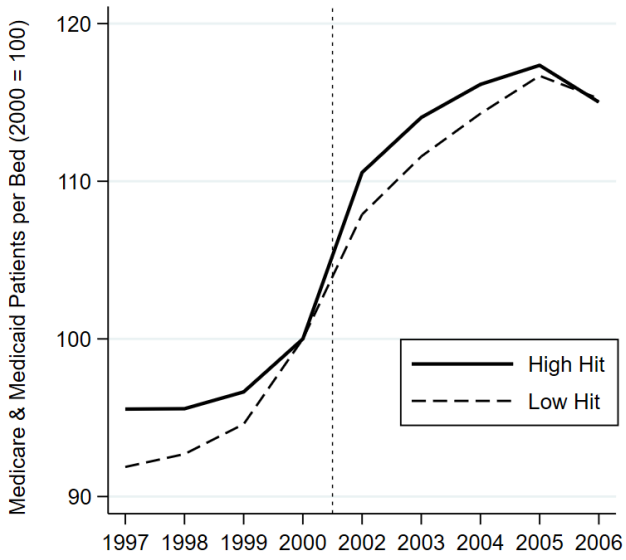
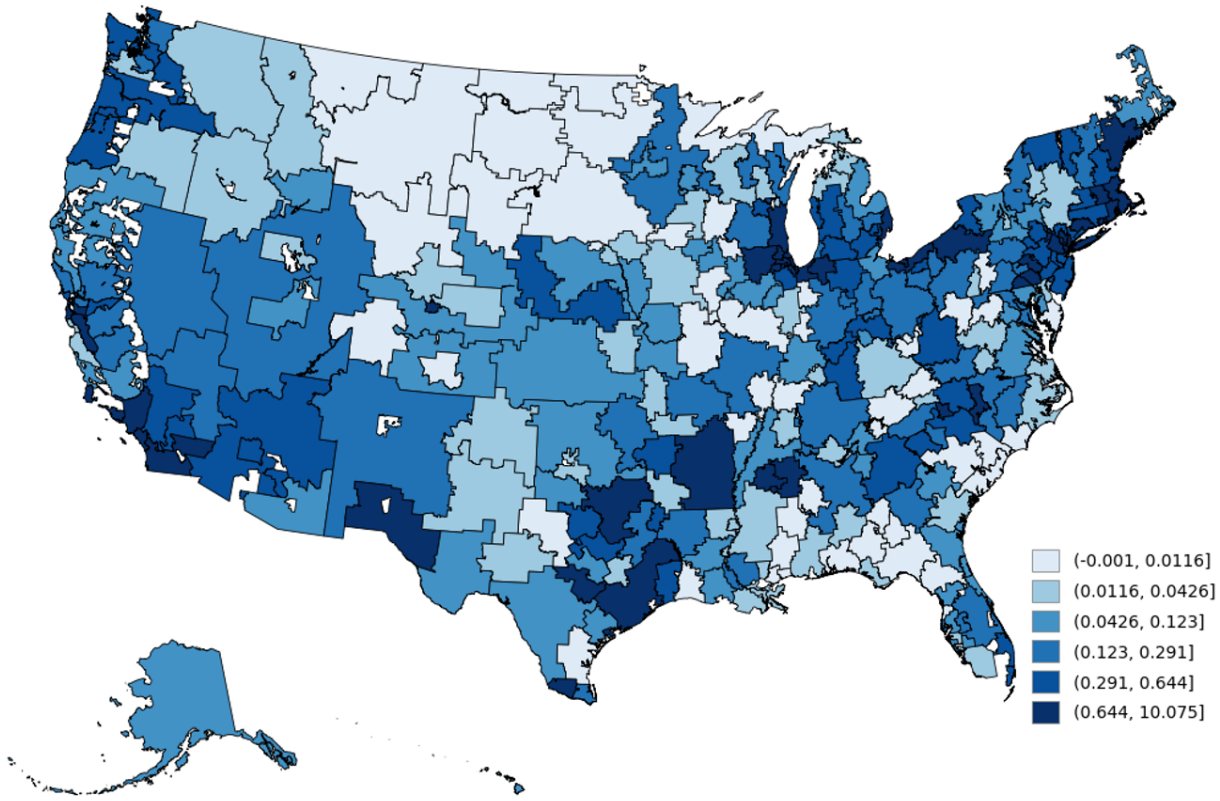


FIGURE 2. Healthcare Market Exposure to Trade Liberalization

This figure illustrates healthcare market exposure to trade liberalization (Panel A) and manufacturing specialization (Panel B) across Hospital Referral Regions (HRRs). In Panel A, shading reflects the magnitude of exposure constructed using Equation (1), darker regions indicate greater exposure to import competition following trade liberalization. In Panel B, manufacturing specialization is measured as manufacturing employment divided by total employment in each HRR in 1991.

Panel A. Geographical distribution to the China trade shocks



Panel B. Density Distribution of Manufacturing Specialty Across U.S. Healthcare Markets

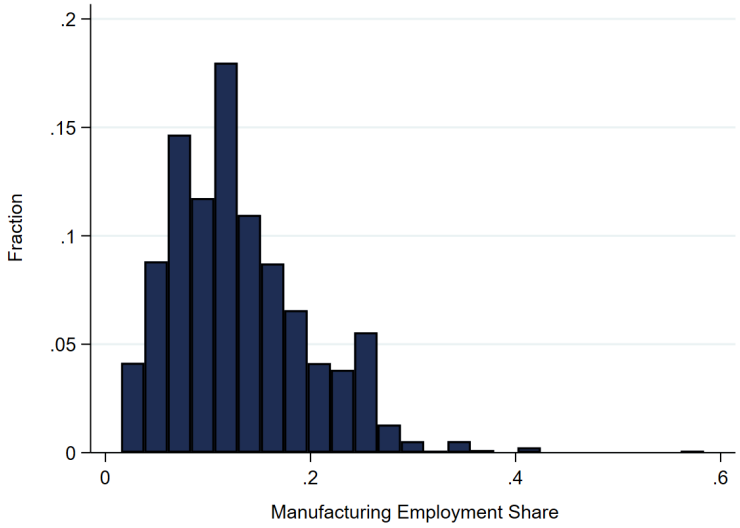


FIGURE 3. Parallel Trends: Hospital Financial and Operational Outcomes

This figure presents difference-in-difference estimates of the effects of trade liberalization on hospital outcomes. The sample period is 1997 to 2006. The regression specification is as specified in Equation (3). The omitted baseline year is 2000; year 2001 is excluded. *Private and Uninsured Patients/Beds* is the number of privately insured and uninsured patient discharges scaled by available beds. *Net Patient Revenue/Patients* is gross patient revenue less contractual allowances and discounts scaled by total discharges. *Net Patient Income* is net patient revenue minus operating expenses. *Total Income* is the sum of net patient revenue and other income. *Total Hours* is total hours worked across all employees. *Operating Expenses* are expenses incurred in the hospital's day-to-day operations. *Total Expenses* is the sum of operating and other expenses. *Fixed Assets* is the hospital's net book value of property, plant, equipment, and other long-lived assets. The figure reports coefficient estimates with standard errors clustered at the HRR-year level and corresponding 90% confidence intervals.

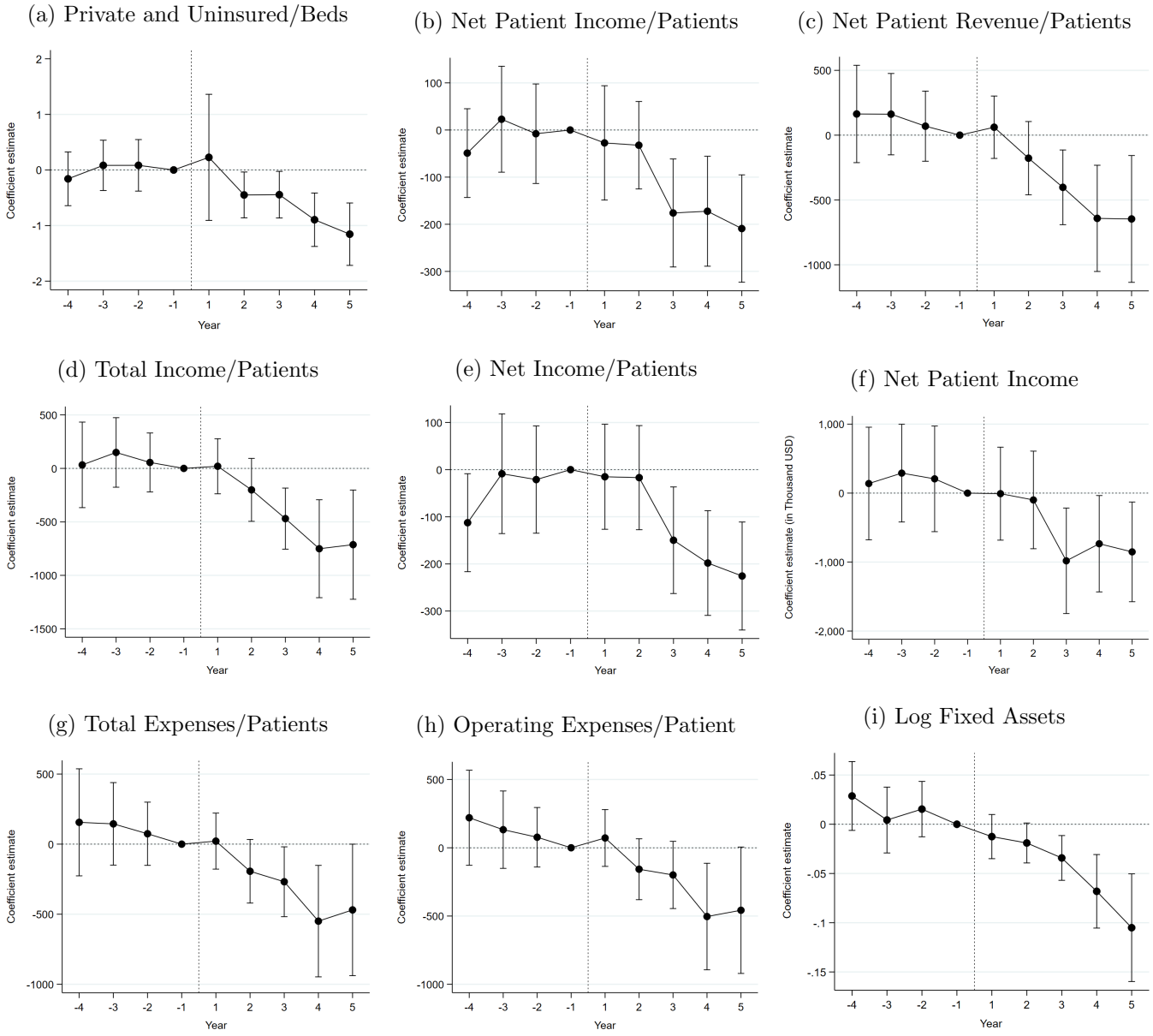
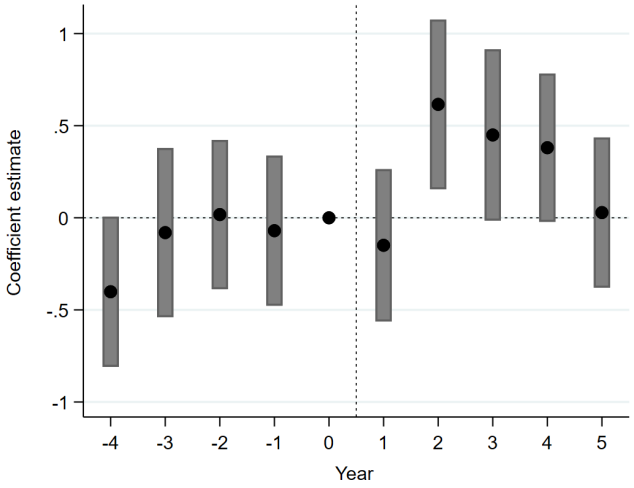


FIGURE 4. Parallel Trends: Hospital Closures and Acquisitions

This figure presents dynamic estimates of trade liberalization on hospital closures and acquisitions, corresponding to the static estimates in Table 5, Panel B, columns (1) and (2). The sample period is 1997 to 2006. The regression specification is as specified in Equation (3). The omitted year is 2001. *Probability of Hospital Closed* is a dummy equal to one in the final year a hospital remains in operation. *Probability of Hospital Acquired* equals one if there is a change in hospital system ownership. The figure reports coefficient estimates with standard errors clustered at the HRR-year level and corresponding 90% confidence intervals. Longer run hospital acquisition and closure outcomes are shown in Appendix D.2.

(a) Probability of Hospital Closed (%)



(b) Probability of Hospital Merged (%)

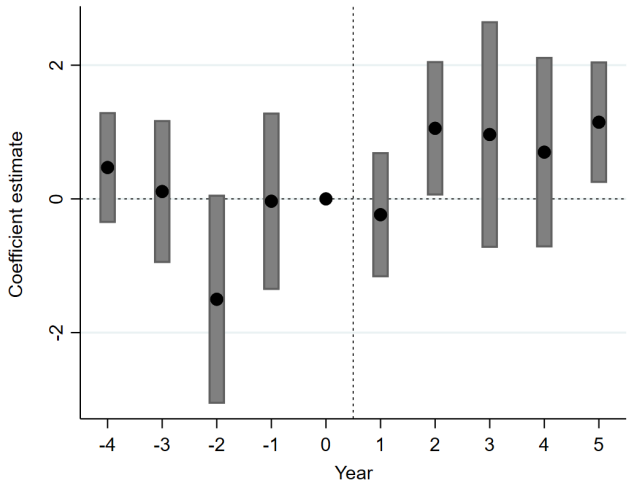
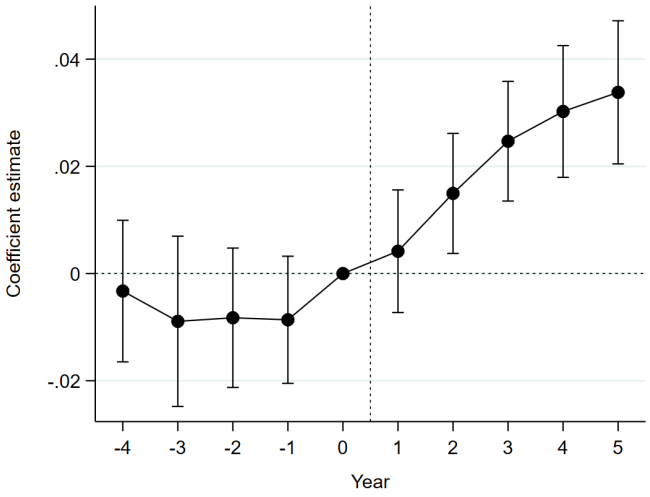


FIGURE 5. Parallel Trends: Health Insurance Premiums

This figure presents difference-in-difference estimates of the spillover effects of trade liberalization on health insurance pricing, corresponding to Table 8, Panel A. The unit of observation is the firm-Hospital Referral Region (HRR)-year level. The dependent variable, *Insurance Premiums per Insured*, is the total health insurance premiums paid by firm i divided by the total number of insured individuals, including employees and their dependents (such as spouses and children). Panel A presents results for all firms, while Panel B presents results for manufacturing firms, defined as those with two-digit SIC codes between 20 and 39. The sample period is 1997 to 2006. The regression specification is as specified in Equation (3). The omitted year is 2001. The figure reports coefficient estimates with standard errors clustered at the HRR-year level and corresponding 90% confidence intervals. Longer run results on health insurance premiums are in Appendix D.1.

(a) All firms



(b) Manufacturing firms only

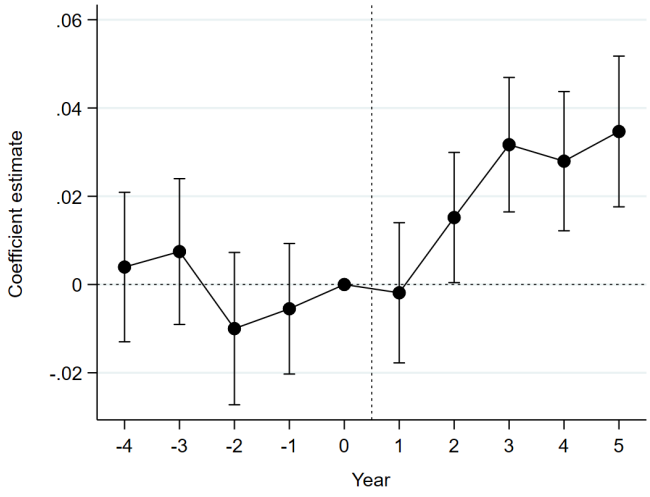


TABLE 1. Summary Statistics

The sample period spans 1997 to 2006. Panel A presents outcomes at the Hospital Referral Regions (HRR) level merged to the HCRIS data. $Exposure_h^{\text{CHN}\to\text{USA}}$ and $Exposure_h^{\text{CHN}\to\text{OTH}}$ are shift-share measures of a healthcare market's exposure to the China trade shock as defined in section 3.2. *Manufacturing Specialization,* $\theta_{h,1991}$ is the share of total employment in manufacturing industries within the HRR in 1991 as defined in Equation (4). *Out-Migration Rate* is out-migrants divided by the sum of stayers and movers. *Net Out-Migration Rate* is net out-migrants (out-migrants minus in-migrants) divided by the sum of stayers and movers. *Fraction of Elderly Population* is the share of individuals aged 65 and older. *Net Wealth Loss per Capita* is the total out-migrant AGI minus total in-migrant AGI, both in thousands, scaled by the HRR population. *Firm Closure Rate (%)* is firm closures divided by total number of firms multiplied by 100. Panel B reports hospital- and firm-year level outcomes based on CMS HCRIS data and FOIA requests for Form 5500. *Private and Uninsured Patients per Bed* is the number of privately insured and uninsured patient discharges divided by the average number of available beds. *Net Patient Revenue per Patient* is gross patient revenue less contractual allowances and discounts scaled by total discharges. *Net Patient Income per Patient* is net patient revenue minus operating expenses scaled by total discharges. *Total Income* is the sum of net patient revenue and other income. *Net Income* is total income minus operating and other expenses. *Total Hours* is total hours worked by all employees. *Operating Expenses* are expenses incurred in the hospital's day-to-day operations. *Total Expenses* is the sum of operating and other expenses. *Notes and Loan Payable* is long-term debt due after one year. *Available Bed Days* is the total number of available inpatient bed days during the year. *Fixed Assets*, *Buildings*, *Equipment*, and *Investments* are corresponding hospital book values. *Probability of Hospital Closed* equals 100 in the hospital's final year of operation, and zero otherwise. *Probability of Hospital Acquired* equals 100 if there is a change in hospital system ownership, and zero otherwise. *Insurance Premium per Insured* is employer-sponsored health insurance premiums divided by the total number of covered employees and covered dependents, measured at the firm-year level. Panel C reports DRG-level outcomes derived from discharge-level NIS HCUP data and aggregated to the hospital–DRG level by taking the mean, with (%) indicating the mean of the dummy variable has been multiplied by 100.

Panel A. Hospital Referral Region (HRR)-Level Outcomes

Variable	N	Mean	P5	Median	P95	SD
$Exposure_h^{\text{CHN}\to\text{USA}}$	32,560	0.53	0.00	0.20	2.49	0.83
$Exposure_h^{\text{CHN}\to\text{OTH}}$	32,560	0.37	0.00	0.16	1.50	0.54
Manufacturing Specialization, $\theta_{h,1991}$	32,560	0.13	0.04	0.12	0.25	0.07
Out-Migration Rate (%)	32,560	13.96	3.41	9.83	37.98	13.24
Net Out-Migration Rate (%)	32,560	0.00	-1.38	0.06	1.27	0.75
Fraction of Elderly Population (%)	32,560	14.15	9.06	13.18	26.12	4.63
Net AGI Loss per Capita	32,560	0.00	-0.38	0.02	0.31	0.20
Firm Closure Rate (%)	32,560	7.58	5.99	7.38	9.47	1.52

Panel B. Hospital- and Firm-Level Outcomes

Variable	N	Mean	P5	Median	P95	SD
Private and Uninsured Patients per Bed	28,474	22.24	4.62	19.36	49.12	15.36
Net Patient Revenue per Patient ($)	29,226	13,672.59	6,180.46	11,864.09	26,616.48	12,217.76
Net Patient Income per Patient ($)	29,226	-291.41	-3,134.93	-106.59	2,401.91	5,202.13
Total Income per Patient ($)	29,226	14,675.38	6,530.30	12,523.64	28,595.49	16,120.78
Net Income per Patient ($)	29,226	507.31	-1,838.42	395.58	2,865.64	2,642.18
Net Patient Income ($000s)	29,375	-458.97	-19,166.43	-241.22	19,398.55	14,490.20
Net Income ($000s)	29,375	4,850.06	-7,614.47	1,295.56	29,029.23	12,980.11
Hours per Employee	29,245	2,232.32	0.00	2,173.73	2,936.37	2,107.74
Operating Expenses per Patient ($)	29,226	13,959.89	6,406.13	12,013.46	26,800.71	14,717.03
Total Expenses per Patient ($)	29,226	14,178.02	6,486.77	12,178.82	27,283.40	15,232.22
Notes and Loan Payable per Patient ($)	11,655	4,862.03	16.20	2,915.10	13,100.68	14,061.09
Available Bed Days	29,277	48,497.31	6,570.00	37,960.00	140,084.00	38,092.28
Fixed Assets ($000s)	28,638	49,914.07	1,425.56	26,197.69	170,165.05	76,020.29
Buildings ($000s)	26,612	52,615.09	1,624.86	25,971.22	188,069.00	84,966.18
Equipment ($000s)	24,610	38,333.91	1,186.18	18,943.43	138,707.23	57,246.88
Investments ($000s)	14,852	32,780.53	77.82	7,715.97	146,405.20	78,121.33
Probability of Hospital Closed (%)	36,754	0.85	0.00	0.00	0.00	9.16
Probability of Hospital Acquired (%)	36,754	2.69	0.00	0.00	0.00	16.19
Insurance Premium per Insured ($)	260,066	5,025.63	104.30	3,463.27	10,186.61	37,710.06
Number of Insured	260,066	606.01	31.00	206.00	2,357.00	1,395.86

Panel C. Diagnosis-Related Group (DRG)-Level Outcomes

Variable	N	Mean	P5	Median	P95	SD
Mortality Rate (%)	1,073,659	2.78	0.00	0.00	15.79	11.20
Number of Procedures	1,073,883	1.54	0.00	1.04	4.50	1.59
Length of Stay (Days)	1,073,782	4.71	1.00	3.50	11.83	5.68
Number of Discharges	1,073,883	30.43	1.00	6.00	118.00	115.33
Medicare Patients	1,073,883	11.09	0.00	2.00	49.00	36.00
Medicaid Patients	1,073,883	5.36	0.00	0.00	15.00	44.25
Privately Insured Patients	1,073,883	11.53	0.00	2.00	39.00	66.27
Uninsured Patients	1,073,883	1.27	0.00	0.00	5.00	9.96
Average Age	1,073,025	53.40	6.07	58.33	80.50	21.42
Fraction of Female Patients	1,047,139	0.58	0.00	0.56	1.00	0.34
Fraction of White Patients	1,073,883	0.53	0.00	0.65	1.00	0.42
Fraction of Black Patients	1,073,883	0.07	0.00	0.00	0.50	0.18
Fraction of Hispanic Patients	1,073,883	0.09	0.00	0.00	0.53	0.21

TABLE 2. Effects of Trade Liberalization on the Loss of Profitable Patients

This table presents difference-in-difference estimates of the effects of trade liberalization on local hospitals' profitable patient base. The sample period is 1997 to 2006. The regression specification is as specified in Equation (5). i, d, h, and t denote hospital, Diagnosis-Related Group (DRG), Hospital Referral Region (HRR), and year, respectively. Exposure_h is HRR h's sectoral exposure to the China trade shock, constructed using Equation (1). Post_t is a dummy equal to one for years 2002 and later, following China's accession to the WTO in December 2001. θ_h is HRR h's manufacturing specialization, constructed as the share of total employment within manufacturing industries of HRR h in 1991. $X_{i,d,h,t}$ is a vector of patient characteristics within each hospital–DRG–year, including the shares of female, White, Black, and Hispanic patients. $Z_{i,h,t}$ is a vector of hospital characteristics, including hospital bed size, location, and ownership type. Observations are weighted by the number of discharges within each hospital–DRG–year. The mean and standard deviation (SD) of log-transformed variables are reported in levels. 2.5% of cells with missing patient demographic controls in the underlying discharge records, primarily due to unreported patient gender in 1997, are retained by setting the affected control to zero and including an indicator for missing demographics. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

	(1) Log Private Patients (All Ages)	(2) Log Private Patients (Ages 0–17)	(3) Log Private Patients (Ages 18–39)	(4) Log Private Patients (Ages 40–54)	(5) Log Private Patients (Ages 55–64)	(6) Log Private Patients (Ages 65+)	(7) Log Medicare Patients (All Ages)
Exposure × Post	-0.038***	-0.052**	-0.038***	-0.038***	-0.021**	0.008	-0.000
	(0.015)	(0.023)	(0.013)	(0.011)	(0.011)	(0.039)	(0.017)
Observations	805,861	177,365	398,055	483,225	418,144	260,844	774,030
Mean of Y	15.361	17.269	9.311	5.511	4.572	3.885	15.391
SD of Y	76.117	115.180	64.701	13.530	9.620	9.496	41.617
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.861	0.896	0.876	0.732	0.737	0.644	0.862

TABLE 3. Effects of Trade Liberalization on Uninsured Patient Admissions

This table presents difference-in-difference estimates of hospitals' uncompensated-care patient base. The sample period is 1997 to 2006. The regression specification is as specified in Equation (5). In Columns (2) to (7), the regressions are further interacted with *High Risk DRG*$_d$, which equals one if the DRG's ex-ante (1997–2001) average mortality rate is above the median across all DRGs. *Exposure* is HRR h's sectoral exposure to the China trade shock, constructed using Equation (1). *Post* is a dummy equal to one for years 2002 and later, following China's accession to the WTO in December 2001. θ_h is HRR h's manufacturing specialization, constructed as the share of total employment within manufacturing industries of HRR h in 1991. *Routine* is the fraction of inpatient admissions that are routine admissions. *ED* is the fraction of inpatient admissions admitted through the emergency department (ED). *Elective* is the fraction of inpatient admissions that are elective admissions. *Clinic* is the fraction of inpatient admissions referred from a clinic or physician's office. *Transfer* is the fraction of inpatient admissions transferred from another healthcare facility. *Patient Controls* is a vector of patient characteristics within each hospital–DRG–year, including the shares of female, White, Black, and Hispanic patients. *Hospital Controls* is a vector of hospital characteristics, including hospital bed size, location, and ownership type. The mean and standard deviation (SD) of log-transformed variables are reported in levels. 2.5% of cells with missing patient demographic controls in the underlying discharge records, primarily due to unreported patient gender in 1997, are retained by setting the affected control to zero and including an indicator for missing demographics. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

	Log Uninsured Admissions						
	(1) All	(2) All	(3) ED	(4) Routine	(5) Elective	(6) Clinic	(7) Transfer
Exposure × Post	0.037	0.013	-0.002	0.020	0.054	-0.123**	-0.006
	(0.038)	(0.041)	(0.035)	(0.052)	(0.101)	(0.050)	(0.118)
Exposure × Post × High Risk DRG		0.073***	0.057***	0.056	0.342***	0.134**	0.049
		(0.026)	(0.019)	(0.044)	(0.125)	(0.059)	(0.109)
Observations	328,340	324,089	240,943	126,284	48,772	16,385	7,268
Mean of Y	4.146	4.166	3.153	4.064	2.671	1.985	2.192
SD of Y	17.685	17.793	8.134	23.944	12.340	4.582	7.120
Exposure × High Risk DRG Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.697	0.698	0.608	0.716	0.541	0.466	0.398

TABLE 4. Effects of Trade Shock on Labor Mobility and Local Demographics

This table presents difference-in-difference estimates of the effects of trade liberalization on labor mobility. The sample period is 1997 to 2006. The regression specification is as specified in Equation (2). *Out-Migrants* is the number of individuals who moved out of HRR h over the previous twelve months, constructed using address changes reported on IRS Statistics of Income tax returns. *Fraction of Out-Migrants* is the number of individuals who moved out divided by the total number of individuals initially residing in HRR h. *Net Out-Migrants* is the number of individuals who moved out of HRR h net of those who moved in. *Fraction of Elderly Population* is the share of individuals aged 65 and older. *Net AGI Loss per capita* is the total adjusted gross income (AGI) of out-migrants minus the total AGI of in-migrants, scaled by the total number of individuals initially residing in HRR h, which proxies for the loss of income and local tax base in HRR h. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. *** , ** , and * denote significance at the 1%, 5%, and 10% levels.

	(1) Out-Migration Rate (%)	(2) Log (Out-Migrants)	(3) Net Out-Migration Rate (%)	(4) Log (Net Out-Migrants)	(5) Fraction of Elderly Pop (%)	(6) Log (Elderly Pop)	(7) Net AGI Loss per capita
Exposure × Post	0.095***	0.021***	0.154***	0.153***	0.250***	0.024**	0.041***
	(0.025)	(0.004)	(0.031)	(0.058)	(0.065)	(0.012)	(0.007)
Observations	32,612	32,612	32,612	17,836	32,612	32,612	32,612
Mean of Y	13.984	150,282	0.006	1,993	14.155	229,349	0.001
SD of Y	13.250	165,731	0.746	17,025	4.626	211,230	0.199
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.998	0.999	0.874	0.849	0.979	0.998	0.876

TABLE 5. Effects of Trade Liberalization on Hospital Outcomes

This table presents difference-in-difference estimates of the effects of trade liberalization on hospital financial and operational outcomes. The sample period is 1997 to 2006. The regression specification is as specified in Equation (2). *Private & Uninsured Patients per Bed* is the number of privately insured and uninsured patient discharges divided by the average number of available beds. *Net Patient Income* equals net patient revenue minus operating expenses. *Total Income* includes income from operating and investment activities plus other non-operating categories such as donations and contributions. *P (Hospital Closed)* is a dummy equal to one in the final year a hospital remains in operation. *P (Hospital Acquired)* is a dummy equal one if there is a change in hospital system ownership. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A. Hospital Financial Outcomes

	(1) Private & Uninsured Patients per Bed	(2) Net Patient Revenue per Patient	(3) Total Income per Patient	(4) Net Patient Income per Patient	(5) Net Income per Patient	(6) Net Patient Income
Exposure × Post	-0.527***	-449.858***	-471.672***	-112.240***	-82.492**	-682,000***
	(0.190)	(109.805)	(108.976)	(36.000)	(37.243)	(223,653)
Observations	28,365	29,117	29,117	29,117	29,117	29,270
Mean of Y	22.245	13,673	14,675	-291.412	507.306	-458,966
SD of Y	15.356	12,218	16,121	5,202	2,642	14,490,196
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.770	0.682	0.678	0.771	0.413	0.543

Panel B. Hospital Closures and Acquisitions

	(1) P (Hospital Closed) (%)	(2) P (Hospital Acquired) (%)
Exposure × Post	0.371**	0.905**
	(0.169)	(0.384)
Observations	32,110	32,110
Mean of Y	0.885	2.698
SD of Y	9.364	16.201
HRR FE	Yes	Yes
Hospital FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.167	0.017

Panel C. Hospital Operational Outcomes

	(1) Log (Fixed Assets)	(2) Log (Investments)	(3) Log (Building)	(4) Log (Equipment)	(5) Hours per Employee	(6) Log (Bed Days)	(7) Operating Expenses per Patient	(8) Total Expenses per Patient
Exposure × Post	-0.058***	-0.158***	-0.070***	-0.032**	77.260***	0.053***	-348.881***	-378.098***
	(0.015)	(0.032)	(0.017)	(0.014)	(24.778)	(0.005)	(101.526)	(102.650)
Observations	28,517	14,501	26,492	24,453	29,136	29,169	29,117	29,117
Mean of Y	49,914,073	32,780,533	52,615,087	38,333,907	2,232	48,497	13,960	14,178
SD of Y	76,020,287	78,121,334	84,966,176	57,246,875	2,108	38,092	14,717	15,232
HRR FE	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
Adjusted R^2	0.926	0.817	0.901	0.920	0.420	0.954	0.709	0.694

TABLE 6. Hospital Responses to Trade-Induced Distress

This table presents difference-in-difference estimates of hospital responses to trade-induced distress. The sample period is 1997 to 2006. The regression specification is as specified in Equation (5). *Exposure* is HRR h's sectoral exposure to the China trade shock, constructed using Equation (1). *Post* is a dummy equal to one for years 2002 and later, following China's accession to the WTO in December 2001. θ_h is HRR h's manufacturing specialization, constructed as the share of total employment within manufacturing industries of HRR h in 1991. *Number of Procedures* is the average number of procedures per patient, respectively, within each hospital–DRG–year. *Patient Controls* is a vector of patient characteristics within each hospital–DRG–year, including average patient age and the shares of female, White, Black, and Hispanic patients. *Hospital Controls* is a vector of hospital characteristics, including hospital bed size, location, and ownership type. The mean and standard deviation (SD) of log-transformed variables are reported in levels. 2.5% of cells with missing patient demographic controls in the underlying discharge records, primarily due to unreported patient gender in 1997, are retained by setting the affected control to zero and including an indicator for missing demographics. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

	(1) Log Procedures (All Payers)	(2) Log Procedures (Private Payers)	(3) Log Procedures (Medicare Payers)	(4) Log Procedures (Medicaid Payers)	(5) Log Procedures (Uninsured Payers)
Exposure × Post	-0.030**	-0.027***	-0.034***	-0.024**	-0.028***
	(0.012)	(0.010)	(0.013)	(0.010)	(0.011)
Observations	918,356	653,895	641,237	385,373	223,672
Mean of Y	1.797	1.902	1.944	1.986	1.983
SD of Y	1.573	1.625	1.690	1.820	1.763
HRR FE	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.697	0.645	0.672	0.605	0.554

TABLE 7. Effects of Distress and Cost Cutting on Quality of Care

This table presents difference-in-differences estimates of hospital distress and aggressive cost-cutting on quality of care. The sample period is 1997 to 2006. The regression specification is as specified in Equation (5). θ_h is HRR h's manufacturing specialy, constructed as the share of total employment within manufacturing industries of HRR h in 1991. $X_{i,d,h,t}$ is a vector of patient characteristics within each hospital–DRG–year, including average patient age and the shares of female, White, Black, and Hispanic patients. $Z_{i,h,t}$ is a vector of hospital characteristics, including hospital bed size, location, and ownership type. 2.5% of cells with missing patient demographic controls in the underlying discharge records, primarily due to unreported patient gender in 1997, are retained by setting the affected control to zero and including an indicator for missing demographics. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels. Appendix A.6 reports the results separately by the degree of discretion at admission.

	Dependent Variable = Mortality Rate (%)		
	(1)	(2)	(3)
Exposure × Post	0.076**	0.070**	0.070**
	(0.032)	(0.031)	(0.031)
Observations	1,073,648	1,073,648	1,073,648
Mean of Y	2.784	2.784	2.784
SD of Y	11.198	11.198	11.198
HRR FE	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Patient Controls	No	Yes	Yes
Hospital Controls	No	No	Yes
Adjusted R^2	0.469	0.471	0.471

TABLE 8. Effects of Trade Liberalization on Health Insurance Premiums

This table presents difference-in-difference estimates of the spillover effects of trade liberalization on health insurance pricing. The sample period is 1997 to 2006. The regression specification is as specified in Equation (2). *Insurance Premiums per Insured* is the total health insurance premiums paid by firm i divided by the total number of insured individuals, including employees and their dependents (such as spouses and children). Manufacturing firms are those with two-digit SIC codes between 20 and 39. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

	(1) Log (Premium per Insured)	(2) Log (Number of Insured)
Exposure × Post	0.025***	0.012*
	(0.005)	(0.006)
Exposure × Post × Manufacturing		-0.028***
		(0.006)
Observations	237,100	244,065
Mean of Y	5,026	622.784
SD of Y	37,710	1,421.603
Sample	All Firms	All Firms
HRR FE	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adjusted R^2	0.511	0.798

TABLE 9. Heterogeneity by Treatment Intensity

This table presents difference-in-difference estimates of hospital financial and operational outcomes by treatment intensity. The specifications follow Equation (2), and the sample is split based on local economic distress following trade liberalization. Panel A examines heterogeneity by labor mobility, proxied by the average fraction of out-migrants in each HRR over 2002–2006, while Panel B examines heterogeneity by business closures, proxied by the average business closure rate over the same period. In each panel, HRRs are divided into high and low groups based on above- and below-median values, respectively. *Net Patient Revenue per Patients* is gross patient revenue less contractual allowances and discounts scaled by total discharges. *Net Patient Income* is net patient revenue minus operating expenses. *Total Income* is the sum of net patient revenue and other income. *Total Expenses* is the sum of operating and other expenses. *Probability of Hospital Closed* is a dummy equal to one in the final year a hospital remains in operation. *Fixed Assets* is the hospital's net book value of property, plant, equipment, and other long-lived assets. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A. by Labor Mobility

	Panel A.1. High Outmigration Rate					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-654.890***	-745.012***	-164.472***	-577.238***	0.408*	-0.071***
	(136.643)	(148.842)	(50.858)	(140.602)	(0.231)	(0.015)
Observations	14,349	14,349	14,349	14,349	14,419	13,998
Mean of Y	14,200	15,155	523.557	14,651	0.721	55,032,167
SD of Y	14,851	18,604	2,701	17,636	8.462	81,377,612
Adjusted R^2	0.660	0.588	0.378	0.608	0.177	0.925
	Panel A.2. Low Outmigration Rate					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-44.145	-12.466	6.848	1.907	0.245	-0.041**
	(130.831)	(128.565)	(48.074)	(125.382)	(0.226)	(0.020)
Observations	14,415	14,415	14,415	14,415	14,495	14,172
Mean of Y	13,160	14,219	511.450	13,711	0.849	45,037,937
SD of Y	8,875	13,335	2,513	12,514	9.173	69,769,404
Adjusted R^2	0.743	0.852	0.451	0.864	0.167	0.924
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. by Firm Closure

	Panel B.1. High Firm Closure Rate					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-425.227***	-379.113***	-51.802	-311.941***	0.379*	-0.067***
	(117.483)	(117.280)	(43.063)	(116.774)	(0.224)	(0.016)
Observations	14,176	14,176	14,176	14,176	14,273	13,774
Mean of Y	13,219	14,187	455.695	13,730	1.009	57,695,637
SD of Y	9,426	13,447	2,600	12,675	9.994	88,321,485
Adjusted R^2	0.802	0.872	0.420	0.886	0.160	0.904
	Panel B.2. Low Firm Closure Rate					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	80.691	-6.582	-91.060*	100.806	0.054	0.008
	(204.008)	(216.752)	(53.318)	(202.515)	(0.216)	(0.023)
Observations	14,541	14,541	14,541	14,541	14,594	14,349
Mean of Y	14,127	15,171	577.800	14,617	0.562	42,455,874
SD of Y	14,464	18,478	2,618	17,480	7.475	60,829,524
Adjusted R^2	0.633	0.578	0.404	0.597	0.187	0.943
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 10. Heterogeneity by Hospital Reliance on Private Insurance

This table presents difference-in-difference estimates of hospital financial and operational outcomes by hospitals' ex-ante reliance on private insurance. Reliance on private insurance is proxied by hospital-level Medicare Revenue (Panel A) and the share of elderly populations at the Hospital Referral Region (HRR) level (Panel B). The specifications follow Equation (2), and hospitals are divided above and below the median based on pre-period (1997–2000) characteristics. *Medicare Revenue* is approximated by the hospital's Medicare patients multiplied by total net patient revenue and scaled by total patients. *Share of Elderly Populations* is the fraction of the population aged 65 and above, scaled by the total population in the HRRs. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A. by Medicare Revenue

	Panel A.1. High Medicare Revenue					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-32.640	-57.405	-45.181	13.311	0.157	-0.033**
	(107.364)	(109.068)	(43.764)	(99.766)	(0.143)	(0.013)
Observations	14,325	14,325	14,325	14,325	14,339	14,151
Mean of Y	13,990	14,907	643.940	14,288	0.314	83,694,925
SD of Y	10,313	11,226	1,763	10,870	5.593	91,968,998
Adjusted R^2	0.814	0.825	0.305	0.873	0.127	0.856
	Panel A.2. Low Medicare Revenue					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-790.850***	-805.408***	-91.194*	-710.513***	0.636**	-0.085***
	(156.741)	(162.934)	(50.625)	(150.826)	(0.290)	(0.021)
Observations	13,711	13,711	13,711	13,711	13,789	13,279
Mean of Y	12,880	13,910	336.658	13,572	1.204	15,338,058
SD of Y	8,723	13,559	2,727	12,672	10.906	26,317,880
Adjusted R^2	0.774	0.800	0.348	0.813	0.171	0.867
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Panel B. by Share of Elderly Populations

	Panel B.1. High Elderly Population Share					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	85.911	5.751	-29.293	29.860	0.346	0.017
	(193.273)	(204.333)	(56.579)	(192.774)	(0.243)	(0.018)
Observations	14,295	14,295	14,295	14,295	14,355	14,105
Mean of Y	13,550	14,483	460.583	14,038	0.683	44,922,656
SD of Y	10,449	12,025	2,422	11,450	8.235	70,148,254
Adjusted R^2	0.799	0.738	0.364	0.787	0.179	0.941
	Panel B.2. Low Elderly Population Share					
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-735.087***	-728.088***	-105.427**	-591.400***	0.422*	-0.088***
	(121.829)	(123.184)	(45.897)	(116.967)	(0.238)	(0.017)
Observations	14,469	14,469	14,469	14,469	14,559	14,065
Mean of Y	13,806	14,886	573.712	14,320	0.886	55,100,168
SD of Y	13,778	19,439	2,779	18,312	9.372	80,987,317
Adjusted R^2	0.614	0.654	0.447	0.657	0.165	0.908
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Internet Appendix

(for Online Publication)

This appendix supplements the empirical analysis of this paper. Below is a list of sections contained in this appendix.

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A Additional Heterogeneity Analyses

TABLE A.1. Hospital Privately Insured Admissions by Hospital Size

This table replicates the main results from Table 2 on the loss of profitable patient populations, split by hospital size. Hospital size is classified based on the NIS HCUP bed-size categories, which account for region, location (e.g., urban versus rural), and teaching status to reflect relative hospital size within comparable healthcare markets and hospital types. Details on the bed-size cutoffs for each category are provided in Table A.7.

Panel A. Small-sized hospitals

	(1) Log Private Patients (All Ages)	(2) Log Private Patients (Ages 0–17)	(3) Log Private Patients (Ages 18–39)	(4) Log Private Patients (Ages 40–54)	(5) Log Private Patients (Ages 55–64)	(6) Log Private Patients (Ages 65+)	(7) Log Medicare Patients (All Ages)
Exposure × Post	-0.039	-0.133**	-0.028	-0.037	0.002	0.019	0.012
	(0.038)	(0.053)	(0.038)	(0.033)	(0.029)	(0.078)	(0.022)
Observations	160,827	30,723	66,792	83,498	70,680	42,771	163,163
Mean of Y	9.319	13.116	6.309	3.777	3.170	3.015	9.484
SD of Y	46.052	75.242	42.224	9.124	6.329	6.017	24.920
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.837	0.900	0.864	0.690	0.680	0.636	0.840

Panel B. Medium-sized hospitals

	(1) Log Private Patients (All Ages)	(2) Log Private Patients (Ages 0–17)	(3) Log Private Patients (Ages 18–39)	(4) Log Private Patients (Ages 40–54)	(5) Log Private Patients (Ages 55–64)	(6) Log Private Patients (Ages 65+)	(7) Log Medicare Patients (All Ages)
Exposure × Post	-0.141***	-0.163***	-0.090**	-0.104***	-0.080***	-0.046	-0.001
	(0.045)	(0.059)	(0.035)	(0.029)	(0.026)	(0.097)	(0.030)
Observations	253,103	51,250	120,237	146,848	125,736	79,738	240,465
Mean of Y	13.117	16.591	8.259	4.720	3.865	3.629	13.147
SD of Y	64.208	103.269	55.595	10.720	7.196	8.232	33.574
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.855	0.899	0.876	0.706	0.696	0.646	0.858

Panel C. Large-sized hospitals

	(1) Log Private Patients (All Ages)	(2) Log Private Patients (Ages 0–17)	(3) Log Private Patients (Ages 18–39)	(4) Log Private Patients (Ages 40–54)	(5) Log Private Patients (Ages 55–64)	(6) Log Private Patients (Ages 65+)	(7) Log Medicare Patients (All Ages)
Exposure × Post	-0.036**	-0.033	-0.042***	-0.039***	-0.035**	0.020	-0.018
	(0.017)	(0.032)	(0.016)	(0.014)	(0.014)	(0.049)	(0.020)
Observations	391,772	94,321	210,430	252,526	221,305	137,570	370,033
Mean of Y	19.297	19.161	10.886	6.551	5.428	4.319	19.467
SD of Y	91.378	131.514	74.704	15.921	11.444	10.951	50.805
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.873	0.899	0.883	0.747	0.760	0.663	0.874

TABLE A.2. Hospital Financial Outcomes by Hospital Size

This table replicates the main results from Table 5, Panel A on hospital financial performances, split by hospital size. Hospital size (small, medium, and large) is classified based on terciles of average ex-ante patient discharges over 1997–2000, with small-, medium-, and large-sized hospitals corresponding to the bottom, middle, and top terciles, respectively.

Panel A. Small-sized hospitals

	(1) Net Patient Revenue per Patient	(2) Net Patient Income per Patient	(3) Total Income per Patient	(4) Net Income per Patient	(5) Net Patient Income
Exposure × Post	3.749	-112.151	121.020	16.170	-2,478
	(222.221)	(116.379)	(237.505)	(110.304)	(115,846)
Observations	8,961	8,961	8,961	8,961	9,038
Mean of Y	15,443	-849.647	16,866	344.669	-482,880
SD of Y	15,034	8,096	20,202	3,429	4,542,217
HRR FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.804	0.835	0.814	0.352	0.529

Panel B. Medium-sized hospitals

	(1) Net Patient Revenue per Patient	(2) Net Patient Income per Patient	(3) Total Income per Patient	(4) Net Income per Patient	(5) Net Patient Income
Exposure × Post	-349.587***	-122.629***	-347.985***	-88.575*	-728,850***
	(104.799)	(46.748)	(106.253)	(47.374)	(221,242)
Observations	9,448	9,448	9,448	9,448	9,475
Mean of Y	11,790	-9.275	12,375	434.788	279,636
SD of Y	4,745	1,915	5,033	1,783	8,776,862
HRR FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.683	0.349	0.697	0.278	0.393

Panel C. Large-sized hospitals

	(1) Net Patient Revenue per Patient	(2) Net Patient Income per Patient	(3) Total Income per Patient	(4) Net Income per Patient	(5) Net Patient Income
Exposure × Post	-194.188**	-89.463***	-233.874**	-48.531	-1,408,920***
	(90.928)	(30.524)	(94.659)	(30.607)	(450,304)
Observations	10,022	10,022	10,022	10,022	10,025
Mean of Y	13,231	-67.521	14,160	681.088	-1,190,079
SD of Y	5,458	1,472	6,065	1,184	22,596,306
HRR FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.845	0.500	0.848	0.393	0.567

TABLE A.3. Hospital Closures and Acquisitions by Hospital Size

This table replicates the main results from Table 5, Panel B on hospital closures and acquisitions, split by hospital size. The dependent variable, *P (Hospital Closed)* is a dummy equal to one in the final year a hospital remains in operation. *P (Hospital Acquired)* is a dummy equal one if there is a change in hospital system ownership. Hospital size (small, medium, and large) is classified based on terciles of average ex-ante patient discharges over 1997–2001, with small-, medium-, and large-sized hospitals corresponding to the bottom, middle, and top terciles, respectively.

	Small-sized hospitals		Medium-sized hospitals		Large-sized hospitals	
	(1) P (Closed) (%)	(2) P (Merged) (%)	(3) P (Closed) (%)	(4) P (Merged) (%)	(5) P (Closed) (%)	(6) P (Merged) (%)
Exposure × Post	1.043**	0.528	0.719**	1.058	0.126	1.535***
	(0.437)	(0.716)	(0.332)	(0.674)	(0.110)	(0.453)
Observations	9,985	9,985	10,458	10,458	11,083	11,083
Mean of Y	1.242	2.684	0.899	2.697	0.153	2.400
SD of Y	11.075	16.162	9.438	16.199	3.914	15.306
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.169	0.023	0.148	0.010	0.119	0.001

TABLE A.4. Treatment Procedures by Payer Types and Hospital Size

This table replicates the main results from Table 6 on hospital responses to trade-induced distress, split by hospital size. The dependent variable, *Number of Procedures*, is the average number of procedures per patient, respectively, within each hospital–DRG–year. Hospital size is classified based on the NIS HCUP bed-size categories, which account for region, location (e.g., urban versus rural), and teaching status to reflect relative hospital size within comparable healthcare markets and hospital types. Details on the bed-size cutoffs for each category are provided in Table A.7.

Panel A. Small-sized hospitals

	(1) Log Procedures (All Payers)	(2) Log Procedures (Private Payers)	(3) Log Procedures (Medicare Payers)	(4) Log Procedures (Medicaid Payers)	(5) Log Procedures (Uninsured Payers)
Exposure × Post	-0.009	-0.011	-0.016	-0.015	0.021
	(0.033)	(0.028)	(0.034)	(0.026)	(0.030)
Observations	188,293	118,806	121,688	63,172	32,191
Mean of Y	1.773	1.897	1.881	1.948	1.877
SD of Y	1.575	1.606	1.680	1.772	1.626
HRR FE	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.640	0.579	0.628	0.547	0.480

Panel B. Medium-sized hospitals

	(1) Log Procedures (All Payers)	(2) Log Procedures (Private Payers)	(3) Log Procedures (Medicare Payers)	(4) Log Procedures (Medicaid Payers)	(5) Log Procedures (Uninsured Payers)
Exposure × Post	-0.041**	-0.032**	-0.057***	-0.029*	-0.031
	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)
Observations	290,831	203,042	197,793	116,180	62,952
Mean of Y	1.780	1.871	1.927	1.960	1.933
SD of Y	1.569	1.604	1.688	1.809	1.730
HRR FE	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.697	0.637	0.671	0.593	0.534

Panel C. Large-sized hospitals

	(1) Log Procedures (All Payers)	(2) Log Procedures (Private Payers)	(3) Log Procedures (Medicare Payers)	(4) Log Procedures (Medicaid Payers)	(5) Log Procedures (Uninsured Payers)
Exposure × Post	-0.047***	-0.037***	-0.041***	-0.043***	-0.045***
	(0.013)	(0.012)	(0.013)	(0.012)	(0.013)
Observations	439,110	331,845	321,310	205,530	127,315
Mean of Y	1.817	1.922	1.978	2.010	2.029
SD of Y	1.575	1.642	1.693	1.837	1.803
HRR FE	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Patient Controls	Yes	Yes	Yes	Yes	Yes
Hospital Controls	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.734	0.681	0.704	0.636	0.587

TABLE A.5. Quality of Care by Hospital Size

This table replicates the main results from Table 7 on quality of care, split by hospital size. Hospital size is classified based on the NIS HCUP bed-size categories, which account for region, location (e.g., urban versus rural), and teaching status to reflect relative hospital size within comparable healthcare markets and hospital types. Details on the bed-size cutoffs for each category are provided in Table A.7.

	Small-sized hospitals		Medium-sized hospitals		Large-sized hospitals	
	(1) Mortality Rate	(2) Mortality Rate	(3) Mortality Rate	(4) Mortality Rate	(5) Mortality Rate	(6) Mortality Rate
Exposure × Post	0.050	0.027	0.095*	0.089*	0.109**	0.094*
	(0.099)	(0.095)	(0.053)	(0.053)	(0.053)	(0.051)
Observations	242,640	242,640	341,439	341,439	489,470	489,470
Mean of Y	2.880	2.880	2.754	2.754	2.756	2.756
SD of Y	12.424	12.424	11.218	11.218	10.522	10.522
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Patient Controls	No	Yes	No	Yes	No	Yes
Hospital Controls	No	Yes	No	Yes	No	Yes
Adjusted R^2	0.412	0.415	0.465	0.468	0.517	0.519

TABLE A.6. Quality of Care by Discretionary Admission Status

This table replicates the main results from Table 7 on quality of care, separately by the degree of discretion at admission based on DRG classifications. *Nondiscretionary* admissions correspond to acute or emergency conditions, such as stroke, acute myocardial infarction, trauma, poisoning, and burns, for which patients have limited flexibility over the timing or location of care. *Discretionary* admissions include all remaining DRGs, for which patients have relatively greater flexibility over when and where to seek care.

	Discretionary		Nondiscretionary	
	(1) Mortality Rate	(2) Mortality Rate	(3) Mortality Rate	(4) Mortality Rate
Exposure × Post	0.077**	0.071**	0.044	0.048
	(0.032)	(0.032)	(0.101)	(0.102)
Observations	994,235	994,235	79,408	79,408
Mean of Y	2.482	2.482	6.559	6.559
SD of Y	9.912	9.912	21.209	21.209
HRR FE	Yes	Yes	Yes	Yes
DRG-Year FE	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Patient Controls	No	Yes	No	Yes
Hospital Controls	No	Yes	No	Yes
Adjusted R^2	0.336	0.338	0.816	0.818

TABLE A.7. Hospital Bed Size Classifications

This table presents the NIS HCUP hospital bed size classifications (small, medium, and large) used in Equation 5. Rather than applying universal bed cutoffs, HCUP defines hospital bed size categories based on the combination of region, hospital location (urban versus rural), and teaching status to reflect relative size within comparable local healthcare markets and hospital types.

Region	Hospital Type	Small	Medium	Large
Northeast				
	Rural	1–49	50–99	100+
	Urban, nonteaching	1–124	125–199	200+
	Urban, teaching	1–249	250–424	425+
North Central				
	Rural	1–29	30–49	50+
	Urban, nonteaching	1–74	75–174	175+
	Urban, teaching	1–249	250–374	375+
Southern				
	Rural	1–39	40–74	75+
	Urban, nonteaching	1–99	100–199	200+
	Urban, teaching	1–249	250–449	450+
Western				
	Rural	1–24	25–44	45+
	Urban, nonteaching	1–99	100–174	175+
	Urban, teaching	1–199	200–324	325+

B Alternative Empirical Design

TABLE B.1. Alternative Identification Strategy:
Instrumental Variable Difference-in-Differences

This table replicates the main results from Tables 4 and 5 using an instrumental variable difference-in-differences (IV-DID) strategy as an alternative identification strategy to our baseline difference-in-differences model. We instrument for $\text{Exposure}_h \times \text{Post}_t$ using Chinese export growth to other high-income countries; see Section 6.1 for more details on the construction of our instrument and the two-stage specifications. *Post* is a dummy equal to one for years 2002 and later, following China's accession to the WTO in December 2001. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A. Labor Mobility and Demographic Changes

	(1) Out-Migration Rate (%)	(2) Log (Out-Migrants)	(3) Net Out-Migration Rate (%)	(4) Log (Net Out-Migrants)	(5) Fraction of Elderly Pop (%)	(6) Log (Elderly Pop)	(7) Net AGI Loss per capita
Exposure × Post	0.109***	0.025***	0.165***	0.175***	0.267***	0.026**	0.047***
	(0.027)	(0.004)	(0.033)	(0.062)	(0.070)	(0.013)	(0.008)
Observations	32,612	32,612	32,612	17,836	32,612	32,612	32,612
Mean of Y	13.984	150,282	0.006	1,993	14.155	229,349	0.001
SD of Y	13.250	165,731	0.746	17,025	4.626	211,230	0.199
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Statistics	12,262	12,262	12,262	18,152	12,262	12,262	12,262

Panel B. Hospital Financial Outcomes

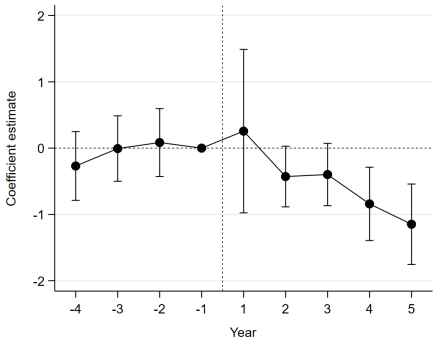
	(1) Private & Uninsured Patients per Bed	(2) Net Patient Revenue per Patient	(3) Total Income per Patient	(4) Net Patient Income per Patient	(5) Net Income per Patient	(6) Net Patient Income
Exposure × Post	-0.444**	-554.899***	-111.388***	-586.013***	-82.142**	-675,104***
	(0.205)	(102.903)	(39.525)	(102.250)	(40.648)	(249,160)
Observations	28,365	29,117	29,117	29,117	29,117	29,270
Mean of Y	22.245	13,673	-291.412	14,675	507.306	-458,966
SD of Y	15.356	12,218	5,202	16,121	2,642	14,490,196
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-Statistics	8,769	9,009	9,009	9,009	9,009	9,097

Panel C. Hospital Operational Outcomes

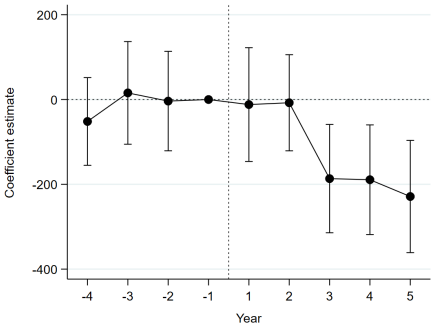
	(1) Log (Fixed Assets)	(2) Log (Investments)	(3) Log (Building)	(4) Log (Equipment)	(5) Hours per Employee	(6) Log (Bed Days)	(7) Operating Expenses per Patient	(8) Total Expenses per Patient
Exposure × Post	-0.063***	-0.185***	-0.073***	-0.030**	96.926***	0.063***	-457.495***	-496.083***
	(0.015)	(0.036)	(0.017)	(0.015)	(24.562)	(0.005)	(93.530)	(94.483)
Observations	28,517	14,501	26,492	24,453	29,136	29,169	29,117	29,117
Mean of Y	16.874	15.581	16.911	16.602	2,232	10.436	13,960	14,178
SD of Y	1.504	2.303	1.514	1.485	2,108	0.897	14,717	15,232
HRR FE	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
F-Statistics	8,013	2,375	7,560	7,410	9,021	9,022	9,009	9,009

Panel C. Dynamic Effects

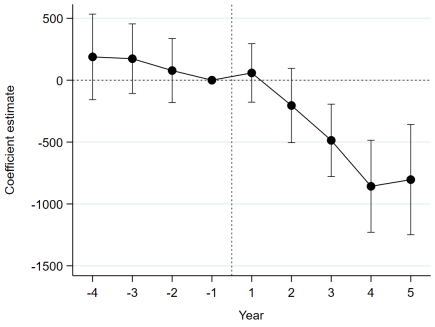
(a) Private and Uninsured/Beds



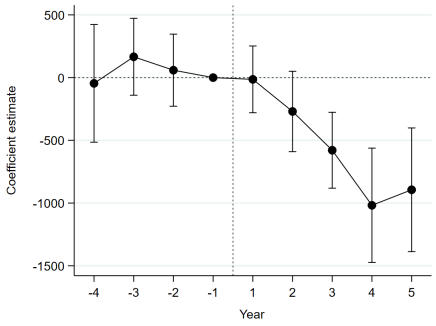
(b) Net Patient Income/Patients



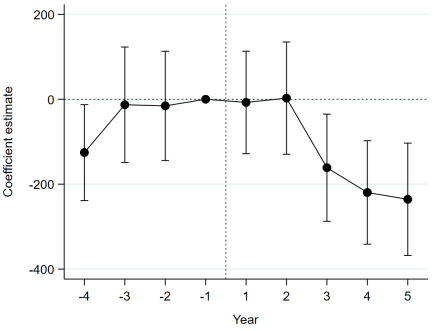
(f) Net Patient Revenue/Patients



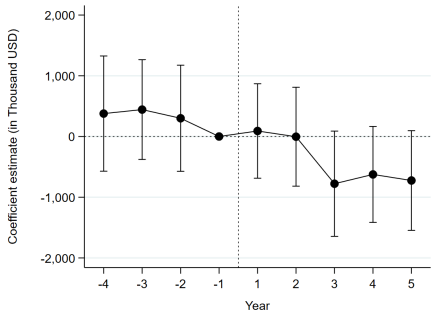
(d) Total Income/Patients



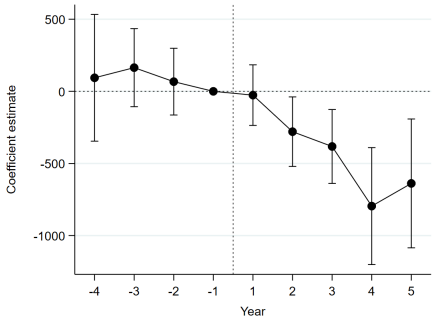
(e) Net Income/Patients



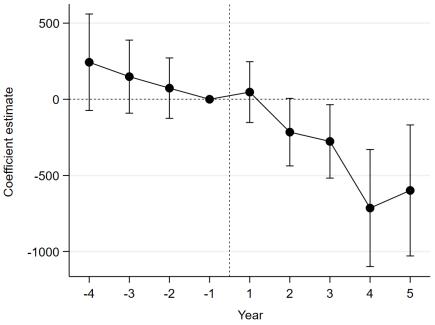
(f) Net Patient Income



(g) Total Expenses/Patients



(h) Operating Expenses/Patients



(i) Log Fixed Assets

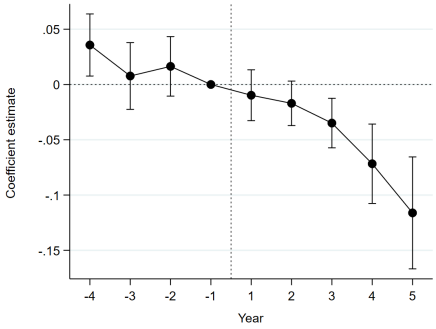


TABLE B.2. Alternative Sample Construction: HCRIS Analysis Including 2001

This appendix replicates the results from Panels A, C, and D of Table 5, which was using the HCRIS data, but including 2001, the year that contain both pre- and post-treatment observations due to overlapping hospital financial reporting periods. The sample period is 1997 to 2006. The regression specification is as specified in Equation (2). *Private Patients per Bed* is the number of privately insured and uninsured patient discharges divided by the average number of available beds. *Net Patient Income* equals net patient revenue minus operating expenses. *Total Income* includes income from operating and investment activities plus other non-operating categories such as donations and contributions. *Notes and Loan Payable* is long-term debt due longer than one year. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the HRR-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A. Hospital Financial Outcomes

	(1) Private & Uninsured Patients per Bed	(2) Net Patient Revenue per Patient	(3) Net Patient Income per Patient	(4) Total Income per Patient	(5) Net Income per Patient	(6) Net Patient Income
Exposure × Post	-0.506***	-431.379***	-124.106***	-461.505***	-106.256***	-603,376***
	(0.192)	(100.763)	(35.251)	(100.176)	(35.075)	(207,335)
Observations	31,515	32,337	32,337	32,337	32,337	32,506
Mean of Y	22.275	13,556	-304.570	14,547	487.994	-498,251
SD of Y	15.342	11,957	5,215	15,759	2,599	14,528,988
HRR FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.779	0.699	0.785	0.695	0.425	0.554

Panel B. Hospital Operational Outcomes

	(1) Operating Expenses per Patient	(2) Total Expenses per Patient	(3) Notes and Loan Payable per Patient	(4) Donations per Patient
Exposure × Post	-324.751***	-347.860***	-298.870**	-3.725**
	(92.739)	(93.431)	(132.625)	(1.609)
Observations	32,337	32,337	12,542	32,337
Mean of Y	13,855	14,068	4,835	37.249
SD of Y	14,413	14,897	13,688	154.376
HRR FE	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adjusted R^2	0.727	0.711	0.733	0.553

C Alternative Geographical Units

TABLE C.1. Effects of Trade Liberalization on Hospital Outcomes – Alternative Geographical Units

This appendix examines the effect of the trade shock on hospital finances using Commuting Zones (Panel A), Hospital Service Areas (Panel B), and counties (Panel C) as alternative geographic units instead of the baseline Hospital Referral Regions. The regression specification is as specified in Equation (2). We assign hospitals to counties using the 2010 Q1 HUD–USPS ZIP-to-county crosswalk, the earliest version available. When a ZIP code maps to multiple counties, we assign it to the county with the largest ZIP-to-county allocation ratio. We then map counties to Commuting Zones using the USDA county-to-Commuting Zone crosswalk. Finally, we assign hospitals to HSAs using the 1997 Dartmouth Atlas ZIP-to-HSA crosswalk, and construct HSA-level exposure measures by aggregating county-level data using a weighted county-to-HSA crosswalk. *Exposure* is the county's sectoral exposure to the China trade shock. *Post* is a dummy equal to one for years 2002 and later. The mean and standard deviation (SD) of log-transformed variables are reported in levels. Standard errors clustered at the geographic-year level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels.

Panel A. Commuting Zone (CZ) Level

	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-402.939***	-448.591***	-74.703*	-365.598***	0.428*	-0.041**
	(124.240)	(124.034)	(38.354)	(113.600)	(0.233)	(0.017)
Observations	27,238	27,238	27,238	27,238	27,388	26,684
Mean of Y	13,718	14,714	490.585	14,233	0.898	16.828
SD of Y	12,437	16,537	2,694	15,658	9.433	1.512
CZ FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.667	0.661	0.418	0.677	0.169	0.925

Panel B. Hospital Service Area (HSA) Level

	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-426.492***	-448.008***	-95.235***	-339.443***	0.444***	-0.046***
	(54.215)	(59.173)	(27.454)	(52.049)	(0.145)	(0.009)
Observations	28,995	28,995	28,995	28,995	29,148	28,399
Mean of Y	13,668	14,671	508.175	14,173	0.904	16.876
SD of Y	12,221	16,130	2,644	15,240	9.465	1.503
HSA FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.682	0.678	0.414	0.694	0.171	0.925

Panel C. County Level

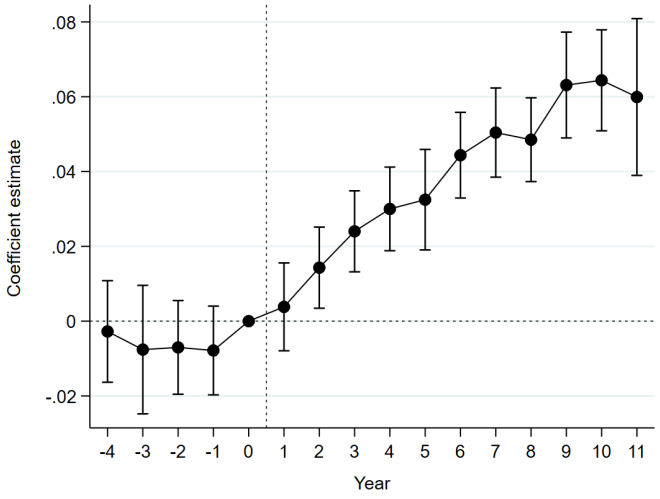
	(1) Net Patient Revenue per Patient	(2) Total Income per Patient	(3) Net Income per Patient	(4) Total Expenses per Patient	(5) P (Hospital Closed) (%)	(6) Log (Fixed Assets)
Exposure × Post	-427.813***	-460.071***	-85.648**	-355.896***	0.512***	-0.050***
	(80.853)	(80.226)	(36.886)	(65.296)	(0.176)	(0.013)
Observations	26,927	26,927	26,927	26,927	27,077	26,387
Mean of Y	13,719	14,715	490.762	14,236	0.898	16.828
SD of Y	12,430	16,525	2,692	15,648	9.433	1.512
County FE	Yes	Yes	Yes	Yes	Yes	Yes
Hospital FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.663	0.658	0.415	0.673	0.168	0.924

D Long-Run Effects on Access to Healthcare and Insurance Premiums

FIGURE D.1. Long-Run Effects–Health Insurance Premium Pricing

This appendix presents the long-run effects of China trade shocks on health insurance premiums, using the same specifications as the ones in Figure 5, but extending the sample through 2012. The unit of observation is the firm-Hospital Referral Region (HRR)-year level. The dependent variable, *Insurance Premiums per Insured*, is the total health insurance premiums paid by firm i divided by the total number of insured individuals, including employees and their dependents (such as spouses and children). Panel A presents results for all firms, while Panel B presents results for manufacturing firms, defined as those with two-digit SIC codes between 20 and 39. The omitted year is 2001. The figure reports coefficient estimates with standard errors clustered at the HRR-year level and corresponding 90% confidence intervals.

(a) All firms



(b) Manufacturing firms only

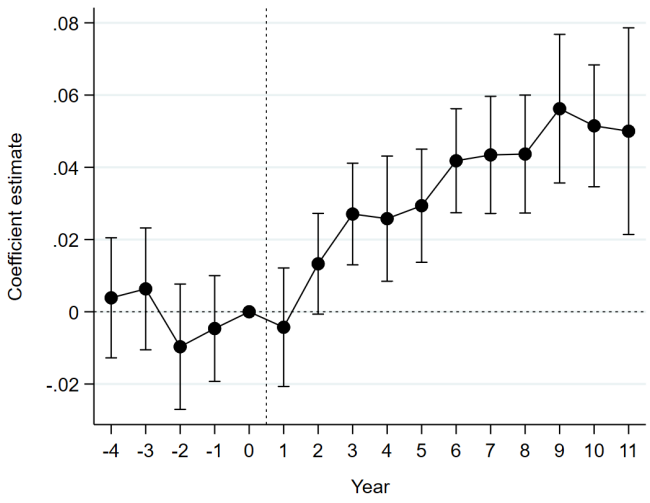


FIGURE D.2. Long-Run Effects–Hospital Closures and Acquisitions

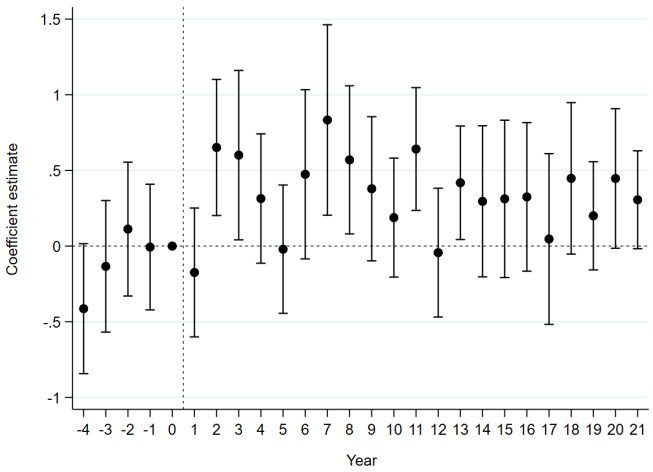
This appendix examines the long-run effects of the China trade shock on healthcare access from 1997 to 2022, using the same specifications as Table 5, Panel B, and Figure 4. The sample covers nearly all U.S. hospitals, as described in Section 3.1.4. The dependent variable, *Closed*, is an indicator equal to one in the final year a hospital remains in operation. *Acquired* equals one if there is a change in hospital system ownership. Panel A reports static difference-in-differences estimates using the same specifications as Panel B of Table 5, but split by different sample periods. *Post* is a dummy equal to one for years 2002 and later, following China's accession to the WTO in December 2001. Panel B shows dynamic effects using the same specifications as Figure 4, but extending the sample through 2022. The unit of observation is the hospital-Hospital Referral Region (HRR)-year. The figures report coefficient estimates with standard errors clustered at the HRR-year level and corresponding 90% confidence intervals.

Panel A. Static Effects

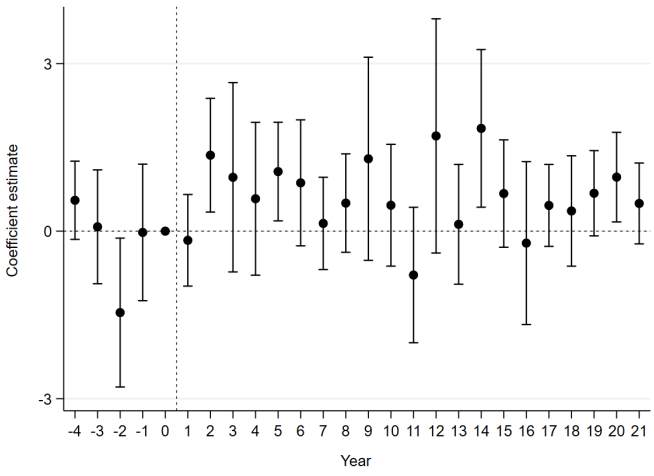
	1997–2006 (Main)		1997–2009		1997–2015		1997–2022 (Full)	
	(1) Closed (%)	(2) Acquired (%)	(3) Closed (%)	(4) Acquired (%)	(5) Closed (%)	(6) Acquired (%)	(7) Closed (%)	(8) Acquired (%)
Exposure × Post	0.366**	0.919**	0.475***	0.817**	0.441***	0.795***	0.431***	0.803***
	(0.174)	(0.368)	(0.163)	(0.318)	(0.148)	(0.303)	(0.148)	(0.289)
Observations	36,099	36,099	46,826	46,826	68,486	68,486	93,260	93,260
Mean of Y	0.753	2.734	0.741	2.603	0.695	2.970	0.677	2.472
SD of Y	8.648	16.308	8.577	15.923	8.308	16.976	8.198	15.526
HRR FE	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
Adjusted R^2	0.161	0.016	0.162	0.012	0.148	0.011	0.141	0.015

Panel B. Dynamic Effects

(a) Probability of Hospital Closed (%)



(b) Probability of Hospital Merged (%)

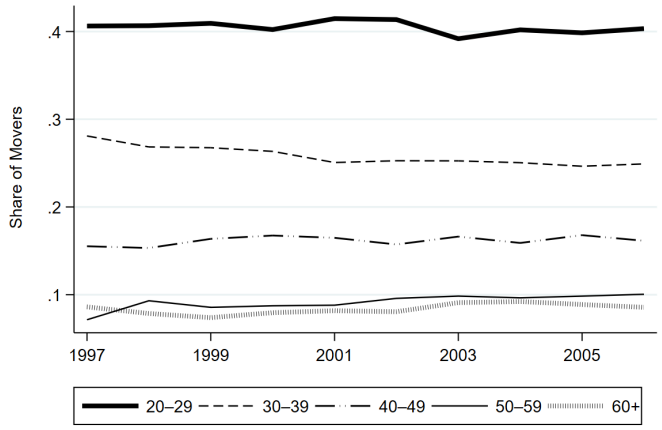


E Additional Descriptive Evidence

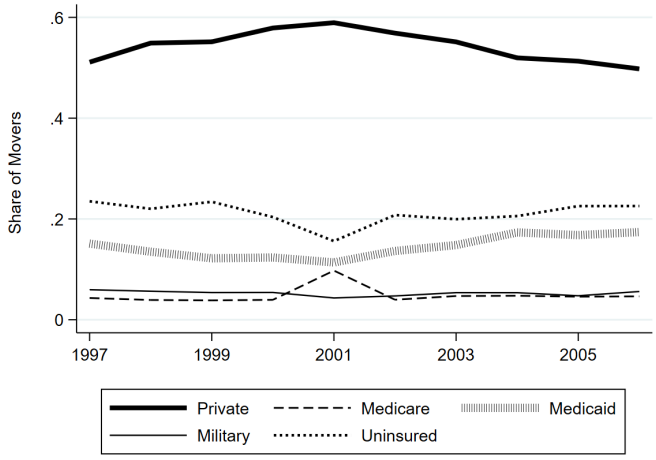
FIGURE E.1. Characteristics of Movers

This appendix presents the characteristics of individuals who moved during our sample period, using data from the Current Population Survey Annual Social and Economic Supplement (CPS ASEC). We exclude within–county movers and individuals younger than 20 years old. Panel A presents the age distribution of movers; Panel B presents their health insurance coverage (private insurance includes employer-sponsored, individually purchased, and spouse-sponsored coverage); Panel C presents their employment status; and Panel D presents their income distribution. Each series reports the annual share of movers in the corresponding category.

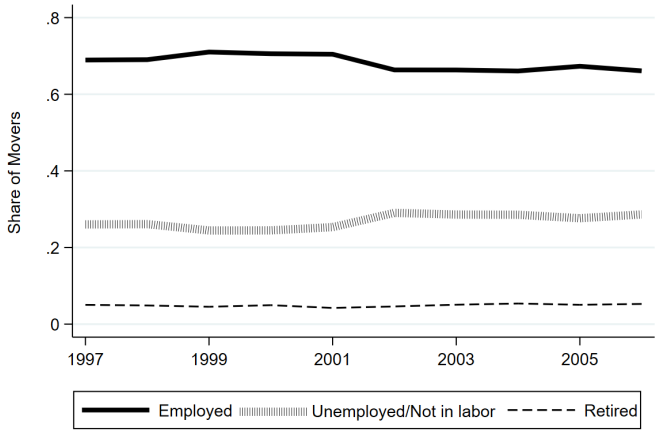
(a) By Age group



(b) By Health Insurance type



(c) By Employment status



(d) By Income group

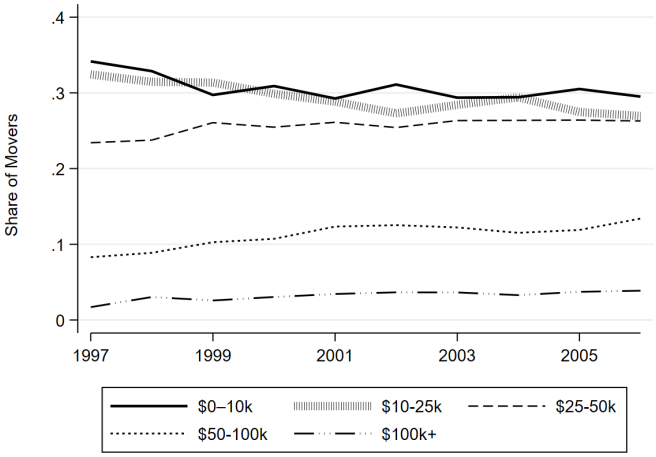
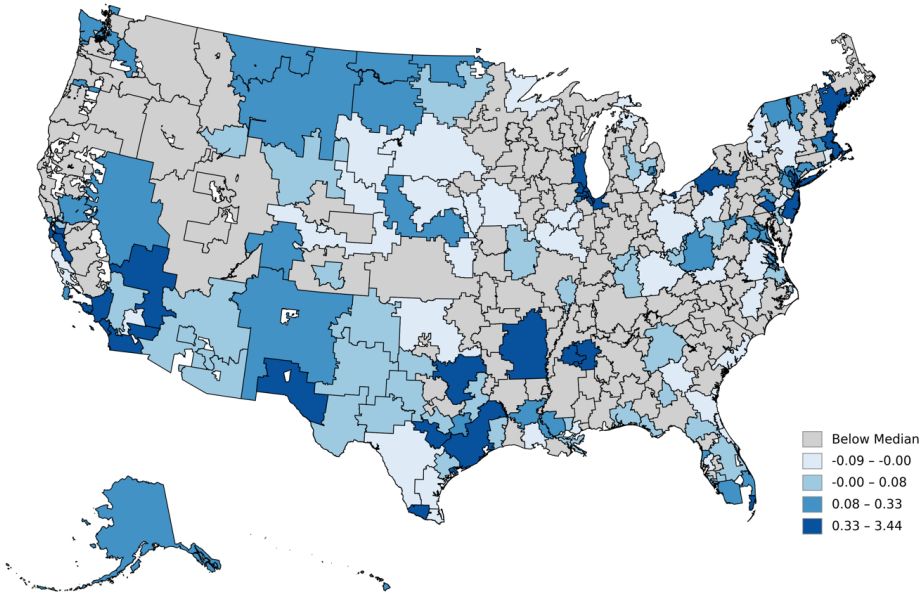


FIGURE E.2. Geographic Distribution of Residual Trade-Shock Exposure

This figure shows the geographic distribution of residual exposure to the China trade shocks across Hospital Referral Regions (HRRs) after residualizing exposure with respect to manufacturing specialization. **Panel A** presents HRRs with above-median residual exposure, while **Panel B** presents HRRs with below-median residual exposure. Darker shades indicate higher residual exposure within each panel. Grey areas indicate HRRs in the opposite exposure group. The sample covers 304 HRRs over the period 1997–2006.

Panel A. HRRs with Above-Median Residual Exposure



Panel B. HRRs with Below-Median Residual Exposure

