Hospital financial health and clinical choices: evidence from the financial crisis*

Manuel Adelino
Duke University's Fuqua School of Business
manuel.adelino@duke.edu

Katharina Lewellen
Tuck School at Dartmouth
k.lewellen@dartmouth.edu

W. Ben McCartney
Duke University's Fuqua School of Business
william.mccartney@duke.edu

July 2018

Abstract

Financial constraints can cause firms to reduce product quality when quality is difficult to observe. We test this hypothesis in the context of medical choices at hospitals. Using heart attacks and child deliveries, we ask whether hospitals shift towards more profitable treatment options after a financial shock—the 2008 financial crisis—and whether the shock worsens patient outcomes. The crisis caused an unprecedented drop in hospital investments, yet we find no overall effects on treatment choices and weak effects on patient outcomes. The results are similar for for-profits and nonprofits, and somewhat stronger for hospitals with more tightly integrated physicians.

* We thank seminar participants at the 2017 American Finance Association, Dartmouth College, Louisiana State University, University of Arizona and University of Tennessee, as well as Andrew Bernard, David Matsa (discussant), David Robinson, Jonathan Skinner and Mitch Towner for their helpful comments and suggestions. The previous versions of this paper were titled "Financial condition and product quality: the case of hospitals".

1 Introduction

The question of how financing affects real choices has been central in corporate finance research. When external financing is costly, a firm experiencing a financial shortfall might resort to actions that boost its current (at the expense of future) cash flow (Fazzari, Hubbard and Petersen (1988)). Though most literature focuses on the consequences of financial frictions for capital investments, the same mechanisms can also affect product quality choice, pricing, output, or worker safety. A number of studies test related hypotheses in the context of public (mostly manufacturing and retail) firms and find evidence that constraints are associated with lower quality output and other adverse outcomes (Rose (1990), Maksimovic and Titman (1991), Phillips (1995), Chevalier (1995), Chevalier and Scharfstein (1996), Matsa (2011), Cohn and Wardlaw (2013)).

This paper focuses on the healthcare sector. Healthcare has become at least as large as manufacturing in terms of employment, but the sector has been largely ignored in corporate finance research.[1] The paper asks how a hospital's financial health affects the quality of medical choices and patient outcomes. Based on studies in health economics, the more intensive treatment choices (such as heart surgery vs. drug-based therapy) are in many settings more profitable to healthcare providers. We test whether endowment losses associated with the 2008 financial crisis caused a shift towards more intensive treatment of patients (in the context of heart attacks and child delivery), and whether they increased adverse patient events. One key assumption for interpreting our tests is that such shifts would decrease treatment quality for the marginal patients, while benefiting hospitals financially in the short run.

We find that, in contrast to the evidence from manufacturing and retail firms, the large negative financial shock to hospitals had no significant effect on the quality of clinical choices or on patient outcomes. Our inability to reject the null of no effects is especially informative considering the large magnitude of the 2008 financial shock (see Abadie (2018) for a formal discussion of why non-significant results are often informative and tend to be under-reported)).[2] The lack of effects is

[1] Healthcare and social services are projected to make up 13.6% of total employment in 2024 while the estimate for manufacturing is 7.1% (Bureau of Labor Statistics, (https://www.bls.gov/emp/ep_table_201.htm). Recent corporate finance studies investigate hospital investment (Adelino, Lewellen, and Sundaram (2015)) and the strategic use of debt in hospitals' negotiations with insurers (Towner (2017)). A related literature investigates the performance, payouts, allocation, and optimal size of university endowments (Lerner, Schoar, and Wang (2008), Brown et al. (2014), Goetzmann and Oster (2012), Gilbert and Hrdlicka (2015)).

[2] Abadie (2018) shows that non-significant results are often more informative than significant results, especially in studies with large samples and when there is little reason to assign a high prior probability on the null point, which as we

surprising given the prior evidence from other industries, and given that physicians' choices appear to respond to more direct financial incentives, such as changes in prices, patient demand, or malpractice insurance (Frakes (2013), Gottlieb (2014), Eliason et al. (2018)).

From a theoretical standpoint, it is unclear to what extent financial shocks to hospitals should affect the quality of medical choices. On the one hand, the key ingredient of models such as Maksimovic and Titman (1991) – the difficulty for customers to observe quality – is a first order concern in the healthcare setting, creating a potential for quality skimping. On the other hand, hospital organizational structure, particularly the nonprofit form, may counteract these incentives. In fact, many authors argue that nonprofits evolved precisely to address information asymmetry problems in the product markets (Arrow (1963), Easley and O'Hara (1983), Glaeser and Shleifer (2001)). This effect is likely reinforced in the hospital setting in which the key choices that determine quality are made by physicians and the extent to which hospital administrators can influence those choices – either directly or through incentive systems – is likely more limited than in other sectors.[3]

We focus on two clinical choices that have been widely researched in health economics: the choice of the intensive vs. drug-based treatment of heart attack (Acute Myocardial Infarction or AMI) patients, and the choice of the Cesarean section (C-section) vs. vaginal birth as a mode of child delivery. Child delivery and heart disease are the two most frequent diagnostic categories, together accounting for 24% of all hospital discharges in 2007 according to the National Hospital Discharge Survey. In addition, detailed data on the medical condition of patients allows us to control for many clinical reasons for the intensive treatment choice and thus focus on the use of these procedures that appear more discretionary.

We start by showing that the 2008 financial crisis had a large negative effect on nonprofit hospital financial health. The potential channels included the decline of financial assets, the collapse of the credit market, and the reduced demand for hospital services due to the rise in unemployment. Following the crisis, hospitals experienced significant and sudden declines in capital investments, consistent with the evidence in Adelino, Lewellen and Sundaram (2015), Dranove, Garthwaite, and Ody (2017), and in the context of universities, in Brown et al. (2014).

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argue above, is the case in our setting. He therefore advocates for more extensive reporting and discussion of non-significant results.

[3] Anecdotal evidence suggests that such influence might be significant. In a recent Wall Street Journal (WSJ) article examining discharge patterns, former hospital employees state that "their corporate bosses exerted pressure to discharge as often as possible during the most lucrative days…" (Hospital Discharges Rise at Lucrative Times" by C. Weaver, A. Wilde Mathews, and T. McGinty, WSJ, 2/17/2015).

We find that this unprecedented shock to hospitals' financial condition had little to no effect on treatment choices. We consider both time-series patterns, i.e. we compare treatment choices pre- and post-crisis for all hospitals, and cross-sectional evidence based on hospitals' returns on their financial assets. The regressions include a large set of covariates that are associated with treatment choice, such as patient age, gender, co-morbidities, and a variety of other risk factors

In the case of the heart attack patients, the rate of intensive cardiac treatment increases during our sample period, but the overall increase is indistinguishable from a time trend and is unrelated to the 2008 financial shock. The intensive treatment rate at large hospitals, which account for 77% of all patients, is essentially flat throughout 2005-2011, suggesting that for the majority of patients treatment intensity remained unchanged. (The hospitals are split into small and large groups at the median of their service revenues.) Small hospitals start off with substantially lower intensive treatment rates in 2005 (25% vs. 55%) and experience an increase during 2005-2011. Again however, this increase is indistinguishable from a time trend and is unrelated to the 2008 financial return. Our conclusions from the C-section analysis mirror those for cardiac treatment. As in the case of heart attack patients, we include detailed controls for the probability of obtaining a C-section, so that concerns of changing patient population do not drive our results.

The last set of tests examines shifts in patient outcomes post 2008 using a set of Patient Safety Indicators (PSI) provided by the Agency for Healthcare Research and Quality (AHRQ). These indicators capture rare adverse patient events following different types of medical interventions (such as postoperative sepsis or perioperative hemorrhage), and are intended to measure the quality of care provided in hospitals. As with the level of treatment intensity, we find no differences in the incidence of these events before and after the crisis in the overall sample. We find some evidence that hospitals with better financial returns in 2008 improved patient safety after the crisis relative to hospital with worse returns, but the results are sensitive to the way we aggregate information in the individual PSIs.

The general lack of treatment responses to the financial crisis raises the question of which mechanisms might be responsible for this "non-result". One possibility is that the nonprofit organizational form "works well" in the sense that its weaker focus on profits shields consumers from undesirable shifts in quality when the organization suffers a financial shock. Another factor might be the specific features of hospital governance, in particular, the often loose relationship between hospitals and the key workers (physicians) that directly affect quality. We explore these channels using information on hospitals' nonprofit vs. for-profit status and their arrangements with physicians. We find that the lack of treatment response was remarkably uniform across the different hospital types.

There is some evidence, however, that looser relationships between hospitals and physicians contributed to the weak response. This is especially notable given the current trend towards stronger physician-hospital integration nationwide (Scott et al. (2016)).

This paper merges two strands of literature. First, we contribute to the corporate finance research on the effects of financing frictions on product market choice. Rose (1990) finds that airlines' accident rates are negatively related to firms past financial performance (see also Phillips and Sertsios (2013)). Similarly, Phillips (1995) finds that firms in less competitive industries shrink output and increase profit margins following leveraged recapitalizations. Chevalier and Scharfstein (1996) show evidence from the supermarket industry that liquidity constraints induce firms to increase markups (and short-run cash flows) and to underinvest in market share during recessions. Chevalier (1995) finds similar evidence for supermarkets engaged in leveraged buyouts. Matsa (2011) shows that financial leverage increases supermarkets' inventory shortfalls – a measure of reduced product quality. Cohn and Wardlaw (2013) show that cash constraints negatively affect workers' safety – workplace accidents increase following negative shocks to firms' financial health. In this paper, we extend this research to the healthcare sector, which is both economically important and highly relevant in this context.

Our paper also directly relates to the literature in health economics that examines medical choices, and how these choices respond to physician financial incentives such as reimbursements, patient demand, or malpractice insurance. For example, Clemens and Gottlieb (2014) show that physicians changed treatment in response to the 1997 changes in Medicare reimbursements. Similarly, Eliason et al. (2018) show that physicians disproportionately discharge patients after crossing a threshold for higher reimbursement (see additional examples in Section 2). In contrast to these studies, our focus is on financial constraints, so we test how medical choices respond to changes in the hospitals' overall financial condition rather than prices or demand for specific services. In that spirit, Dranove, Garthwaite, and Ody (2017) examine the effects of the 2008 financial crisis on hospitals' prices and the offerings of certain services. They find that an average hospital did not raise prices as a result of the financial shock, but that prices might have increased for hospitals with market power.[4] They also find that the crisis led some hospitals to discontinue unprofitable services such as trauma care, emergency psychiatric care, and drug and alcohol treatment while offerings of profitable services (e.g. the existence of cardiac centers) remained unchanged. Our paper differs in that we examine patient-

[4] See Frazer (2011) survey of related research on "cost shifting", defined here as "charging private payers more in response to shortfalls in public payments" (p.90)). The survey concludes that cost shifting is not a pervasive phenomenon, consistent with the weak evidence of price increases in response to the financial crisis in Dranove et al.

level shifts in treatment choices rather than prices or investment. Such shifts are especially interesting in our context as they do not require hospitals to have market power, or to make significant investments in new services at the time when hospitals are financially constrained.

Finally, it is worthwhile to note that the effects on treatment choices and patient outcomes cannot be inferred from the aggregate financial results. For example, hospitals might compensate losses for some patients with more aggressive interventions for others, which would lead to small or no changes overall. We circumvent this issue by looking directly at procedure choice or outcomes for individual patients in specific settings. This approach also allows us to control changes in demand, insurance coverage, and other patient-level factors, which helps more cleanly identify the effect of the shock.

2 Background on C-sections and cardiac procedures

2.1 Background on cardiac procedures

A heart attack or acute myocardial infarction (AMI) is defined as a damage or death of part of the heart muscle caused by insufficient blood flow to the heart. The blood flow is usually impaired by a blockage of the coronary arteries. Heart attack patients may be treated non-invasively using drugs that dissolve possible blood clots (thrombolytics), or they may receive an invasive cardiac procedure to improve blood flow to the heart (revascularization). The invasive procedures are bypass surgery (Coronary Artery Bypass Graft, CABG) or angioplasty (Percutaneous Transluminal Coronary Angioplasty, PTCA). All patients who receive revascularization also receive an invasive diagnostic procedure (cardiac catheterization) that images blood flow and determines the location of the artery blockage. Chandra and Staiger (2008) note that catheterization is "a well-understood marker for surgically intensive management of patients" (p. 9; see also, McClellan et al. (1994), McClellan and Newhouse (1997)). Following this literature, we use catheterizations as a measure of AMI treatment intensity.

The choice between an invasive and a non-invasive treatment path involves many clinical factors, including the severity of the heart attack, patient age, and other diagnoses. Thus, some patients are medically more suitable to receive catheterizations than others. Our premise is that, for the marginal patient, the invasive treatment tends to be more profitable to hospitals than the non-invasive treatment.

Hospitals do not disclose true profits from specific procedures, and profits likely vary with the hospital's capacity, specialization, and patient mix. However, many studies and anecdotal evidence suggest that cardiac surgery is one of the most profitable medical services hospitals provide.[5] For example, Horowitz (2004) examines a variety of sources to determine the relative profitability of various hospital services and concludes that "cardiac surgery – including cardiac catheterization labs, angioplasty, and coronary artery bypass graft (CABG) – are widely known to be hospital profit centers."[6] (See also Dranove et al. (2017)). Consistently, the *New York Times* (*NYT*) reports evidence that doctors at a large for-profit hospital chain performed catheterizations on patients who did not need them, suggesting a profit motive ("Hospital Chain Inquiry Cited Unnecessary Cardiac Work," *NYT*, August 7th, 2012). Similarly, the *Wall Street Journal (WSJ*) quotes nonprofit hospital administrators arguing that for-profit providers "cherry pick" the lucrative cardiac services, which then hurts the nonprofits' bottom line (*WSJ,* June 22nd, 1999).

Extensive research in health economics investigates the medical and economic choices involved in treatment of heart attacks. Several studies focus on understanding the effects of the invasive treatments on patient outcomes and healthcare costs. McClellan and Newhouse (1997) examine hospitals that acquire capacity to provide intensive cardiac treatment, such as catheterizations or revascularizations. By comparing trends in these hospitals to those in non-adopters, they find modest improvements in patient survival rates and substantial increases in treatment costs as reported by hospitals to Medicare.[7] Cutler, McClellan, and Newhouse (2000) show that reimbursements for treatments of heart attacks vary substantially across insurance plans, but that services and patient outcomes are similar across plans. Molitor (2018) documents the variation in catheterization rates across 306 U.S. geographic regions and investigates how physician practice styles vs. local factors contribute to this variation. The paper shows that overall catheterization rates increased from 16% in 1992 to 52% in 2008, and that the cross-regional standard deviation was 8%. Using information on cardiologists moving across regions, he finds that much of that variation was determined by local factors, such as hospital capacity or specialization, rather than physician-specific style.

Finally, Chandra and Staiger (2007) develop a model of specialization in healthcare in which productivity spillovers cause geographic areas to specialize in low- or high-intensity treatments.

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[5] Cuttler et al. (2001) report that in their sample of Medicare patients in 1994, Medicare reimbursement was $36,564 for a bypass surgery, $26,661 for angioplasty, $15,887 for catheterization only, and $10,155 for a non-invasive treatment. However, hospitals do not disclose the costs associated with these procedures, so profits cannot be determined.

[6] Her sources include medical and social science literature, Medicare Payment Advisory Commission and Prospective Payment Assessment Commission reports to Congress, as well as interviews with hospital administrators and doctors.)

[7] McClellan and Newhouse find a 5 percentage point increase in day-one survival rates for AMI patients in hospitals adopting catheterization capabilities. However, the effect seems to result "not from catheterization or revascularization but from correlated beneficial technologies at catheterization hospitals" (p. 63). McClellan et al. (1994) arrive at similar conclusions using a different methodology.

Consistent with the model, they find that AMI patients receiving catheterizations in high-intensity areas are medically less appropriate for intensive treatment. High-intensity areas exhibit higher overall survival returns from intensive treatment but appear less skilled in medical (i.e., non-intensive) treatment.

2.2 Background on C-sections

Based on the 2007 National Hospital Discharge Survey, child delivery was the number one reason for hospitalizations in the U.S., accounting for 4.1 million of all hospital discharges in that year. Of those discharges, 1.4 million were for delivery by Caesarian section, making C-section one of the most frequently performed major surgical procedures in the U.S. The frequency of C-sections increased dramatically over the past few decades. Gruber and Owings (1996) report that C-sections accounted for 5.5% of deliveries in 1970 and that the rate increased four-fold over the subsequent 30 years, reaching over 23% in 1991. The rise in C-sections continued at a slower pace over the subsequent two decades, and it is now close to 30%.

A widespread view among researchers and public health experts is that the current C-section rate in the U.S. is too high: though many C-sections are performed for medically good reasons (such as prior C-section, breech presentation, or fetal distress), it appears that a significant fraction do not improve health outcomes and may even increase certain risks to the mother and the infant (see Gruber and Ownings (1996), Currie and MacLeod (2006) and others). Citing these reasons, the U.S Department of Health and Human Services, in collaboration with other federal agencies and groups, set an objective to reduce the C-section rate nationally by 10% (from 26.5% to 23.9%) by 2020.[8]

Financial incentives of healthcare providers are often cited as one of the key reasons for the high and rising C-section rates in the U.S (along with malpractice lawsuits and technological improvements in the diagnosis of birth complications). Reimbursement rates for C-sections – by both Medicaid and private insurers – are typically much higher than those for vaginal deliveries. Though C-sections are likely more costly to providers (for example, they require longer hospital stay), in general, they are also more profitable (see, for example, Keeler and Brodie (1993)). This is also the assumption we maintain throughout this paper.

[8] Healthy People 2020 Topics & Objectives: Maternal, Infant, and Child Health (https://www.healthypeople.gov/). A similar efforts were made by the Joint Commission – a nonprofit organization that accredits and certifies health care organizations ("Improving performance on perinatal care measures." The Source, July 2013) and by the American College of Obstetricians and Gynecologists, ACOG ("Induction of Labor." ACOG Practice Bulletin 107, August 2009).

Importantly for our analysis, a number of state and national agencies and advocacy groups have been encouraging health care providers to reduce C-section rates, and these pressures intensified in recent years (*New York Times*, 3/12/2014).[9] In 2010, the Leapfrog Group began asking hospitals to voluntarily report statistics on early elective deliveries which are associated with higher C-section rates.[10] Also in 2010, the Joint Commission – a nonprofit organization that accredits and certifies health care organizations – recommended that hospitals report statistics on early elective deliveries and C-section rates among first-time mothers. In 2012, the commission announced that reporting will become mandatory for large hospitals in 2014.[11] In August 2009, the state of Washington equalized Medicaid reimbursement rates for "uncomplicated" C-sections and vaginal deliveries in an effort to reduce financial incentives to perform C-sections. As we discuss in Section 2.2, these developments likely affected the overall trends in C-section rates during our sample period.

Similar to cardiac surgery, C-sections are one of the most frequently studied procedures in health economics. One of the pervasive findings is the large unexplained variation in C-section rates across geographic areas. For example, Baiker et al. (2006) find in their 1996-1998 sample of large U.S. counties that C-section rates for newborns with normal birth weight range from 13.4% to 26%, and much of this variation cannot be explained by the patient-level variables (such as complications of labor) or other county-, hospital-, and state-level factors.

A number of studies investigate the importance of provider financial incentives in the choice of child delivery. In an early study, Stafford (1990) finds that C-section rates are higher for privately insured patients than Medicaid insured patients, suggesting a financial motive. Gruber and Owings (1996) show that state-level declines in fertility rates during 1970-1982 were associated with increases in C-section rates. They argue that this was caused by obstetrician/gynecologists shifting towards the more highly reimbursed Cesarean delivery as demand for their services declined. Gruber, Kim, and Mayzlin (1999) find that higher Medicaid reimbursements for Cesarean delivery relative to vaginal delivery are associated with higher C-section rates, again consistent with physicians' choices responding to the fee differentials. Alexander (2013) finds consistent results looking at changes in Medicaid reimbursements. Johnson (2013) finds that mothers that are physicians are less likely to have

[9] The *New York Times*, 3/12/2014, "Reducing Early Elective Deliveries" by Tina Rosenberg.

[10] That is, deliveries prior to the 39 week of gestation performed without a medical reason. The group cited recent clinical evidence that links these deliveries to worse health outcome for both mothers and infants. See Clark et al. (2009) and Signore (2010). See also the Leapfrog Group Factsheet, March 2011.

[11] The Joint Commission, "Improving performance on perinatal care measures." The Source, July 2013

a C-section than other highly-educated mothers, and that the difference diminishes for hospitals owned by HMOs (that is, hospitals with weaker financial incentives to perform C-sections).

Besides shifts in demand and reimbursements, researchers have also explored the effects of changes in malpractice insurance on C-section rates. Currie and MacLeod (2006) shows that, contrary to common belief, tort reforms that limit physician malpractice risk increase C-section rates. This is consistent with the marginal C-section being riskier than the vaginal birth. Frakes (2013) also documents large shifts in C-section rates in response to state-level changes in malpractice standard rules.

In this paper, we test whether a negative shock to the hospital financial condition causes a shift towards the more intensive, and arguably more profitable, treatments of patients, such as C-sections and invasive cardiac procedures.

3 Sample and data

3.1 Data sources

Hospital financial statement data comes from the Healthcare Cost Report Information System (HCRIS). HCRIS contains information from cost reports submitted annually to the Center for Medicare and Medicaid Services (CMS) by all Medicare-certified institutional providers, including hospitals. The reports contain detailed data on facility characteristics, utilization, and cost allocations, and also include financial statement information, which we use in our tests. Data on physician arrangements comes from the American Hospital Association (AHA) Annual Survey Database and was provided to us by The Dartmouth Institute for Health Policy and Clinical Practice.

The patient level data come from The Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID). The HCUP databases have been developed through a partnership between the federal government, the states, and the healthcare providers sponsored by the Agency for Healthcare Research and Quality. The SID databases contain detailed patient discharge data for all community hospitals of the participating states. The data is translated into a common format to facilitate comparisons across states. All patients, including Medicaid, Medicare, privately insured and uninsured patients are included in the database.

3.2 The HCRIS sample and data description

We start with a sample of 3,272 nonprofit hospitals (19,843 hospital-year observations) from 2005-2011 available on HCRIS. To be included in the sample, we require that the hospital has a minimum of one million dollars in revenues and fixed assets above one million dollars. The descriptive statistics for the HCRIS sample are given in Table 1. In the full sample (top panel), the average nonprofit hospital has net revenues of 164 million dollars and fixed assets of 82.3 million dollars (the medians are 80.7 and 35), the average ratio of net debt to fixed assets is 0.26 and the average ratio of financial investments to fixed assets is 0.53 (the medians are 0.23 and 0.29). The mean ratio of operating income to fixed assets was -0.02 (the median was -0.01), and the mean annual growth rates in fixed assets and net revenues were both 0.06 (the medians were 0.05).

Our measure of performance of financial investments is Income from Investments as reported in Statement of Revenues and Expenses, HCRIS Form G3, Line 7, scaled by lagged fixed assets (*Investment Income* in Table 1). Based on Table 1, investment income was 3% in our sample, with the median of 1%. According to the Statement of Financial Accounting Standards No. 124 (FAS 124), nonprofits are required to mark to market their investments in equity securities with readily determinable fair values and all investments in debt securities, with any gains and losses included in the statement of activities (i.e., the statement of revenues and expenses). CMS does not provide any additional guidelines concerning reporting of income from financial investments for HCRIS, other than stating that the amounts should come from the hospitals' "accounting books and/or records".[12] Thus, we view *Investment Income* as a proxy for hospitals' returns on financial investments and report additional tests that do not rely this measure (see further discussion in Section 5.1).

The bottom panel of Table 1 shows descriptive statistics for the sub-sample of hospitals in the seven states for which we have patient-level SID data: Arizona, California, Florida, Maryland, New Jersey, New York, and Washington. This sample consists of 739 hospitals and 4,379 hospital-year observations. The hospitals are somewhat larger than those in the full sample (for example, the average service revenue is 232 million dollars vs. 164 million dollars in the full sample), have somewhat higher financial leverage and lower ratio of financial investments to fixed assets. Measures of capital investments are similar across the two samples.

[12] See instructions for CMS Cost Reports (https://www.costreportdata.com/instructions/Instr_G300.pdf). Given the lack of specific instructions, we cannot be sure to what extent hospitals follow FAS 124 when reporting for HCRIS or include gains and losses from financial investments on Line 7 of Form G.

We show means for hospitals with above- and below-median performance of financial investments in 2008 in Appendix Table A1. The general message from the table is that hospitals that were more exposed to the 2008 shock were somewhat different on observable (and potentially unobservable) characteristics. This raises the concern that the two sub-samples may have experienced differential shifts in treatment intensity post 2008 for other (non-financial) reasons, and that these shifts counteracted the main effects, leading to the non-result we obtain below. We discuss our strategy to address this concern in Section 5.1.

3.3 The SID samples of child deliveries and heart attacks

The tests involving patient-level information are based on a subsample of hospitals in the seven states for which we have SID data: Arizona, California, Florida, Maryland, New Jersey, New York, and Washington in the years 2005 through 2011. The diagnosis and procedure codes in SID are based on the International Statistical Classification of Diseases (ICD-9-CM).

The AMI sample includes 1,071,550 admissions to 451 nonprofit hospitals. As in Chandra and Staiger (2007), we measure the use of an intensive AMI therapy with an indicator for whether an AMI patient receives a cardiac catheterization, an invasive diagnostic procedure described in more detailed in Section 2.1. In our sample, 49% of AMI patients receive catheterizations. For the regressions in Tables 3 and 4, we limit the sample to hospital-years with at least 50 AMI admissions and an average catheterization rate during our sample period of at least 2%. This results in 1,006,958 admissions to 313 nonprofit hospitals. The number of admissions is 859,806 in regression that exclude the year 2008.

The full sample of child delivers includes 4,853,365 admissions to 378 nonprofit hospitals, 33.5% of which are C-sections. Following Baiker, Buckles, and Chandra (2006), Alexander (2013) and others, we exclude patients with previous C-sections because for these admissions, the C-section probability is close to one (it is 91.4% in our sample). This results in 4,085,253 admissions, 22.6% of which are C-sections. Finally, for the regressions in Tables 6 and 7 we limit the sample to hospitals with at least 50 delivery patients and an average C-section rate during our sample period of at least 2%. This results in a sample of 4,085,035 admissions to 294 nonprofit hospitals. The number of admissions is 3,495,620 in regressions that exclude the crisis year 2008. We follow Frakes (2013) to identify risk factors and complications associated with the probability of obtaining a C-section such as maternal age, breech presentation, multiple deliveries, or placenta previa, and we include indicators for these conditions as control variables in all regressions.

3.4 The SID samples of Patient Safety Indicators

We measure patient outcomes using a set of eight Patient Safety Indicators (PSI) provided by the Agency for Healthcare Research and Quality (AHRQ). The purpose of the indicators is to flag adverse events resulting from patient exposure to the healthcare system that are highly preventable, and thus indicate potential errors or quality concerns. The algorithm to construct the indicators from the HCUP data was developed by the University of California, San Francisco (UCSF)-Stanford Evidence-Based Practice Center (EPS), in collaboration with the University of California at Davis, and the project was commissioned by the AHRQ. The development process involved several stages, starting with identifying over 200 potential indicators, empirically testing their validity, reviewing the clinical literature, and finishing with a review of the indicators by multiple clinical panels (Encinosa and Bernard (2005)).[13] Of the 19 PSI indicators currently provided by AHRQ, we limit our analysis to indicators for which the frequency of the adverse event in our sample is higher than 0.5%.

For each PSI indicator, we calculate the share of patients "at risk" that suffer an adverse event at the hospital and year level. The average incidence varies across PSI's, ranging from 13.8% of "at risk" patients for PSI 18 (Obstetric Trauma Rate – Vaginal Deliver With Instrument) to close to 0.5% for PSI 9 (Perioperative Hemorrhage or Hematoma Rate). We therefore standardize the raw frequencies for each PSI before combining them into summary measures. To do so, we first take the square root of the raw frequencies (using a variance stabilizing transformation for Poisson distributed variables which accelerates convergence to normality (McCullagh and Nelder (1989)). We then standardize each transformed frequency by subtracting its sample mean and scaling by its standard deviation. Finally, we average the standardized frequencies across the different PSI's. We show regression results for three summary measures – the average of all 8 PSI indicators with frequency of an adverse event above 0.5% (PSIAV8), those with occurrence above 1% (PSIAV7), and, finally, excluding measures for which there is a change in methodology during the sample (PSIAV5).[14]

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[13] The development process is described in: http://www.qualityindicators.ahrq.gov/Modules/psi_resources.aspx. For the algorithm to construct the indicators see: AHRQ, "Patient Safety Indicators: Technical Specifications," March 2008 and AHRQ, "Quality Indicators Software Instructions, SAS QI, Version 5.0," March 2015.

[14] The construction of PSI 3 and PSI 12 (referring to Pressure Ulcers and Perioperative Pulmonary Embolism, respectively) changed for all hospitals in 2010. While year fixed effects take care of this overall change, we report robustness tests after excluding these two measures.

4 Financial crisis, hospital financial assets, and capital investments

Our main tests rely on the shock to nonprofit hospitals' financial condition caused by the financial crisis of 2007-2008. The U.S. stock market declined nearly 50% by the end of 2009 from its peak in late 2007 and syndicated bank lending dropped by 47% in the fourth quarter of 2008 relative to the fourth quarter of 2007 (Ivashina and Scharfstein (2010)). The financial crisis affected nonprofit hospitals in three important ways. First, nonprofit hospitals hold large financial assets, such as endowments, and the value of those assets declined significantly during the 2008 stock market crash. Figure 1 shows that the ratio of financial investments to fixed assets reported on HCRIS declined from 0.56 in 2007 to 0.47 in 2008, a 17% decline.[15] This decline had a direct effect on the hospitals' cash flows. Even prior to 2008, most nonprofit hospitals report significant operating losses (also in Figure 1) and need to rely on income from financial investments to offset those losses. Additionally, most nonprofit hospital spending rules tie funds available for spending to the past market values of the nonprofits' endowments (see Adelino, Lewellen and Sundaram (2015)), so a decline in the value of financial assets in 2008 had a direct impact on those funds, constraining hospital spending and investments.

Second, the credit crunch of 2008 increased borrowing costs and limited hospitals' access to credit. Nonprofit hospitals rely heavily on borrowing to finance investments and day-to-day operations. The ratio of financial debt to fixed assets prior to the financial crisis (in 2007) was 0.58 for the average hospital in our sample (the ratio of financial debt minus temporary investments was 0.3). A report by Wells Fargo Securities (WFS, 2011) shows that there were close to 550 bond issues by nonprofit hospitals in 2007, accounting for over $40 billion in aggregate proceeds. A substantial fraction of hospital bond issues prior to the crisis were variable-rate bonds (47% of the issues in 2007 were fixed rate as reported by WFS (2011)), so many hospitals experienced a dramatic increase in borrowing costs as bond yields rose in 2008.[16]

[15] The actual drop in the financial assets' value might have been larger if not all financial investments reported on HCRIS were marked-to-market.

[16] Consistent with these effects, a survey by the American Hospital Association (AHA) reports that a significant fraction of the surveyed hospitals experience some negative consequences of the credit crunch, including increased interest expense for variable-rate bonds (33% of hospitals), increased collateral requirements (12%), inability to issue bonds (11%), and difficulty refinancing auction rate debt or roll-over or renew credit (11% and 10%). Moreover, 60% of the surveyed hospitals with defined benefit pension plans (or 31% of all surveyed hospitals) report a need to increase pension funding levels as a result of the losses on their financial investments. American Hospital Association (November 2008). "Rapid Response Survey, The Economic Crisis: Impact on Hospitals."

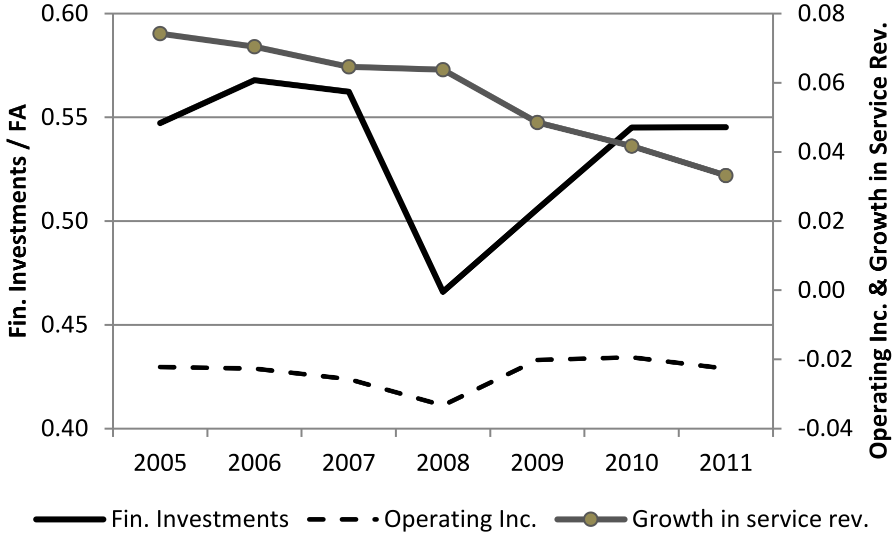


Fig. 1: Nonprofit hospitals' financial performance from 2005-2011. The sample includes 3,272 nonprofit hospitals from 2005 through 2011. *Financial Investments* is the dollar amount of financial investments scaled by fixed assets. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Service Revenue* is revenue from medical services.

Third, the economic downturn following the financial crisis likely led to a decline in the demand for hospital services and in patient revenues. The Bureau of Labor and Statistics reports that the unemployment rate increased from 5% in December of 2007 to 9.9% in December of 2009, which meant that many Americans lost their employment based health insurance. As a result, more patients might have scaled back demand for healthcare services, were unable to pay for those services, or sought coverage through Medicaid. According to the U.S. Census Bureau, the proportion of Americans with employment based health insurance reached a bottom of 56.1% in 2009, declining from 59.8% in 2007. At the same time, the proportion of Americans insured through Medicaid increased from 13.4% in 2007 and 15.7% in 2009.[17] Reflecting these trends, Figure 1 shows that operating profitability declined in 2008, but recovered to the pre-crisis levels in the subsequent year. Growth in service revenue exhibits a steady downward trend throughout our sample period with a somewhat larger decline in 2009.

[17] To mitigate the effects of the recession on Medicaid, The American Recovery and Reinvestment Act (ARRA), enacted in February of 2009, provided financial relief of $103 billion to the state Medicaid programs. Based on the Kaiser Commission on the Medicaid and the Uninsured survey, the ARRA funds helped prevent reimbursement rate increases in several states (47 states report rate increases and 21 states reported rate reductions in 2009, and the numbers are 36 and 39 for 2010).

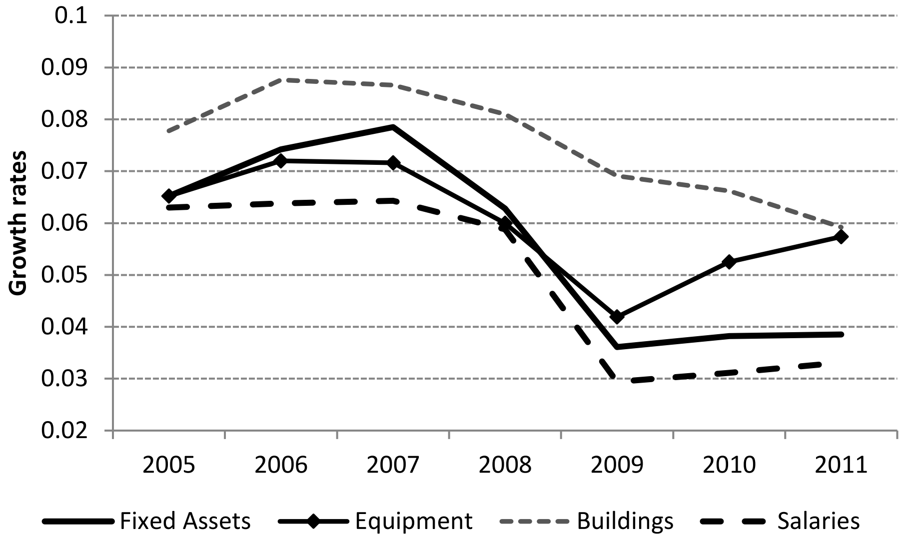


Fig. 2: Nonprofit hospitals' investment from 2005-2011. The sample includes 3,272 nonprofit hospitals from 2005 through 2011. The figure shows growth rates in Fixed Assets, Equipment and Buildings, each scaled by lagged fixed assets, and growth in salaries. *Fixed Assets* is gross land, buildings, and equipment minus accumulated depreciation. *Equipment* includes cars and trucks, major movable equipment, minor equipment, and minor nondepreciable equipment.

Adelino, Lewellen and Sundaram (2015) show that hospitals tend to reduce capital investment in response to negative cash flow shocks, suggesting that we should observe large investment cuts post 2008. Figure 2 shows that this is, in fact, the case. Hospital average investment (capital expenditure) rate – measured as the growth in fixed assets – increases from 6.5% in 2005 to 7.9% in 2007, and then declines abruptly reaching 3.6% in 2009. There is a similarly large drop in spending on equipment and salary growth. Spending on buildings seems to decline more gradually, perhaps because large construction projects involve long-term planning and are more difficult to adjust in the short run. The regressions in Table A2 in the Appendix show that these patterns persist after controlling for a linear time trend, hospital fixed effects, and a set of time-varying covariates.

As discussed earlier, the financial crisis and the subsequent recession could have affected hospital investments and product market choices through multiple channels. This includes the "financial channel", i.e., the immediate effect of the stock market crash and the credit crisis on the hospitals' financial condition and access to credit, but also the longer-term demand effects caused by the economic downturn and the rise in unemployment. In addition, the legal and regulatory uncertainties leading up to the signing of Obamacare in March of 2010 might have contributed to the decline in investment rates. The evidence in Adelino et al. suggests that the financial channel played at least some role: they show using a hospital panel from 1999 to 2006 that hospital investment declines following poor performance of their financial assets. We find consistent results for the crisis period: the regressions in Table A3 in the Appendix show that growth rates in fixed assets and buildings declined significantly more strongly after the crisis for hospitals with low financial returns in 2008.

5 Financial crisis and patient treatment

5.1 Identification

In this section, we ask whether the financial shock to hospitals associated with the 2008 financial crisis caused a shift towards more intensive treatment of patients (or led to adverse patient outcomes). To do so, we test whether hospitals that suffered larger losses on their financial assets in 2008 increased treatment intensity more after 2008 relative to other hospitals. Similarly, we test whether such low-return hospitals exhibit larger declines in the quality of patient outcomes. The key identifying assumption is that any differences in the post-2008 changes in treatment between high- and low-return hospitals are caused by these hospitals' financial performance. This assumption would be violated if returns on financial assets are associated with shifts in treatment intensity via other channels. Specifically, our results could be generated if high-return hospitals increased treatment intensity post 2008 for other (non-financial) reasons. They could also be generated if high-return hospitals experienced a financial shortfall in 2008 (not captured by our financial return measure), and if this shortfall caused them to increase treatment intensity post 2008. In either scenario, we may see no differential response to the crisis for high- and low-return hospitals. As a result, we would mistakenly conclude that financial performance had no effect on treatment choices when in fact such effect did exist, but we are unable to detect it.

We address these concerns in three ways. First, we examine aggregate patterns in treatment intensity and patient outcomes around 2008 to test if intensity (or outcomes) increased discretely after 2008: if both high- and low-return hospitals increased intensity in the post-crisis period, this should be captured by the pre- and post-crisis tests. Second, we examine a plausible alternative channel through which high-return hospitals might have increased intensity post 2008 namely via increased capital investments in the preceding years. These results are discussed in Section 5.2.

Third, we employ alternative ways to identify hospitals that were more severely hit by the financial crisis. We use hospital size and financial leverage in the pre-crisis period to gauge its vulnerability to a major financial shock. Since these measures do not rely on financial returns, they offer useful robustness tests. Finally, our patient-level dataset allows us to examine separately privately-insured patients, which are generally considered to be more profitable to the hospital compared to Medicaid, Medicare, or uninsured patients. We can thus use privately-insured patients to more cleanly identify financially-induced shifts in treatment intensity post 2008.

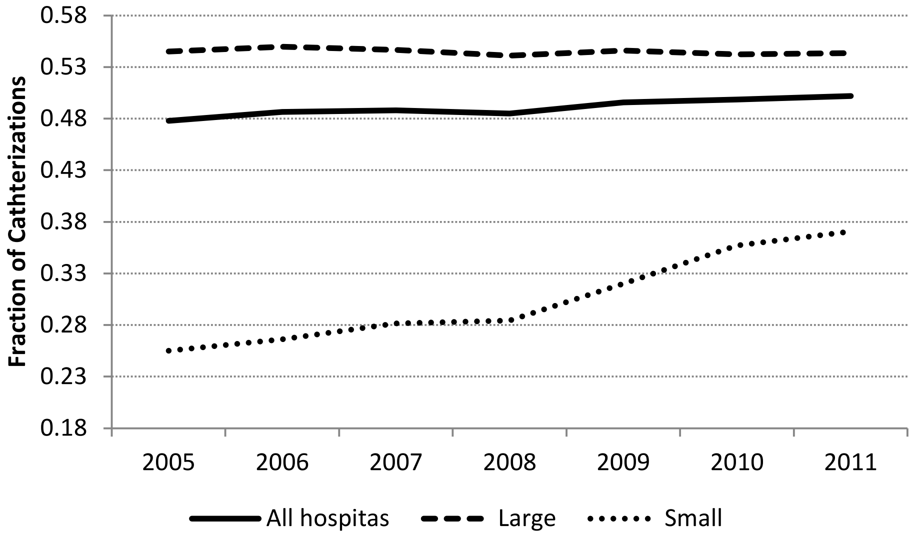
5.2 *Evidence on cardiac treatment*

This section describes the evidence on the use of catheterizations around the 2008 financial crisis. Our sample of 1,071,550 heart attack patients is described in Table 2. The average patient is 70 years old, 43% of patients are female, and 63% of patients are insured by Medicare (private insurance and Medicaid account for 24% and 6.2% of the sample). Of all admitted heart attack patients, 49% receive catheterizations. Consistent with previous evidence on the variation in treatment choice across regions, the catheterization rates in our data vary from 41.5% in Maryland to 55.4% in Arizona.

In addition to the raw catheterization rates, we construct a patient-level measure of adjusted catheterizations, using a logit regression of the catheterization indicator on dummies for patient race, sex, insurance status, and age group. The adjusted or "excess" catheterization rates range from -6.6% in Maryland to 5.6% in Arizona. Splitting the hospitals at the median of service revenues shows that catheterizations are substantially more frequent in large hospitals than small hospitals (54.5% vs. 30.5% for raw catheterizations and 4.8% vs. -16.2% for adjusted catheterizations). Thus, hospital size is strongly positively linked to the intensity of the cardiac treatment, consistent with the specialization argument in Chandra and Staiger (2007).

Turning to the time-series patterns, Figure 3 shows that the overall catheterization rates increased somewhat during our sample period, but that the increase was caused entirely by small and generally less intensive hospitals. For large hospitals, both the raw and the adjusted rates remained flat throughout our sample period (close to 51% and 5%, respectively). Since 77.2% of patients in our sample were treated at large hospitals, this suggests that treatment choice was essentially unchanged for the majority of patients. In contrast, small hospitals experienced a 13 percentage point increase in catheterization rates during our sample period, starting from a below-average rate of 26% in 2005 (compared to 55% for large hospitals). Small hospitals exhibit is a somewhat steeper increase in the second half of our sample period although, as we show below, the overall increase cannot be distinguished from a time trend.

Table 3 shows regressions of the catheterization dummy on a time trend and a post-crisis indicator equal to one for years 2009-2011 and equal to zero for years 2005-2007. All regressions are



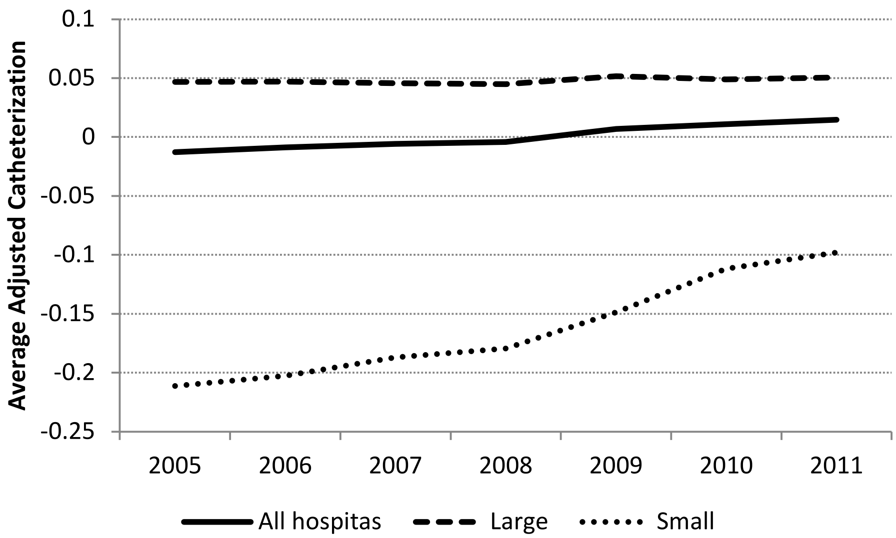


Fig. 3: Catheterizations frequency for heart attack patients from 2005-2011. The sample consists of 1,071,550 heart attack admissions to 451 nonprofit hospitals in seven states (listed in Table 3) from 2005 to 2011. Large and small hospitals are hospitals with above- and below-median service revenues in the prior year. *Adjusted catheterization* is the difference between the patient's catheterization indicator (equal to one when the patient receives catheterization) and his predicted probability of catheterization from a logit regression of the catheterization dummy on dummy variables for the patient's age group, sex, race, and insurance status.

clustered at the hospital level. Patient characteristics and hospital fixed effects are included in the left panel; the right panel excludes hospital fixed effects.

The regressions mirror the evidence from Figure 3: based on the left panel, small hospitals exhibit a significant increase in catheterization rates of 1.3 percentage points a year during our sample period. Controlling for the time trend, there was a 2.0 percentage point increase in catheterization rates post crisis, though the effect is not statistically significant. Large hospitals show no significant trend and a smaller and statistically insignificant post-crisis effect, independently of specification (in Table 3, it is 0.4% with a t-statistic of 0.7). Since large hospitals capture over three quarters of cardiac patients in our sample, for most patients there is no significant change in patient treatment post 2008.

Table 4 interacts the *Post_Crisis* indicator with the dummies for the second and the third terciles of investment returns in 2008. We run separate regressions in the full sample of cardiac patients (Panel A) and the sub-sample of privately insured, and thus generally more profitable, patients (Panel B). The regressions include year dummies, patient attributes and time-varying hospital characteristics from Table 2. There is no evidence that the post-crisis increase in catheterization rates for small hospitals was caused by the subset of hospitals with low investment returns in 2008: the interactions of *Post_Crisis* with the indicator for the third return tercile are close to zero in regressions with and without hospital fixed effects. There is some evidence that large hospitals with high returns in 2008 reduced catheterization rates after the crisis (relative to large hospitals with low returns), but the effect is statistically significant only in the full-sample regression with no hospital fixed effects.

We view both the time-series tests (in Table 3) and the cross-sectional tests (in Table 4) as important for interpreting the overall results. The cross-sectional tests allow us to differentiate between hospitals with better vs. worse financial performance in 2008. However, one might argue that given the large magnitude of the 2008 financial crisis, most hospitals were hit hard by the shock, so we may not observe a differential effect based on financial returns in 2008. Moreover, as we discuss in Section 3.2, we cannot be sure that all hospitals mark their securities to market in Form G, or include gains and losses from investments in investment income (see discussion of the relevant accounting rules in Section 3.2). For these reasons, comparing the pre- and post-crisis periods is especially informative because it captures the overall changes in catheterization rates and does not rely on information about financial returns. The lack of a robust post-2008 increase in catheterizations in the overall sample makes it less likely that the crisis had a significant effect on catheterization rates, but that our cross-sectional tests failed to detect it.

In the Appendix, we perform two additional robustness tests to address these concerns. First, instead of returns, we use financial leverage prior to the crisis as a measure of the hospitals' vulnerability to the financial shock. In Table A4, Panel A we split hospitals into sub-samples with below- and above-median financial leverage in 2005. The regressions show no significant difference in the post- vs. pre-crisis catheterization levels between the two samples, consistent with our main results. Second, we explore the possibility that hospitals with high returns in 2008 may have shifted towards higher-intensity treatments because they made larger capital investments in subsequent years. In Table A4, Panel B, we regress catheterizations directly on lagged capital expenditures and the control variables in Table 3. We find no evidence of positive association, suggesting that the investment channel is unlikely to explain our results.

Overall, the evidence in this section suggests that the financial crisis had little to no effect on treatment decisions for the majority of the AMI patients. Smaller hospitals increased intensity but the effect is difficult to distinguish from a time trend. Moreover, for small hospitals it is not clear whether the shift was harmful to patients. As we discuss earlier, such harmful effects would occur if the financial shock moved hospitals away from their optimal intensity level (as in Chandra and Staiger (2007)). Since small hospitals start off with catheterization rates significantly below the national average, this assumption might not hold in this sub-sample. To gain further insight into this question, Section 5.3 examines direct effects of the crisis on patient safety outcomes.

5.3 Evidence on C-sections

In this section we repeat the analysis in Tables 3 and 4 using the choice of a C-section vs. vaginal birth as the more intensive treatment option. The C-section rate in our sample of 4,085,253 admissions, which excludes secondary C-sections, is 22.6%, consistent with prior literature (e.g. Alexander (2013)). As with the cardiac sample, we construct an adjusted C-section rate by regressing the C-section dummy on a range of indicators for birth complications, mother's age, race, insurance status, and other diagnoses (described in more detail in Section 3.3). 53.4% of the patients in our sample are covered by private insurance and 41.3% are covered by Medicaid. As with catheterizations, we can think of these adjusted (or "excess") C-section rates as keeping patient mix fixed, and capturing deviations from the average treatment.

There is an important difference between the child delivery setting and the cardiac analysis in the previous section. In the case of child deliveries, our sample period coincided with a number of initiatives by various government agencies and advocacy groups aimed at reducing the nationwide

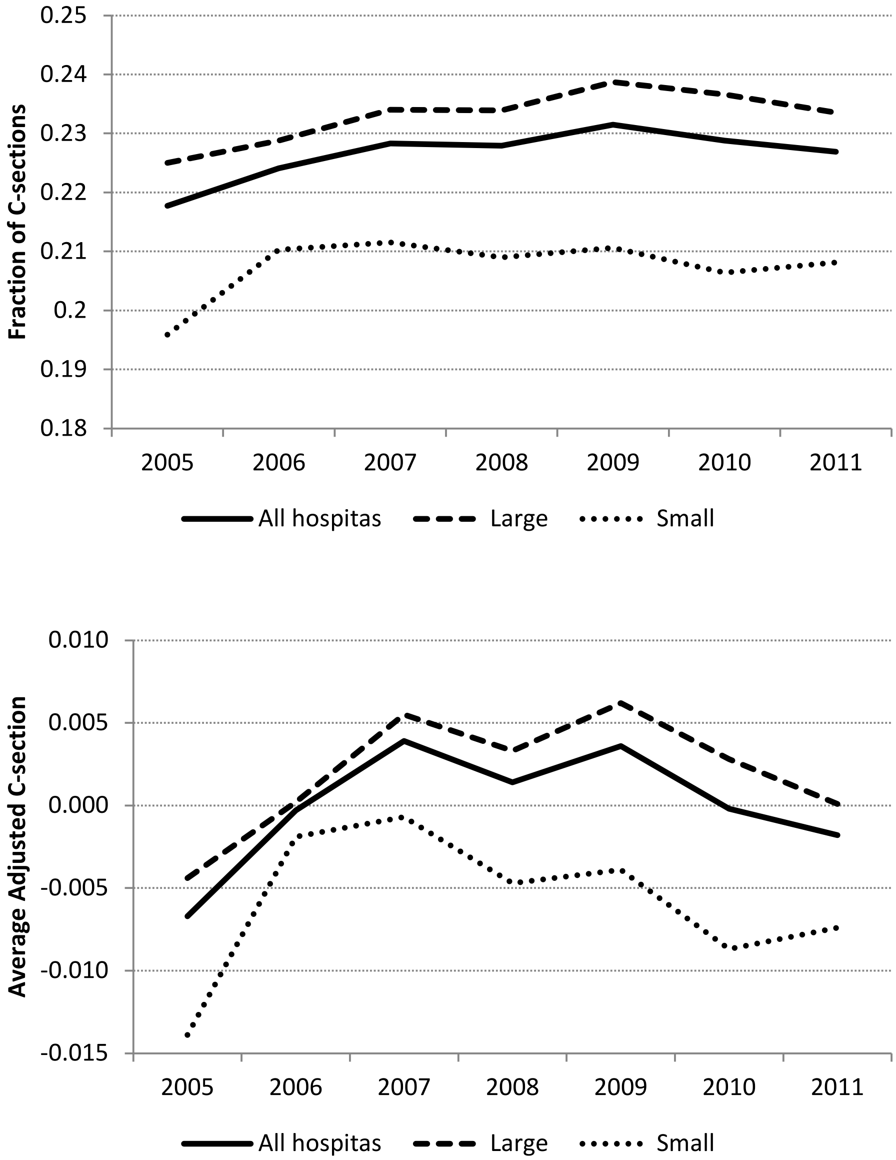


Fig. 4: C-sections frequency for child deliveries from 2005-2011. The sample consists of 4,085,253 child delivery admissions to 378 nonprofit hospitals in seven states (listed in Table 6) from 2005 to 2011. Large and small hospitals are hospitals with above- and below-median service revenues in the prior year. Adjusted C-section is the difference between the patient's C-section indicator (equal to one when the patient receives a C-section) and her predicted C-section probability from a logit regression of the C-section dummy on dummy variables for the birth complications and mother's diagnoses listed in Table 6, the mother's age group, race, and insurance status.

rates of C-sections and early elective deliveries (these developments are summarized in Section 2.2). Thus, the overall trend in the use of C-sections during this period likely reflects the hospitals' response to these efforts, in addition to any financial incentives caused by the financial crisis. Though the combined effect of these competing forces is ambiguous, our cross-sectional predictions remain unchanged: if a hospital's financial condition affects the treatment choice, hospitals with poorer financial performance during the financial crisis should show less willingness to lower their C-section rates post 2008 in response to the non-pecuniary pressures. Moreover, the financial crisis is sudden and largely unexpected (in contrast to the ongoing pressures from the advocacy groups), so our time-series tests using trends and a post-2008 indicator should still be able to pick up sudden shifts in the C-section rates post 2008. We test these hypotheses in Tables 6 and 7.

The time-series of C-section rates are depicted in Figure 4. Based on the figure, the raw rates increased modestly from 21.8% in 2005 to 23.2% in 2009 (continuing an upward trend from early 1970s (Gruber and Owings (1996)) and then declined slightly to 22.7% in 2011. The regressions in Table 6 confirm this pattern: they show a small but statistically significant increase in C-section rates of 0.1% a year during our sample period, and controlling for the time trend, a small and statistically insignificant decline of about 0.3% in the post crisis period (t-statistics of -1.4 in column one and -1.52 in column four).

Table 7 tests whether hospitals that were more strongly affected by the financial crisis – as measured by their investment returns in 2008 – showed a weaker tendency to reduce C-sections post 2008. As for cardiac procedures, we regress the C-section indicator on a Post-Crisis dummy and its interactions with the second and the third return tercile dummies. In Panel B, we run separate regressions for the sub-sample of private patients. In general, the interaction coefficients are small and statistically insignificant, consistent with our previous conclusions that a hospital's financial condition played little role in the treatment choice.

As we discuss in Section 2.2, state of Washington equalized the Medicaid reimbursement rates for C-sections and vaginal deliveries in August of 2009 in an effort to reduce the use of C-sections. Since likely lowered the hospitals' financial incentives to perform C-sections in the post-crisis period, we re-run the tests after excluding Washington in Appendix Tables A5 and A6. The overall conclusions remain unchanged.

To summarize, the evidence in this section reinforces our conclusions from the cardiac analysis: in general, hospitals show no tendency to shift towards the more intensive and more profitable treatments in response to the negative financial shock. In fact, in the case of child deliveries, the intensive treatment rate declined rather than increased post 2008, likely reflecting the nationwide pressures to limit C-section use.

5.4 *Evidence on rare adverse safety events*

Our final set of tests investigates the effects of the hospital financial shortfalls caused by the 2008 financial crisis on patient outcomes measured using the Patient Safety Indicators (PSI) provided by the AHRQ. PSI are designed to track the incidence of preventable negative health outcomes resulting from patients' exposure to the healthcare system. Examining these types of outcomes is interesting because they represent direct measures of quality of medical services. There are at least two channels through which patient outcomes, and in particular the incidence of rare adverse events captured by the PSI, could deteriorate due to negative financial shocks to a hospital. First, a financial shortfall can induce a hospital to scale back on capital investments (such as equipment or technology) and medical staff, both of which could adversely affect the quality of care. In fact, a number of studies have documented a positive relation between reductions in nursing staff and the incidence of patient safety events (see survey in Stanton and Rutherford (2004)). Given the large cuts in capital investments and salaries following the 2008 financial crisis documented in Section 4, it is reasonable to expect some adverse effects on patient outcomes. The second channel through which the financial crisis could affect patient outcomes is via (financially motivated) shifts in medical treatment choices, which is the mechanism we explore in the previous subsections. To the extent that the previous analysis failed to detect these effects, this section offers an alternative test.

As described in Section 3.4, each indicator focuses on a particular clinical setting and is defined for a corresponding subset of patients. For example, PSI #9 (Perioperative Hemorrhage or Hematoma Rate) tracks the incidence of hemorrhage or hematoma in a broad sample of surgical patients, while PSI #19 (Obstetric Trauma Rate – Vaginal Delivery Without Instrument) focuses on vaginal delivery discharge patients. As explained in Section 3.4, out of the 19 indicators provided by the AHQR, we examine a subset of eight indicators with incident rates higher than 0.5% across all hospitals in our SID sample during 2005-2011. We also show our tests using the seven indicators with incidence of 1%, as well as using the five indicators without a change in the construction of the indicator in the sample.

Table 8, Panel A lists and describes each of the indicators in our data. Panel B shows summary statistics of the standardized measures (the standardization procedure is described in Section 3.4), as well as the summary statistics of the three averages we use as dependent variables in the regressions.

Panel C shows the incidence of each patient safety event in our sample, and, finally, Figure 5 shows the time-series of each indicator around the financial crisis of 2008.

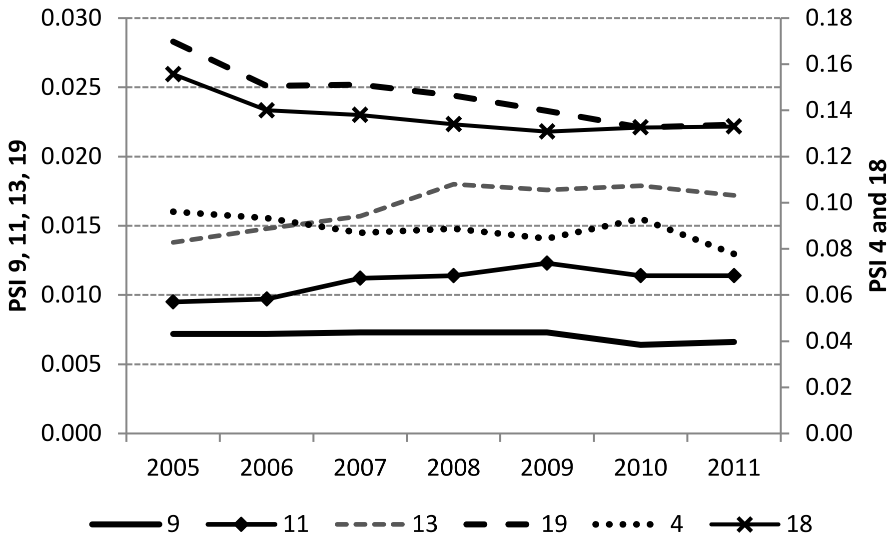


Fig. 5: Patient Safety Indicators (PSI) for 2005-2011. The figure shows the time-series of patient safety indicators with the incidence of at least 0.5% for the sample of hospitals in the seven states for which we have SID data. The indicators are described in Table8. PSI's #3 and #12 are excluded because of a change in computation during our sample period. The figure includes Death Rate among Surgical Inpatients with Serious Treatable Complications (#4), Perioperative Hemorrhage or Hematoma Rate (#9), Postoperative Respiratory Failure Rate (#11), Postoperative Sepsis Rate among elective surgical discharges (#13), Obstetric Trauma Rate – Vaginal Delivery With Instrument (#18), and Obstetric Trauma Rate – Vaginal Delivery Without Instrument (#19).

The sample of patients for each indicator is different based on the set of patients that are "at-risk", as defined by AHRQ. Figure 5 shows no evidence of an abrupt increase in patient safety concerns post 2008, and all indicators exhibit fairly smooth time trends. In Table 9, we regress each of the three hospital-level averages (across 8, 7 or 5 standardized indicators) on a *Post_Crisis* indicator interacted with dummies for the second and the third tercile of the hospital's financial returns in 2008. As in the cardiac and the C-section analyses, these regressions include year fixed effects and the time-varying hospital-level controls. The results show somewhat lower incidence of rare adverse events for hospitals with better financial performance in 2008, especially for hospitals in the top tercile of returns. The coefficients on the interactions of *Post_Crisis* with *Inv_Inc08_T3* are negative and statistically significant when we use the first two measures (PSIAV8 and PSIAV7), and the coefficients are generally larger (in absolute value) for small hospitals. The results are statistically weaker and smaller in magnitude for the PSIAV5 measure and in regressions without hospital fixed effects. A coefficient of -.162 for small hospitals (third column of Table 9, Panel A) implies that hospitals in the top tercile of returns had a lower average incidence of adverse events by 26% of one standard deviation relative to hospitals in the lowest tercile (the standard deviation of PSIAV8 for small hospitals is 0.61).

Overall, this analysis shows no evidence that patient safety worsened on average following the crisis. However, there is some evidence that hospitals with better performance of their financial assets in 2008 experienced a relative improvement in patient safety after the crisis. This effect appears stronger within a sub-sample of smaller hospitals, which likely faced tighter financing constraints and were therefore more vulnerable to financial shocks.

6 Organizational form and physician integration

The evidence so far shows that, in spite of the large financial shock to nonprofit hospital finances, we see no consistent evidence that physicians changed the treatment of patients in response to the shock and only weak evidence on worsening of patient outcomes. In this section, we explore whether the responses differed depending on hospitals' organizational form and their relationship with physicians.

6.1 Nonprofit vs. for-profit hospitals

The for-profit organizational form implies a bigger focus on financial performance and potentially stronger incentives to reduce quality in response to a negative financial shock. In this section, we test whether the 2008 financial shock affected medical treatment choices at for-profit hospitals. Finding a response for for-profits (but not nonprofits) would suggest that the nonprofit organizational form helps prevent such quality shifts in hospitals. Working against finding this effect, however, is the fact that for-profits might have been less strongly affected by the financial crisis than nonprofits. Though they likely suffered from the reduction in credit market access, for-profits may have been less affected by the stock market crash because they do not own endowments and, in general, rely less heavily on financial assets to finance their day-to-day operations.

Our overall sample consists of 1,895 for-profit hospitals from 2005 to 2011 (9,947 observations). As shown in Table A7 in the Appendix, the average for-profit hospital is relatively small: it has $24.4 million in assets and $62.7 million in revenues, compared to $82.3 and $164.0 million for nonprofits. Only 13% of for-profit hospitals report having financial investments (our definition of financial investments excludes cash balances and temporary investments), compared to 63% of nonprofits. Investment income represents 1% of total assets for for-profits that report it (38% of total), compared to 3% of total assets for nonprofits with investment income (69% of total). For-profits are substantially more profitable than nonprofits: the ratio of operating profits to lagged fixed assets is 14% for for-profits compared to -2% for nonprofits. The average growth in buildings as a fraction of lagged fixed assets is 3% for for-profits compared to 8% for nonprofits, and the corresponding growth rates for equipment are 8% vs. 6%.

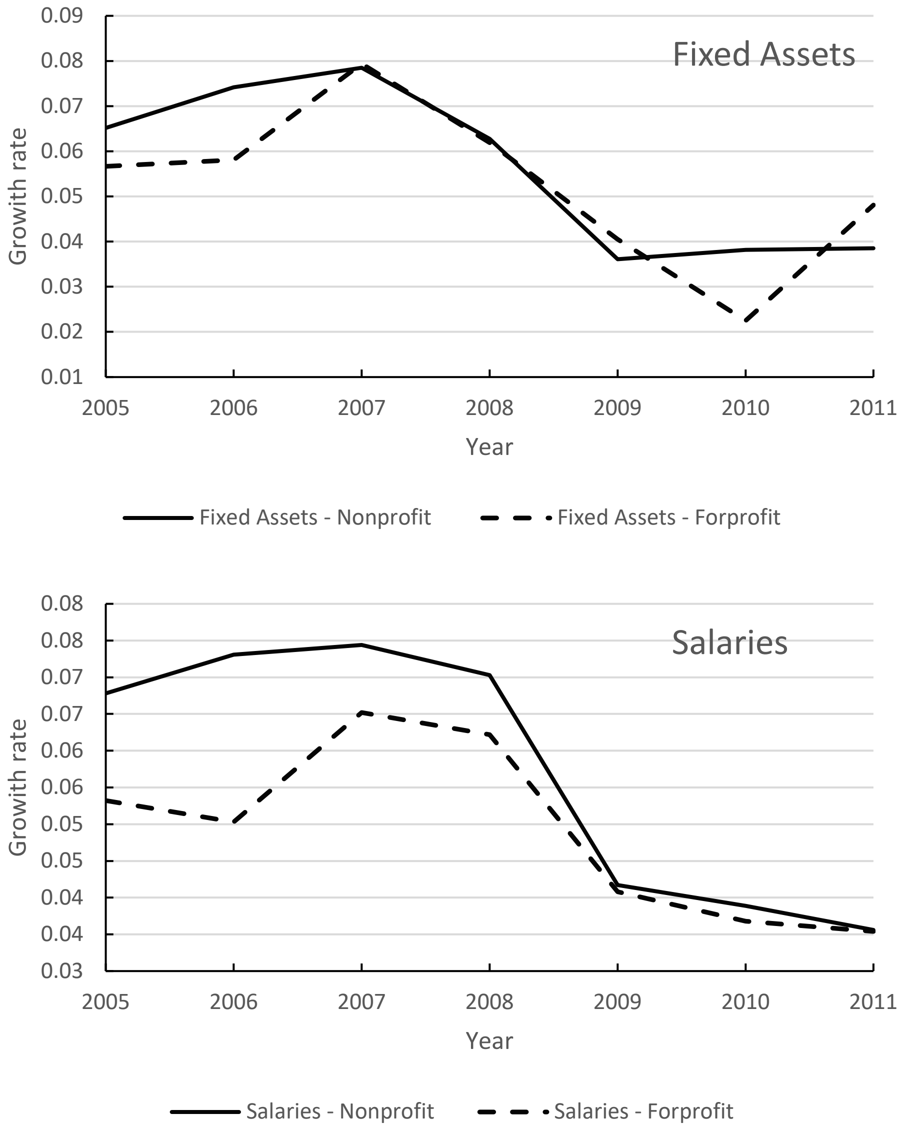


Fig. 6: Nonprofit and for-profit hospitals' investment from 2005-2011. The sample includes 3,272 nonprofit hospitals and 1,895 for-profit hospitals from 2005 through 2011. The figure shows the average growth rates in Fixed Assets and Salaries for each hospital group by year. Fixed Assets is gross land, buildings, and equipment minus accumulated depreciation.

Figure 6 shows that for-profits reduced their capital expenditures after 2008, similarly to nonprofits, though the effect on salaries appears less pronounced (the multivariate regressions in Table A7 in the Appendix shows similar results). Given the for-profits' weaker reliance on financial assets, the likely channels are the contraction in credit supply in 2008 and the anticipated loss in patient revenues due to the subsequent economic downturn.

We next examine changes in patient treatment in the post- vs. pre-crisis period (since for-profits do not have endowments, we cannot implement cross-sectional tests using financial returns). Table 10 shows the results from catheterization regressions similar to those in Table 3. Based on the regression in column 1, for-profit hospitals increased their propensity to perform catheterizations during our sample period by one percentage point a year, which is similar to the trend estimated for small nonprofit hospitals in Table 3. (As a reference point, the average catheterization rate in 2007 is 48% for for-profits compared to 49% for nonprofits and 28% for small nonprofits). However, controlling for the trend, there is no evidence that the catheterization rate increased more strongly after 2008: the coefficient on the post-crisis dummy is positive but close to zero. The lack of differential response for for-profits vs. nonprofits is also apparent from the regression in column 2 estimated on the combined sample.

The regressions in columns 3 and 4 explore the for-profit and nonprofit hospitals' treatment of privately insured (and thus likely more profitable) patients vs. other patients post 2008. Each regression includes a dummy variable for private patients and its interactions with *Post-Crisis* and the time trend. Based on column 3, there is no evidence that for-profit hospitals shifted towards a more intensive treatment of private vs. other patients after the financial crisis, especially compared to nonprofit hospitals. There is weak evidence of such shift for nonprofits: the coefficient on the interaction of *Private* with *Post-Crisis* in column 4 is positive and significant with a t-statistic of 1.9. We explore this effect in more detail in Section 6.2.[18]

Overall, the evidence in Table 10 suggests that for-profit hospitals did not increase the use of the more intensive and generally more profitable medical treatments after 2008. This is especially interesting given the concern that in information sensitive industries such as healthcare, for-profits would be more prone to "hidden" shifts in quality in response to financial shocks.

6.2 Physicians-hospital integration

One reason why treatment choices are unresponsive to hospitals' financial condition might be that physicians' incentives are only loosely aligned with those of the hospital. In this section we test

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[18] As we discuss in Section 2.2, the pre-post crisis analysis is more difficult to interpret for C-section because of the confounding effect of political pressures to reduce C-section rates, which might have had different effects on for-profits vs. nonprofits. However, in unreported regressions similar to those in Table 10, find no evidence that for-profits increased C-section rates more post-2008 than nonprofits.

this hypothesis by examining treatment responses at hospitals in which physicians are employees of the hospital and are therefore most closely integrated in the organization.

The data on physician arrangements with the hospital comes from the American Hospital Association (AHA) Annual Survey Database. The survey covers the universe of U.S. hospitals and includes, among other things, information on hospital organizational structure, services, staffing and physician arrangements. The survey reports hospital participation in eight types of physician arrangements, which are usually grouped into three major categories: no affiliation, employment affiliation, and contractual non-employment affiliation (Madison (2004), Scott et al. (2016)). The latter can take on a variety of forms: in some cases, the hospital enters into a contract with physicians who agree to perform services at the hospital but otherwise remain independent (e.g., they own independent practices, negotiate separate contracts with insurers, etc.). In other cases, the hospital forms a joint venture with physicians or establishes a separate legal entity that provides various services to physicians, including management or marketing services or negotiating contracts with insurers. Such entities might also set physician compensation or establish common standards of quality (Dynan, Bazzoli, and Burns (1998)).

Based on Panel A of Table 11, 38% of hospitals in our sample report having no contractual or employment relationship with at least some of their staff physicians as of 2008. This compares with 41% reporting an employment relationship and 34% reporting a contractual relationship. Similarly, 45% of hospitals report having a high-integration arrangement with at least some of their physicians based on the classification developed in Dynan, Bazzoli, and Burns (1998). This could involve either an employment or a close contractual relationship.[19] Large hospitals as well as teaching hospitals or academic centers are generally more integrated. For example, the high-integration dummy is, on average, 0.50 for large hospitals vs. 0.38 for small hospitals in our sample, split at the median based on the size of service revenues. Similar to prior studies, we find that integration increased during our sample period: hospitals that report having a high-integration arrangement increased from 29% in 2005 to 48% in 2011. One limitation of the physician arrangement indicators in Panel A is that they do not tell us the fraction of a hospital's physicians involved in each type of arrangement. However, starting in 2010, the AHA reports the number of their privileged physicians (that is, physicians with privileges to refer a patient to the hospital and/or perform services at the hospital) that are employed by the hospital, have an individual or a group contract with the hospital, or none of the above. Based

[19] Dynan, Bazzoli, and Burns (1998) find that contractual arrangements involving a Management Service Organization were usually highly integrated.

on Panel B in Table 11, 15% of privileged physicians are employed, 8% have individual contracts, 22% have a group contract, and 49% had no contractual or employment relationship with the hospital.

Several authors argue that higher-integration models, such as employment or close contractual arrangements, can align physician and hospital incentives.[20] This may happen through several channels, including physician compensation contracts creating incentives to offer services that are more profitable to the hospital. Hospitals might also directly monitor the quality and the cost effectiveness of those services or require that physicians adhere to certain quality standards. Moreover, physicians involved in hospital management or governance may have direct stakes in their organizations' financial health. Prior literature finds mixed evidence on the effects of hospital-physician integration. For example, Madison (2004) finds that hospitals that adopt the integrated salary model increase procedure rates in the treatment of heart attacks though the effects are small and there is no change in the patient outcomes. Similarly, Scott et al. (2016) find no effect of hospitals' switches to physician employment on mortality rates, readmission rates, or length of stay, and Ciliberto and Dranove (2006) find no effect on hospital charges. However, Baker, Bundorf, and Kessler (2014) find that increases in hospital-physician integration are associated with higher payments received for services to privately insured patients. These prices are distinct from hospital charges and represent actual payments made either by insurance companies or by patients in the form of copayments or deductibles. This finding could mean that integrated hospitals negotiate better terms with insurers, or that they are able to offer more highly compensated services to their patients.

In contrast to the previous studies, which examine changes in outcome variables around hospitals' decisions to strengthen physician integration, we test whether treatment of patients responds to an exogenous shock to the hospital's financial condition, and in particular, whether this response varies with the degree of integration. Our main hypothesis is that the more tightly integrated physicians are more likely to shift towards profitable treatments after the hospital experiences a financial shortfall. As a starting point, in Table 12, Panel A we run regressions of the catheterization dummy on the *Post-Crisis* indicator, similar to those in Table 3, but include a measure of integration (*INTEG*), its interaction with *Post-Crisis*, and separately with the time trend. In columns 1-3 of Panel A, we measure integration using the Dylan et al. indicator for physician employment or close contractual

[20] Baker, Bundorf, and Kessler (2014) argue that though legal restrictions prohibit hospitals from directly paying doctors for referrals, vertical integration allows them to circumvent these restrictions. By employing or contracting with physicians, hospitals can induce them to increase procedures, diagnostic testing, or other services at their facilities.

arrangements. To capture the finer variation in the degree of integration, columns 4-6 use the fraction of privileged physicians that are employed by the hospital.

Generally, we find evidence that the more integrated hospitals increased catheterization levels after 2008 relative to the less integrated hospitals. Based on the left panel, the interaction of *INTEG* with *Post-Crisis* is positive in the full sample, but it is statistically significant only in the subsample of large hospitals. Within the large-hospital subsample, integrated hospitals increased their catheterization rates by 2.5% post 2008 relative to the low-integration hospitals (the t-statistic of 2.3). The effect is negative and not significant for small hospitals, which, based on Table 11, are less likely to be integrated. The results become stronger when we use the finer measure of integration, the percentage of privileged physicians employed by the hospital. In the right panel, the interaction of *Post_Crisis* with this measure is positive and significant in the full sample and in the sample of large hospitals (t-statistics of 2.8 and 2.7), and it is similar in magnitude though statistically not significant in the sub-sample of small hospitals (t-statistic of 1.6).

In Panel B of Table 12, we explore whether these effects differ for privately-insured vs. other patients. The earlier analysis in Section 6.1 suggests that private patients in nonprofit hospitals experienced stronger increases in catheterizations post-2008 (Table 10, column 4). If the differential treatment of private patients was caused by the financial shock to the hospital, the effect should be stronger for hospitals able to exert more influence on physicians, which would be the case in the more integrated organizations. In Panel B, we split the nonprofit sample into high- and low-integrated sub-samples based on the dummy indicating physician employment or a close contractual arrangement. Within each sub-sample, we estimate regressions similar to those in Panel A of Table 12, except that we include an indicator for private patients, *Private*, and its interactions with the *Post-Crisis* dummy and the time trend. We find that the interaction of *Private* with *Post-Crisis* is positive and significant only in the sub-sample of high-integration hospitals, consistent with our hypothesis. For example, based on the first column, high-integration hospitals increased catheterizations post-crisis by 2.6 percentage points more for private patients compared to non-private patients (t-statistic of 2.6). We find no differential effect on private vs. non-private patients for non-integrated hospitals: the coefficients on the interaction term are close to zero in all regressions. After splitting each sub-sample based on size, we find that the results for the high-integration sub-sample are again driven by larger, and generally more integrated, hospitals.

Finally, in Panel C of Table 12, we test whether the high-integration hospitals increased cardiac treatment intensity more strongly when their financial assets performed especially poorly in 2008. We find no evidence that this was the case: as in the previous regressions, the interactions of *Post-Crisis* with the return tercile dummies are insignificant in all columns. One explanation for the lack of significant interactions might be that the crisis affected hospitals through multiple channels, in particular through the credit channel and the subsequent economic downturn, and thus, caused a major financial shock even for hospitals with less significant losses on their endowments. Our earlier finding that for-profit hospitals, which do not hold endowments, contracted their investment growth post 2008 similarly to nonprofits, is consistent with this interpretation.

To summarize, the findings in Table 12 suggest that integrated hospitals responded more strongly to the 2008 financial shock by increasing treatment intensity of their cardiac patients. Consistent with a financial motive, the increase was stronger for privately insured, and thus likely more profitable patients. However, we find no evidence that the shift was related to the severity of the negative shock to the hospital's financial assets. Overall, the findings suggest that hospital-physician integration played a role in the transmission of financial stress to treatment choices, though we cannot directly attribute these effects to financial constraints caused by the contraction of endowments.

7 Conclusions

A large corporate finance literature examines the interaction between firms' financing and their product market choices. One of the central findings is that, when quality is imperfectly observed by consumers, financially constrained firms have incentives to lower their product quality to increase cash flows in the short run. A number of studies find evidence of such "quality skimping" in manufacturing and retail firms. This paper focuses on the healthcare sector: it test whether financial shortfalls at hospitals affect the quality of the physicians' treatment choices. We examine two high-stakes medical settings that have been widely explored in health economics: heart attacks and child delivery. In both cases, the more intensive treatment choice – heart surgery in case of heart attacks and C-section in case of child delivery – tends to be more profitable to hospitals. We test whether physicians shift towards these more intensive treatment options when the hospital's financial condition deteriorates. Our assumption is that such shifts in quality – induced by the hospitals' financial shortfalls – would be detrimental to patients. We also test whether negative financial shocks have negative effects on patient outcomes.

We use the 2008 financial crisis to identify the effects of a financial shock. The central finding of the paper is that, in spite of the large magnitude of this shock, the physicians' treatment choices remained unchanged. For large hospitals, catheterization rates were essentially flat throughout 2005-

2011. Small hospitals experienced an increase in catheterization rates during this period, but the increase was indistinguishable from a time-trend and was unrelated to financial returns in 2008. A similar picture emerges from the C-section analysis. Finally, we find no apparent worsening of patient outcomes as measured by Patient Safety Indicators (PSI) after the crisis. However, we find some evidence that hospitals with better performance of their financial assets in 2008 improved patient outcomes in the post-crisis period, consistent with the effects of financing constraints.

Our overall lack of significant response stands in stark contrast to the previous literature on the effects of financial constraints on product quality in corporations, and we examine two potential explanations for these findings. The first explanation is that the nonprofit organizational form works well at counteracting the adverse effects of financial shocks, at least in the high-stakes medical contexts we examine. However, we find no support for this hypothesis from examining the for-profit hospitals' response to the financial crisis, which was generally similar to that of nonprofits. As a second explanation, we consider another common feature of hospital governance: the often loose relationship between a hospital's management and its key workers (physicians) that determine quality. We find that hospitals with closer ties to their physicians (such as employment) increased treatment intensity post-2008, especially for their privately insured patients. These results suggest that looser ties between firms and workers could mitigate product market frictions in industries such as healthcare: if managers are more concerned about short-term financial results, their weaker ability to exert pressure on workers shield customers from "hidden" quality shifts.

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Table 1: Descriptive statistics for the HCRIS sample. The sample in Panel A includes 3,272 nonprofit hospitals from 2005 through 2011. The sub-sample in Panel B includes 704 hospitals in the seven states for which we have SID data (AZ, CA, FL, MA, NJ, NY, WA). The financial data come from HCRIS, Schedule G. *Fixed Assets* is gross land, buildings, and equipment minus accumulated depreciation. *Service Revenue* is revenue from medical services. *Net Debt* is total financial debt (bonds and bank loans) minus cash and temporary securities scaled by net fixed assets. *Financial Investments* is the dollar amount of financial investments scaled by net fixed assets. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Investments Income* is income from investments from statement of revenues in Schedule G scaled by lagged net fixed assets (see details in Section 3.2). *Equipment* includes cars and trucks, major movable equipment, minor equipment, and minor nondepreciable equipment.

	Mean	Median	Std	P5	P95	N
Panel A: All States						
Fixed Assets (in millions)	82.30	35.00	140.00	1.28	313.00	19,726
Service Revenue (in millions)	164.00	80.70	235.00	7.69	590.00	19,843
Net Debt	0.26	0.23	0.63	-0.87	1.40	17,911
Financial Investments	0.53	0.29	0.63	0.00	2.08	12,422
Investments Income	0.03	0.01	0.05	0.00	0.15	13,590
Operating Income	-0.02	-0.01	0.16	-0.35	0.25	19,281
Growth in Fixed Assets	0.06	0.00	0.18	-0.12	0.44	18,743
Growth in Equipment	0.06	0.05	0.13	-0.15	0.31	15,692
Growth in Buildings	0.08	0.03	0.17	-0.08	0.45	17,418
Growth in Salaries	0.05	0.05	0.06	-0.05	0.15	15,378
Growth in Sales	0.06	0.05	0.08	-0.08	0.21	19,232
Panel B: Seven SID States						
Fixed Assets (in millions)	111.00	59.40	162.00	3.98	407.00	4,354
Service Revenue (in millions)	232.00	155.00	282.00	14.10	708.00	4,379
Net Debt	0.32	0.30	0.65	-0.80	1.51	4,168
Financial Investments	0.40	0.16	0.56	0.00	1.65	2,554
Investments Income	0.03	0.01	0.04	0.00	0.12	3,001
Operating Income	-0.04	-0.02	0.16	-0.36	0.21	4,295
Growth in Fixed Assets	0.06	0.01	0.17	-0.11	0.43	4,193
Growth in Equipment	0.06	0.05	0.13	-0.15	0.28	3,612
Growth in Buildings	0.08	0.03	0.16	-0.08	0.44	4,002
Growth in Salaries	0.06	0.06	0.05	-0.03	0.15	4,121
Growth in Sales	0.06	0.06	0.08	-0.07	0.21	4,283

Table 2: Descriptive statistics for the SID heart attack sample. The sample consists of 1,071,550 heart attack admissions to 451 nonprofit hospitals in seven states (listed in the bottom panel) from 2005 to 2011. Heart attacks (Acute Myocardial Infarction, AMI) are identified based on the ICD-9-CM diagnosis code '410'. *Catheter* is an indicator for whether the patient received cardiac catheterization during his hospital stay. We use the Clinical Classifications Software (CCS) for ICD-9-CM, procedure code 47 to identify catheterizations. *Predicted Cath* is the predicted probability of catheterization from a logit regression of *Catheter* on dummy variables for the patient's age group, sex, race, and insurance status. *Adjusted Cath* is *Catheter* minus *Predicted Cath*. Large and small hospitals are hospitals with above- and below-median service revenues in the prior year.

	All Hosp.	Large	Small
Catheter	0.490	0.545	0.305
Predicted Cath.	0.490	0.497	0.468
Adjusted Cath.	0.000	0.048	-0.162
White	0.693	0.675	0.756
Black	0.085	0.088	0.073
Hispanic	0.097	0.102	0.083
Private Ins.	0.241	0.253	0.200
Medicaid	0.062	0.065	0.055
Medicare	0.629	0.613	0.680
Self-pay	0.042	0.042	0.040
No-charge	0.004	0.005	0.003
Other-pay	0.022	0.022	0.023
Female	0.425	0.416	0.457
Age	70.050	69.551	71.742
N	1,071,550	827,482	244,068

	Arizona	California	Florida	Maryland	New Jersey	New York	Washington
Catheter	0.554	0.526	0.543	0.415	0.431	0.431	0.515
Predicted Cath.	0.498	0.496	0.492	0.481	0.482	0.474	0.522
Adjusted Cath.	0.056	0.030	0.050	-0.066	-0.051	-0.043	-0.007
Private Ins.	0.206	0.246	0.204	0.255	0.272	0.205	0.337
Medicaid	0.084	0.085	0.049	0.063	0.022	0.090	0.049
Medicare	0.631	0.604	0.652	0.630	0.638	0.664	0.552
Self-pay	0.027	0.036	0.050	0.039	0.063	0.026	0.036
No-charge	0.001	0.000	0.015	0.002	0.000	0.001	0.008
Other-pay	0.050	0.029	0.031	0.011	0.005	0.013	0.017
Female	0.408	0.418	0.410	0.454	0.437	0.444	0.408
Age	69.530	69.946	69.732	69.188	70.812	71.037	69.660
N	84,083	250,030	222,404	118,110	179,420	138,466	79,037

Table 3: Regressions of the catheterization choice for the SID sample of heart attack patients. The sample includes hospital admissions for the Acute Myocardial Infarction (AMI). The table shows OLS regressions of the indicator variable for whether the patient received catheterization during his hospital stay. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Trend* is the time trend. The control variables include indicators for the patient's race, sex, insurance status, and age group. Large and small hospitals are split at the median of revenues in the previous year. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp	Large	Small	All Hosp	Large	Small
Post_Crisis	0.005	0.004	0.020	0.006	0.003	0.013
	(1.017)	(0.704)	(1.403)	(0.958)	(0.545)	(0.651)
Trend	0.003*	0.000	0.013***	0.002	-0.000	0.014**
	(1.860)	(0.171)	(2.951)	(1.173)	(-0.048)	(2.606)
White	-0.019***	-0.017***	-0.021**	-0.030***	-0.014	-0.052**
	(-3.835)	(-3.094)	(-2.459)	(-2.715)	(-1.202)	(-2.021)
Black	-0.087***	-0.089***	-0.064***	-0.105***	-0.091***	-0.167***
	(-14.122)	(-13.083)	(-6.117)	(-8.128)	(-7.246)	(-5.795)
Hispanic	-0.006	-0.008	0.010	0.007	0.014	-0.006
	(-1.209)	(-1.327)	(0.865)	(0.632)	(1.217)	(-0.209)
Medicaid	-0.097***	-0.100***	-0.078***	-0.100***	-0.103***	-0.070***
	(-18.326)	(-16.683)	(-9.106)	(-12.445)	(-12.025)	(-4.182)
Medicare	-0.095***	-0.098***	-0.079***	-0.100***	-0.097***	-0.091***
	(-19.824)	(-17.509)	(-12.515)	(-15.608)	(-13.135)	(-9.403)
Self-pay	-0.005	-0.003	0.000	-0.010	-0.011	0.017
	(-0.907)	(-0.597)	(0.001)	(-1.630)	(-1.588)	(1.164)
No-charge	0.029**	0.025*	0.052***	0.063***	0.068***	0.011
	(2.439)	(1.908)	(2.881)	(4.207)	(5.765)	(0.272)
Other-pay	-0.036***	-0.034***	-0.038***	-0.030***	-0.029***	0.000
	(-5.093)	(-4.105)	(-3.404)	(-2.826)	(-2.701)	(0.015)
Female	-0.040***	-0.042***	-0.029***	-0.052***	-0.051***	-0.051***
	(-23.813)	(-21.680)	(-10.646)	(-26.699)	(-22.335)	(-15.899)
Hospital FE	Y	Y	Y	N	N	N
Patient age FE	Y	Y	Y	Y	Y	Y
N	859806	700472	159334	859806	700472	159334

Table 4: Regressions of catheterization choice for the SID sample of heart attack patients: interaction with investments income in 2008. The sample includes hospital admissions for Acute Myocardial Infarction (AMI). The table shows OLS regressions of the indicator variable for whether the patient received catheterization during his hospital stay. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments (scaled by lagged net fixed assets) in 2008. *Trend* is the time trend. The control variables include indicators for the patient's race, sex, insurance status, and age group, the time-varying hospital variables included in Table A2 (operating cash flow, log(service revenue), and growth in service revenue in the prior year). Large and small hospitals are split at the median of revenues in the previous year. Year fixed effects are included in all regressions. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp	Large	Small	All Hosp	Large	Small
Panel A: All patients						
Post_Crisis*Inv_Inc08_T2	0.023	0.001	0.042	0.021	0.013	0.070*
	(1.314)	(0.096)	(1.003)	(1.243)	(0.801)	(1.731)
Post_Crisis*Inv_Inc08_T3	-0.012	-0.019	-0.006	-0.024	-0.038*	0.017
	(-0.761)	(-1.238)	(-0.153)	(-1.245)	(-1.914)	(0.418)
Inv_Inc08_T2				-0.037	-0.002	-0.107
				(-1.285)	(-0.082)	(-1.407)
Inv_Inc08_T3				-0.022	0.002	-0.056
				(-0.610)	(0.045)	(-0.664)
Hospital FE	Y	Y	Y	N	N	N
Patient controls	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	513146	404485	108661	513146	404485	108661
Panel B: Privately insured patients						
Post_Crisis*Inv_Inc08_T2	0.027	0.010	0.027	0.030	0.022	0.071
	(1.221)	(0.568)	(0.391)	(1.568)	(1.138)	(1.270)
Post_Crisis*Inv_Inc08_T3	-0.011	-0.022	-0.014	-0.015	-0.032	0.039
	(-0.623)	(-1.341)	(-0.222)	(-0.669)	(-1.453)	(0.672)
Inv_Inc08_T2				-0.056*	-0.023	-0.117
				(-1.722)	(-0.857)	(-1.162)
Inv_Inc08_T3				-0.046	-0.017	-0.099
				(-1.082)	(-0.381)	(-1.020)
Hospital FE	Y	Y	Y	N	N	N
Patient controls	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	122179	99446	22733	122179	99446	22733

Table 5: Descriptive statistics for the SID sample of child deliveries patients. The sample consists of 4,085,253 child delivery admissions to 378 nonprofit hospitals in seven states (listed in the bottom panel) from 2005 to 2011. Child delivery is identified based on the ICD-9-CM diagnosis code 'V27'. *C-section* is an indicator for whether the delivery was via a Cesarean section. We use the ICD-9-CM, procedure codes 740, 741, 742, 744, and 7499 to identify C-sections. *Predicted C-section* is the predicted probability of a C-section from a logit regression of *C-section* on dummy variables for the birth complications and mother's diagnoses listed below, the patient's age group, race, and insurance status. *Adjusted C-section* is *C-section* minus *Predicted C-section*. Large and small hospitals are hospitals with above- and below-median service revenues in the prior year.

	All Hospitals	Large	Small
C-section	0.226	0.233	0.207
Predicted C-section	0.226	0.231	0.213
Adjusted C-section	0.000	0.002	-0.006
Hypertension	0.081	0.084	0.072
Previa	0.018	0.019	0.015
Early_Labor	0.073	0.079	0.056
Complications_Mother	0.377	0.386	0.352
Multi_Kids	0.016	0.018	0.010
Breech	0.080	0.082	0.075
Cord_Prolapse	0.003	0.003	0.003
Rupture	0.000	0.000	0.000
White	0.431	0.421	0.461
Black	0.112	0.123	0.079
Hispanic	0.267	0.255	0.301
Private Insurance	0.534	0.559	0.462
Medicaid	0.413	0.392	0.474
Medicare	0.003	0.003	0.004
Self_Pay	0.027	0.025	0.033
No_Charge	0.001	0.001	0.001
Other_Pay	0.021	0.019	0.027
Age	27.916	28.241	26.960
N	4,085,253	3,049,558	1,035,695

	Arizona	California	Florida	Maryland	New Jersey	New York	Washington
C-section	0.185	0.213	0.257	0.232	0.257	0.235	0.192
Predicted C-section	0.215	0.215	0.233	0.246	0.238	0.228	0.226
Adjusted C-section	-0.030	-0.001	0.024	-0.014	0.018	0.007	-0.034
Private Insurance	0.456	0.495	0.462	0.571	0.692	0.563	0.589
Medicaid	0.453	0.469	0.470	0.397	0.218	0.400	0.381
Medicare	0.003	0.002	0.004	0.003	0.003	0.005	0.003
N	387,074	1,249,239	682,905	388,935	515,775	541,340	319,985

Table 6: Regressions of the C-section choice for the SID sample of child deliveries. The sample includes hospital admissions for child delivery. The table shows OLS regressions of the indicator variable for whether the delivery was via a Cesarean section. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Trend* is the time trend. The control variables include indicators for birth complications, mother diagnoses, race, sex, insurance status, and age group. Large and small hospitals are split at the median of revenues in the previous year. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp.	Large	Small	All Hosp.	Large	Small
Post_Crisis	-0.003	-0.004	-0.003	-0.004	-0.002	-0.012
	(-1.409)	(-1.378)	(-0.745)	(-1.523)	(-0.579)	(-1.522)
Trend	0.001**	0.001**	0.001*	0.001**	0.001	0.003
	(2.418)	(1.996)	(1.761)	(2.180)	(1.328)	(1.637)
Hypertension	0.181***	0.179***	0.185***	0.178***	0.176***	0.184***
	(61.464)	(53.126)	(34.704)	(51.532)	(43.558)	(32.987)
Previa	0.329***	0.320***	0.362***	0.328***	0.318***	0.363***
	(51.883)	(43.146)	(39.770)	(50.217)	(41.764)	(39.094)
Early_labor	0.020***	0.023***	0.008**	0.019***	0.021***	0.010***
	(8.967)	(8.961)	(2.524)	(8.325)	(8.074)	(2.815)
Complications_Mother	0.046***	0.047***	0.043***	0.038***	0.040***	0.034***
	(29.932)	(24.967)	(19.001)	(20.728)	(17.990)	(12.283)
Multi_Kids	0.214***	0.210***	0.231***	0.215***	0.211***	0.231***
	(36.948)	(32.529)	(21.256)	(34.513)	(30.448)	(20.202)
Breech	0.579***	0.578***	0.581***	0.580***	0.579***	0.582***
	(74.214)	(60.318)	(52.875)	(70.795)	(57.425)	(50.170)
Cord_Problems	0.417***	0.404***	0.456***	0.417***	0.404***	0.456***
	(27.395)	(21.458)	(24.642)	(29.079)	(23.132)	(22.721)
Rupture	0.419***	0.421***	0.405***	0.424***	0.422***	0.426***
	(9.383)	(8.047)	(4.755)	(9.588)	(8.211)	(4.967)
White	-0.004	-0.005	0.001	0.002	-0.000	0.010
	(-1.588)	(-1.650)	(0.294)	(0.437)	(-0.016)	(1.400)
Black	0.021***	0.023***	0.017***	0.035***	0.035***	0.036***
	(6.122)	(5.644)	(4.196)	(5.802)	(5.107)	(4.238)
Hispanic	-0.010***	-0.008***	-0.012***	0.016***	0.017**	0.018**
	(-4.290)	(-2.960)	(-3.549)	(2.743)	(2.272)	(2.092)
Medicaid	-0.032***	-0.034***	-0.026***	-0.042***	-0.046***	-0.029***
	(-19.099)	(-16.577)	(-11.654)	(-13.377)	(-11.982)	(-7.013)
Medicare	0.022***	0.024***	0.018**	0.010	0.009	0.015*
	(4.069)	(3.413)	(2.218)	(1.481)	(1.084)	(1.793)
Self_Pay	-0.056***	-0.059***	-0.048***	-0.051***	-0.054***	-0.039***
	(-19.629)	(-18.082)	(-9.999)	(-12.413)	(-10.727)	(-6.556)
No_Charge	-0.041***	-0.047***	-0.016	-0.065***	-0.075***	-0.017
	(-4.787)	(-4.901)	(-1.004)	(-4.164)	(-4.298)	(-0.776)
Other_Pay	-0.010***	-0.010***	-0.009**	-0.025***	-0.029***	-0.012
	(-4.194)	(-3.487)	(-2.160)	(-5.133)	(-4.909)	(-1.492)
Hospital FE	Y	Y	Y	N	N	N
Patient Age FE	Y	Y	Y	Y	Y	Y
N	3495620	2601662	893958	3495620	2601662	893958

Table 7: Regressions of the C-section choice for the SID sample of child deliveries: interaction with investments income in 2008. The sample includes hospital admissions for child delivery. The table shows OLS regressions of the indicator variable for whether the delivery was via a Cesarean section. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments (scaled by lagged net fixed assets) in 2008. *Trend* is the time trend. The control variables include indicators for birth complications, mother's diagnoses, race, sex, insurance status, and age group, the time-varying hospital variables included in Table A2 (operating cash flow, log(service revenue), and growth in service revenue in the prior year). Large and small hospitals are split at the median of revenues in the previous year. Year fixed effects are included in all regressions. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp.	Large	Small	All Hosp.	Large	Small
Panel A: All patients						
Post_Crisis*Inv_Inc08_T2	0.001	0.005	-0.004	-0.001	-0.002	0.007
	(0.252)	(0.905)	(-0.514)	(-0.211)	(-0.278)	(0.564)
Post_Crisis*Inv_Inc08_T3	-0.002	-0.004	0.003	-0.003	-0.008	0.011
	(-0.399)	(-0.720)	(0.346)	(-0.754)	(-1.510)	(1.153)
Inv_Inc08_T2				-0.005	-0.011	0.016
				(-0.468)	(-0.842)	(1.078)
Inv_Inc08_T3				-0.002	0.001	0.000
				(-0.292)	(0.134)	(0.007)
Hospital FE	Y	Y	Y	N	N	N
Patient age FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	2046077	1491580	554497	2046077	1491580	554497
Panel B: Privately insured patients						
Post_Crisis*Inv_Inc08_T2	0.002	0.006	-0.002	-0.001	-0.007	0.016
	(0.497)	(0.927)	(-0.209)	(-0.198)	(-0.614)	(1.164)
Post_Crisis*Inv_Inc08_T3	-0.002	-0.004	0.003	-0.005	-0.008	0.009
	(-0.467)	(-0.613)	(0.345)	(-0.945)	(-1.400)	(0.893)
Inv_Inc08_T2				0.003	0.004	0.017
				(0.302)	(0.312)	(1.094)
Inv_Inc08_T3				-0.006	-0.001	-0.004
				(-0.667)	(-0.087)	(-0.317)
Hospital FE	Y	Y	Y	N	N	N
Patient age FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
N	1065328	802951	262377	1065328	802951	262377

Table 8: Patient Safety Indicators (PSI): summary statistics. The table describes the PSI indicators and the standardized measures used in Table 11. The algorithm for each indicator is described in: AHRQ, Patient Safety Indicators: Technical Specifications, March 2008. The AHRQ algorithm provides all ICD-9-CM diagnosis codes to identify the sample of patients to be used in the computation of each indicator, and all diagnosis codes to identify the adverse events for these patients. We screen each patient in our sample for these diagnoses to identify the samples and to compute the PSI indicators. Panel A shows the definitions of the eight PSI indicators with occurrence in our sample of at least 0.5%. To construct the measures used in Table 9, we first compute the hospital-level frequency for each indicator event. We then transform the raw frequencies using a variance-stabilizing transformation for Poisson-distributed variables by taking their square root. The transformed hospital-level frequencies are standardized by subtracting their pooled mean and scaling by their standard deviations. The regressions use averages across eight, seven, or five of the standardized measures: PSIAV8, PSIAV7, PSIAV5 (see definitions in Panel A). Panel B shows descriptive statistic for each standardized measure and their averages. Panel C reports the incidence of each adverse event across all patients in our sample, and for patients of large and small hospitals (large and small hospitals are split at the median of revenues in the previous year).

Panel A: PSI Descriptions

PSI #	Description
03	Pressure Ulcer Rate
04	Death Rate among Surgical Inpatients with Serious Treatable Complications
09	Perioperative Hemorrhage or Hematoma Rate
11	Postoperative Respiratory Failure Rate
12	Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate
13	Postoperative Sepsis Rate (among Elective Surgical Discharges)
18	Obstetric Trauma Rate – Vaginal Delivery With Instrument
19	Obstetric Trauma Rate – Vaginal Delivery Without Instrument
PSIAV8	Average across all eight standardized PSI measures with occurrence > 0.5%
PSIAV7	Average across seven standardized PSI measures with occurrence > 1% (excluding 9)
PSIAV5	Same as PSIAV7, except PSIs 3 and 12 excluded due to measurement change during our sample period

Panel B: Standardized PSI measures: hospital level

PSI#	Mean	Median	Std.	P5	P95	N
03	0.08	0.06	0.78	-1.27	1.37	2912
04	0.05	0.17	0.90	-1.36	1.31	1960
09	0.18	0.29	0.85	-1.84	1.31	2842
11	-0.04	0.00	0.63	-1.28	0.77	2056
12	0.04	0.06	0.75	-1.65	1.08	2844
13	-0.05	-0.01	0.69	-0.99	0.93	2024
18	0.07	0.16	0.91	-2.30	1.26	2233
19	0.09	0.14	0.93	-1.38	1.38	2281
PSIAV8	0.03	0.11	0.52	-1.03	0.66	2918
PSIAV7	0.01	0.07	0.57	-1.05	0.68	2918
PSIAV5	-0.01	0.08	0.67	-1.14	0.81	2702

Panel C: Raw PSI measures: patient level

PSI #	All Hospitals		Large		Small	
	Mean	N	Mean	N	Mean	N
03	0.023	9,411,786	0.023	7,136,669	0.023	2,275,117
04	0.088	107,549	0.087	89,078	0.091	18,471
09	0.007	8,958,123	0.007	7,214,545	0.005	1,743,578
11	0.011	3,082,510	0.012	2,490,215	0.010	592,295
12	0.012	9,528,962	0.013	7,688,527	0.009	1,840,435
13	0.016	756,630	0.016	619,933	0.015	136,697
18	0.138	251,430	0.142	186,795	0.129	64,635
19	0.024	2,966,961	0.025	2,209,608	0.023	757,353

Table 9: Regressions of the Patient Safety Indicators (PSI) measures: interaction with investment income in 2008. The table shows hospital-level OLS regressions of PSI measures *PSIAV8*, *PSIAV8*, and *PSIAV5* described in Table 8. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments (scaled by lagged net fixed assets) in 2008. The control variables are the time-varying hospital variables included in Table A2 (operating cash flow, log(service revenue), and growth in service revenue in the prior year). Large and small hospitals are split at the median of revenues in the previous year. Year fixed effects are included in all regressions. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp.	Large	Small	All Hosp.	Large	Small
Panel A: Dep. Variable is PSIAV8: average across eight standardized PSI measures with occurrence > 0.5%						
Post_Crisis*Inv_Inc08_T2	-0.091	-0.059	-0.139	-0.080	-0.039	-0.124
	(-1.617)	(-1.049)	(-1.538)	(-1.605)	(-0.719)	(-1.616)
Post_Crisis*Inv_Inc08_T3	-0.085*	-0.041	-0.162**	-0.055	-0.020	-0.104
	(-1.714)	(-0.721)	(-2.020)	(-1.173)	(-0.391)	(-1.451)
Inv_Inc08_T2				0.017	-0.053	0.070
				(0.313)	(-0.895)	(0.873)
Inv_Inc08_T3				0.042	-0.003	0.101
				(0.768)	(-0.058)	(1.130)
Hospital FE	Y	Y	Y	N	N	N
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	1480	686	794	1480	686	794
Panel B: Dep. Variable is PSIAV7: average across seven standardized PSI measures with occurrence > 1%						
Post_Crisis*Inv_Inc08_T2	-0.097	-0.043	-0.165*	-0.088*	-0.036	-0.139*
	(-1.637)	(-0.721)	(-1.703)	(-1.697)	(-0.755)	(-1.698)
Post_Crisis*Inv_Inc08_T3	-0.125**	-0.042	-0.237**	-0.092	-0.036	-0.152*
	(-2.034)	(-0.642)	(-2.307)	(-1.600)	(-0.595)	(-1.709)
Inv_Inc08_T2				0.003	-0.062	0.056
				(0.050)	(-0.866)	(0.614)
Inv_Inc08_T3				0.090	0.042	0.148
				(1.262)	(0.732)	(1.213)
Hospital FE	Y	Y	Y	N	N	N
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	1480	686	794	1480	686	794

Panel C: Dep. Variable is PSIAV5: average across five standardized PSI measures with occurrence > 1%, excluding PSI03 and PSI09						
Post_Crisis*Inv_Inc08_T2	-0.036	-0.080	-0.012	-0.101	-0.078	-0.086
	(-0.536)	(-1.402)	(-0.095)	(-1.323)	(-1.103)	(-0.679)
Post_Crisis*Inv_Inc08_T3	-0.104	-0.106	-0.119	-0.129*	-0.111	-0.127
	(-1.602)	(-1.358)	(-1.018)	(-1.821)	(-1.540)	(-1.069)
Inv_Inc08_T2				-0.001	-0.036	0.009
				(-0.013)	(-0.283)	(0.074)
Inv_Inc08_T3				0.148*	0.123	0.169
				(1.840)	(1.320)	(1.336)
Hospital FE	Y	Y	Y	N	N	N
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	1368	642	726	1368	642	726

Table 10: For-profit hospital investment and cardiac treatment intensity around the 2008 financial crisis. The table shows regressions of the catheterization choice for the SID sample of hospital admissions for the Acute Myocardial Infarction (AMI). The dependent variable is an indicator for whether the patient received catheterization during his hospital stay. The independent variables are defined in Table 3. The hospital samples consist of for-profits (columns 1 and 3), nonprofits (column 4), and both (column 2). *For-profit* is a dummy variable for for-profit hospitals. *Private* is a dummy variable for patients with private insurance. In both panels, standard errors are clustered by hospital. T-statistics are in parentheses.

	For-profits	All Hospitals	For-profits	Nonprofits
Post-Crisis	0.003	0.005	0.004	0.002
	(0.199)	(1.013)	(0.289)	(0.346)
Trend	0.010***	0.003*	0.009**	0.003*
	(2.724)	(1.879)	(2.392)	(1.746)
Post-Crisis*For-profit		0.001		
		(0.098)		
Trend*For-profit		0.006		
		(1.427)		
For-profit		-0.019		
		(-0.555)		
Post-Crisis*Private			-0.006	0.012*
			(-0.342)	(1.850)
Trend*Private			0.004	0.000
			(1.071)	(0.289)
Private			0.225**	0.024
			(2.357)	(0.691)
Patient controls	Y	Y	Y	Y
Hospital FE	Y	Y	Y	Y
N	191,277	1,051,083	191,277	859,806

Table 11: Physician arrangements descriptive statistics. Panel A shows descriptive statistic for hospital participation in different types of physician arrangements as reported in the American Hospital Association (AHA) annual survey in 2008. Each variable is an indicator equal to one if the hospital has the arrangement with at least some of its physicians, and equal to zero otherwise. MSO stands for Management Service Organization. Panel B shows descriptive statistics for the fraction of all privileged physicians under each arrangement as reported in the AHA survey in 2010 (first available year). Large and small hospitals are split at the median of revenues in the previous year.

Panel A: Fraction of hospitals engaging in each type of physician arrangements

	All hospitals	Large	Small	Academic Centers	Teaching
Employment or MSO	0.45	0.50	0.38	0.67	0.51
Employment	0.41	0.47	0.33	0.67	0.47
Contractual arrangements	0.34	0.35	0.33	0.50	0.35
No integration	0.38	0.34	0.44	0.25	0.32
N	307	174	133	12	134

Panel B: Fraction of privileged physicians in a hospital under each arrangement

	Mean	Median	STD	P25	P75	N
Employed	0.15	0.04	0.25	0.00	0.00	224
Individual contract	0.08	0.00	0.20	0.00	0.00	225
Group contract	0.22	0.14	0.26	0.02	0.00	225
Not employed or under contract	0.49	0.59	0.34	0.01	0.00	225

Table 12: Regressions of the catheterization choice for the SID sample of heart attack patients: hospital integration with physicians. The sample includes hospital admissions for the Acute Myocardial Infarction (AMI). The table shows OLS regressions of an indicator variable for whether the patient received catheterization during his hospital stay. *Post-Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Trend* is the time trend. Panel A shows regressions run on the full sample of non-profit hospitals. *INTEG* is a measure of hospital integration defined in the table heading. Panel B shows regressions run separately on sub-samples of integrated and non-integrated hospitals, classified based on the indicator for employment relationship or MSO. *Private* is an indicator for privately insured patients. Panel C shows regressions run on the sub-sample of integrated hospitals. *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments (scaled by lagged net fixed assets) in 2008. The control variables are described in Table 3. Large and small hospitals are split at the median of revenues in the previous year. Standard errors are clustered by hospital. T-statistics are in parentheses.

Panel A: The post-crisis response: interaction with measures of hospital integration

	INTEG = 1 if hospital has employment relationship or MSO			INTEG = % of privileged physicians that are employed		
	All Hosp.	Large	Small	All Hosp.	Large	Small
Post-Crisis	-0.001	-0.011	0.025	-0.012*	-0.011	-0.013
	(-0.190)	(-1.357)	(1.278)	(-1.818)	(-1.494)	(-1.015)
Post-Crisis*INTEG	0.011	0.025**	-0.038	0.075***	0.075***	0.087
	(1.064)	(2.308)	(-1.497)	(2.771)	(2.697)	(1.592)
Trend	0.003	0.002	0.007	0.004**	0.003	0.010**
	(1.595)	(0.895)	(1.582)	(2.041)	(1.525)	(2.323)
Trend*INTEG	-0.002	-0.004	0.014	-0.011	-0.024***	0.006
	(-0.563)	(-1.297)	(1.597)	(-1.520)	(-3.709)	(0.534)
Patient controls	Y	Y	Y	Y	Y	Y
Hospital FE	Y	Y	Y	Y	Y	Y
N	742473	590534	151939	551083	440334	110749

Panel B: The post-crisis response: interaction of the patient's insurance status for high-integration vs. low-integration hospitals

	High integration hospitals			Low integration hospitals		
	All Hosp.	Large	Small	All Hosp.	Large	Small
Post-Crisis	0.005	0.008	-0.008	-0.002	-0.011	0.026
	(0.652)	(0.958)	(-0.430)	(-0.230)	(-1.210)	(1.169)
Post-Crisis*Private	0.026**	0.030***	-0.002	-0.002	-0.004	0.029
	(2.586)	(2.844)	(-0.059)	(-0.156)	(-0.373)	(0.935)
Private	-0.091	-0.148	0.264***	0.033	0.035	0.133

	(-0.822)	(-1.354)	(6.762)	(1.133)	(1.416)	(0.607)
Trend	0.002	-0.001	0.024***	0.002	0.000	0.009
	(0.825)	(-0.519)	(2.786)	(0.918)	(0.191)	(1.496)
Trend*Private	-0.003	-0.003	0.007	0.006**	0.007**	0.004
	(-1.164)	(-1.124)	(1.105)	(2.582)	(2.609)	(0.651)
Patient controls	Y	Y	Y	Y	Y	Y
Hospital FE	Y	Y	Y	Y	Y	Y
N	370220	321950	48270	334940	264276	70664

Panel C: Interactions with investment income in 2008: integrated hospitals

	All Hosp	Large	Small	All Hosp	Large	Small
Post_Crisis*Inv_Inc08_T2	0.029	0.005	0.048	0.018	0.006	0.083
	(1.147)	(0.282)	(0.665)	(0.714)	(0.318)	(1.103)
Post_Crisis*Inv_Inc08_T3	0.013	-0.013	0.040	-0.001	-0.029	0.067
	(0.449)	(-0.475)	(0.559)	(-0.022)	(-1.369)	(0.894)
Inv_Inc08_T2				0.002	0.027	-0.021
				(0.060)	(0.717)	(-0.183)
Inv_Inc08_T3				0.008	0.029	0.055
				(0.170)	(0.578)	(0.421)
Hospital FE	Y	Y	Y	N	N	N
Patient controls	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	217177	178900	38277	217177	178900	38277

Internet Appendix – Table A1: Descriptive statistics for hospitals above and below the median returns on financial investments in 2008, HCRIS sample. The sample includes 1,777 nonprofit hospitals in 2007. The financial data come from HCRIS, Schedule G. Return on financial investments is measured as income from investments from statement of revenues in Schedule G scaled by lagged net fixed assets (see details in Section 3.2). *Fixed Assets* is gross land, buildings, and equipment minus accumulated depreciation. *Service Revenue* is revenue from medical services. *Net Debt* is total financial debt (bonds and bank loans) minus cash and temporary securities scaled by net fixed assets. *Financial Investments* is the dollar amount of financial investments scaled by net fixed assets. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Equipment* includes cars and trucks, major movable equipment, minor equipment, and minor nondepreciable equipment.

	Below median returns in 2008			**Above median returns in 2008**		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Fixed Assets (in millions)	86.1	37.0	142.0	57.7	24.1	91.8
Service Revenue (in millions)	170.0	82.2	247.0	133.0	58.4	209.0
Net Debt	0.36	0.31	0.59	0.22	0.20	0.70
Financial Investments	0.47	0.18	0.61	0.56	0.34	0.64
Operating Income	-0.04	-0.02	0.16	-0.02	-0.01	0.15
Growth in Fixed Assets	0.08	0.03	0.19	0.08	0.02	0.19
Growth in Equipment	0.06	0.05	0.13	0.08	0.06	0.14
Growth in Buildings	0.09	0.03	0.18	0.08	0.03	0.16
Growth in Salaries	0.06	0.07	0.05	0.06	0.06	0.05
Growth in Sales	0.07	0.06	0.08	0.06	0.06	0.08

Internet Appendix – Table A2, Panel A: Hospital investments around the 2008 financial crisis. The table shows OLS regressions of hospital investments and salary expenditures on the post-crisis dummy and control variables. The sample consists of nonprofit hospitals during 2005-2011. The dependent variables are change in fixed assets, change in equipment spending, or change in spending on buildings, each scaled by lagged fixed assets, or change in spending on salaries scaled by lagged salaries. The top and bottom 1% of observations in the dependent variables are excluded to minimize the influence of data errors, hospital mergers and closures. The *Post-Crisis* dummy is set to one for years 2009-2011 and is set to zero for years 2005-2007 (year 2008 is excluded). Trend is the linear time trend. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Service Revenue* is revenue from medical services. *Revenue Growth* is the growth in revenues from medical services. Standard errors are clustered by hospital. T-statistics are in parentheses.

	Fixed Assets	Equipment	Buildings	Salaries	Fixed Assets	Equipment	Buildings	Salaries
Post-Crisis	-0.048***	-0.043***	-0.016*	-0.038***	-0.050***	-0.042***	-0.018**	-0.039***
	(-5.89)	(-6.10)	(-1.88)	(-14.65)	(-6.92)	(-6.99)	(-2.51)	(-16.73)
Trend	0.007***	0.009***	0.001	0.006***	0.004**	0.006***	-0.000	0.003***
	(3.26)	(4.56)	(0.63)	(7.34)	(2.56)	(4.48)	(-0.20)	(5.13)
Operating Income	0.146***	0.086***	0.077***	0.070***	0.053***	0.040***	0.027***	0.015***
	(5.50)	(4.13)	(3.38)	(7.23)	(4.92)	(4.36)	(2.88)	(4.00)
Revenue Growth	0.004	0.014	-0.036	0.114***	0.092***	0.052***	0.022	0.190***
	(0.15)	(0.62)	(-1.41)	(11.37)	(4.96)	(3.40)	(1.24)	(25.18)
Log(Service Revenue)	-0.088***	-0.052***	-0.049***	-0.073***	0.004***	-0.006***	0.004***	0.001**
	(-4.12)	(-3.29)	(-2.66)	(-8.23)	(2.92)	(-5.62)	(3.80)	(2.54)
Intercept	1.639***	0.973***	0.977***	1.376***	-0.015	0.152***	0.009	0.017*
	-0.048***	-0.043***	-0.016*	-0.038***	-0.050***	-0.042***	-0.018**	-0.039***
Hospital FE	Yes	Yes	Yes	Yes	No	No	No	No
N	15466	12942	14403	12674	15466	12942	14403	12674

Internet Appendix – Table A2, Panel B: Hospital investments around the 2008 financial crisis: SID states. The table shows OLS regressions of hospital investments and salary expenditures on the post-crisis dummy and control variables. The sample consists of nonprofit hospitals during 2005-2011. The dependent variables are change in fixed assets, change in equipment spending, or change in spending on buildings, each scaled by lagged fixed assets, or change in spending on salaries scaled by lagged salaries. The top and bottom 1% of observations in the dependent variables are excluded to minimize the influence of data errors, hospital mergers and closures. The *Post-Crisis* dummy is set to one for years 2009-2011 and is set to zero for years 2005-2007 (year 2008 is excluded). Trend is the linear time trend. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Service Revenue* is revenue from medical services. *Revenue Growth* is the growth in revenues from medical services. Standard errors are clustered by hospital. T-statistics are in parentheses.

	Fixed Assets	Equipment	Buildings	Salaries	Fixed Assets	Equipment	Buildings	Salaries
Post-Crisis	-0.055***	-0.052***	-0.007	-0.032***	-0.054***	-0.048***	-0.005	-0.033***
	(-3.37)	(-3.61)	(-0.44)	(-6.62)	(-3.73)	(-3.85)	(-0.32)	(-7.47)
Trend	0.009**	0.010***	-0.001	0.003**	0.007**	0.009***	-0.002	0.001
	(2.08)	(2.74)	(-0.27)	(2.16)	(2.10)	(3.19)	(-0.70)	(0.65)
Operating Income	0.133**	0.085*	-0.032	0.071***	0.092***	0.075***	0.032	0.033***
	(2.16)	(1.79)	(-0.67)	(4.18)	(3.47)	(3.74)	(1.41)	(4.13)
Revenue Growth	0.019	0.063	-0.002	0.113***	0.098**	0.092***	0.017	0.190***
	(0.32)	(1.34)	(-0.04)	(5.94)	(2.40)	(2.79)	(0.41)	(12.27)
Log(Service Revenue)	-0.057	-0.027	-0.017	-0.055***	0.006**	-0.003	0.005**	0.001
	(-1.39)	(-0.96)	(-0.54)	(-3.62)	(2.18)	(-1.15)	(2.23)	(1.51)
Intercept	1.108	0.517	0.408	1.085***	-0.069	0.075*	-0.006	0.027
	(1.46)	(1.03)	(0.69)	(3.86)	(-1.29)	(1.68)	(-0.13)	(1.49)
Hospital FE	Yes	No	Yes	No	Yes	No	Yes	No
N	3513	3031	3361	3318	3513	3031	3361	3318

Internet Appendix - Table A3, Panel A: Hospital investments around the 2008 financial crisis: interaction with investments income in 2008. The table shows OLS regressions of hospital investments and salary expenditures. The sample consists of nonprofit hospitals during 2005-2011. The dependent variables are change in fixed assets, change in equipment spending, or change in spending on buildings, each scaled by lagged fixed assets, or change in spending on salaries scaled by lagged salaries. The top and bottom 1% of observations in the dependent variables are excluded to minimize the influence of data errors, hospital mergers and closures. The *Post-Crisis* dummy is set to one for years 2009-2011 and is set to zero for years 2005-2007 (year 2008 is excluded). *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments (scaled by lagged net fixed assets) in 2008. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Service Revenue* is revenue from medical services. *Revenue Growth* is the growth in revenues from medical services. Standard errors are clustered by hospital. T-statistics are in parentheses.

	Fixed Assets	Equipment	Buildings	Salaries	Fixed Assets	Equipment	Buildings	Salaries
Post_Crisis*Inv_Inc08_T2	0.012	0.007	0.024**	0.003	0.012	0.003	0.018**	0.004
	(1.094)	(0.837)	(2.509)	(0.802)	(1.256)	(0.451)	(2.259)	(1.280)
Post_Crisis*Inv_Inc08_T3	0.043***	0.007	0.040***	0.004	0.046***	0.004	0.037***	0.005*
	(3.933)	(0.845)	(4.193)	(1.193)	(4.735)	(0.580)	(4.520)	(1.803)
Inv_Inc08_T2					-0.008	0.001	-0.015**	0.001
					(-1.020)	(0.199)	(-2.309)	(0.688)
Inv_Inc08_T3					-0.020***	0.007	-0.016***	-0.001
					(-2.759)	(1.348)	(-2.654)	(-0.661)
Operating Income	0.198***	0.148***	0.123***	0.078***	0.058***	0.051***	0.026*	0.012**
	(5.164)	(5.414)	(3.743)	(6.884)	(4.007)	(4.134)	(1.905)	(2.236)
Revenue Growth	-0.001	0.011	-0.073**	0.116***	0.117***	0.065***	0.022	0.199***
	(-0.019)	(0.390)	(-2.292)	(8.635)	(4.770)	(3.280)	(0.959)	(20.313)
Log(Service Revenue)	-0.103***	-0.078***	-0.051*	-0.078***	0.002	-0.006***	0.003**	0.001*
	(-3.197)	(-3.754)	(-1.930)	(-5.380)	(1.449)	(-4.172)	(1.996)	(1.915)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Hospital FE	Y	Y	Y	Y	N	N	N	N
N	9577	8264	9021	7722	9577	8264	9021	7722

Internet Appendix - Table A3, Panel B: Hospital investments around the 2008 financial crisis: interaction with investments income in 2008: SID states. The table shows OLS regressions of hospital investments and salary expenditures. The sample consists of nonprofit hospitals in the seven states for which we have SID data during 2005-2011. The dependent variables are change in fixed assets, change in equipment spending, or change in spending on buildings, each scaled by lagged fixed assets, or change in spending on salaries scaled by lagged salaries. The top and bottom 1% of observations in the dependent variables are excluded to minimize the influence of data errors, hospital mergers and closures. The *Post-Crisis* dummy is set to one for years 2009-2011 and is set to zero for years 2005-2007 (year 2008 is excluded). *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments (scaled by lagged net fixed assets) in 2008. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Service Revenue* is revenue from medical services. *Revenue Growth* is the growth in revenues from medical services. Standard errors are clustered by hospital. T-statistics are in parentheses.

	Equipment	Buildings	Fixed Assets	Salaries	Equipment	Buildings	Fixed Assets	Salaries
Post_Crisis*Inv_Inc08_T2	0.008	0.062***	0.036*	0.001	0.007	0.044***	0.029	0.002
	(0.507)	(3.557)	(1.735)	(0.184)	(0.510)	(2.850)	(1.530)	(0.336)
Post_Crisis*Inv_Inc08_T3	-0.011	0.050***	0.033	0.001	-0.011	0.041**	0.031	-0.001
	(-0.635)	(2.667)	(1.505)	(0.134)	(-0.778)	(2.416)	(1.590)	(-0.101)
Inv_Inc08_T2					-0.009	-0.035***	-0.028**	-0.002
					(-0.852)	(-2.884)	(-1.988)	(-0.499)
Inv_Inc08_T3					0.010	-0.033***	-0.036**	-0.001
					(0.876)	(-2.705)	(-2.414)	(-0.270)
Operating Income	0.139**	-0.021	0.167**	0.064***	0.097***	0.027	0.112***	0.029**
	(2.100)	(-0.368)	(2.130)	(2.771)	(3.607)	(0.943)	(3.194)	(2.519)
Revenue Growth	0.055	-0.024	0.016	0.121***	0.079*	0.021	0.105*	0.197***
	(0.924)	(-0.342)	(0.213)	(4.931)	(1.864)	(0.392)	(1.895)	(10.702)
Log(Service Revenue)	-0.037	0.019	-0.028	-0.066**	-0.005*	0.003	0.003	0.001
	(-0.897)	(0.458)	(-0.500)	(-2.305)	(-1.651)	(0.923)	(0.844)	(1.042)
Year FE	Y	Y	Y	Y	N	Y	N	Y
Hospital FE	Y	Y	Y	Y	N	N	N	N
N	8264	9021	9577	7722	1896	2087	2169	2037

Internet Appendix - Table A4: Regressions of the catheterization choice for the SID sample of heart attack patients – robustness tests. The sample includes hospital admissions for the Acute Myocardial Infarction (AMI). The table shows OLS regressions of the indicator variable for whether the patient received catheterization during his hospital stay. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007. *Trend* is the time trend. The control variables include indicators for the patient's race, sex, insurance status, and age group. Hospital fixed effects are included in the first three columns. In Panel A, hospitals are split at the median of financial leverage in 2005. Financial leveraged is defined financial debt minus cash and temporary investments scaled by the lagged fixed assets. In Panel B, large and small hospitals are split at the median of revenues in the previous year. *Lagged capital investment* in growth in fixed assets in the previous year. Standard errors are clustered by hospital. T-statistics are in parentheses.

Panel A: Catheterization regressions for high- and low-leverage hospitals

	All Hosp.	High Leverage	Low Leverage	All Hosp.	High Leverage	Low Leverage
Post_Crisis	0.005	0.006	0.004	0.006	0.005	0.006
	(1.017)	(0.955)	(0.488)	(0.958)	(0.685)	(0.684)
Trend	0.003*	0.003*	0.002	0.002	0.003	0.001
	(1.860)	(1.687)	(0.948)	(1.173)	(1.231)	(0.401)
Hospital FE	Y	Y	Y	N	N	N
Patient controls	Y	Y	Y	Y	Y	Y
N	859806	448710	411096	859806	448710	411096

Panel B: Catheterization regressions on lagged capital investments

	All Hosp.	Large	Small	All Hosp.	Large	Small
Trend	0.004***	0.001	0.017***	0.003**	0.000	0.017***
	(2.787)	(0.635)	(4.463)	(2.127)	(0.272)	(4.260)
Lagged capital investment	-0.003	0.001	-0.025	0.000	-0.016	-0.047
	(-0.354)	(0.082)	(-1.579)	(-0.007)	(-0.704)	(-1.133)
Hospital FE	Y	Y	Y	N	N	N
Patient controls	Y	Y	Y	Y	Y	Y
N	987344	803844	183500	987344	803844	183500

Internet Appendix - Table A5: Regressions of the C-section choice for the SID sample of child deliveries: Washington state excluded. The sample includes hospital admissions for the child delivery. The table shows OLS regressions of the indicator variable for whether the delivery was via a Cesarean section. Post_Crisis is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Trend* is the time trend. The control variables include indicators for birth complications, mother diagnoses, race, sex, insurance status, and age group. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp.	Large	Small	All Hosp.	Large	Small
Post_Crisis	-0.004*	-0.004	-0.003	-0.005*	-0.003	-0.008**
	(-1.657)	(-1.467)	(-0.822)	(-1.670)	(-0.820)	(-1.992)
Trend	0.002***	0.001	0.002***	0.002***	0.001	0.003***
	(2.744)	(1.615)	(2.888)	(2.629)	(1.362)	(3.064)
Hypertension	0.183***	0.179***	0.192***	0.181***	0.176***	0.192***
	(59.569)	(47.027)	(39.487)	(49.796)	(37.873)	(37.617)
Previa	0.331***	0.318***	0.360***	0.330***	0.316***	0.360***
	(48.919)	(36.448)	(43.467)	(47.191)	(35.157)	(42.441)
Early_labor	0.019***	0.024***	0.007**	0.018***	0.021***	0.010***
	(8.139)	(8.211)	(2.354)	(7.442)	(7.155)	(2.884)
Complications_Mother	0.046***	0.047***	0.045***	0.039***	0.040***	0.037***
	(28.554)	(21.542)	(19.395)	(20.220)	(15.612)	(13.005)
Multi_Kids	0.218***	0.213***	0.234***	0.219***	0.213***	0.234***
	(38.881)	(31.859)	(24.024)	(35.941)	(29.430)	(23.188)
Breech	0.587***	0.584***	0.593***	0.589***	0.586***	0.594***
	(76.541)	(56.080)	(58.713)	(72.680)	(52.965)	(56.800)
Cord_Problems	0.415***	0.417***	0.410***	0.415***	0.416***	0.415***
	(25.133)	(41.974)	(10.492)	(26.590)	(40.966)	(11.437)
Rupture	0.434***	0.469***	0.367***	0.438***	0.465***	0.383***
	(9.574)	(8.114)	(5.166)	(9.752)	(8.216)	(5.353)
White	-0.004	-0.007*	0.004	-0.008**	-0.007	-0.007
	(-1.190)	(-1.720)	(1.497)	(-2.285)	(-1.563)	(-1.522)
Black	0.021***	0.023***	0.020***	0.024***	0.026***	0.022***
	(6.064)	(4.963)	(4.440)	(4.346)	(3.604)	(3.501)
Hispanic	-0.009***	-0.006*	-0.011***	0.006	0.014*	-0.003
	(-3.579)	(-1.901)	(-3.540)	(1.183)	(1.664)	(-0.496)
Medicaid	-0.033***	-0.036***	-0.027***	-0.044***	-0.051***	-0.030***
	(-18.302)	(-14.368)	(-13.283)	(-13.302)	(-10.974)	(-8.328)
Medicare	0.022***	0.024***	0.020***	0.009	0.010	0.013
	(3.834)	(2.754)	(2.983)	(1.262)	(0.884)	(1.615)
Self_Pay	-0.056***	-0.059***	-0.050***	-0.054***	-0.055***	-0.046***
	(-19.360)	(-16.705)	(-10.660)	(-13.267)	(-9.539)	(-8.592)
No_Charge	-0.042***	-0.054***	-0.003	-0.068***	-0.089***	-0.005
	(-4.816)	(-6.219)	(-0.173)	(-4.373)	(-5.027)	(-0.238)
Other_Pay	-0.011***	-0.012***	-0.009***	-0.028***	-0.036***	-0.014**
	(-4.337)	(-3.426)	(-2.634)	(-5.442)	(-4.925)	(-2.121)
Hospital FE	Y	Y	Y	N	N	N
Patient Age FE	Y	Y	Y	Y	Y	Y
N	3221343	2061760	1159583	3221343	2061760	1159583

Internet Appendix - Table A6: Regressions of the C-section choice for the SID sample of child deliveries: Washington state excluded. The sample includes hospital admissions for child delivery. The table shows OLS regressions of the indicator variable for whether the delivery was via a Cesarean section. *Post_Crisis* is a dummy variable equal one for the years 2009-2011 and equal zero for the years 2005-2007 (year 2008 is excluded). *Inv_Inc08_T2* and *Inv_Inc08_T3* are dummy variables for the second and the third tercile of the hospital's return on financial investments in 2008. *Trend* is the time trend. The control variables include indicators for birth complications, mother's diagnoses, race, sex, insurance status, and age group, the time-varying hospital variables included in Table A2 (operating cash flow, log(service revenue), and growth in service revenue in the prior year). Year fixed effects are included in all regressions. Hospital fixed effects are included in the first three columns. Standard errors are clustered by hospital. T-statistics are in parentheses.

	All Hosp.	Large	Small	All Hosp.	Large	Small
Post_Crisis*Inv_Inc08_T2	0.001	0.004	-0.006	-0.000	0.007	-0.005
	(0.161)	(0.799)	(-0.960)	(-0.058)	(1.190)	(-0.579)
Post_Crisis*Inv_Inc08_T3	-0.001	-0.003	0.002	-0.003	-0.002	-0.001
	(-0.325)	(-0.573)	(0.322)	(-0.705)	(-0.337)	(-0.121)
Inv_Inc08_T2				-0.001	-0.023	0.017
				(-0.053)	(-1.487)	(1.340)
Inv_Inc08_T3				-0.003	0.001	-0.008
				(-0.356)	(0.092)	(-0.688)
Hypertension	0.181***	0.177***	0.189***	0.178***	0.172***	0.189***
	(43.797)	(32.968)	(31.463)	(36.242)	(26.897)	(30.203)
Previa	0.333***	0.320***	0.360***	0.331***	0.317***	0.360***
	(36.306)	(26.041)	(37.829)	(35.676)	(25.640)	(36.714)
Early_labor	0.020***	0.025***	0.009**	0.019***	0.023***	0.010**
	(6.540)	(6.458)	(2.150)	(5.967)	(5.688)	(2.443)
Complications_Mother	0.046***	0.047***	0.043***	0.038***	0.040***	0.036***
	(21.084)	(15.543)	(15.065)	(14.359)	(11.128)	(10.851)
Multi_Kids	0.218***	0.213***	0.229***	0.219***	0.214***	0.230***
	(30.321)	(24.976)	(17.877)	(28.335)	(22.936)	(17.346)
Breech	0.585***	0.582***	0.591***	0.584***	0.581***	0.590***
	(50.291)	(35.395)	(41.844)	(46.943)	(32.816)	(40.224)
Cord_Problems	0.407***	0.419***	0.390***	0.408***	0.416***	0.396***
	(15.988)	(28.063)	(7.018)	(16.882)	(28.733)	(7.302)
Rupture	0.426***	0.458***	0.376***	0.437***	0.463***	0.393***
	(6.815)	(5.366)	(4.216)	(7.151)	(5.651)	(4.320)
White	-0.005	-0.009	0.006	-0.009*	-0.007	-0.007
	(-1.166)	(-1.619)	(1.433)	(-1.820)	(-1.183)	(-1.465)
Black	0.024***	0.024***	0.026***	0.019**	0.022**	0.015**
	(5.791)	(4.712)	(4.435)	(2.415)	(2.192)	(2.146)
Hispanic	-0.009***	-0.007**	-0.009**	-0.000	0.000	-0.002
	(-3.120)	(-2.089)	(-2.040)	(-0.103)	(0.099)	(-0.294)
Medicaid	-0.034***	-0.039***	-0.026***	-0.042***	-0.049***	-0.031***
	(-13.643)	(-10.925)	(-9.479)	(-9.791)	(-8.717)	(-6.571)
Medicare	0.028***	0.032***	0.023***	0.020**	0.023**	0.013
	(4.587)	(3.938)	(2.801)	(2.578)	(2.296)	(1.130)
Self_Pay	-0.057***	-0.060***	-0.053***	-0.057***	-0.059***	-0.054***

	(-15.833)	(-13.474)	(-8.718)	(-12.963)	(-9.858)	(-11.073)
No_Charge	-0.048***	-0.059***	-0.013	-0.077***	-0.093***	-0.015
	(-5.050)	(-5.804)	(-0.885)	(-5.566)	(-6.209)	(-0.650)
Other_Pay	-0.011***	-0.012***	-0.009*	-0.030***	-0.038***	-0.015**
	(-3.410)	(-2.929)	(-1.861)	(-4.864)	(-4.396)	(-1.989)
Hospital FE	Y	Y	Y	N	N	N
Patient age FE	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y
Time-varying hosp. vars.	Y	Y	Y	Y	Y	Y
N	1953024	1233539	719485	1953024	1233539	719485

Internet Appendix – Table A7: Descriptive statistics for the for-profit hospitals, HCRIS sample. The sample includes 1,895 for-profit hospitals from 2005 through 2011. The financial data come from HCRIS, Schedule G. *Fixed Assets* is gross land, buildings, and equipment minus accumulated depreciation. *Service Revenue* is revenue from medical services. *Net Debt* is total financial debt (bonds and bank loans) minus cash and temporary securities scaled by net fixed assets. *Financial Investments* is the dollar amount of financial investments scaled by net fixed assets. *Operating Income* is the difference between service revenue and service expenses scaled by lagged net fixed assets. *Investments Income* is income from financial investments from statement of revenues in Schedule G scaled by lagged net fixed assets. *Equipment* includes cars and trucks, major movable equipment, minor equipment, and minor nondepreciable equipment. Panel B shows OLS regressions of for-profit hospital investments and salary expenditures on the post-crisis dummy and control variables. The dependent variables are change in fixed assets, change in equipment spending, or change in spending on buildings, each scaled by lagged fixed assets, or change in spending on salaries scaled by lagged salaries. The *Post-Crisis* dummy is set to one for years 2009-2011 and is set to zero for years 2005-2007. Trend is the linear time trend. The time-varying controls are defined in Table A2.

Panel A: Descriptive statistics: for-profit hospitals

	Mean	Median	Std	P5	P95	N
Fixed Assets (in millions)	24.4	8.3	41.3	0.3	98.2	9,947
Service Revenue (in millions)	62.7	28.9	86.4	6.2	232	9,998
Net Debt	0.36	0.03	1.74	-2.82	3.81	8,002
Financial Investments	0.28	0.03	0.56	0.00	1.65	1,306
Investments Income	0.01	0.00	0.02	0.00	0.07	3,766
Operating Income	0.14	0.09	0.37	-0.40	0.85	9,293
Growth in Fixed Assets	0.05	-0.03	0.33	-0.26	0.66	9,024
Growth in Equipment	0.08	0.04	0.20	-0.19	0.48	7,609
Growth in Buildings	0.03	0.00	0.15	-0.11	0.33	6,642
Growth in Salaries	0.05	0.04	0.08	-0.08	0.21	7,881
Growth in Sales	0.06	0.05	0.13	-0.15	0.33	9,265

Panel B: Investment regressions: for-profit hospitals

	Fixed Assets	Equipment	Buildings	Salaries
Post-Crisis	-0.049**	-0.046***	-0.010	-0.029***
	(-2.023)	(-3.046)	(-0.721)	(-5.310)
Trend	0.013**	0.007*	0.006*	0.007***
	(2.139)	(1.646)	(1.675)	(5.056)
Hospital FE	Y	Y	Y	Y
Time-varying controls	Y	Y	Y	Y
N	7,114	5,993	5,306	6,275