The Effects of For-Profit Hospitals on the Quantity and Quality of Care Provided

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1 Introduction and Background

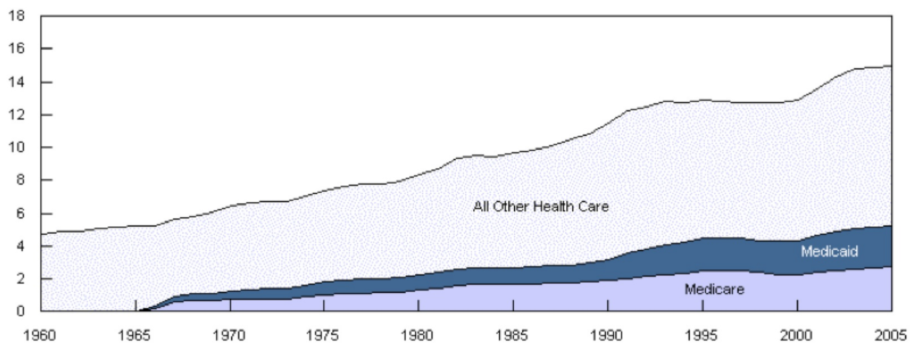
1.1 The Intersection of Medicare and For-Profit Hospitals

Since its inception in 1965, the United States Medicare program has seen its costs rise steadily every year (Figure 1). It is the nation's largest health insurance program, responsible for covering over 44 million citizens whose ranks will grow substantially as the baby-boomers begin turning 65 this year. While in its early years the program represented just 4% of the Federal budget, 40 years later Medicare now consumes over 15% of the budget, over $500 billion annually (Potetz 2008 & CMS). Without any reform, these costs are projected to rise dramatically in the coming decades.

Importantly, however, these past and projected cost increases are not due to the effects of an increased subscriber pool alone. Instead, as Figure 2 shows, the majority of the future cost increases are due to excess cost growth independent of the effects of an aging population. While some cost increases are to be expected as incomes rise and technology improves, the annual national growth rate of Medicare expenditures between 1995 and 2004 was 6.0%, substantially above the average United States GDP growth rate of 3.25% for the same period (World Bank 2009 and State Health Facts). These numbers imply that Medicare will consume an increasing fraction of the country's resources and that this growth rate will be unsustainable in the future.

There are a number of factors that drive Medicare expenses and that, more specifically, will contribute to the "excess cost growth" in Figure 2 . Chief among them are hospital-based health care expenditures. 2009 Medicare expenditure

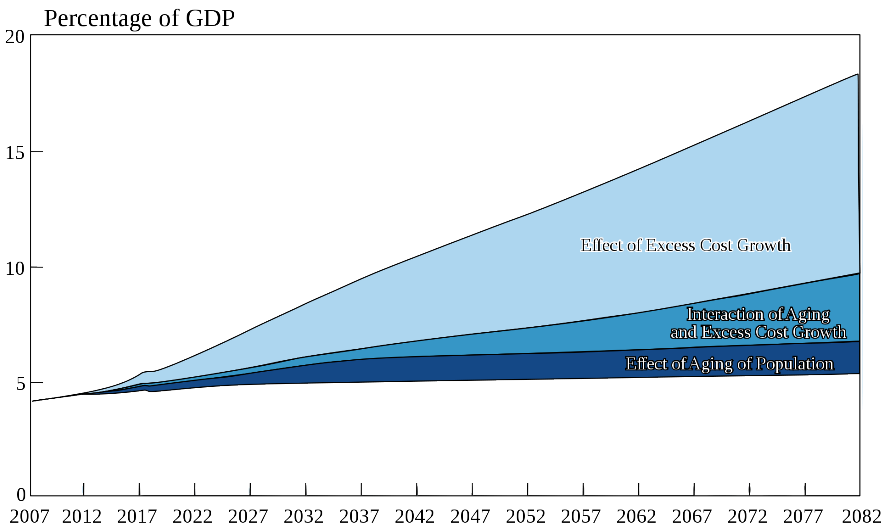
Figure 1: Healthcare Expenditures as a Percentage of United States GDP (CBO)



data from the Centers for Medicare & Medicaid Services (CMS) show that, of the \$502bn spent on Medicare, \$220bn of this cost was generated as a result of hospital care. At approximately 44% of the total cost of Medicare, hospital care is the single largest contributor to the program's cost, with physician and clinical services taking second at approximately 27% (\$109bn) of Medicare expenditures. Therefore, understanding what drives hospital expenditures is an important first step in tackling the ballooning program costs.

While national Medicare expenditures are growing at an alarming rate, certain regional healthcare markets are evidently better able to control these rising costs than others. As shown in Figure 3, there is substantial variation in average total per enrollee Medicare reimbursements across the 306 Hospital Referral Regions (HRRs) of the United States. These HRRs are local hospital markets defined as collections of Hospital Service Areas (HSAs)—groups of zip codes in which residents receive a majority of their hospitalizations from hospitals contained in those zip codes—where at least one hospital regularly performs major cardiovas-

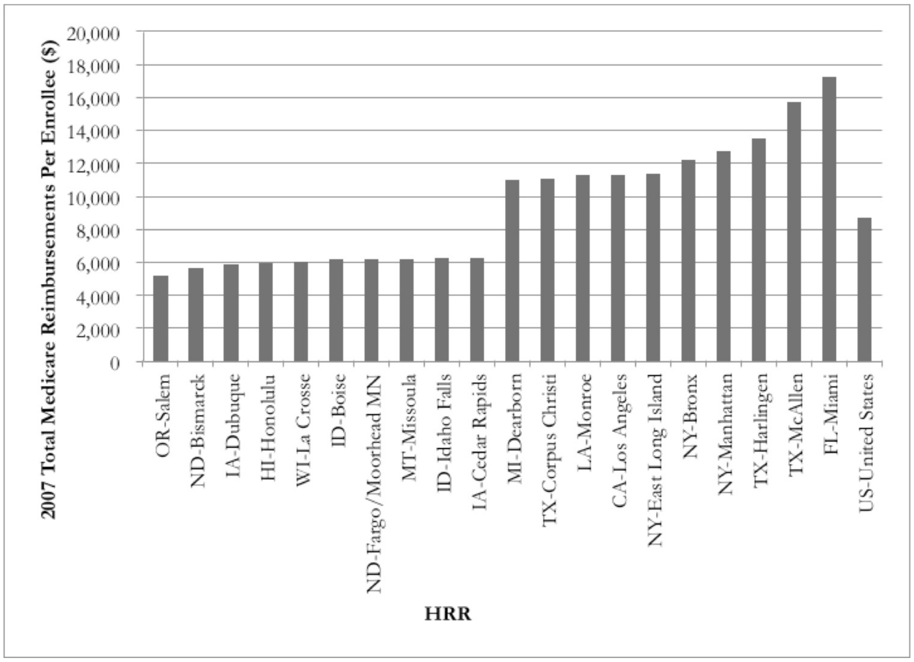
Figure 2: Projected Growth in Medicare Expenditures as a Percentage of United States GDP (CBO)



cular procedures and neurosurgery (Dartmouth Atlas of Healthcare). Figure 3 shows the 10 HRRs with the lowest average per enrollee reimbursements and the 10 HRRs with the highest reimbursements, as well as the national average.

One potential cause for the variation in Medicare costs across HRRs, which also links said variation to the excess cost growth pictured in Figure 2, is hospital ownership and the resultant differences in product mix. Medicare reimbursements vary only slightly for a given service, so the variation across HRRs seen in Figure 3 must be caused by differences in the types and quantities of services being provided. These differences in product mix are observed across the three main hospital ownership styles in the United States—for-profit ownership, not-for-profit ownership, and government ownership—which, in turn, are further subdivided into the more detailed categories utilized by the American Hospital Association. Not-

Figure 3: Largest and Smallest Total Medicare Reimbursements Per Enrollee in 2007



for-profit hospitals historically and currently dominate the sector. Between 1992 and 2007, for example, not-for-profit hospitals controlled, on average, 59.26% of all hospital beds in the country. However, ownership of hospital beds in the United States has been trending away from not-for-profit or government ownership and towards increased for-profit ownership over the last fifty years. Between 1970 and 2005 approximately 7% of the roughly 5,000 not-for-profit hospitals in the United States converted to for-profit ownership (Cutler & Horwitz, 1998). Not only are hospitals changing ownership status, for-profit hospitals are growing in size relative to not-for-profits. Whereas the average not-for-profit hospital used to operate three times as many beds as the average for-profit hospital, as of 2000 this gap has decreased to the extent that this same comparison shows not-for-profits operating only 32% more beds than their for-profit competitors (David, 2003).

Indeed, the data for this paper from the American Hospital Association show that, between 1992 and 2007, the number of government-owned and not-for-profit hospitals has fallen while the number of for-profit hospitals has been steadily rising. A transition matrix is shown below in Table 1. The data in the table show that, between 1992 and 2007, there was a net increase in for-profit hospitals—reflecting hospitals that either transitioned to this style of ownership or opened as new hospitals—of 282. This net increase represents more than a 20% rise in this style of ownership when compared to 1992 levels. Over the same period, 448 government-owned hospitals and 246 not-for-profit hospitals either closed or changed ownership. Ignoring hospitals that either opened or closed, and focusing only on ownership *transitions* between 1992 and 2007, 621 existing hospitals changed their ownership style to become for-profit hospitals over this time period while only 478 hospitals transitioned away from for-profit ownership—a net transition towards for-profit ownership of 143 hospitals. Compared to the net transition to not-for-profit ownership of just 47 hospitals and the 190 hospitals that transitioned *away* from government ownership, it is clear that the vast majority of hospital ownership transitions created for-profit institutions (AHA).

The substantial change in the ownership structure of hospitals, together with rising Medicare reimbursements and the significance of hospital-based costs, draw attention to the importance of investigating the potential negative effects of profit-maximizing firms in the healthcare market. With the aid of panel data regression analysis, I seek to answer the following question: do HRRs with higher proportions of for-profit hospitals have significantly higher average per enrollee

Table 1: Hospital Ownership Transition Matrix

		1992			
		Not Open in 1992	Not-For-Profit	For-Profit	Government-Owned
	Not Open in 2007	N/A	751	623	392
2007	Not-For-Profit	458	2295	340	424
	For-Profit	762	446	501	175
	Government-Owned	134	271	138	1350

Medicare reimbursements? I will also investigate whether any increased expenditures result in better health as measured by a decreased HRR mortality rate. Beyond helping to address the issue of whether or not increased expenditures generates a meaningful change in this very important metric, a significantly decreased mortality rate may also help explain why for-profit hospitals are gaining market share. As costs associated with the Medicare program continue to rise, it becomes increasingly important to evaluate which factors are causing the increases and whether or not these drivers are associated with any meaningful benefits. Those factors which do not successfully generate value for the program may ultimately come under fire as the government works to close the Federal deficit.

1.2 A Theory of Hospital Behavior

Before examining the potential effects of ownership structure on Medicare expenditures, it is important to characterize the behavior of hospitals and the fundamental differences between each style of ownership. Chang & Jacobson (2010) propose that all hospitals maximize the following objective function:

$$V = R + f(P, q, \theta, u) \tag{1}$$

where R is a given hospitals net revenue, P are non-distortionary perquisites, q is the quantity of healthcare provided, θ is "anything that increases the cost of production, such as non-contractable quality" or distortionary perquisites, and u is the level of free care that the hospital provides. This function is maximized subject to the break-even constraint:

$$\pi(q, \theta) - R - P - u - F \geq 0 \tag{2}$$

$$\pi(q, \theta) = pq - C(q, \theta) = \int_0^q p - (c(x) + \theta)dx \tag{3}$$

where F is any fixed cost shock, p is price, and "c are continuous functions which are weakly increasing and weakly convex in their arguments." While all hospitals maximize V subject to these constraints, for-profit, not-for-profit, and government-owned hospitals choose different values of q, P, θ, and u. All hospitals must at least break even.

The exact choices of each type of hospital depend largely on the behavior model used to describe that ownership style. As expected, for-profit hospitals simply profit-maximize. However, the behavior of not-for-profit hospitals is not so well defined. Chang & Jacobson put forth four existing theories of this behavior—that not-for profit hospitals are "for-profits in disguise," are prestige maximizers, are "perquisite" maximizers, or are social welfare maximizers—and then empirically test the set of hypotheses.

The "for-profits in disguise" hypothesis was first put forth by Weisbrod (1988) and it describes how not-for-profit hospitals may, in fact, simply operate as traditional profit-maximizing institutions despite their outward appearance as the charitable organization implied by their ownership status. The exact reasoning for this is unclear. One potential reason is the increasing ambiguity surrounding the CBO's requirements for not-for-profit hospital status (CBO 2006). Chang & Jacobson explain that the formal requirements for not-for-profit status have become less well-defined over time; thus it is easier for these hospitals to behave like for-profit institutions while maintaining their original, protective, not-for-profit status. They could also act as "for-profits in disguise" simply because of inadequate monitoring and enforcement of the CBO's regulations. Regardless, as Chang & Jacobson highlight, the literature that seeks to quantify this potential behavioral difference is mixed. The implications of the "for-profits in disguise" hypothesis suggest that not-for-profit hospitals might act as traditional profit-maximizers such that, in response to a fixed cost shock, they would not change their behavior. However, while there is evidence, discussed in more detail below, that not-for-profit hospitals do in fact begin to behave like their for-profit competitors under certain conditions, Chang & Jacobson conclude it is not plausible that not-for-profit hospitals profit-maximize in the same way as traditional for-profit hospitals.

A second model, described by Newhouse (1970), hypothesizes that not-for-profit hospitals in fact maximize some weighted average of healthcare quality and quantity, defined as "prestige," such that they must at least break even. If hospitals maximize prestige, they would balance any changes in the quantity of care provided with a proportional change in its quality, or in the quantity of altruistic care they provide. They do this with the intent of generating a maximal amount of prestige given a set of resources. A hospital that behaved in this manner would not simply profit-maximize, nor would it maximize purely altruistically, instead the hospital would maximize some combination of the two. Horwitz & Nichols (2009), whose findings and implications are discussed in greater detail below, find evidence that not-for-profit hospitals may in fact output maximize in this manner. In fact, this decision to provide higher quality care at the expense of quantity, in order to maximize prestige, may be a key factor in the decision to take on not-for-profit status, as suggested by both Newhouse (1970) and Lakdawalla & Philipson (1998).

Similarly, not-for-profit hospitals may choose to maximize perquisites, which appear as θ and P in Equations 1, 2, and 3. The important distinction between these two types of perquisites is that θ represents perquisites which affect production costs while P represents those perquisites which are non-distortionary. For instance, a perquisite which increases the cost of production would be lavishly decorated patient rooms since, all else held constant, a hospital with functional but more basic rooms could provide the same care. Nice offices for doctors, however, should not directly impact the hospital's cost of production per unit of q; perquisites such as this are non-distortionary. Hospitals which perquisite maximize are less concerned with the precise quantity of care they provide and instead maximize their income given a predetermined level of distortionary perquisites. More generally, this theory, like prestige maximization, describes not-for-profit hospital behavior as being somewhere in the middle of the spectrum between pure profit maximization and pure altruism.

Finally, it is possible that not-for-profit hospitals simply maximize altruistic behavior—the quantity of uncompensated care they provide, u. Given that like-mindedly altruistic managers and employees have been shown to self-select into not-for-profit institutions (Besley & Ghatak 2005), certain hospitals may exist to provide a maximal amount of charity care. At least when compared to for-profit hospitals, not-for-profit hospitals have been empirically shown to provide relatively more charity care (Horwitz 2005 and Frank & Salkever 1991). However government-owned hospitals provide the most charity care of the three ownership styles.

Chang & Jacobson go on to empirically test these hypotheses by utilizing the fixed cost shock generated as a result of California's Seismic Retrofit Mandate. They demonstrate that, as expected, for-profit hospitals do not alter their behavior following a fixed cost shock. Not-for-profit hospitals, however, respond by increasing the relative share of more profitable services, such as neonatal intensive care days, obstetrics discharges, and MRI minutes. Of the four theories described above, Chang & Jacobson's results provide empirical evidence that not-for-profit hospitals are not for-profits in disguise, nor are they purely altruistic. Instead, not-for-profit hospitals seem to maximize their own balance of quality and quantity. While they *do* change their behavior in response to the fixed cost shock, they respond differently than their for-profit and government-owned competitors; it is the fact that such a change in behavior exists which distinguishes not-for-profit from for-profit hospitals. Chang & Jacobson find that not-for-profit hospital behavior is best modeled by either Newhouse's (1970) prestige maximization theory or their modification of that theory, perquisite maximization. They empirically demonstrate that not-for-profit hospitals provide a unique combination of quantity and quality of healthcare.

As a matter of application to this paper, I expect that the model of hospital behavior put forth by Chang & Jacobson will result in different types and quantities of care being provided by for-profit and not-for-profit hospitals. Because for-profit hospitals consistently profit-maximize while not-for-profit hospitals are more concerned with the quality of the care they provide, in addition to the quantity, I expect that Medicare reimbursement levels will vary accordingly. I will use the variation in these reimbursements caused by each type of hospital's choice of product mix to measure the effect of increased for-profit hospital ownership on average per enrollee Medicare expenditures.

1.3 Distortionary Behaviors of For-Profit Hospitals

Given that for-profit hospitals maximize Equation 1 differently than not-for-profit hospitals, the impacts of these decisions on hospital behavior are significant. The profit-maximizing behavior of for-profit hospitals, which shifts incentives such that they focus on profit above all else, can be harmful to patients and is a plausible contributor to the variation in Medicare reimbursements seen in Figure 3. Picone, Chou, & Sloan (2002) find that hospitals, upon conversion to for-profit ownership, increase prices to boost profits while also increasing mortality rates—however, due to the nature of the healthcare industry, both of these changes are hard for patients to monitor.

One contributor to these price increases is upcoding. Carter, Newhouse, &

Relles (1990) find that hospitals have a strong incentive to report diagnoses in ways that result in maximal payment from insurers or Medicare/Medicaid. For-profit hospitals are especially susceptible to this incentive, the ultimate result of which is increased Medicare reimbursements. Silverman & Skinner (2004) find that between 1989 and 1996 for-profit hospitals exhibited a 23 percentage point increase in "the percentage of admissions for respiratory disease coded with the most expensive [diagnostic related group] DRG" while not-for-profit hospitals increased this behavior by only 10 percentage points. DRGs control the amount of money a hospital is reimbursed for a given procedure and it is to the hospitals advantage to place patients in the most lucrative DRG as is possible. The 13 percentage point difference in upcoding observed between ownership styles likely arises as a result of for-profit hospitals' ultimate goal of bottom line profit maximization. Because not-for-profits are less concerned with overall profit, as shown by Chang & Jacobson, the incentive to upcode is not as great, though not completely removed.

Additionally, for-profit hospitals may cream skim more frequently than do not-for-profit hospitals. Cream skimming, specifically "horizontal" cream skimming, as defined by Levaggi & Montefiori (2003), is the practice by which hospitals choose to provide treatment only for those ailments that are less severe and simultaneously more lucrative. In addition to "horizontal" cream skimming, there exists "vertical" cream skimming by which hospitals carefully choose patients within a single treatment group. These two sub-types are combined to give what Levaggi & Montefiori define as "market cream skimming"—a more complete definition that is most commonly used by other authors. Indeed, Berta et al. (2010) find evidence that for-profit hospitals cream skim substantially more than do not-for-profit hospitals. The finding that not-for-profit hospitals cream skim less often is not surprising given that they perform more charity care; if their aim is not to purely profit-maximize, they need not worry about selecting only the most lucrative patients or treatment groups.

However, when grouped with upcoding and the methods of quantity selection discussed by Chang & Jacobson, these side effects of for-profit hospital ownership provide additional context which I can use in my analysis of their impact of mortality rates. Specifically, I would expect each of these characteristics of for-profit hospitals to have different impacts on mortality rates. Upcoding, for example, should not have any direct impact on mortality; the patient is presumably receiving the same care regardless of the hospital's ability to charge Medicare a higher fee for the same service. Cream skimming, however, may actually impact mortality rates in a beneficial manner. By carefully selecting their patients, hospitals should be better able to generate the desired outcomes. So, despite the fact that cream skimming may reduce social welfare because some patients are neglected, those patients which are actually treated may experience lower mortality rates. Finally, if hospitals set the overall quantity of care they provide, they will, by extension, also choose their level of quality. As such, it is unclear whether a change in quantity will have a beneficial or detrimental impact on mortality rates. There is, however, a growing literature (Woolhandler & Himmelstein 2004, Gawande 2009, and Teno 2010, etc.) that suggests for-profit hospitals are choosing to provide additional quantities of care. The authors listed above found that, often, this additional care is unnecessary care and, furthermore, has no clear beneficial impact on mortality rates. They provide evidence that for-profit hospitals use this care solely as a means by which they can increase reimbursements, and as theory suggests, maximize profits.

1.3.1 The Spillover Effects of For-Profit Hospitals

Additionally, there is empirical evidence that the presence of for-profit hospitals in the healthcare market alters the behavior of not-for-profit hospitals. Duggan (2002) shows that when not-for-profit hospitals must compete with for-profit providers they begin to mimic the behavior of the profit-maximizers. Due to their ownership style, for-profit hospitals respond very aggressively to changes in incentives such as California's Disproportionate Share (DSH) program whose implementation suddenly incentivized the treatment of additional Medicaid patients. However, not-for-profit hospitals must also respond aggressively so as not to lose a large share of their patients; not-for-profit hospitals may not be seeking to make the same level of profits as private hospitals but they are still subject to the same break-even constraint. In order to demonstrate this theoretical effect of an incentive shift within the market, Duggan compares Los Angeles and San Francisco. Los Angeles not-for-profit hospitals face heavy competition from for-profit providers, while San Francisco not-for-profits do not. As the theory predicted, the Los Angeles not-for-profit hospitals had to respond more dramatically to DSH than did those in San Francisco in order to prevent the loss of patients.

Horwitz & Nichols (2009) also observe this spillover effect. They too find that, in response to high concentrations of for-profit hospitals in a given area, not-for-profits begin to behave more like their competitors; not-for-profit hospitals in areas of higher for-profit market penetration offer relatively more profitable care and less unprofitable care. Separately, Alexander & Lee (2006) suggest that another means by which not-for-profit hospitals begin to mimic for-profit hospitals is through a change in the mode of governance. They find that not-for-profit hospitals run using a corporate governance model, similar to that of a for-profit corporate institution, are able to achieve better operational efficiency (the ratio of total expenses to statistical beds), a higher volume of admissions, and market share. Indeed, as not-for-profit hospitals begin to adopt more of the characteristics of their for-profit competitors they seem to also gain some of their efficiencies. Cutler & Horwitz (1998) show that one of the main reasons hospitals convert from not-for-profit to for-profit ownership is the anticipation of this increased operational efficiency,[1] in addition to the expectation of increased future profits.

Additionally, Frank et al. (2000) show that as hospital ownership trends began shifting towards increased for-profit ownership, not-for-profit hospitals were forced to implement revenue growth programs outside of their traditional missions. While these hospitals used to exist almost exclusively on tax exemptions, government subsidies, and private contributions, they are increasingly being forced to add profit-making subsidiaries such as satellite clinics, urgent care centers, and industrial medicine centers to boost their bottom lines. This is due, in part, to a decrease in philanthropy which has forced not-for-profit hospitals to diversify their revenue generation strategies (Sloan et al. 1990).[2] Notably, however, these new facilities and medical offerings, which venture outside of the historic core services

[1] Cutler & Horwitz (1998) explain that this increased efficiency could be the result of a number of factors including: a greater ease of entry and exit into the market, superior management talent, or greater access to efficiency-producing accounting and data management software.

[2] This decrease in philanthropy may in fact be one of the reasons for which not-for-hospitals convert to for-profit ownership, as suggested by Sloan et al. (1990).

of not-for-profit hospitals, potentially compromise their mission of offering affordable care to the medically needy. Given these results, it seems for-profit hospitals may have both a direct impact on costs, but also a secondary impact through their effects on not-for-profit hospitals.

One other documented effect of not-for-profit hospitals' decision to behave more like their for-profit counterparts is an increase in prices. Keeler et al. (1999) find that prices increase due to competition, even in non-profit hospitals, and even in areas with relatively less competition. This is at odds with traditional supply and demand models but Rivers & Bae (1999) also find that greater levels of competition do in fact raise prices. Indeed, Deneffe & Masson (2002) actually find that not-for-profit hospitals exhibit profit-maximizing behavior. It is not to the same extent as for-profit hospitals and it is not the only behavior they maximize, but it is still significant in that it shows not-for-profits behave more like for-profit hospitals than may have initially been expected.

Aside from ownership there are other potential explanations for the variation in the reimbursement rates seen in Figure 3. Given that Medicare reimbursement rates differ only slightly, depending on the Geographic Adjustment Factor (Centers for Medicaid and Medicare Services 2010), differences in per enrollee reimbursements must stem from differences in the quantity and composition of services provided. As discussed above, one such cause of this could be hospital ownership, others could include the underlying health of the population or the demand for care. These variables are hard to quantify but I will attempt to control for them in order to best isolate the effect of ownership on the quantity of care provided.

In addition to the supply and demand for care, a variety of cost-cutting measures—such as salaried doctors, accountable care organizations, and efficiency improving technology—can also help account for this variation in that they shift incentives away from additional health care for the sake of additional health care and instead emphasize the provision of appropriate treatment while minimizing costs. When doctors are paid using a fee-for-service system, they are rewarded for providing additional and perhaps unnecessary care. In addition to providing evidence of this phenomenon, Glied & Zivin (1999) explain how alternative methods of payment such as capitation—whereby a provider is paid a fixed fee for each patient that joins their service—which places the full cost of the patients' care on the provider, incentivize cost-reducing measures such as additional preventative care. Moving away from fee-for-service and towards capitation pay or salaried doctors, in tandem with increased doctor accountability, could help reduce the incentive to order additional procedures strictly to increase the patient's bill. To a certain degree separate from hospital ownership, mechanisms such as these provide alternative means by which Medicare expenditures may be controlled.

1.4 A Brief Review of Existing Literature

The relationship between for-profit hospital ownership and Medicare expenditures has been examined previously. There are papers (Woolhandler 1997 and Chan 1997) that have argued a positive correlation between for-profit status and higher overall costs but there are also those that argue the opposite: that for-profit hospitals are more efficient (Manning 1997). However, of these three papers, only Chan uses regression analysis to draw conclusions. Both Woolhandler and Manning rely on observations and analysis of summary statistics to reach their findings. While Chan uses a similar model to the one used here, a regression-based model that does include fixed effects, his paper (like Woolhandler (1997) and Manning (1997)) is over a decade old. The large shifts in hospital ownership observed in the past twenty years are not fully accounted for in these papers. The current paper, which includes recent data and a high proportion of for-profit hospitals, updates Chan's analysis and adds an examination of mortality.

In an analysis similar to the one presented below, Silverman et al. (1999) use data from 1989, 1992, and 1995 to empirically examine the relationship between hospital ownership and the average annual per-enrollee Medicare reimbursement in hospital service areas (HSAs)—which are aggregated to form the HRRs used in my analysis. One distinction between the Silverman et al. paper and this paper is the way in which the regional hospital ownership is defined. While Silverman et al. chooses to allow only three distinct possibilities, 100% for-profit, 100% non-profit, or mixed, a combination of the two, in my paper I look at proportions of ownership that are unconstrained. Their paper does find significant results; they find that those areas controlled by for-profit hospitals are likely to have somewhere between 9.5% and 14% higher costs than regions controlled by non-profit providers (Silverman et al. 1999). However, by looking at the proportion of ownership in each region and regressing that on Medicare reimbursements, I am able to estimate the effect of a higher proportion of for-profit ownership on regional Medicare payments while also controlling for HRR fixed effects.

In addition to measuring the relationship between ownership status and quantity of care provided, this paper seeks to determine whether or not for-profit hospitals generate better health outcomes. It has been established that more spending does not necessarily lead to improved patient health (Fisher et al. 2003). In fact, Fisher et al. (2003) show that many high-expenditure regions within the United States actually have worse outcomes than similar regions with lower Medicare expenditures. It is likely that we have reached the "flat of the curve" where each additional dollar of healthcare spending generates only a marginal increase in health outcomes. Because more spending does not ensure better outcomes, it is important to establish what factors or incentives are driving this increase in care provision if. As mentioned above, there is a growing literature (Woolhandler & Himmelstein 2004, Gawande 2009, and Teno 2010, etc.) which demonstrates that for-profit hospitals are providing more (unnecessary) care, are billing Medicare more to do so, and are not generating demonstrable improvements in outcomes; if this is indeed the case, they can be considered inferior to their not-for-profit competitors.[3]

As discussed above, there are discrepancies in the findings of the few papers that have examined the relationship between hospital ownership and Medicare expenditures. There is also no consensus regarding the effect of ownership on the quality of care provided. However, the evidence suggests that for-profit hospitals almost certainly do not provide significantly better care, measured by short-term mortality, than not-for-profit hospitals. Of the 31 studies Eggleston et al. (2006) examine using meta-regressions, only one paper (Mukamel et al. 2001) finds that for-profit hospitals have lower rates of adverse events with an effect size that is

[3]Given previous literature, I expect that some of the disparity between for-profit and not-for-profit Medicare reimbursements is likely the result of upcoding; however, I presume that the majority is caused by variance in the quantity of care provided. Unfortunately, I have no means by which to separate upcoding from an increase in quantity of care provision.

significantly different from zero. Milcent (2005) also finds a four-point reduction in mortality rates at fee-for-service for-profit hospitals when compared to hospitals not operating under this reimbursement plan. However, her analysis is based on the French hospital system, which operates differently than our system in the United States. Other papers (Sloan et al. 1999 and Taylor et al. 1999) find that for-profit hospitals have lower rates of adverse events but these rates are not significantly different from zero and their papers do not examine the relationship as explicitly as this paper does.

On the other hand, the majority of papers that examine the relationship between for-profit status and health outcomes find that for-profit hospitals generate outcomes that are no better, or are even worse, than not-for-profit hospitals. Shen (2002) finds that for-profit and government-owned hospitals have a 3-4% higher rate of adverse outcomes than their not-for-profit counterparts, but her analysis is limited by her inability to include all US hospitals and her use of data from 1985 through 1994. Similarly, Lien, Chou, & Liu (2008) find that patients who are admitted to for-profit hospitals in Taiwan experience higher 1- or 12-month mortality rates than those who are treated at not-for-profit institutions.

In the paper I consider a foundation for my own analysis, Sloan et al. (2001) used Medicare claims data for patients who visited non-government owned hospitals between 1982 and 1995 to estimate the impact of hospital ownership on mortality. While they found slight increases in Medicare expenditures for patients who visited for-profit hospitals, the variation was not very large. Interestingly, they found no differences in outcomes based on the type of hospital that patients visited;

The paper's use of instrumental variables[4] to control for hospital preference makes a for compelling argument, but it does not adequately control for the fact that certain types of Medicare patients—for example richer, younger, better insured, or healthier patients—may prefer for-profit hospitals. I avoid this issue by examining the relationship at the HRR level instead of the patient or hospital level. Here too I am able to use my more recent data, capturing the rise of for-profit hospitals, as an important distinction.

My use of HRR level data also helps address a patient selection issue highlighted in Lien, Chou & Liu (2008): "...due to the complexity of the U.S. health care market, it is not easy to disentangle the pure effect of hospital ownership from other institutional settings such as segmentation of insurance status or payers and payment types." Instead of focusing on patient level actions by hospitals and their outcomes, I am able to avoid issues that would arise from certain patients preferring for-profit hospitals, as discussed above. In general, my use of HRR level data allows me to control for HRR fixed effects while minimizing the need to control for patient-level preferences; each HRR functions as its own healthcare market by construction. Finally, the implication that for-profit hospitals can cause not-for-profit hospitals to behave more like profit-maximizers highlights the importance of using HRR-level data so as to examine for-profit influence at the market level. It also highlights the potential impact of for-profit hospitals on the healthcare industry even in cases where market penetration is modest.

As mentioned above, this paper investigates whether regions where a higher proportion of hospital beds are owned by for-profit organizations will have higher

[4] "state nonprofit hospital market share in the year of admission, state government hospital market share in the year of admission, market shares squared, and a cross product term of the two shares" (Sloan et al. (2001)).

average per enrollee Medicare expenditures. Given their different incentives and demonstrated behavior, it is reasonable to expect that such differences will manifest themselves as disparities in Medicare reimbursements. Additionally, given that I find increased Medicare reimbursements attributed to for-profit hospital ownership, I examine whether these increased expenditures manifest themselves as improved patient outcomes.

The paper proceeds as follows: in Section 2 I discuss my empirical strategy, in Section 3 I describe the sources and manipulation of my data, and in Section 4 I present and discuss my results.

2 Empirical Strategy

In order to examine the relationship between for-profit hospital ownership and Medicare expenditures, I will begin by looking at why for-profit hospitals locate where they do. In order to do so, I run the following panel regression:

$$forprofit_{it} = \beta_0 + \beta_j X_{it} + \sigma_i + \gamma_t + \epsilon_{it} \tag{4}$$

Here, 'forprofit' measures the proportion of beds owned by for-profit hospitals in any HRR, i and in a year, t. X is a matrix of control variables containing the natural log of the Medicare eligible population, the proportion, ranging from 0 to 1, of residents who are white, black, Hispanic, male, native, have graduated high school or college, and the natural log of the average household income. In order to give importance to the largest of the HRRs, as there is a significant amount of population size variation, this regression is run weighted by the natural log of the 65+ population of the region. Though I will eventually control for these same HRR-level characteristics in future regressions, they still provide important information as to what types of characteristics drive the location-choice of for-profit hospitals.

In addition to the socioeconomic and demographic control variables listed above, fixed effects are used in an effort to further reduce bias. γ, a set of year fixed effects, is included in each of these panel regressions in order to account for year-to-year variation in national reimbursement rates that could be correlated with secular trends towards privatization. σ is a set of HRR fixed effects that, by controlling for such unobservable time-invariant characteristics as general attitudes towards spending or a particularly strong opinion of for-profit hospitals, help protect against potential endogeneity that would result from a correlation between these unmeasured variables and either the dependent or independent variables. Because HRR fixed effects control for variation across HRRs that does not change over time, and leave just the within-HRR variation to identify the results, the HRR fixed effects may weaken the statistical power of the analysis. Additionally, the fixed effects make comparisons between HRRs difficult because they control for across-HRR variation. However, I feel that the benefit of reduced exposure to endogeneity outweighs these limitations.

Next, having examined which observable HRR characteristics drive for-profit hospital penetration, I turn to the regression equations which are used to answer my research questions. Here too the method of analysis is a series of panel regressions which include the year and location fixed effects discussed above as well as the socioeconomic and demographic control variables. To examine the ownership-expenditure relationship, the first section of analysis utilizes the following regression equation:

$$ln(Medicare)_{it} = \beta_0 + \beta_1 forprofit_{it} + \beta_j X_{it} + \sigma_i + \gamma_t + \epsilon_{it} \tag{5}$$

Here the for-profit variable has the same meaning as above, while the dependent variable, *ln(Medicare)*, represents HRR-level average per enrollee Medicare expenditures. Both variables are defined for a given HRR, i, and any given year, t. The matrix of socioeconomic and demographic control variables, X, the HRR fixed effects, σ, and the year fixed effects, γ are the same as above. This regression is also run, when indicated below, without these HRR fixed effects in order to examine the variation across HRRs, which is removed upon their inclusion. The equation also, when indicated below, contains the HRR's Herfindahl-Hirschman Index (HHI) in order to measure the level of competition within each HRR. The HHI ranges from 0 to 1; a value closer to 1 implies that beds within that HRR are concentrated in a smaller number of hospitals.

Finally, a similar regression equation is used to evaluate the relationship between death rates and for-profit hospital ownership. Slight variations in the following equation are used throughout:

$$deathrate_{it} = \beta_0 + \beta_1 forprofit_{it} + \beta_j X_{it} + \sigma_i + \gamma_t + \epsilon_{it} \tag{6}$$

Here the 'death rate' variable is constructed as the number of deaths per 1000 people in a given HRR, i, and in a given year, t. The overall HRR death rate is, when noted below, substituted for more gender-, race-, or cause-specific death rates but its construction remains the same. These sub-population death rates are used to examine the effect of increased for-profit penetration on groups of people for whom the hospitals' effect may be larger and potentially statistically significant. The independent variables—for-profit ownership and the matrix of control variables, X—are identical to those included in equations 4 and 5. Furthermore, when noted below, equation 6 will be evaluated without the inclusion of HRR fixed effects in order to observe the effects of across-HRR variation.

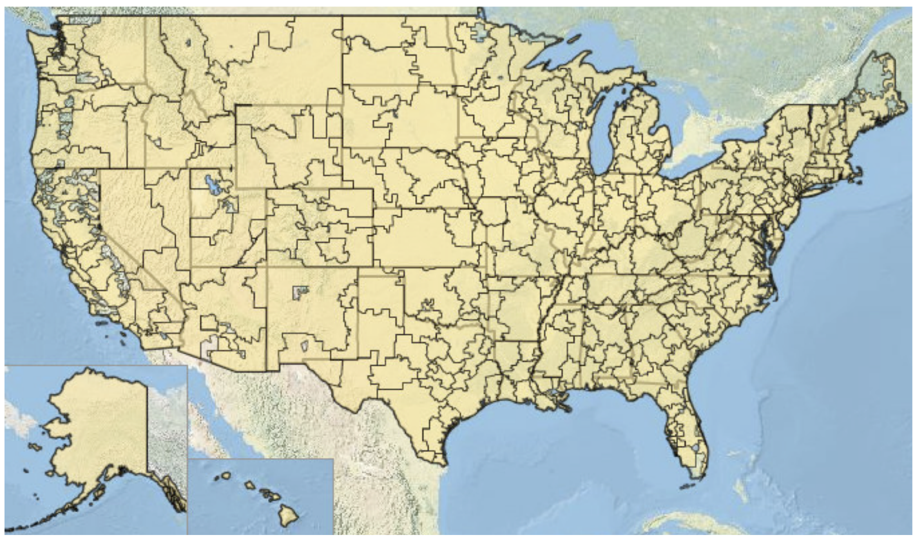
3 Data

The data for this project come from multiple sources. The data used to calculate the average per enrollee Medicare expenditures in each HRR come from the Dartmouth Atlas of Health Care. These data are part of a regional data set based on a 100% sample of Medicare enrollees indicating annual Medicare costs. The United States of America is broken down into 306 different Health Referral Regions (HRRs) as defined by the Dartmouth researchers; a map of their distribution is shown below in Figure 4. HRRs range in population from approximately 100,000 to nearly 10,000,000 while their Medicare-eligible population, defined as residents between the ages of 65 and 99, ranges between 18,000 and nearly a million. HRR-level Medicare data are collected annually and are accessible online from 1992-2007.[5] For each HRR the Dartmouth Atlas provides detailed information about the average per-enrollee Medicare expenditures; this thesis makes use of each HRR's average combined Part A and Part B expenditures. For each year

[5] The data are available at: http://www.dartmouthatlas.org/tools/downloads.aspx

in the data expenditures are adjusted to 2010 Dollars using the Consumer Price Index (CPI) and are incorporated into regression equations as the natural log of their magnitude. Summary statistics for this variable and many of those discussed below are shown in Table 2.

Figure 4: HRR Distribution Across the United States (The Dartmouth Atlas)



My second source is the American Hospital Association (AHA). I use the AHA data—which provides detailed data at the hospital level about ownership, beds, and location—to construct my key variable of interest: the proportion of beds in any given HRR that are controlled by for-profit hospitals. The AHA provides detailed information on each of the over-6,000 hospitals in its database at any given time, representing virtually all large hospitals, and the vast majority of all hospitals in the United States. AHA hospitals fall into one of four categories: general, special, rehabilitation and chronic disease, or psychiatric. Hospitals are

Table 2: Summary Statistics for Key Variables

VARIABLES	Observations	Mean	Std. Dev.	Minimum	Maximum
For-Profit	4896	0.1312	0.1581	0	1
Not-For-Profit	4896	0.5926	0.2548	0	1
Government-Owned	4896	0.2761	0.2032	0	1
Death Rate	4896	50.45	4.51	33.12	63.61
HHI	4896	0.1616	0.1195	0.0129	0.8331
Proportion Male	4896	0.4908	0.0083	0.4618	0.5251
Proportion Female	4896	0.5092	0.0083	0.4749	0.5382
Proportion 65+	4896	0.1326	0.0299	0.0434	0.3107
Proportion White	4896	0.8904	0.0983	0.2289	0.9977
Proportion Black	4896	0.0715	0.0836	0	0.3549
Proportion Hispanic	4896	0.0389	0.0814	0.0006	0.6705
Proportion Native	4896	0.9273	0.0745	0.5479	0.9931
Avg. Household Income	4896	$84496.85	$21811.86	$42486.77	$204109.30
Proportion of HS Grads	4896	0.3097	0.0564	0.1543	0.4905
Proportion of College Grads	4896	0.139	0.0389	0.0619	0.3069

also organized by ownership, in three separate categories: government-owned hospitals, for-profit hospitals, and not-for-profit hospitals. Hospitals are matched to HRRs based on their zip codes using a crosswalk provided by The Dartmouth Atlas.[6] To account for the differences in hospital sizes, for-profit control is measured as the fraction of beds operated by for-profit hospitals.[7,8]

Mortality data, used to examine the relationship between for-profit hospital penetration and outcomes, come from the National Bureau of Economic Research (NBER). The NBER's Multiple Cause-of-Death Mortality Data provide detailed

[6] The Dartmouth Atlas provided a crosswalk from zip code to HRR match each hospital to its HRR. Missing or mismatched hospitals were largely due to the AHA inclusion of hospitals in the U.S. Virgin Islands and Guam, territories for which HRRs do not exist. Other missing values were corrected for by manually matching the zip code to its assigned HRR.

[7] The total number of beds in a region was summed as were the number of beds controlled by each ownership type, then divided to yield a proportion of ownership for each category in each HRR.

[8] The HHI value is calculated by first determining the share of beds within a given HRR that each hospital controls, then squaring and summing these values.

information on each death within the United States in a given year. Additionally, because each death described in the NBER mortality data is associated with an International Classification of Diseases (ICD) code, more detailed death counts are measured using those deaths involving citizens 65 years of age or older who died of one of nine diseases[9]—the top nine causes-of-death according to the Centers for Disease Control (CDC 2010) whose corresponding ICD codes were valid options in all years of the mortality data. As mentioned above, these death counts are used in order to determine whether or not for-profit hospitals have a differential effect on sub-populations and their corresponding death rates. In addition to the disease-specific death counts, separate death counts were also measured for race- and gender-specific sub-populations for the same reason.[10] While hospitals were identified at the zip code-level, the individual-level mortality data provided geographic identifiers only at the county level. All death counts were converted to death rates per 1000 citizens using county-level annual population data from the U.S. Census Bureau. HRR death rates were imputed based on county-level death rate data.[11]

Finally, data used to generate demographic and socioeconomic control variables come from the 1990 and 2000 United States Census as well as the 2005-2009 American Community Survey 5-Year estimates. In order to capture the socioeconomic status and demographics of each HRR, several control variables are used.

[9]These diseases include: cancer, diabetes, heart disease, hypertension, cerebrovascular diseases, pneumonia and influenza, chronic obstructive pulmonary disease, liver disease, or an accident.

[10]For regressions run using these race-specific sub-populations, HRRs are dropped in which the relevant population falls below 100 people in any year in the main dataset.

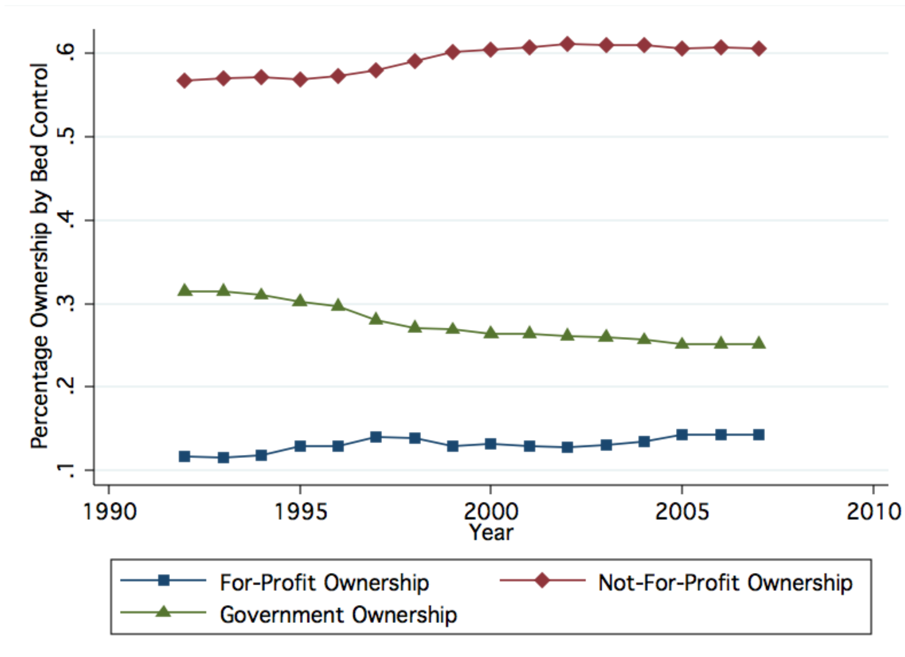
[11]HRRs are only defined as a collection of zip codes. Because the mortality data is only identified at the county level, the MABLE/Geocorr Geographic Correspondence Engine was used to match counties to zip codes. Where counties crossed zip code lines, the fraction of the county population in each zip code was used to weight the assignment. The zip code-level mortality data was aggregated to the HRR level using the Dartmouth Atlas crosswalk.

These include: the Medicare-eligible population, race composition, average total household income (adjusted to 2010 Dollars using the CPI), composition of educational attainment, the proportion of 65+ males, poverty status, and status as a native citizen. All of these variables were collected from the 1990 and 2000 Census as well as the 5-year 2005-2009 American Community Survey. These data are not provided at the HRR level; instead it was aggregated from the zip code-level as above. Values for the full sixteen years in the dataset are generated using linear interpolation between the three points in time: 1990, 2000, and 2009.

Figure 5 shows the trends in annual average hospital ownership, by ownership type, as a percentage of total beds in a given HRR. Over all sixteen years non-profit hospitals dominate the healthcare market with over 59.3% market share, on average. For-profit hospitals, with a relatively meager 13.1% share of the beds in any given region, are also less prevalent than the government-owned hospitals which have an average market share of 27.6%. Figure 5 shows that the increase in for-profit hospital ownership has come, largely, at the cost of government-owned hospitals. Indeed, government hospital market share decreased by over 6% between 1992 and 2007 while both for-profit and not-for-profit market share has risen. However, while not-for-profit-controlled hospital beds were in decline from 2002 to 2007, there were an increasing number of beds controlled by their for-profit counterparts. In these five years alone for-profit market share increased by 1.4% while the corresponding not-for-profit market share fell by 0.5%.

Figure 6 is a histogram of the sixteen-year average for-profit hospital bed ownership levels in each of the 306 HRRs. Over 10% (36) of all HRRs have no beds in for-profit hospitals in any of the sixteen years but otherwise there is a relatively

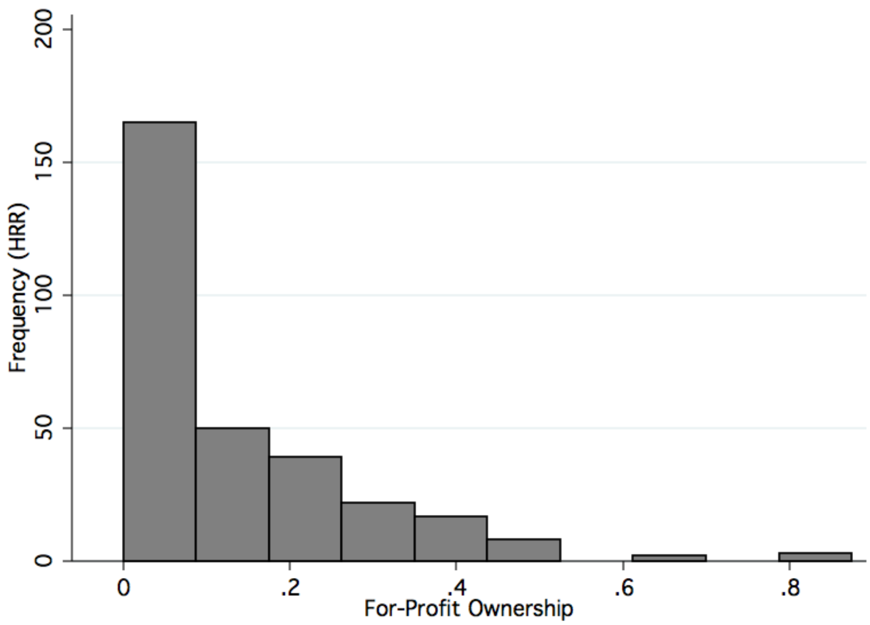
Figure 5: Hospital Ownership Trends Between 1992 and 2007



equal distribution of market penetration levels throughout the remaining HRRs. The histogram also shows that there are some HRRs with extremely high for-profit hospital market shares but that HRRs of this type are uncommon. Not a single HRR has 100% of its beds controlled by for-profit hospitals for each of the sixteen years. Also, as a matter of for-profit hospital distribution, the HRRs with these more extreme values are spread across the country.

The change in for-profit ownership between 1992 and 2007 within each HRR is shown below in Figure 7. The histogram is approximately normally distributed, with the majority of HRRs experiencing little change in for-profit ownership levels over time. Here too there are a handful of HRRs which exhibit more extreme

Figure 6: Histogram of Average For-Profit Bed Ownership Levels Across all 306 HRRs



changes but such HRRs are not isolated in any one area of the country.

Figure 8 shows the equivalent histogram generated using the natural log of the HRR-average per enrollee Medicare expenditures. The histogram is approximately normally distributed around 8.88 ($7187), the sixteen-year average, with only a handful of HRRs characterized by extremely high Medicare reimbursements. As above, HRRs with more extreme expenditures are spread across the country.

Figure 7: Histogram of the Change in Average For-Profit Bed Ownership Levels Across all 306 HRRs

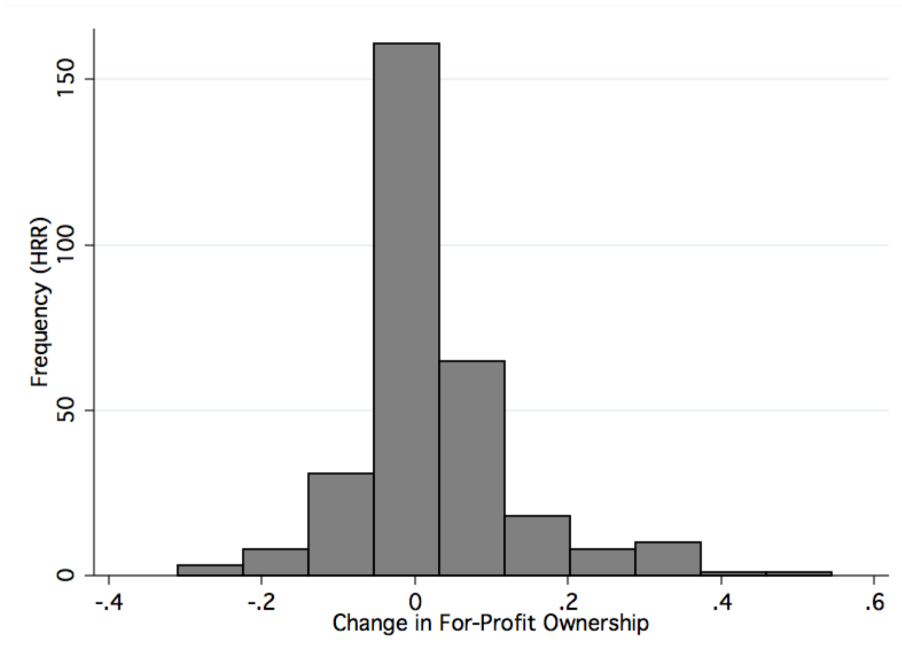
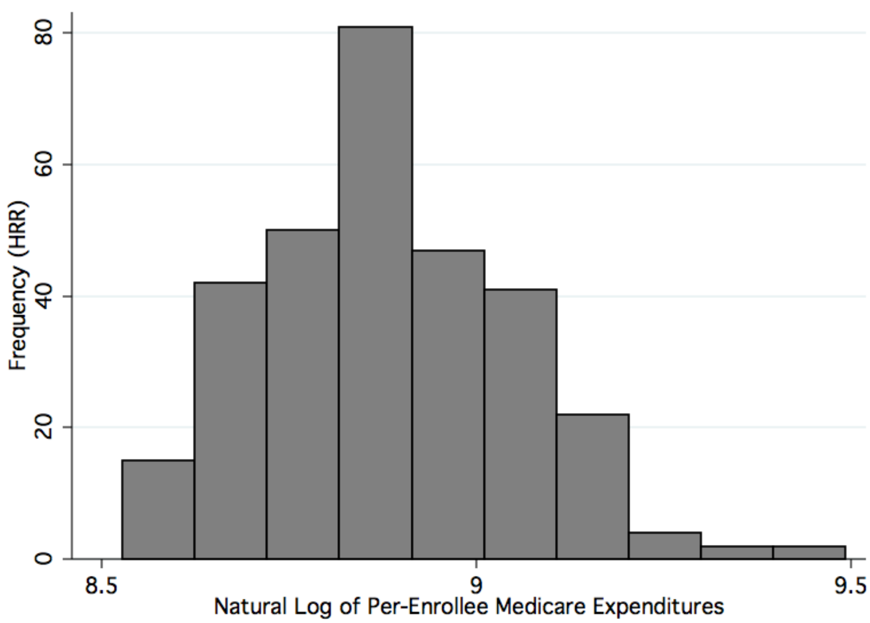


Figure 9 shows the relationship between average per enrollee Medicare expenditures in a given HRR and the proportion of beds in that region that are owned by for-profit hospitals. The size of the circles in the graph corresponds to the Medicare-eligible population of that region. Larger circles signify more populous regions. The figure shows that most HRRs are clustered, as expected, around the sixteen-year averages of both variables, 8.88 ($7187) for log Medicare expenditures and 13.1% for ownership. The correlation between for-profit ownership and Medicare expenditures is 0.33 and is illustrated in the figure by the linear trend line.

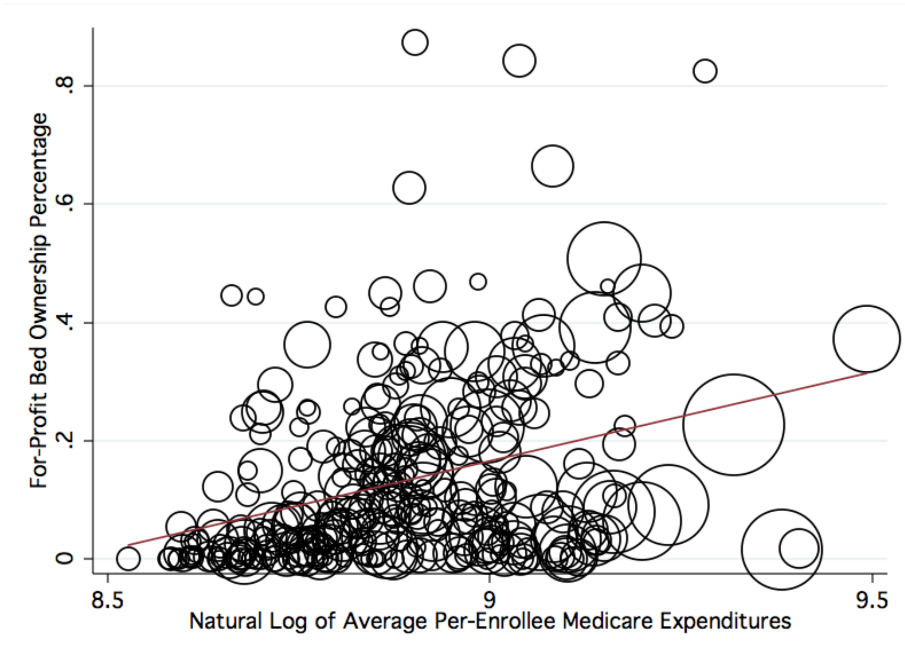
Figure 10 shows the change in average per enrollee Medicare expenditures

Figure 8: Histogram of the Natural Log of Average Per Enrollee Medicare Expenditures Across all 306 HRRs



and the proportion of beds owned by for-profit hospitals in each HRR between 1992 and 2007. The size of the circles in the graph corresponds to the Medicare-eligible population of that region. Larger circles signify more populous regions. While the average change in for-profit ownership is small, as seen in Figure 7, the average increase in per enrollee Medicare expenditures is substantial: 0.466 ($1435). The correlation between the change in for-profit ownership and the change in Medicare expenditures is positive, with a value of 0.09; it is illustrated in the figure by the linear trend line.

Figure 9: The Relationship Between For-Profit Hospital Ownership and Medicare Expenditures, Weighted by the Medicare-Eligible Population

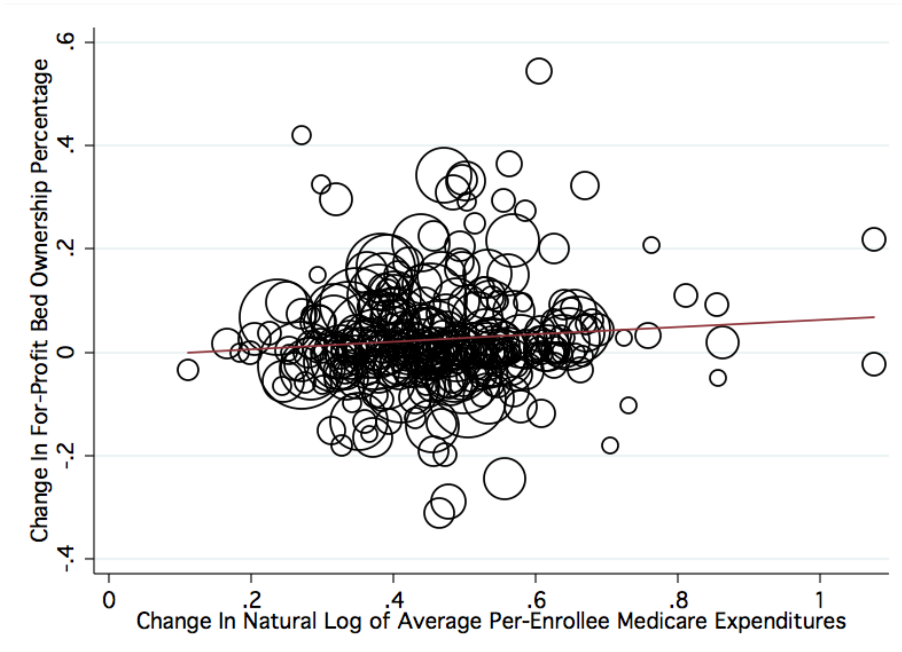


4 Results and Discussion

4.1 Drivers of For-Profit Hospital Location Decisions

Before examining the relationship between for-profit hospital ownership and per enrollee Medicare reimbursements, I evaluate Equation 4 using the panel data described above. The results of this first set of regressions are reported in Table 3. The results show the relationship between each the socioeconomic and demographic control variables and the key variable of interest, the proportion of beds which are controlled by for-profit hospitals. Column 1 includes year fixed effects but no HRR fixed effects; because of this, there is additional across-HRR

Figure 10: The Relationship Between the Change in Both For-Profit Hospital Ownership and Medicare Expenditures Between 1992 and 2007, Weighted by the Medicare-Eligible Population



variation which drives the results. As such, there are multiple variables with statistically significant coefficients. The results in Table 3 Column 1 indicate that for-profit hospitals are associated with HRRs in which there is an older, generally less-educated population. The results also suggest that for-profit hospitals locate in HRRs with larger black and Hispanic populations. The addition of HRR fixed effects in Column 2 removes the across-HRR variation, leaving only within-HRR variation to drive the results. Because these variables do not change substantially over time within a given HRR all coefficients lose statistical significance in this column. Regardless, these results help indicate which HRR characteristics contribute most meaningfully to for-profit hospital penetration.

4.2 The Relationship Between For-Profit Hospital Ownership and Medicare Expenditures

Next I examine the effects of increased for-profit penetration on Medicare expenditures. Table 4 shows the results of the main panel data regressions; all regressions in this table are weighted by the natural log of the 65+ population in a given HRR so as to reduce the effects of the small HRRs on the coefficients. Column 1 includes all 16 years of panel data as well as year fixed effects but does not include any socioeconomic or demographic control variables. The coefficient on the key variable, for-profit hospital ownership, is large and statistically significant. The coefficient, with a magnitude of 0.339, implies that a doubling of for-profit penetration would result in an associated 40.3% increase in the average per enrollee Medicare reimbursements for that HRR.[12] The 16-year national average for-profit hospital market share is 13% and many HRRs have for-profit market shares which are substantially higher, as seen in Figure 6. Thus, it is not unrealistic to expect that any given HRR may experience such an increase in market share at some point in the future.

Column 2 includes the same year fixed effects but adds socioeconomic and demographic control variables; HRR fixed effects are still absent. Here too the coefficient on the key variable, for-profit hospital ownership, is large and statistically significant. Interpreted in the same manner as above, it suggests that a doubling of for-profit hospital ownership would increase average per enrollee Medicare expenditures by 28.5%.

[12] This percentage increase is calculated by first adding the regression coefficient value to the natural log of 16-year national average per enrollee Medicare expenditures (8.885). I then exponentiate the new value and calculate the percentage change between the two values.

The control variables in Table 4 Column 2 that are statistically significant include: the proportion of the population that is male, the proportion of the population that is black, the proportion of the population that is native to the United States, the proportion of the 25+ population that has graduated from college, and the natural log of the average household income in 2010 dollars. Nearly all of these variables have coefficients with the predicted sign. A population that is made up of more men than women should have lower average per-enrollee Medicare reimbursements because, for instance, it has been established that women simply visit the doctor more often than do men (Waldron 1976). The result observed here is consistent with these findings. Additionally, it has been established that populations with a higher proportion of black citizens are generally sicker (Randall 2011). This too is consistent with the positive coefficient seen in Table 4. The literature also suggests that immigrants, on average, are healthier than native-born citizens (Goldman, Smith & Sood 2006). This finding explains the negative coefficient on the 'proportion native' variable.

Table 4 Column 2 also suggests that HRRs with more highly educated citizens have lower Medicare reimbursements. The coefficient on the proportion of the 25+ population that has a bachelor's degree is strongly negative and highly significant. The literature has shown that better educated individuals are generally healthier (Ross & Wu 1995) and it is plausible that they may be better consumers (Michael 1975), more cost-sensitive even though Medicare is covering their healthcare expenditures. In line with this hypothesis, Blustein et al. (1998) find that patients of lower socioeconomic status experience more preventable hospitalizations than do those patients of higher status. Finally, the coefficient on the average household income variable is positive and statistically significant, as anticipated. Higher-income populations will likely demand more care than otherwise similar but poorer communities but there is also some chance that the may relationship may hold in the opposite direction. Regardless, both of these variables' coefficients switch sign and lose significance in later regressions which suggests that their significance in Column 2 may be spurious.

Column 4 also leaves out control variables but adds HRR fixed effects. These fixed effects eliminate across-HRR variation as a means by which to drive results, and, as anticipated, greatly reduce the magnitude of the coefficient on the key variable, for-profit hospital ownership. However, the regression takes its final form in Column 5 which includes the year and HRR fixed effects as well as all main control variables. Though now just slightly outside of statistical significance (with a p-value of 0.081) this coefficient of 0.0681 is interpreted in the same manner as those from Columns 1, 2, and 4 such that a 100% increase in the proportion of for-profit hospital beds would yield a 7.05% increase in Medicare expenditures. While this coefficient has the anticipated sign, many of the coefficients on the control variables have unexpected signs or magnitudes, though many have fallen out of significance. However, because these variables change very little over time within a given HRR and because previous coefficients were based on across-HRR variation, which is now removed due to the inclusion of HRR fixed effects, these changes are not surprising.

Columns 3 and 6 include a measure of each HRRs Herfindahl–Hirschman Index (HHI) as a control variable for the level of competition among hospitals. The coefficient is not significant in either column which indicates that the effect of for-profit hospitals is not simply an addition of competition within the healthcare market. Instead, for-profit hospitals are behaving in such a way that they generate statistically significant increases in the average per enrollee Medicare expenditures.

Table 5 investigates whether the impact of for-profit penetration differs across markets. Columns 1 and 2 compare the differential impact of for-profit hospital penetration on Medicare expenditures when the HRRs large (above the median 65+ population in 1992) or small. The results indicate that for-profit hospital penetration has a larger impact on Medicare reimbursement totals in smaller HRRs. The relationship between market size could be due to the fact that smaller HRRs tend to have fewer hospitals and therefore have more market concentration. However, comparing markets with high levels of market concentration in 1992 (above the median Herfindahl index) to those with low levels of market concentration, the coefficients are similar, as shown in Columns 3 and 4 of Table 5. Another explanation for the bigger effects of for-profit penetration in small markets is that these markets tend to have low initial levels of for-profit representation. As shown in Columns 5 and 6 of Table 5, the apparent effect of increasing the fraction of beds that are in for-profit hospitals is more pronounced in HRRs with few for-profits in 1992. The initial introduction of for-profit hospitals into a market may increase competition and affect behavior of non-profit hospitals.

The results from Table 4 give evidence of the causal effect of for-profit hospital ownership on Medicare reimbursements. Areas with a higher proportion of for-profit hospitals have statistically significantly higher average per enrollee Medicare reimbursements. This finding is in line, in terms of both magnitude and direction, with that of Sloan et al. (2001) and Silverman et al. (1999), both of whom also find a similar causal relationship using much older data. Notably, however, the results here address the lack of hospital fixed effects in Silverman's paper and the issues discussed earlier that arise from hospital-level analysis.

4.3 The Relationship Between For-Profit Hospital Ownership and Mortality Rates

While for-profit hospitals are associated with significantly higher Medicare reimbursement totals for an HRR, these additional expenditures do not lead to lower levels of mortality. Tables 6 and 7 show the results of the second main set of panel-data regressions including all sixteen years of data. Each pair of columns represents a new dependent variable, run with and without HRR fixed effects. The results in this table show the relationship between any given HRR death rate and the level of for-profit hospital ownership in that HRR. Here too all regressions are weighted by the Medicare-eligible population in a given HRR, or the race-specific population where appropriate, so as to reduce the undue impact of small HRRs on the coefficients. Also, due to the small size of black and Hispanic populations in many HRRs, analyses of these populations drop all HRRs that ever have the relevant population drop below 100 people in any year in the main dataset.

In Tables 6 and 7, no coefficient on the for-profit variable is statistically significant when the HRR fixed effects are included. The statistically significantly negative coefficients on the for-profit ownership variable in columns 5, 7, 9, and 13 are the result of variations across HRRs because they are eliminated by the inclusion of HRR fixed effects.[13]

[13] It is important to note that, given my data, I am only able to observe changes in mortality rate. Patient health and/or quality of life could change in ways not measured by mortality but I am not be able to measure

Many of the signs and magnitudes of the coefficients on control variables are in line with those found in Table 4. Much as HRRs with a higher proportion of white or black residents were associated without higher Medicare expenditures, these same HRRs are associated with higher death rates, overall and within these specific populations. Additionally, HRRs with a higher proportion of Hispanic residents, who are traditionally healthier, are associated with significantly lower death rates. As for the impact of education on death rates, high school graduation does not have a statistically significant impact but college graduation has a significantly negative impact on the overall death rate, the male death rate, and the white death rate. This finding is in keeping with the results in Table 4; better-educated individuals tend to be in better health and, thus, HRRs with a higher proportion of college graduates should have lower Medicare reimbursements and lower death rates.

It is important to note that the magnitude of the effect of for-profit hospitals on expenditures (seen in Table 4 Column 5) is sufficiently large that, if the additional expenditures were used effectively, they would generate improvements in mortality rates large enough to observe given the standard errors in Table 6. Cutler, McClellan & Newhouse (1998), they find that the cost of extending a heart attack patient's life by a year is approximately \$6,000. The effect size seen in Table 4 is just over \$500 per enrollee, which, when brought to the 1,000-person level of the death rate measures, is approximately \$500,000. In order to be observed in Table 6, this money must improve the mortality rate by 1.76 per 1,000 people.[14] Given that the rate of heart attacks among Medicare patients is almost

these changes.

[14] 1.76 is twice the standard error on the for-profit variable coefficient from Table 6 Column 2.

certainly less than 7.4%,[15] the cost to extend each of these patients' lives would be approximately $440,000. As such, if for-profit hospitals were using the increases in Medicare expenditures that they generate to treat heart attack patients, they should generate meaningful changes in the mortality rates. Table 6 clearly shows that they do not use the increased expenditures to effect a statistically significant change in mortality rates.

Table 8 shows the results of similar panel regressions, all including HRR fixed effects, which show the effect of for-profit hospital ownership on a number of race-gender-interacted death rates. While the full set of socioeconomic and demographic control variables are included in these reactions, Table 8 shows only the coefficient on the main variable. Regardless of the specific interaction, for-profit hospital ownership never has a statistically significant effect on death rate.

Table 9 shows the results of additional panel regressions, including HRR fixed effects that show the effect of for-profit hospital ownership on the top nine causes-of-death according to the 2000 U.S. Census. The only disease that is significantly affected by hospital ownership is liver disease. Even though the result is small in magnitude, it implies that a doubling of the proportion of beds that are owned by for-profit hospitals would generate a full standard deviation decrease in the death rate from liver disease. However liver disease has an important behavioral component and, because it is the only disease on which for-profits have a statistically detectible impact, the result is likely spurious.

Table 10 shows the coefficient on the for-profit variable when regressed

[15]The incidence of heart attacks among the 85-94 population is 74 per 1,000 people; this is almost certainly lower for the Medicare population as a whole. As such, 7.4% provides an appropriate upper bound on the rate of heart attacks within the Medicare population (American Heart Association 2010).

against the gender-race-cause-of-death-specific death rate. Each regression includes the full set of control variables and HRR fixed effects. The only other death rate (besides liver disease) on which for-profit ownership has a statistically significant effect is cerebrovascular disease in men. The point estimate suggests doubling for-profit ownership in an HRR would increase the death rate from cerebrovascular disease in men by approximately one half of a standard deviation. However, for-profit hospitals do not have any statistically significant effect on other interacted death rates, and here too it is likely that the one significant result is a statistical anomaly.

When analyzed as a whole, Tables 6 through 10 demonstrate that for-profit hospitals do not have a statistically detectable impact on the overall death rate, and there is not consistent evidence of an impact on race-, age-, or disease-specific death rates. This finding generally agrees with the results of Eggleston et al. (2006), whose meta-regression analysis shows that for-profit hospitals do not have a statistically significant impact on death rates. Thus, despite the statistically significantly higher Medicare expenditures associated with for-profit market penetration, men and women 65 and older are not dying less frequently.

4.4 Concluding Thoughts

The findings discussed above provide further evidence that the United States has reached the "flat of the curve," discussed briefly in Section I. While increasing healthcare expenditures when they are very low can dramatically improve outcomes, returns to yet higher expenditures are substantially diminished—the curve flattens. The increased Medicare expenditures shown to be the result of for-profit hospital ownership are likely generating such insignificant changes in the death rate because the expenditures are on the “flat of the curve.” The lack of effect on death rate may also be the result of the type of care of which for-profit hospitals are providing more—specifically end-of-life care. A recent study by Teno et al. (2010) showed that for-profit hospitals are more likely to give feeding tubes patients with advanced dementia, even when these do not necessarily lengthen the life of the patient; hospitals are, however, able to charge for their insertion. Unfortunately, the literature suggests that behavior such as may be widespread (Woolhandler & Himmelstein 2004 and Gawande 2009, etc.). Care such as this, care that does not meaningfully impact clinical outcomes, drives up per-enrollee Medicare expenditures and is in line with the incentives of for-profit hospitals.

The theory of hospital behavior put forth by Chang & Jacobson (2010) suggests that for-profit and not-for-profit hospitals will provide different quantities of care which would result in differences in the Medicare reimbursements generated by these different types of hospitals. In line with this theory, the results presented here suggest that the recent trend towards increased for-profit ownership of hospitals will lead to higher Medicare expenditures at a time when the programs costs are already ballooning out of control. It seems that for-profit hospitals are taking advantage of the asymmetric information in the healthcare market; by upcoding, cream-skimming, and providing more of the most profitable care, for-profit hospitals are able to drive up Medicare reimbursement rates without generating improvements in mortality rates. Healthcare for the sake of healthcare is detrimental to both the patient and the Medicare system. In a climate of intense debate about health policy, these results highlight the importance of discussing the ownership structure of America's hospitals. Not all hospitals are created equal.

5 Figures and Tables

Table 3: Relationship Between For-Profit Ownership and Control Variables

DEPENDENT VARIABLE: For-Profit Hospital Penetration

VARIABLES	Year F.E. No HRR F.E.	Year F.E. HRR F.E.
HHI	-0.0946	-0.290***
	(0.104)	(0.0703)
Ln(Pop 65+)	0.00322	0.00751
	(0.0141)	(0.0383)
Prop. Male	3.399*	0.929
	(1.475)	(1.737)
Prop. 65+	1.649**	-0.418
	(0.592)	(0.971)
Prop. 65+ White	0.226ˆ	0.600
	(0.126)	(0.371)
Prop. 65+ Black	0.613***	0.382
	(0.168)	(0.472)
Prop. 65+ Hisp.	0.723***	0.609
	(0.168)	(0.416)
Prop. Native	0.256	0.107
	(0.220)	(0.323)
Prop. 25+ HS	-0.993***	0.0466
	(0.212)	(0.354)
Prop. 25+ College	-0.859*	-0.315
	(0.424)	(0.661)
Ln(Avg. Income)	-0.00909	-0.00252
	(0.0738)	(0.0804)
Constant	-1.776	-0.856
	(1.297)	(1.341)
Observations	4,896	4,896
R-squared	0.255	0.917

Robust standard errors in parentheses.
*** p<0.001, ** p<0.01, * p<0.05 p̂<0.1
Notes: Each observation is an HRR-year.

Table 4: Relationship Between For-Profit Hospital Ownership and Medicare Expenditures

DEPENDENT VARIABLE: Average Per Enrollee Medicare Expenditures

VARIABLES	No HRR F.E. No Controls	No HRR F.E. Controls	No HRR F.E. Controls + HHI	HRR F.E. No Controls	HRR F.E. Controls	HRR F.E. Controls + HHI
For-Profit	0.339***	0.251***	0.248***	0.0825*	0.0681^	0.0724
	(0.0604)	(0.0474)	(0.0458)	(0.0405)	(0.0389)	(0.0393)
HHI			-0.103^			0.0524
			(0.0619)			(0.0640)
Ln(Pop 65+)		0.0151^	0.00332		0.119**	0.119**
		(0.00829)	(0.0114)		(0.0380)	(0.0379)
Prop. Male		-4.465***	-4.554***		0.0356	0.0202
		(1.051)	(1.037)		(1.791)	(1.780)
Prop. 65+		-0.520*	-0.460^		-1.465*	-1.498*
		(0.244)	(0.237)		(0.713)	(0.708)
Prop. 65+ White		0.170	0.181^		1.249**	1.236**
		(0.114)	(0.108)		(0.379)	(0.381)
Prop. 65+ Black		0.517***	0.521***		0.880	0.859
		(0.150)	(0.146)		(0.535)	(0.533)
Prop. 65+ Hisp.		0.176	0.179		0.424	0.423
		(0.174)	(0.175)		(0.464)	(0.465)
Prop. Native		-0.967***	-0.973***		0.730^	0.733
		(0.197)	(0.197)		(0.418)	(0.417)
Prop. 25+ HS		0.172	0.146		-0.244	-0.246
		(0.210)	(0.207)		(0.448)	(0.449)
Prop. 25+ College		-1.416***	-1.509***		1.238	1.269
		(0.337)	(0.340)		(0.786)	(0.785)
Ln(Avg. Income)		0.344***	0.371***		-0.217	-0.219
		(0.0675)	(0.0697)		(0.156)	(0.156)
Constant	8.562***	7.683***	7.581***	8.640***	7.752***	7.790***
	(0.0131)	(1.052)	(1.050)	(0.0111)	(2.029)	(2.021)
Observations	4,896	4,896	4,896	4,896	4,896	4,896
R-squared	0.427	0.699	0.700	0.923	0.926	0.926

Robust standard errors in parentheses.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$ $\hat{p}<0.1$
Notes: Each observation is an HRR-year. 'For-profit' refers to the number of beds within an HRR controlled by for-profit hospitals.

Table 5: Heterogeneous Relationship Between For-Profit Hospital Ownership and Medicare Expenditures

DEPENDENT VARIABLE: Average Per Enrollee Medicare Expenditures

VARIABLES	Big HRR	Small HRR	High HHI	Low HHI	Low Initial NFP	High Initial NFP
For-Profit	0.00652	0.116ˆ	0.0564	0.0722	0.110*	-0.0314
	(0.0519)	(0.0591)	(0.0455)	(0.0646)	(0.0533)	(0.0516)
Ln(Pop 65+)	0.151**	0.0823	0.0936ˆ	0.145*	0.188**	0.0840
	(0.0558)	(0.0538)	(0.0495)	(0.0625)	(0.0605)	(0.0478)
Prop. Male	3.166	-2.109	-0.917	1.482	-0.922	0.0707
	(2.862)	(2.250)	(2.042)	(3.434)	(2.307)	(2.440)
Prop. 65+	-0.848	-2.523*	-0.815	-2.495ˆ	-2.477*	-1.041
	(0.774)	(1.126)	(0.864)	(1.291)	(1.060)	(1.098)
Prop. 65+ White	0.749ˆ	2.633**	1.733ˆ	0.907*	0.765	1.366*
	(0.426)	(0.989)	(0.890)	(0.434)	(0.469)	(0.670)
Prop. 65+ Black	1.035	2.206ˆ	0.877	1.146	0.683	0.291
	(0.758)	(1.129)	(1.075)	(0.789)	(0.753)	(0.847)
Prop. 65+ Hisp.	-0.0786	1.512ˆ	1.133	-0.0629	0.402	0.333
	(0.390)	(0.864)	(0.921)	(0.378)	(0.544)	(0.727)
Prop. Native	0.422	1.505ˆ	1.270ˆ	0.491	0.915ˆ	0.269
	(0.538)	(0.872)	(0.724)	(0.559)	(0.552)	(0.672)
Prop. 25+ HS	-0.872	0.135	0.475	-1.122ˆ	0.446	-0.910
	(0.820)	(0.535)	(0.602)	(0.675)	(0.697)	(0.546)
Prop. 25+ College	0.788	1.974ˆ	2.299*	0.422	0.587	1.613
	(1.275)	(1.086)	(1.077)	(1.192)	(1.100)	(1.020)
Ln(Avg. Income)	-0.256	-0.326ˆ	-0.488*	-0.143	-0.0185	-0.552**
	(0.299)	(0.185)	(0.187)	(0.183)	(0.138)	(0.167)
Constant	7.160ˆ	8.320***	10.11***	6.891**	5.400**	12.35***
	(3.681)	(2.468)	(2.473)	(2.360)	(2.010)	(2.210)
Observations	2,448	2,448	2,448	2,448	2,416	2,480
R-squared	0.946	0.903	0.907	0.943	0.923	0.933

Robust standard errors in parentheses.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$ $\hat{p}<0.1$
Notes: Each observation is an HRR-year. 'For-profit' refers to the number of beds within an HRR controlled by for-profit hospitals.

Table 6: Relationship Between For-Profit Hospital Ownership and Race- and Gender-Specific Mortality Rates

DEPENDENT VARIABLE: Death Rate (Specified in Column Headings)

VARIABLES	Death Rate (DR) No HRR F.E.	Death Rate (DR) HRR F.E.	Male DR No HRR F.E.	Male DR HRR F.E.	Female DR No HRR F.E.	Female DR HRR F.E.
For-Profit	-1.641^	1.229	-1.123	2.101^	-2.179*	0.597
	(0.938)	(0.883)	(1.021)	(1.187)	(0.976)	(0.830)
Ln(Pop 65+)	3.27e-07	-9.58e-06***	2.08e-07	-1.19e-05***	4.43e-07	-8.25e-06***
	(1.09e-06)	(2.32e-06)	(1.21e-06)	(2.91e-06)	(1.08e-06)	(2.11e-06)
Prop. Male	-178.9***	-149.8*	-207.7***	-216.2*	-175.9***	-113.6*
	(37.27)	(63.58)	(42.79)	(86.69)	(35.58)	(56.03)
Prop. 65+	-71.35***	-67.91***	-67.10***	-77.39***	-78.26***	-61.04***
	(10.75)	(15.47)	(12.48)	(21.16)	(10.07)	(14.79)
Prop. 65+ White	11.80***	39.95*	7.526*	31.63	15.45***	48.62**
	(2.891)	(17.01)	(3.347)	(21.65)	(2.830)	(14.84)
Prop. 65+ Black	7.597^	15.16	9.268*	15.00	7.646*	17.09
	(3.995)	(17.11)	(4.669)	(21.66)	(3.818)	(15.26)
Prop. 65+ Hisp.	-15.48***	-9.833	-15.57***	11.02	-15.83***	-21.59*
	(3.754)	(13.09)	(4.497)	(18.12)	(3.441)	(10.82)
Prop. Native	5.148	-12.71	6.624	-2.335	3.699	-20.99
	(5.733)	(18.13)	(6.957)	(22.91)	(5.145)	(15.95)
Prop. 25+ HS	9.845^	3.852	11.30^	-17.35	9.434^	14.01
	(5.404)	(11.44)	(6.172)	(13.97)	(5.218)	(10.68)
Prop. 25+ College	-22.02*	-11.02	-27.82*	-14.01	-16.91^	-12.77
	(9.440)	(27.84)	(10.87)	(34.41)	(8.996)	(25.36)
Ln(Avg. Income)	-4.989*	-5.926^	-7.701**	-8.461	-3.245^	-3.986
	(2.008)	(3.186)	(2.410)	(5.331)	(1.825)	(2.652)
Constant	185.4***	178.6***	239.3***	252.9***	157.9***	130.2***
	(37.34)	(44.32)	(44.47)	(69.51)	(34.14)	(38.09)
Observations	4,896	4,896	4,896	4,896	4,896	4,896
R-squared	0.719	0.934	0.742	0.923	0.694	0.921

Robust standard errors in parentheses.
*** p<0.001, ** p<0.01, * p<0.05 p̂<0.1
Notes: Each observation is an HRR-year. ‘For-profit’ refers to the number of beds within an HRR controlled by for-profit hospitals.

Table 7: Relationship Between For-Profit Hospital Ownership and Race- and Gender-Specific Mortality Rates, cont.

DEPENDENT VARIABLE: Death Rate (Specified in Column Headings)

White DR No HRR F.E.	White DR HRR F.E.	Nothispanic DR No HRR F.E.	Nothispanic DR HRR F.E.	Black DR No HRR F.E.	Black DR HRR F.E.	Hispanic DR No HRR F.E.	Hispanic DR HRR F.E.
-2.756**	1.367	-1.925^	5.329	1.360	6.380	-7.073**	-0.563
(0.982)	(0.965)	(1.063)	(4.289)	(2.697)	(4.870)	(2.299)	(2.330)
8.04e-07	-1.03e-05***	3.09e-07	-1.07e-05***	5.59e-07	-9.23e-06	1.43e-06	-1.22e-05
(1.25e-06)	(2.47e-06)	(1.33e-06)	(2.54e-06)	(3.19e-06)	(5.97e-06)	(1.51e-06)	(7.99e-06)
-229.7***	-162.6**	-141.9**	44.27	-80.59	-350.3^	128.8*	-439.4***
(37.84)	(60.83)	(47.58)	(99.76)	(70.66)	(180.7)	(62.95)	(119.4)
-81.94***	-81.82***	-67.36***	-135.5**	-96.88***	-189.1^	-10.92	-188.9***
(10.31)	(15.82)	(12.10)	(44.52)	(23.46)	(108.5)	(16.79)	(41.35)
-8.649	11.36	14.68***	-54.22	-7.368	-12.35	-15.90***	-8.139
(8.185)	(17.53)	(3.102)	(47.14)	(14.90)	(27.68)	(4.372)	(13.94)
-19.59*	-12.53	13.75**	-51.97	-42.65**	-14.54	-26.20**	32.22
(7.940)	(18.73)	(4.841)	(49.43)	(15.33)	(31.55)	(8.263)	(32.84)
-13.00**	-7.792	-6.315	-70.10^	-17.53^	-10.29	22.83***	-27.19
(3.944)	(14.87)	(5.108)	(40.09)	(9.468)	(22.53)	(4.847)	(16.37)
-0.607	-9.511	2.615	17.57	21.80^	-23.28	12.55^	-23.65
(5.601)	(16.11)	(8.220)	(15.30)	(11.24)	(29.12)	(6.801)	(15.46)
5.618	5.966	11.49^	43.85	17.62	20.35	32.92**	104.2**
(6.217)	(11.22)	(6.683)	(35.56)	(20.50)	(57.87)	(12.63)	(36.91)
-34.90***	-23.32	-31.61**	-97.88^	-5.529	-85.01	41.74**	65.96
(9.990)	(28.07)	(11.58)	(50.42)	(27.82)	(60.67)	(14.55)	(38.51)
-4.314*	-7.611*	-2.145	-5.870	-15.50***	10.94	-13.53***	-21.81
(1.948)	(3.543)	(2.918)	(3.647)	(4.254)	(9.644)	(3.809)	(11.83)
233.1***	229.8***	134.0*	148.0**	269.8***	174.2	111.7^	489.7***
(38.06)	(47.05)	(55.01)	(55.69)	(58.31)	(108.2)	(59.95)	(134.4)
4,896	4,896	4,896	4,896	4,272	4,272	4,208	4,208
0.572	0.909	0.423	0.684	0.218	0.418	0.279	0.504

Table 8: Relationship Between For-Profit Hospital Ownership and Race and Gender Interaction Mortality Rates

DEPENDENT VARIABLE: Death Rate (Specified in Column Headings)

VARIABLES	White Male DR HRR F.E.	White Female DR HRR F.E.	Nothispanic Male DR HRR F.E.	Nothispanic Female DR HRR F.E.	Black Male DR HRR F.E.	Black Female DR HRR F.E.	Hispanic Male DR HRR F.E.	Hispanic Female DR HRR F.E.
For-Profit	1.601	0.305	6.219	4.031	0.619	0.787ˆ	-0.278	0.567
	(1.096)	(0.794)	(4.851)	(3.856)	(0.783)	(0.438)	(0.613)	(0.415)
Constant	161.4***	70.51ˆ	185.3*	88.89ˆ	33.32	4.836	56.98***	-24.37
	(46.91)	(36.81)	(72.92)	(51.17)	(32.99)	(22.19)	(16.91)	(17.26)
Observations	4,896	4,896	4,896	4,896	4,272	4,272	4,208	4,208
R-squared	0.954	0.957	0.818	0.817	0.989	0.991	0.996	0.997

Robust standard errors in parentheses.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$ $\hat{p}<0.1$
All regressions include standard control variables, as above. Each observation is an HRR-year. ‘For-profit’ refers to the number of beds within an HRR controlled by for-profit hospitals.

Table 9: Relationship Between For-Profit Hospital Ownership and Disease-Specific Mortality Rates

	DEPENDENT VARIABLE: Death Rate (Specified in Column Headings)								
VARIABLES	Cancer	Diabetes	Heart Disease	Hypertension	Cerebrovascular Disease	Pneumonia Influenza	COPD	Liver Disease	Accident
For-Profit	0.188	-0.0213	0.633	-0.0448	0.259	-0.0478	0.211	-0.238*	-0.0443
	(0.217)	(0.116)	(0.471)	(0.0443)	(0.200)	(0.165)	(0.139)	(0.118)	(0.0822)
Ln(Pop 65+)	-9.79e-07*	-5.66e-07*	-4.86e-06***	-8.06e-08	-8.76e-07*	-4.79e-07	-5.48e-07*	1.70e-08	-8.10e-08
	(4.90e-07)	(2.71e-07)	(1.01e-06)	(1.35e-07)	(4.38e-07)	(3.74e-07)	(2.13e-07)	(1.87e-07)	(1.93e-07)
Prop. Male	-10.85	-5.002	-113.1**	-1.278	-11.25	2.270	5.801	-7.502ˆ	1.870
	(14.12)	(5.913)	(38.75)	(2.532)	(9.571)	(9.444)	(6.189)	(4.226)	(3.427)
Prop. 65+	-11.82***	-9.037***	-12.80	-1.543ˆ	-0.666	0.953	-8.519***	-3.107	-0.823
	(3.455)	(1.598)	(9.141)	(0.799)	(3.797)	(3.064)	(2.378)	(2.277)	(1.351)
Prop. 65+ White	1.802	-3.781**	11.12	-1.683***	0.178	3.780	1.453	-1.370ˆ	2.165**
	(3.121)	(1.245)	(7.236)	(0.371)	(1.979)	(2.365)	(1.257)	(0.827)	(0.673)
Prop. 65+ Black	-9.963**	-8.416***	4.872	-2.622***	8.286**	7.417**	-4.107*	-6.342***	0.637
	(3.515)	(1.743)	(8.511)	(0.608)	(2.909)	(2.424)	(1.676)	(1.298)	(1.135)
Prop. 65+ Hisp.	-5.915*	-0.467	9.006ˆ	-0.379	1.502	3.686ˆ	-5.408***	5.978***	0.156
	(2.355)	(1.085)	(4.667)	(0.445)	(2.207)	(2.070)	(1.536)	(0.760)	(0.630)
Prop. Native	5.810	3.748**	-21.31*	1.109*	0.703	-2.141	3.267**	-0.618	-0.417
	(3.676)	(1.317)	(8.496)	(0.450)	(2.015)	(2.066)	(1.092)	(0.980)	(0.717)
Prop. 25+ HS	-2.885	0.0915	-1.248	-0.451	5.572*	7.027***	3.464**	-3.815***	-3.002***
	(2.627)	(1.309)	(5.624)	(0.522)	(2.404)	(2.060)	(1.336)	(1.001)	(0.775)
Prop. 25+ College	-1.906	-5.288**	-15.99	-3.258***	9.003*	9.682*	-4.745ˆ	-4.345**	-1.941
	(6.112)	(2.023)	(12.25)	(0.943)	(3.557)	(4.482)	(2.808)	(1.607)	(1.429)
Ln(Avg. Income)	-1.280*	0.178	0.307	0.000236	-0.300	-0.599	-0.941	0.161	0.264
	(0.606)	(0.276)	(2.180)	(0.114)	(0.646)	(0.399)	(0.580)	(0.308)	(0.253)
Constant	27.99**	4.432	86.57**	2.313	8.449	2.274	7.028	7.544ˆ	-2.913
	(9.130)	(3.600)	(27.01)	(1.680)	(8.530)	(5.986)	(7.151)	(3.942)	(3.089)
Observations	4,896	4,896	4,896	4,896	4,896	4,896	4,896	4,896	4,896
R-squared	0.869	0.814	0.950	0.769	0.893	0.853	0.884	0.756	0.791

Robust standard errors in parentheses.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$ $\hat{p}<0.1$
Each observation is an HRR-year. 'For-profit' refers to the number of beds within an HRR controlled by for-profit hospitals.

Table 10: Relationship Between For-Profit Hospital Ownership and Race, Gender and Disease Interaction Mortality Rates

DEPENDENT VARIABLE: Death Rate (Specified in Column and Row Headings)

	Cancer	Diabetes	Heart Disease	Hypertension	Cerebrovascular Disease	Pneumonia Influenza	COPD	Liver Disease	Accident
Male	0.376	0.0757	0.658	0.0151	0.482*	-0.124	0.330ˆ	-0.291*	-0.0981
	(0.362)	(0.124)	(0.554)	(0.0502)	(0.214)	(0.178)	(0.182)	(0.146)	(0.0922)
Female	0.0689	-0.0832	0.628	-0.0862ˆ	0.0911	0.00869	0.125	-0.200ˆ	-0.00469
	(0.197)	(0.123)	(0.472)	(0.0494)	(0.218)	(0.170)	(0.154)	(0.102)	(0.0935)
White	0.170	-0.0480	0.572	-0.0585	0.342ˆ	-0.0422	0.247	-0.230*	-0.0102
	(0.212)	(0.104)	(0.459)	(0.0417)	(0.205)	(0.166)	(0.152)	(0.114)	(0.0855)
Black	1.047	0.692	1.781	-0.0899	0.0887	0.450	-0.254	-0.131	0.0635
	(1.439)	(0.653)	(1.965)	(0.357)	(1.153)	(1.262)	(0.490)	(0.269)	(0.326)
Hispanic	0.510	-0.543	-0.432	0.201	0.00642	-0.350	0.333	-0.214	-0.0102
	(0.524)	(0.813)	(1.003)	(0.138)	(0.249)	(0.246)	(0.200)	(0.140)	(0.180)
Nothispanic	1.016	0.0525	2.079	-0.0416	0.652	0.162	0.477	-0.214ˆ	0.0278
	(0.887)	(0.151)	(1.602)	(0.0451)	(0.418)	(0.254)	(0.305)	(0.115)	(0.117)

Robust standard errors in parentheses.
*** $p<0.001$, ** $p<0.01$, * $p<0.05$ $\hat{p}<0.1$
Notes: Each cell represents the coefficient on the 'for-profit' variable. For-profit' refers to the number of beds within an HRR controlled by for-profit hospitals. All regressions include standard control variables, as above, as well as HRR and year fixed effects. Each observation is an HRR-year.

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