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Valuing the hospital industry from a financing efficiency standpoint

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Abstract

We investigate the valuation of the non-government hospital industry focusing on two of its ownership structures: nonprofits hospitals (NPHs) and for-profits hospitals (FPHs). We find both structures are inefficient from a financing standpoint by being overlevered with lower grade bond ratings. By not issuing optimal amounts of debt, we estimate that NPHs lose 18% and 61% of their potential value for nongrowth and growth situations, respectively. The corresponding percentages for FPHs are somewhat similar at 19% and 53%. We attribute these losses to agency and financial distress costs. In terms of absolute dollars, the loss from straying from optimal debt ratios is 173% and 254% greater for NPHs than FPHs for nongrowth and growth, respectively. We find the tax advantages gained to NPHs require FPHs to be more efficient to achieve equality in NPH firm value. We estimate NPHs must be 47% and 55% less efficient than FPHs for nongrowth and growth situations, respectively, to reach a point where they would convert to a for-profit ownership structure. We offer a waste-warlord agency theory to explain why NPHs convert to FPHs despite their huge tax subsidies. Our results minimally indicate that waste-warlord agent behavior extends to at least a noticeable minority of NPHs. This is consistent with research that finds 5% of NPHs converted to FPHs over an eight-year period.

JEL Classification: C02, G32, H21, H41, H51, H54, H58

Keywords: Capital Structure Models, Firm Valuation, Hospital Industry, Healthcare Markets

1 Introduction

The valuation of an enterprise is more than its cash flows from revenue sources discounted by the cost of debt and the cost of equity. It must also consider personal tax consequences as well as ownership types and structures. Outside forces, like legislative tax rates, create an intrinsic advantage to a particular ownership type. For example, a pass-through enterprise, such as a sole proprietorship, avoids the double taxation experienced by a corporation (except for an S corporation) and thus generally has an overall corporate and personal tax advantage. External legislative powers also create an intrinsic advantage to one corporation structure over another corporation structure. For example, an enterprise that has a nonprofit corporation structure typically has lower corporate and personal tax rates compared to a for-profit corporation structure. This can give the nonprofit corporation a valuation advantage that can lead to inefficiencies to the extent nonprofits are without the monitoring mechanisms found within for-profits.

In this paper, we investigate if the tax advantage of nonprofit corporations over for-profit corporations leads to inefficiencies made visible through capital structure valuation. Can a capital structure model graphically reveal what many suspect to be a major problem when nonprofits receive too much of a favorable tax treatment? We will do this by using the nongovernment hospital industry that provides a unique opportunity to compare the capital structures of nonprofit and for-profit firms. This is because hospitals, regardless of their ownership structure, have a common set of assets and face similar demand curves. This can lead to a better comparison of differences in the valuation outcomes based on ownership structures. Throughout this paper, the word "hospital" includes not only large individual hospitals but also healthcare systems that include hospitals, clinics, outpatient care centers, and specialized care centers. Of importance, our major source of hospital statistics focuses on the largest healthcare systems and the largest hospitals. Thus, our results are not necessarily applicable to smaller hospitals and healthcare systems or to government sponsored hospitals such as university research hospitals.

Before we can investigate an industry and compare its ownership structures, we must first have models to value enterprises when they take on debt. The mainline capital structure research is rooted in the perpetuity taxation models of Modigliani and Miller (1963), referred to as MM. These models focus on the value of the corporate tax deduction from issuing debt. Miller (1977) extends the MM by allowing for both corporate and personal taxes. By only
considering tax effects and a nongrowth situation, the gain to leverage (G_L) equations of MM and Miller are limited. We need two models to overcome the MM and Miller limitations. First, we need a nongrowth model that evaluates capital structure change by also incorporating other leverage-related effects beyond a tax effect. To meet this need, we use the nongrowth Capital Structure Model (CSM) of Hull (2007) that extends the MM and Miller perpetuity models by including borrowing rates in its G_L model while still keeping tax rates. Second, we need a model that incorporates growth while keeping tax effects and other leverage-related effects. To meet this need, we utilize the CSM G_L equation of Hull (2010) that adds the dimension of growth to the CSM nongrowth model. Unlike the MM and Miller models, the latter two perpetuity models can determine an interior optimal debt-to-firm value (ODV) choice.

In our investigation of the non-government hospital industry, we use our four perpetuity G_L models to address a number of research questions including the following. How do the tax advantages of nonprofit hospitals (NPHs) over for-profit hospitals (FPHs) affect the ODV choice? Do the current debt-to-firm value (CDV) choices for NPHs and FPHs agree with their ODV choices? Given the CDV and ODV choices and after-tax valuations for NPHs and FPHs based on these choices, what can we say about any valuation loss in straying from ODVs? If we find substantially less valuation for one ownership structure in terms of the other when at their ODVs, what does this tell us about the operational efficiency of that structure? What can an efficiency critique mean in terms of when to convert from one hospital ownership structure to another ownership structure? For our purposes, we define efficiency as implying an economic state in which every hospital optimally allocates resources to serve each patient and stakeholder in the best way while minimizing waste and unwarranted managerial perquisites. When one hospital ownership structure's operation is economically efficient, any changes made to assist another ownership structure would harm the efficient one. Suppose the assistance comes in the form of excessive tax subsidization. Such assistance would give the recipient enterprise a comparative valuation advantage and allow them to operate with less efficiency while remaining competitive due to the extreme tax subsidization.

When applying our four perpetuity G_L models, we assign the same unlevered before-tax cash flows to each ownership structure. For all four models, we find that NPHs achieve higher levered firm value (V_L) compared to FPHs. This is because NPHs pay very little, if any, corporate and personal taxes relative to FPHs creating an advantage for NPHs. When using the MM G_L formula, both NPHs and FPHs maximize V_L and achieve their ODVs by issuing the largest amount of debt allowed by our choices based on fifteen bond ratings. FPHs have a higher maximum gain to leverage (max G_L) compared to NPHs under the MM model where only corporate taxes are relevant. To convert to an FPH, an NPH's efficiency would have to fall 12% to overcome the tax disadvantage according to the MM model. NPHs only pay taxes if they have profitable side ventures and we find that the typical NPH has negligible ventures. For this scenario where α equals zero, every debt choice for Miller renders the same zero value for G_L and NPHs are indifferent to the amount of debt issued. A slight change in our assumptions about tax rates could cause either a negative or a positive α. For a negative α, NPHs issue zero debt because any debt issue generates a negative G_L. For a positive α, the Miller results are similar to MM as both NPHs and FPHs maximize V_L by issuing the largest amount of debt allowed. To convert to a FPH if α is positive, an NPH's efficiency would, like the MM result, have to fall. MM and Miller do not include the cost of equity in their G_L equations but do have a cost of debt. However, since the application of all G_L formulas involve retiring different amounts of unlevered equity, the amount of debt (and not the cost of debt in itself) is the factor that the MM and Miller model uses. For the nongrowth and growth CSM, the costs of borrowing increase with a greater debt choice enabling it to have an optimal debt-equity choice. Thus, we have to call into question the preciseness of the MM and Miller results. They are impractical except for unusual situations. For this reason, our analysis spends an entire time on these two models. Their main purpose is a benchmark for what firms accomplish when tax rates apply.

Unlike MM and Miller, the nongrowth CSM and growth CSM demonstrate NPHs realize greater max G_L values compared to FPHs by being at their interior ODVs and this is true in terms of dollar amounts and relative increases in unlevered firm value. This occurs despite FPHs having a higher corporate tax rate on debt. Thus, we conclude that optimal capital structure decision-making leads to lower agency and financial distress costs for NPHs. The CSM show hospitals are overlevered and experience large losses by straying from their ODVs. The loss in dollar amount from straying is much greater for NPHs than for FPHs. In percentage terms, the losses are more similar because NPHs have
much greater after-tax valuations as they pay little, if any, taxes. Of practical importance, we find that both NPHs and FPHs attain similar ODVs for a nongrowth situation but FPHs attain 25% greater ODVs for a growth situation. We discover that hospitals should be striving for upper medium grade bond ratings associated with ODVs instead of often settling for lower medium grade bond and non-investment grade bonds, both of which are associated with higher CDVs. Our assignment of bond ratings are consistent with what Damodaran (2016) indicates times interest earned ratios should be.

We show FPHs must achieve much greater operational and management efficiencies to overcome their tax disadvantages and compete with NPHs. The fact more NPHs convert to FPHs (as opposed to FPHs switching to NPHs) indicates that FPHs attain higher levels of efficiency relative to NPHs. Using Medicare data on 4.8 million patients, Joynt, Orav, and Jha (2014) find that 237 of 4,571 hospitals in 30 states and the District of Columbia converted from NPH to FPH from 2002 to 2010. This indicates that over one in twenty NPHs convert within an eight-year period to an FPH. To add value by converting to an FPH, we estimate that an NPH's efficiency would have to fail 47% and 55%, respectively, according to the nongrowth CSM and growth CSM. We offer a waste-warlord agency theory to explain this inefficiency. This theory predicts that the huge tax subsidies create an environment where those in charge are prone to mismanage the surplus of funds created by huge tax subsidies. The mismanagement likely includes spending wastefully and collecting funds for personal gain.

Our findings are robust when varying the premium of the cost of equity over the cost of debt, changing tax rates, or modifying market rate and risk-free rate. We obtain our results by assigning costs of borrowing based on bond ratings that fall as debt increases. However, besides a debt ratio, there are other factors influencing bond ratings (such as profitability and liquidity) so that there is not a perfect relation between greater debt ratios and lower bond ratings than we assume. Thus, we interpret our results with caution until researchers conduct more tests including a comparison of individual NPHs and FPHs and a look at a less recent period.1 It is also possible that our sample, which consists of larger hospitals, is not representative of smaller or medium-sized hospitals. This limits the applicability of our findings.

We order the remainder of this paper as follows. In Section 2, we provide background information relevant to our investigation of optimal hospital financing and after-tax hospital valuation. Section 3 overviews capital structure theory and findings and introduces the four capital structure models that generate our perpetuity G_t equations. In Section 4, we present descriptive statistics for hospitals and procedural computations for values for key variables used to generate our findings. In Section 5, we apply our nongrowth G_t equation and compare results for NPHs and FPHs. Section 6 reports findings using our growth G_t equation and Section 7 summarizes and findings as given in Table 9. In Section 8, we provide conclusions.

2 Background Information

In this paper, we draw conclusions about the financing and operational inefficiencies of the non-government hospital industry and its division into two ownership structures: nonprofit hospitals (NPHs) and for-profit hospitals (FPHs). We base our conclusions on the valuations after corporate and personal taxes are considered. We cannot separate these conclusions from the present and future challenges facing the hospital industry. To understand these challenges, this section provides background information. We begin by looking at hospital industry factoids that indicate a number of factors that lead to an overlevered industry. Next, we overview characteristics associated with NPH and FPH ownership structures. We then discuss the quality of health care provided by NPHs and FPHs and the conversion of NPHs to FPHs. Finally, we introduce a waste-warlord agency theory of nonprofit management to explain the ongoing phenomenon of NPHs converting to FPHs.

2.1 Hospital Industry Factoids and Features

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1 It is possible that what we observe is a temporary phenomenon due to drastic changes in the healthcare industry that affects the data for 2014, which is the latest year for which hospital data is available and the year we gather data for variables used in four models. Because we found data for the year 2014 to be similar for the average of the most recent five-year period of 2010-2014, future research would have to use data before that and probably pre-Obamacare period to verify if what the overlevered situation that we find a temporary is finding.
Hospital industry factoids provide insight on the hospital industry thus aiding the interpretation process when comparing valuations between NPHs and FPHs. According to the latest survey of the American Hospital Association (AHA) released in 2016 using 2014 data, there are 5,627 hospitals in the U.S. with 4,926 community hospitals. The latter consists of 2,870 NPHs (58.26%) owned by non-investors or members, 1,053 FPHs (21.38%) owned by investors, and 1,003 government hospitals (20.36%) owned by state or local governments. This paper’s tests using our four G0 models exclude government hospitals so that NPHs only include nonprofit hospitals that are also non-government hospitals.

Of the 4,926 community hospitals, about 38% serve rural hospital with two-thirds of these classified as Critical Access Hospitals (CAHs) by the Centers for Medicaid and Medicare Services (CMS). CAHs receive cost-based reimbursement from Medicare in lieu of standard fixed reimbursement rates. Safety-net hospitals are a classification of hospitals that provide care that is more charitable. These hospitals receive payments from CMS to balance the unreimbursed care of treating the sizeable numbers of Medicaid, Medicare and uninsured patients. Hospitals vary significantly in size, from rural facilities to larger care facilities.

According Becker’s Hospital Review (BHR), U.S. health spending increased by 5.2% in 2014 to a total of around $3 trillion. This increased spending is occurring while hospitals and healthcare facilities continue to undergo a strong shift in their business model. New elements of the business model focus on supplying more services and promoting healthy lifestyle styles. It is unknown how this model will stand up to new forces pushing hospital profits. For example, there has been a shift from inpatient visits to less costly outpatient visits. Additionally, the growth in health insurance features, like high-deductibles, have increased costs for consumers causing patients to postpone or refuse medical care. A cutback in healthcare spending from less inpatient visits and postponement of medical spending causes a downward pressure on profits and thus decreases earnings retained for investment. With a fall in retained earnings, the book value of equity falls leading to an overleveraged situation. According to trade-off theorists (discussed in Section 3.1), firms valuation will suffer.

BHR states there was an average of 2,145 outpatient visits per 1,000 people in 2013. Furthermore, for 2013, we find $13 billion underpayment for medical services absorbed by hospitals. This total includes shortfalls of $38 billion for Medicare and $13 billion for Medicaid. For 2013, hospitals received payment of 88 cents for every dollar spent caring for Medicare patients. Under Medicaid, hospitals collected payment of 90 cents for every dollar spent caring for Medicaid patients. The latter statistics indicate the hospital industry provided slightly over eleven percent charitable care for these two government programs. Of importance to our study, the shortfall in underpaid services leads to lower revenues and thus lower retained earnings. Once again, the book value of equity falls causing an overleveraged situation and loss in firm value.

For every ten people, BHR reports there will be one admission per year to a hospital as an in-patient. However, people are spending less time in occupying hospitals bed due to less invasive surgeries and cutting-edge anesthesia methods that allow patients to leave the same day. The average length of stay is between four and five days. The average cost per inpatient day is $2,346 for NPHs and $1,798 for FPHs. Compared to FPHs, the latter number can indicate NPHs have a different type of patient that demands greater charitable care and/or NPHs are less efficient in providing health care. Regardless, with fewer in-patients for both NPHs and FPHs, we find revenues falling leading to a shortage of funds. This creates a situation that can conceivably spur on the issuance of debt to compensate for lower internal equity. Once more, the outcome leads to an overleveraged hospital industry.

The Department of Health and Human Services (2015) estimates that the passage of the Affordable Care Act reduced the amount of uncompensated care by $7.4 billion in 2014 alone. The compensation a hospital obtains for a service fluctuates based on the payer. Governmental payers, including Medicare and Medicaid, set rates, and virtually every hospital elects to receive them in order to admit these patients. With commercial payers, hospitals can bargain rates based on factors such as volume. Still many commercial rates are set based on a formula that uses Medicare rates as the standard-bearer. BHR writes that Medicare covers about 41% of patients treated by hospitals. Thus, cuts in

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2 Unless noted otherwise, the numbers and percentages, which follow in this section, retrieved 8/12/2016 at [http://www.beckerhospitalreview.com/lists/59-things-to-know-about-the-hospital-industry-2016.html](http://www.beckerhospitalreview.com/lists/59-things-to-know-about-the-hospital-industry-2016.html).
Medicare causing reduction in payments will have a negative effect on the hospital industry. Shortage of cash flows can lead to hospitals seeking external sources of financing including issuing too much debt. At least in the short-run, hospitals can find themselves with costly debt and a loss in value.

Historically, the public justifies the tax-exempt status for NPIs under the assumption that they ensure proper health services to their communities including charity care. However, in the past five years, lawmakers have examined if the tax breaks are greater than the charitable care and benefits provided by the hospitals. As part of the Affordable Care Act (ACA) enacted in 2010, the IRS has implemented stricter reporting requirements, and many state and local governments are currently evaluating hospital tax breaks based on subsidizing greater quality care. One response is that hospitals are entering into a variety of value-based payment models with CMS and private payers where there are incentives for providing high-quality care that meets specific standards. However, BHR notes that an October 2013 report, from the United States Government Accountability Office, found the Value-Based Purchasing Program had modest effects on Medicare payments and no apparent change in quality-of-care trends.

Hospitals that increase physician usage get greater growth but lower profit margins because of the high costs of using physicians. This raises the questions of the value added by physicians as opposed to what lower compensated health care workers could provide who accept less pay. Agency costs can result from monitoring high salaried physicians who can be motivated to gain control of hospital systems. However, there are other structural problems related to the supply of physicians. The Association of American Medical Colleges (AAMC) estimates the U.S. will have a shortage of between 61,700 and 94,700 physicians by 2025 with a significant shortage among many surgical specialties. Thus, the high cost of employing physicians is not likely to decrease. The fifty-four percent burnout rate for physicians in 2014 compares unfavorably with other professions. This burnout rate trend is worsening. This supply-demand problem is something the government could address by supporting the staffing of medical schools to allow the acceptance of more qualified applicants. Furthermore, American College of Healthcare Executives report that the 18% CEO turnover for hospitals is high compared to other industries. This indicates that the industry itself has something inherently undesirable about it. The average patient, who has received a hospital bill and seen the allowable write-offs for those with insurance, knows firsthand that things are dysfunctional. The above problems that lead to an overleveraged situation and uncertainties in managing hospitals are important to this study as they indicate serious concerns reflected in the valuation for NPIs and FPHs that we report in Sections 5 and 6.

2.2 Characteristics of Nonprofit and For-Profit Ownership Structures for Hospital

Table 1 summarizes similarities and differences in characteristics between NPIs and FPHs as referenced and discussed throughout this paper. From this table, we can observe major differences in owners, board members, official obligations, major goals, and mission. The decision-making and implementation category illustrates that FPHs are better equipped to be more efficient. Whereas sources of revenues are similar, NPIs have a big advantage in terms of creating revenues from donations and maintaining profits through lower taxes. Table 1 also reports the distribution constraints NPIs face that can lead to low monitoring by those who have the greatest stake in the profitability of the hospital. Finally, Table 1 briefly describes the differences in financing and in taxes paid. We discuss these differences in more detail in later sections.

Insert Table 1 (about here)

With few exceptions, both nonprofit and for-profit hospitals are corporations. Nonprofits incorporate in the United States under chapter 501(c) of the IRS code with the majority registered as 501(c)3 corporations. The IRS requires that a 501(c)3 corporation exists for a charitable purpose; cannot be created or operated to benefit private interests; and, cannot provide residual earnings to directly benefit individuals or organizations that control the nonprofit. As can be gleaned from Table 1, the defining characteristics of nonprofits are lack of equity owners, non-distribution constraint, and tax subsidies. The lack of equity owners restricts nonprofits from accessing capital in equity markets. The non-distribution constraint prohibits paying residual earnings to individuals who exercise control over the firm. Tax subsidies available to nonprofits are the tax deductibility of donations; tax exemptions from both

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property taxes and the corporate income tax; and issuance of debt that is exempt from personal taxes. The tax
deductibility of donations enables NPHs to attract donors that provide funds to invest in capital expansion. The tax
exemptions for NPHs can influence capital expenditures. Hansmann (1981) views capital expansion as the main
validation for the corporate income tax exemption. Hospitals can received short-term financing by maintaining a line
of credit with a local bank that enables them to pay their bills during months when their cash flow is negative.
However, if revenues fall, they may be unable to meet the constant drain of paying the interest forcing conversion of
this financing to long-term debt at a steeper cost.

Unlike NPHs, FPHPs pay property and income taxes and have more avenues for raising capital. The greater
capacity to raise funds enable FPHPs to better upgrade facilities, purchase medical equipment, and cultivate information
systems. Despite these advantages, critics of FPHPs argue that they only answer to equity owners who may not have
the same interests as the local communities. This can create an agency conflict between the community (principal)
and equity owners (agent) if equity owners maximize their own wealth at the expense of sufficient health care to the
community. Compared to NPHs, some believe FPHPs are more likely to stop offering services that are valuable because
they are money-losing services. Because FPHPs do not have the subsidies associated with NPHs, they should be less
likely to finance operating losses and inefficiency in production.

Besides a heavy reliance on tax-exempt debt, NPHs achieve funds through donations, payment for services
rendered, and grants from government and private sources. The value of net assets for NPHs are analogous to the book
value of equity for FPHPs in that they are built up through the retention of net revenues. Donations for NPHs often
come with restrictions on their use. Donations can be unrestricted, temporarily restricted, or permanently restricted to
specific uses by the donor. Unrestricted tax-deductible donations are limited to supporting the charitable mission of
organization and cannot benefit private individuals. Restricted donations are akin to preferred stock in that they create
a specific obligation on the firm but do not create a liability for the firm. Permanently restricted donations often create
endowment funds where the use is limited by agreement between the donor and recipient organization. Temporarily
restricted donations finance one-time projects, such as constructing a building, but have their use limited by agreement
between the donor and the recipient (FASB 2008). The purpose of government and private grants are primarily to
meet specific needs or pursue specific outcomes and the use of these funds are restricted to those purposes.

To justify their subsidies, NPHs must produce charitable care value to their communities and society that justify
the value of their subsidies. Frank and Salkever (1994) suggest it is difficult to monitor the care provided by NPHs
and with the subsidies tied to the nonprofit title. They offer two historical justifications for providing public subsidies
to hospitals. First, the nonprofit status of NPHs signals trustworthiness in that patient care is their top concern. This
trust signal can alleviate information asymmetries that exist between healthcare providers and their patients, while
FPHPs have a separate loyalty to the equityholders that may conflict with their loyalty to their patients. Second,
healthcare is a public good and people should receive medical care regardless of their ability to pay. Since NPHs
receive substantial subsidies, they should be in a better position than FPHPs to provide charitable care to poorer patients.
However, as documented in the next section, the research cannot find consistent support of superior care by NPHs
over FPHPs.

2.3 Quality of Health Care Provided by Nonprofit and For-Profit Hospitals

The existing literature (McClellan and Staiger, 1999; Horwitz, 2005; Congressional Budget Office, 2006; Joynt,
Orav, and Jha, 2014; Valdovino, Le, and Hsia, 2015) indicates that the amount of charitable care and the quality of
that care for NPHs are not noticeably different from FPHPs. This is surprising given that Adelino, Lewellen, and
Sundaram (2013) point out FPHPs strive to maximize shareholder value while NPHs endeavor to serve donors, workers,
community, and society. As a result, Adelino, Lewellen, and Sundaram write that NPHs evaluate and select investment
projects differently than FPHPs and this will hold even in the absence of agency problems or other frictions found
within hospital governance. Regardless, the potential for agency conflicts adds another dimension that distinguish
NPHs from FPHPs because donors and taxpayers have at best weak control over the internal decision making of NPHs.
This leads to NPHs maximizing the utility of insiders (board members and employers) as opposed to donors and
taxpayers. This suggests that NPHs are not in close proximity to FPHPs on the governance spectrum. The structures
unique to NPHs and FPHPs can involve significant economic stakes with the stakes potentially high due to the effects
of weak governance on nonprofit behavior.
The hospital ownership research explores to what extent the nonprofit and for-profit corporation structure influences both firm valuation and healthcare quality. Horwitz (2005) suggests greater firm valuation for FPHs on several fronts. *First*, she finds that FPHs are more likely to offer profitable care like open-heart surgery and less likely to offer unprofitable services like psychiatric emergency care or substance abuse treatment. *Second*, she also discovers that FPHs respond more quickly to changes in financial incentives. When home healthcare became profitable, the likelihood of FPHs offering the services more than tripled, but when a law changed to make the services less profitable, the probability of FPHs offering them dropped quickly. *NPHs* went through a similar change, but it was not as fast or dramatic. *Third*, Horwitz adds that, when under financial pressure, FPHs are more likely to close or restructure than NPHs. However, it can be difficult to know what valuation differences between NPHs and FPHs are the result of the type of ownership or the individual hospital management and geographic market. Lower taxes and greater subsidies for NPHs should result in higher valuations.

In regards to healthcare behaviors, McClellan and Staiger (1999) investigate NPHs and FPHs focusing on elderly patients with heart disease. They find that the higher mortality rate for FPHs compared to NPHs reflect the location more than the ownership structure. Within specific markets, for-profit ownership appears to be associated with better quality care. The small average difference in mortality between NPHs and FPHs masks an enormous amount of variation in mortality within each of these ownership structures. Overall, these results suggest that factors other than for-profit or nonprofit ownership structure are the main determinants of quality of hospital care. A Congressional Budget Office (2006) study found that, on average, the share of operating expenses that went to uncompensated care was 4.7% at NPHs and 4.2% at FPHs. Both of these percentages pale in comparison to government hospitals, for which the share was 13%. Like McClellan and Staiger, the congressional study found wide variation in the level of care provided by individual hospitals regardless of the ownership structure. If the level of healthcare represents true costs separate from government tax subsidies, then valuations for NPHs and FPHs should be similar.

### 2.4 Conversion between Nonprofit and For-Profit Hospitals

Conversions between NPHs and FPHs regularly take place indicating that the ownership structure is important and can improve the financing and operational efficiency of the hospital. Most conversions involve a new or existing for-profit firm purchasing the assets of the nonprofit. The purchase price serves to pay off any outstanding debt with the remainder going to the charitable purpose of the organization. Regular conversions between the ownership types indicate common grounds between the NPHs and FPHs that make possible a smooth transition to a new ownership structure. Furthermore, studies find similar characteristics remain after conversion. For example, Young and Desai (1999) investigate 43 NPHs that converted to FPHs and discover there were no statistically significant differences in health care prices after conversion. This was also true for the levels of uncompensated care provided or the provision of unprofitable services like trauma care, burn care and substance abuse treatment. However, they document that some new FPHs did see major changes. Within three years of conversion, seven of the 43 new FPHs had increased their level of uncompensated care by more than 40%, and ten had reduced it by more than 40%. The study also found that soon after converting, the new FPHs increased the percentage of insiders on their boards. The latter implies a drop in community representation. NPHs used for comparison purposes also had an increase in insiders on the board, but the change was not as large as it was among the new FPHs.

Cutler and Horwitz (2000) investigate 330 conversions of NPHs to FPHs. To provide insight on reasons for conversion and subsequent performance, they examine in detail two cases of hospital conversions. They discover that declining operating profitability and a decreased ability to service outstanding debt drives conversion from NPH to FPH. The implication of the conversion is that FPH management will do a better job of managing the finances of the hospital and the hospital will overcome the costs of being overleveraged. They find improved financial performance following conversion due to the ability of FPHs to increase public sector reimbursements and cut costs.

Blumenthal and Weissman (2000) point to the importance of the terms of the sale when conversions take place between NPHs and FPHs. They examine three academic medical centers bought by FPH chains and found no measurable harmful effects on charitable endeavors. One reason for this finding is that the contracts require the purchasers to continue their level of charitable care. Collins, Gray, and Hadley (2001) study eight NPHs that converted to FPHs including four that later closed. They find that FPH conversion prolonged the life of many institutions whose
value to their communities was low. They noted that the outcomes of conversions vary due to different factors that exercise an influence. Factors include institutional structures, histories, markets, and purchasers.

In their examination hospital ownership conversions, Sloan, Ostermann, and Conover (2003) describe a model in which the decision to convert is based on which ownership structure provides the greatest present value for the firm. If an FPH can increase the value of an NPH by increasing cash flows or decreasing the cost of capital, then the FPH will seek to convert to an NPH. FPHs typically have lower costs of capital due to greater access to equity markets. Consistent with the results of Cutler and Horwitz (2000), they find that conversion from NPH to FPH is most likely if the hospital has moderately negative operating margins, high debt ratios, and increasingly competitive environments. Conversions from FPH to NPH are more likely if the hospital’s operating margin suddenly decrease.

Joynt, Orav, and Jha (2014) examine 237 NPHs to FPHs conversions and find converting hospitals improved their profit margins more than a matched control sample of NPHs. They also discover there are no significant differences in processes, nurse staffing levels, poor or minority patients, and mortality outcomes between the postconversion FPHs and their control sample. Thus, the quality of healthcare does not change but the profitability does implying an enhancement in firm value. NPHs that converted to FPHs tended to be small to medium in size, located in the south, situated in an urban or suburban area, and less often teaching institutions.

While the conversion studies cannot definitely say valuation increased from changing ownership structure, the fact more NPHs convert to FPHs indicate that for many situations the conversion to a for-profit ownership structure creates more value. Given the greater number of conversions to NPHs despite tax subsidy advantage, one can argue that the for-profit structure for many situations is the most efficient structure in terms of producing favorable managerial practices and decision-making that leads to optimal financing choices and greater operational cash flows.

2.5 Waste-Warlord Agency Theory of Nonprofit Management

Easley and O'Hara (1983) note that state laws in the United States require that day-to-day expenses for nonprofits, including salaries, be reasonable. The problem is being able to accurately measure if the expenses are reasonable. Huge tax subsidies for NPHs create room for wasteful spending and indulgent perquisites for agents especially if proper monitoring is not possible or circumventable. This leads to a waste-warlord agency theory of nonprofit management where those in charge manage inefficiently and/or expropriate funds. This represent an agency conflict between principals doing the entrusting (community, patients, and donors) and agents in charge of hospital governance (board members and expert workers). By definition, warlords are leaders who threaten the sovereignty of an entity due to the ability to create forces loyal to them. Devoted forces within the system bow to the warlords because the warlords provide job security and pay benefits in exchange for the extraction of their benefits. Given the large tax subsidies, it could be relatively easy for NPHs to have warlord sovereigns in place to syphon off the excess tax subsidies to their own advantage or just exercise suboptimal behavior because no one will notice due to surplus subsidies. Overseeing an NPH may lead to a type of management practice where the supervisors intercept goods for themselves that escape notice due to lack of transparency and glut of funds produced by government subsidies.

Consistent with this waste-warlord agency theory, a criticism of the nonprofit ownership structure is that the lack of equity owners and subsequent weak governance from the board of directors leads to greater control by expert workers and greater agency problems compared to their for-profit counterparts. As noted by Glaeser (2003), the greatest difference between NPHs and FPHs is that NPHs do not have owners. Simply put, when no one is in charge to mind the store from a profit motive standpoint, the store’s value is at risk. Managers of nonprofit organizations face little and weak monitoring, generally by non-professionals. Glaeser points out the generally weak governance of nonprofit organizations means that if the organizations become financially self-sufficient over time, they will almost invariably become oriented toward the interests of their elite workers. The findings by Adelino, Lewellen, and Sundaram (2015) are consistent with Glaeser. They examine the effect of endowment investment returns on capital expenditures for NPHs and argue that the lack of governance results in overinvestment that benefits the expert workers. Investment returns represent cash flow shocks that are unrelated to the operations of the hospital. Little external oversight exists for the use of these returns with the exception that the funds must further the charitable mission of the hospital.
3 Capital Structure Research

In this section, we describe two major capital structure theories applicable to hospitals and their empirical support. We next look at how NPHs determine their capital structure. We then overview perpetuity gain to leverage (GL) equations usable to compute the change in value when an unlevered firm issues debt to retire equity.

3.1 Literature Review: Major Capital Structure Theories and Evidence

The two most widely recognized capital structure theories are the trade-off theory (TOT) and the pecking order theory (POT). Early TOT advocates (Baxter, 1967; Kraus and Litzenberger, 1973) contend an optimal debt-to-firm value ratio (ODV) exists that maximizes VL at a point where the marginal benefit of the debt equals the marginal financial distress costs. Since NPHs have little if any corporate tax shields, the agency component of TOT research can support an ODV for NPHs using an argument that an optimal debt-equity mix minimizes the potential principal-agency conflicts. The agency-based TOT of Jensen and Meckling (1976) demonstrates that ODV can occur without taxes and bankruptcy costs. This theory is particularly applicable to NPHs that deal with negligible tax rates. Jensen (1986) suggests that attaining ODV through debt issuance can resolve agency problems related to those in charge squandering excess cash. This notion should be especially relevant to NPHs since equity owners and investment analysts do not monitor those in charge of nonprofits.

TOT researchers (Donaldson, 1961, Myers, 1984; Myers and Majluf, 1984) offer a theory of capital structure choice based on a strict ordering of financing choices. Donaldson discovers corporate managers prefer earnings for financing capital projects, and if they need more resources to cover all profitable opportunities, they turn to asset conversion. If that is still not enough, they will issue debt before selling new equity. Besides adverse selection, the POT ordering of items can stem from a variety of other factors including agency conflicts and taxes. Bowman (2002) offers a POT that has a different arrangement of financing choices for NPHs than for FPHs. For Bowman, managers should prefer earnings (donations) to borrowing and borrowing to asset conversion where asset conversion refers to selling a portion of the endowment. Thus, to be consistent with POT, NPHs should choose to finance new investment with incoming donations prior to issuing debt. A principal cost for Bowman is the cost of default because stakeholders in an NPH cannot liquidate its assets even if on a downward spiral. NPHs should wait to use endowment funds until they reach their debt constraint as the endowment funds used jointly with tax-exempt debt create arbitrage cash flows. The selling of endowment funds is asset conversion that, for the Bowman POT variant, replaces issuing equity since NPHs cannot issue equity.

Empirical researchers (Altman, 1984; Fischer, Heinkel and Zechner, 1989; Kortevegh, 2010) support TOT for FPHs. This implies FPHs can be financially inefficient by issuing too little debt thereby losing corporate tax shield or issuing too much debt causing financial distress. Wedig, Sloan, Hassan, and Morrissey (1988) and Wedig, Hassan and Morrissey (1996) have provided both theoretical and empirical support for a theory of costly debt financing in NPHs. Their theories and evidence also indicate that the cost of debt financing for nonprofit entities is an increasing function of the total level of funds borrowed. Wedig, Sloan, Hassan and Morrissey (1998) find that chain hospitals are able to access more debt, both taxable and tax-exempt, than freestanding hospitals. Consistent with Gentry and Penrod (2000) and Gentry (2002), Bowman (2002) notes that tax-exempt debt opens the door for tax arbitrage and encourages borrowing, even when there are sufficient internal resources to acquire needed physical assets. Bowman's results support the hypothesis that NPHs follow TOT when determining how to finance their organization.

Similar to Bowman (2002), Jegers and Verschuuren (2006) design tests to determine if TOT or POT dictates how nonprofit managers design the capital structure of the firm. Their results are consistent with POT where agency costs are important when considering all liabilities, but not for interest-bearing debt only. Consistent with TOT, Graham (2000), Kortevegh (2010), and Van Birgelen, Graham, and Yang (2010) suggest that the increase in firm value from retaining ODV can range from 4% to 10%. Ruhl and Sull (2010) present the central conclusion that the overall evidence is far more consistent with models in which optimal debt priority and composition is set to mitigate managerial and creditor agency problem. They state that an asymmetric information story based on POT is not sufficient to explain their results. Graham and Leary (2011) summarize how well the TOT and POT approaches explain the sources of variation and highlight their empirical shortcomings. They find that researchers miscalculate important variables in empirical tests.
3.2 NPHs Choice of Capital Structure

The research on how NPHs choose their capital structure is sparse. Although support for POT may be consistently lacking for FPHs, such is not always the case for NPHs where the order of preference to minimize information sharing and loss of autonomy depends on the ability to generate funds from non-donative sources. If a nonprofit can generate funds by providing services, as in the cases of hospitals and universities, or through the income of existing endowments, the path of least resistance should follow funding activities through service-generated revenues, income from endowments, new donations, and then interest-bearing debt. This modified POT path allows for less external monitoring of mission achievement and greater autonomy for expert workers. Glaser (2003) finds support for a modified POT for nonprofits when examining universities and hospitals. The explanatory power of the POT relies on sufficient and consistent service-generated revenues and sufficiently large endowments to reduce the reliance on a source of new endowment funds. In the absence of these sources of funds, nonprofits face a debt constraint as the source of repayment relies on a consistent flow of donations.

NPHs are one of a few types of nonprofits that have tax-exempt debt available. This type of debt can encourage NPHs to issue debt beyond what might be optimal and perhaps do so with less anxiety of being overlevered. For NPHs that cannot issue tax-exempt debt, the use of costly bank debt might be discouraged relative to funding with internally generated funds. However, NPHs might be encouraged to issue bank debt by their board and donors if the firm faces higher agency costs because of high levels of free cash flows. The ongoing interest payments would then be higher, as suggested by Jensen (1986). The free cash flow problem can be problematic for NPHs, as owners are not allowed to receive excess cash as either dividends or capital gains. To the extent an NPH is limited by the tax-exempt debt it can issue, it could turn to the high cost of bank debt financing to counteract the free cash flow problem.

Besides the free cash flow problem, NPHs have other potential principal-agency concerns. For example, NPHs do not have standard metrics for evaluating managers (such as stock returns, return on equity, and profit margins). This implies potential agency problems with monitoring and evaluating managers of nonprofits due to a lack of clear measures and proper oversight supplied by profit-seeking equity owners. To illustrate the latter, Stewart (2015) writes that Cooper Union in New York City, a prestigious college, borrowed $175M for 30 years at a rate of 5.75% and then spent most of the proceeds on a lavish new building while continuing to run operating deficits. This nonprofit institution also agreed to a prohibitively expensive prepayment penalty, making it financially impossible to extricate itself from the terms of the loan.6

3.3 Four GL Models

The MM (1963) and Miller (1977) models offer the most recognizable gain to leverage (GL) equations to value the debt-equity choice. For MM, the increase in value from a debt-for-equity transaction is

$$ G_L^{D \rightarrow E} = T_E D $$

(1)

where D $\rightarrow$ E indicates the direction of the exchange is an increase in leverage, $T_E$ is the corporate tax rate, and D is perpetual debt. $T_E$ can be viewed as the coefficient of sensitivity that captures the value of not paying taxes (federal, state, and municipal taxes) due to the deductibility of the interest payment. Without personal taxes and with a perpetual interest payment (1), debt is defined as $D = \frac{1}{r_D}$ where $r_D$ is the cost of debt and equals the risk-free rate ($r_f$) if debt is riskless.

Building on the research of Farrar and Selwyn (1967), Miller includes personal taxes and expands (1) so that

$$ G_L^{D \rightarrow E} = [1 - \alpha] D $$

(2)

where $\alpha = \frac{(1 - T_E)(1 - T_D)}{(1 - T_D)}$, $T_E$ and $T_D$ are the respective personal tax rates applicable to income from equity and debt, and D now includes personal taxes. With personal taxes, the value of debt becomes $D = \frac{(1 - T_E)}{r_D}$. Miller (1977) believes the costs related to the increases in debt are negligible enabling the effect of personal taxes alone to offset the

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effect of corporate taxes at the firm level. Thus, for Miller, incorporating personal taxes restores an earlier finding by Modigliani and Miller (1958) that a firm's value lies in its operating assets.

In light of Miller's claims, the TOT research considers a variety of leverage-related costs and shows, contrary to Miller's belief, that ODV exists even with personal taxes. By arguing for a hierarchy of financing choices that preserves financial slack, avoids negative signaling, and reduces flotation costs, POT is not intrinsically in disagreement with TOT. This is because the path of raising funds, suggested by POT, is a path that can also lead to the ODV. The pathway offered by POT is a route aimed at minimizing costs and thus can be an essential part of TOT that suggests ODV occurs where benefits' and costs of debt offset one another. Leland (1995) considered a perpetuity-like framework with firm value following a diffusion process with constant volatility and linked optimal leverage to firm risk, taxes, bankruptcy costs, riskless interest rates, payout rates and bond covenants. Goldstein, Ju, and Leland (2001) extend Leland and propose a model of dynamic capital structure in which a firm has the option to increase future debt levels where the tax advantages to debt increase significantly and both the optimal leverage ratio range and predicted credit spreads are more in line with what is observed in practice. Hackethal and Mauer (2012) extend the TOT of Leland (1994) where the firm has multiple debt issues and equity owners choose the timing of investment.

Hull (2007) coins the phrase the Capital Structure Model (CSM) to describe his approach to valuing a debt-for-equity transaction. The CSM extends the perpetuity Gt line of research originating in MM (1962). Hull views his perpetuity model as the financing side complement to the payout side found in the Dividend Valuation Model (DVM). Like the DVM, the CSM has both nongrowth and growth equations and both are perpetuity discount models. The CSM is derived from the definition of Gt = VL − VU, where levered firm value (VL) and unlevered value (VU) are defined in terms of a perpetuity after-tax cash flow discounted by their respective costs of borrowing. An ODV can result since each increasing debt-for-equity choice generates increasing costs of levered equity and debt that eventually causes Gt to begin falling as the amount of debt issued increases.

Unlike MM and Miller, the CSM debt-for-equity Gt equation can lead to an interior ODV consistent with TOT. The CSM represents an innovative approach that generates a Gt equation with multi-components as opposed to the single component equations of MM and Miller. Keeping the MM and Miller unlevered and nongrowth conditions where the plowback ratio (PBR) is zero, Hull (2007) derives the nongrowth CSM Gt equation by subtracting the standard definitions for VU (with nongrowth) from VL (with nongrowth). This equation is

\[
G_t^{D \rightarrow E} \text{ (nongrowth)} = \left[1 - \frac{CF_{it}}{r_t}\right]D - \left[1 - \frac{r_{U}}{r_t}\right]E_U
\]  

(3)

where \( r_U \) and \( r_t \) are the respective unlevered equity and levered equity and, \( E_t \) (or \( V_U \)) = \( \frac{(1-T_E)(1-T_C)}{r_t} \) with \( C = (1-PBR)(CF_{it}) \) where \( PBR = 0 \) since (3) assumes nongrowth and \( CF_{it} \) is the perpetual cash flow before taxes. The first component of (3) is positive since we expect \( \frac{CF_{it}}{r_t} < 1 \) to hold except for rare situations. Hull argues this component represents a positive tax-agency effect because a positive effect can result even when taxes are a nonfactor. This is because the first component is positive when \( \alpha = 1 \), which represents a situation where tax rates are offsetting such that \( (1-T_E)(1-T_C) = 1-T_D) \). The second component is negative because \( \frac{r_{U}}{r_t} < 1 \). Hull states this component embodies a negative financial distress effect caused by increasing \( r_t \) values as debt increases such that the component becomes more negative as debt increases. Hull and Price (2015) apply the nongrowth CSM to pass-through companies to show an optimal exists even in a world without corporate taxes.

Hull (2010) builds on (3) by assuming growth where \( PBR > 0 \) and demonstrates how the plowback-payout decision influences the leverage decision through his equilibrating levered equity growth rate (Gt) that includes both the plowback and leverage choice. The Gt equation with growth is derived by subtracting the standard definitions for \( V_U \) (with growth) from \( V_L \) (with growth). The growth CSM equation is

\[
G_t^{D \rightarrow E} \text{ (growth)} = \left[1 - \frac{CF_{it}}{r_t}\right]D - \left[1 - \frac{r_{U}}{r_t}\right]E_U
\]  

(4)

11
where \( r_{ul} \) and \( r_{lg} \) are the growth-adjusted discount rates on unlevered and levered equity; \( r_{ul} = r_{l} - g_{u} \) with \( r_{l} \) and \( g_{u} \) as the borrowing and growth rates for unlevered equity; \( r_{lg} = r_{l} - g_{l} \) with \( r_{l} \) and \( g_{l} \) as the borrowing and growth rates for levered equity; and, \( r_{l} \) (with growth) = \( \frac{(1-T_c)(1-T_p)C}{(1-T_c)} \) with \( C = (1-PBR)(CF_{ot}) \) where \( PBR > 0 \). Hull shows that while \( G_{l} \) depends on its plowback-payout decision, \( G_{u} \) depends on both the plowback-payout and debt-equity decisions. Hull treats the latter two growth variables as equilibrating variables and defines them as equilibrating \( G_{u} = \frac{r_{ul}(1-T_c)RE}{C} \) and equilibrating \( G_{l} = \frac{r_{l}(1-T_c)RE}{C+G(1-T_c)} \) where \( RE \) is retained earnings, \( G = \frac{r_{lg}G_{l}}{(1-T_l)(1-T_c)} \) and is the after-tax perpetuity resulting from \( G_{l} \), and an iterative process is used to determine the equilibrating \( G_{l} \). The introduction of growth can alter the signs for the two components in (4) so that they differ from the two corresponding components in (3).

4 Hospital Descriptive Statistics

In Table 2, we provide descriptive statistics for key hospital variables. In Table 3, we give current values for variables used to compute our \( G_{l} \) and \( V_{l} \) results. We next introduce our bond ratings approach to deriving costs of borrowing for fifteen debt issuance choices. Table 4 reports these fifteen borrowing costs for NPHs and FPHs.

4.1 Descriptive Statistics

Table 2 provides mean and median statistics for 378 non-government hospitals consisting of 360 nonprofit hospitals (NPHs) and eighteen for-profit hospitals (FPHs). We use data from Modern Healthcare Systems Financials (MHSP) database for the year 2014, which is the most recent year for annual hospital data. For the most part, a hospital observation consists of a healthcare system with multiple hospitals and healthcare facilities. After removing 64 observations that did not have sufficient information or were government nonprofit hospitals, 360 non-government NPHs remain consisting of large nonprofit healthcare systems and large individual nonprofit hospitals. There are eighteen FPHs representing the eighteen largest for-profit healthcare systems that contain the overwhelming majority of for-profit hospitals and other for-profit healthcare facilities.

Insert Table 2 (about here)

Comparing NPHs and FPHs, we find 23.5% of variables where the medians for NPHs are greater than medians for FPHs. When we take the difference between median for NPH and FPH and divide it by the average of the two medians, the four greatest differences are: Total Margin Ratio (net income divided by total revenue), Days Cash on Hand, Cash-to-Debt Ratio, and Time Interest Earned Ratio. These results suggest that NPHs have greater capacity to generate profits from revenue sources; have a greater number of days that they can continue to pay their operating expenses with the amount of cash on hand; have more operating cash flows compared to liabilities; and, have better positioned themselves to honor their liabilities. The latter three variables are related and collectively indicate NPHs may have too much idle cash. While NPHs have a greater Total Margin Ratio (greater by 15.5%), we should note that FPHs have a much greater Operating Margin Ratio (greater by 55%). The differences in these two ratios reflect the differences in revenue sources where, as seen earlier in Table 1, NPHs receive donations, which are a non-operating source of revenues that can cause a greater Total Margin Ratio. Additionally, NPHs can also have lower costs such as not paying property taxes leading to a greater Total Margin Ratio.

The following four variables have more noticeable differences in terms of medians for FPHs being relatively greater than medians for NPHs: Before-Tax Cash Flows (proxied by EBIT + depreciation and amortization expenses), Operating Income, Interest Expense, and Total Liabilities. The superiority of the before-tax cash flows and operating income for FPHs is not totally due to the fact their "Total Assets" variable has a median that is 38% greater than that for NPHs. As just seen, the Operating Margin Ratio for FPHs is 35% greater than NPHs indicating a greater capacity to create operational cash flows. However, FPHs are inferior if we consider an after-tax valuation because NPHs only pay taxes on small profitable ventures that they undertake. This disparity in taxes paid will be seen later in Sections 5 and 6 when we compute after-tax firm values for NPHs and FPHs and find NPHs have much greater after-tax values.
for every dollar of cash flow generated from their revenue sources.\footnote{For our later comparison tests for NPHs and FPHs, we base their valuations on each having $1,000,000 before-tax cash flows. These tests are concerned with the after-tax value associated with this before-tax cash flow.} Greater interest expense for FPHs can be explained by greater amounts of debt being issued. A number of factors encourage larger amount of debt for FPHs. For example, FPHs can be forced into bankruptcy proceedings making it possible to liquidate their assets whereas NPHs are exempt from such proceedings. Thus, lenders shy away from debt for NPHs. Furthermore, debt for FPHs is believed to have less agency problems. When debt is perceived as having fewer financial distress and agency problems, then more debt will likely be issued causing a greater quantity of interest payments. If we break-down total liabilities, we find that FPHs have 42% greater current liabilities than NPHs and 60% greater long-term debt compared to NPHs. Greater use of debt is not just a function of greater FPH size as the median Total Liabilities to Total Assets for FPHs is 22% greater than that found for NPHs. As can be seen in Table 2, the medians and means are very similar for this variable.

4.2 Cost of Debt

The cost of debt (r_D) for bonds is determined by their yields. For bank debt, r_D is the interest expense on bank debt divided by its book value. While both NPHs and FPHs can use bonds and bank debt, only FPHs get the corporate tax deduction on interest paid. While NPHs can issue tax-exempt bonds, bank debt is not exempt from federal income tax (and other applicable taxes such as state taxes) and so is more expensive than tax-exempt bonds for NPHs. On one hand, NPHs have less incentive than FPHs to issue debt since interest expenses do not provide a tax deduction at the corporate tax rate (T_c). On the other hand, NPHs can issue debt that is exempt from personal taxes (T_p). In a world where the risk of NPHs and FPHs are the same such that both have the same before-tax cost of debt, we have, on an after-tax basis, r_{D,NPH} = (1-T_p)r_D and r_{D,FPH} = (1-T_c)r_D. If T_p = T_c, we have r_{D,NPH} = r_{D,FPH}. However, even if T_p = T_c, other factors may prevent r_{D,NPH} = r_{D,FPH} from holding. For example, as seen in Table 2, since FPHs have higher debt-to-firm ratios (DV) and higher TIE ratios, then ceteris paribus r_{D,FPH} > r_{D,NPH} should typically hold. However, there are also factors that can cause r_{D,NPH} > r_{D,FPH} to hold. We describe these below.

First, NPHs can have greater agency costs because they have less external monitoring compared to FPHs where analysis scrutinize their performance. Second, NPHs can have greater financial distress risk because, unlike FPHs, lenders cannot force NPHs into involuntary bankruptcy. As noted by Elliott and Hollander (2014), NPHs can fully deplete their assets prior to lenders having the opportunity to seek relief from possible default. Third, from Table 2, we saw that NPHs have lower operating profit margins compared to FPHs. With lower operating profit margins, NPHs can be more risky due to greater dependence on non-operating revenue sources that may not be available to service debt because these funds are restricted.

Fourth, NPHs rely heavily on tax-exempt debt but this type of debt is subject to the “project financing” rule. This rule states that nonprofits issuing tax-exempt debt must spend more on approved capital projects than the amount of the tax-exempt financing. Wedig, Hassan, and Morrissey (1990) describe two situations that can lead to suboptimal capital structure decisions under this rule. One situation is where the dollar amount of available tax-exempt financing is greater than the dollar amount of profitable capital projects. For this situation, they find that excess debt capacity spurs investment. Thus, firms may take on projects with low returns in order to access the tax-exempt financing. This results in being overleveraged and overinvesting. The other situation assumes the dollar amount of profitable projects exceeds the amount of available cash even when the NPH has too much tax-exempt debt. The inability of NPHs to access equity markets can result, once again, in being overleveraged but this time leads to underinvesting, as they will pass up profitable projects.

4.3 Cost of Equity

Financial managers typically measure the cost of equity by common methods such as CAPM, DVM or a premium of the cost of levered equity (r_L) over the cost of debt (r_D). For FPHs, the cost of equity financing can be external with financing from new issues or internal with the financing from retained earnings. For NPHs, external financing stems from new donors and internal financing from the retention of profits from sales, services and investments. In terms of external financing for NPHs, donors give gifts ranging from small cash donations to large endowments that bequest
large sums of money. The cash flows from donor gifts are arguably the least expensive form of financing. We can cite two reasons for this claim. First, donors do not receive dividends or capital gains from their donation and so the hospital has no payout obligations. Second, funds from donors do not create usage obligations for the hospital unless the donations is restricted. Donations can lead to overcompensating workers. For example, Feinman and Hubbard (2005) show that nonprofit organizations in states with poor government oversight have managerial compensation that is more highly correlated with inflows from donations.

Like debt financing, equity financing for NPHs pose greater agency problems than for FPHs. Consider the internal financing associated with revenues from services where the non-distribution constraint requires that NPHs retain the revenues. As the amount of wealth increases from retained earnings, Glaeser (2003) argues worker control increases causing less donor and board influence over operations of the NPH. Thus, as revenues generated from services increase there is reduced reliance on external financing from endowments and decreased control from past donors on the use of endowment funds. The result is agency conflicts as workers compete with donors and board members over organizational control.

Capital structure theory discusses other periphery costs of equity financing. For example, Hull (2010) maintains that retained earnings have a price tag that consists of paying corporate taxes before usage of the retained earnings occur. Corporate taxes are generally more expensive than flotation costs from new issues. This makes retained earnings or internal equity an expensive source of funds. POT proponents would argue that external equity financing for FPHs have costs that internal equity financing avoids. Besides flotation costs, a major expense circumvented is negative signaling that accompanies new issues. Except for small profitable ventures like gift shops, NPHs can retain earnings without corporate taxes. Thus, Hull argues that the cost of internal equity for NPHs is cheaper than experienced by FPHs. However, to the extent there are greater agency concerns for NPHs, they can face a number of costs from any source of financing and these costs are higher than those experienced by FPHs.

4.4 Gain to Leverage and Valuation Variables

Table 3 provides medians for key hospital variables needed to get our gain to leverage (GL) and firm value (VL) results found in Sections 5 and 6. This table reports 8.11% for the market return (RM), which is consistent with equity indices the past forty years, and 1.90% for the risk-free rate (RF) given by the twenty-year government security. We use an unlevered beta (βL) of 0.57, which is essentially what Damodaran (2016) report for his sample of healthcare facilities for 2014. The value of 0.57 applies to both NPHs and FPHs under the assumption that all hospitals have similar assets regardless of ownership structure. Given our values for RM, RF, and βL, we use the CAPM to compute the unlevered cost of equity (UL) of 5.4397% as reported in Table 3.

Insert Table 3 (about here)

Table 3 next supplies current debt-to-firm value ratios (CDVv) of 0.470 for NPHs and 0.565 for FPHs. Given the nature of nonprofits, the total liabilities to total assets ratio proxies for the market-based CDV. However, for FPHs, we adjust the Total Liabilities to Total Assets value for FPHs down from a median of 0.726 given in Table 2 to 0.565 based on computations of market value of equity for FPHs that lower the relative amount of debt financing. Suppose we use the 0.736 value in Table 2 for the market value. Doing this will not change our general conclusions about FPHs being overleveraged as reported in Sections 5 and 6 but would cause our results and conclusions to be even more overleveraged than what we report in Sections 5 and 6.

Our costs of borrowing reported in Table 3 correspond to current debt-to-firm value ratios (CDVv). While we are reporting these costs now, they cannot be identified until Sections 5 and 6 when we apply our nongrowth and growth CSM equations with our fifteen debt issuance choices based on fifteen bond ratings. The first value for each cost of borrowing in Table 3 is for a nongrowth situation and the second value is for a growth situation. As seen in Table 3, the RD values that correspond to CDVv of 0.470 for NPHs are 4.2323% for nongrowth and 2.9996% for growth. For FPHs, the RF values that correspond to CDVv of 0.565 are 6.15% for nongrowth and 5.15% for growth. The RF values are 7.0923% for nongrowth and 5.8596% for growth for NPHs. For FPHs, they are 9.01% for nongrowth and 8.01% for growth.

Table 3 next reports the debt beta (βD) and levered equity beta (βL) values based on the RD and RF using the beta formulas of βD = (RD - RF) / (RM - RF) and βL = (RL - RF) / (RM - RF). As seen in this table, the median βD values for NPHs
are 0.3756 for a nongrowth situation and 0.1771 for a growth situation. For FPHs, they are 0.6844 for nongrowth and 0.5233 for growth. The $\beta_1$ values for NPHs are 0.8361 for nongrowth and 0.6376 for growth. For FPHs, they are 1.1499 for nongrowth and 0.9839 for growth.

The total hospital tax rate includes the tax rate on income and other taxes. These aren't separately delineated on hospital financial statements. While NPHs may pay taxes on business activities not related to their mission as well as pay taxes on property not being used to fulfill the mission of the nonprofit, these taxes tend to be relatively small and generally unrelated to the capital structure of the firm. Tax-exempt debt for NPHs requires that the debt be used for a specific, predetermined purpose that is related to the mission of the nonprofit. With the above in mind, Table 3 reports that the corporate tax rate for NPHs ($T_{\text{CNPNI}}$) is 2.00% under the assumption that non-profits cannot avoid all corporate, state and other applicable taxes. We compute the corporate tax rate for FPHs ($T_{\text{CNPNI}}$) as 33.4% from Capital IQ using median of the tax rates for the publicly traded FPHs for 2014.

As reported in Table 3, the personal tax rates on equity ($T_{\text{ENPNI}}$) and debt ($T_{\text{DENPNI}}$) are, respectively, 1.00% and 1.908% for NPHs and 18.80% and 19.08% for FPHs. We will now explain how we chose these values. Since few hospitals pay any dividends, the effective personal equity tax rate of $T_e$ is assumed to equal the capital gains rate for FPHs. Marotta (2014) indicates that the majority of tax payers who invest in equity will pay a marginal tax rate on capital gains of 18.8%. Thus, for FPHs, we use $T_{\text{ENPNI}} = 18.80\%$ as the typical or median situation. NPHs do not payout earnings, as they have no equity investors per se even for small the for-profit ventures they might undertake. Some states allow nonprofits to issue shares but they are the traditional dividend paying shares. Thus, we assume negligible leakage of benefits that might have personal tax consequence and so set $T_{\text{ENPNI}}$ at 1.00%. We calculate the effective $T_{\text{DENPNI}}$ of 19.08% for FPHs based on the imputed personal tax rate on debt from municipal bond and corporate AAA bond yields. We assume a small personal tax rate on debt for NPHs because not all of their debt is tax-exempt and use $T_{\text{DENPNI}} = 1.908\%$. While we assume small numbers for $T_{\text{ENPNI}}$, $T_{\text{DENPNI}}$, and $T_{\text{CNPNI}}$, we do not know how negligible they might be in actuality. Regardless, the use of 0% (or even somewhat larger numbers than what we use) will not impact our findings. Unlike betas and the costs of borrowing, tax rates are assumed to be independent of the leverage ratio.

4.5 Deriving Costs of Borrowings for Fifteen DVs using the Bond Ratings Approach

We provide details on the fifteen bond ratings, spreads, and costs of borrowing values for fifteen increasing debt-to-firm values (DV$s$) in Table 4. To get the cost of debt for FPHs ($r_{\text{DFPH}}$) for each DV, we first identify fifteen spreads for fifteen bond ratings as supplied by Damodaran (2016). We then add each spread to our risk-free rate of 1.90%. This gives our fifteen $r_{\text{DFPH}}$ values. To illustrate, for the first bond rating of Aaa/AAA where the spread over 1.90% is 0.75%, we have: $r_{\text{DFPH}} = 1.90\% + 0.75\% = 2.65\%$. In a similar fashion, we compute the other fourteen $r_{\text{DFPH}}$ values in sequence based on the highest to lowest bond ratings as seen in Table 4.

Insert Table 4 (about here)

To get the costs of debt for nonprofits ($r_{\text{DENPNI}}$), we adjust $r_{\text{DFPH}}$ based on the weighted amount of tax-exempt debt (referred to as $W_{\text{TED}}$) for NPH. To get $W_{\text{TED}}$, we use a random sample of fifty NPHs with total interest-bearing debt and tax-exempt debt information to come up with a weight of about 0.934 based on dividing tax-exempt debt by total interest bearing debt. Consequently, we assume that personal taxes are paid on $(1 - 0.934) = 0.066$ of remainder of the total debt where this remainder would likely be bank debt. Thus, we use $W_{\text{TED}} = 0.934$ when adjusting $r_{\text{DFPH}}$ downward by the personal tax rate on debt for NPHs ($T_{\text{DENPNI}}$). In formula form, we have: $r_{\text{DENPNI}} = r_{\text{DFPH}}(1 - T_{\text{DENPNI}})W_{\text{TED}} + r_{\text{DENPNI}}(1 - W_{\text{TED}})$ where $r_{\text{DENPNI}}$ is one of the fifteen costs of debt used for NPHs. Inserting our values where $T_{\text{DENPNI}} = 19.8\%$ (given in Table 3) and $r_{\text{DFPH}} = 2.65\%$, we get $r_{\text{DENPNI}} = 2.65\%(1 - 19.8\%)(0.934) + 2.65\%(1 - 0.934) = 2.1778\%$ for the highest bond rating. In a similar fashion, we compute the other fourteen values for $r_{\text{DENPNI}}$ in sequence based on the highest to lowest bond ratings as seen in Table 4.

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5 Nongrowth Results and Findings

In this section, we provide our findings. We begin by presenting the nongrowth results for MM (1963) in Table 5, Miller (1977) in Table 6, and nongrowth CSM in Table 7. The current DV (CDV) and $E_0$ are given in the panel headings for each table. Max $G_1$ and max $V_L$ refer respectively to the maximum $G_1$ and maximum $V_L$ at ODV. For each table, we give the max $G_1$ in the grey-shaded column. We end this section by discussing our nongrowth findings and conclude that the CSM produces results that are more realistic. In Section 6, we will explore how these nongrowth results compare to growth results.

5.1 MM Results

Table 5 provides results using the MM gain to leverage ($G_1$) equation given in (1). Panel A has results for nonprofit hospitals (NPHs). As given in Table 3, we assume a corporate tax rate ($T_C$) for NPHs of 2% based on small profitable ventures. MM do not consider personal taxes and so the personal tax rates on debt ($T_D$) and equity ($T_E$) are both 0%. $E_0$ or $V_L$ is unlevered equity computed on an after-tax basis and discounted by the cost of unlevered equity ($r_U$) of 5.4397% as was given in Table 3. All four $G_1$ applications use $1M$ (where M refers to millions) in before-tax cash flows (C). Given our above values, we have: $E_0 = (1 - T_C)(1 - T_D)/r_U = (1 - 0.02)(1 - 0.02)$/$1,000,000)/0.054397 = $18,015,699 or about $18,016M. We compute results for fifteen debt issuances with the proceeds retiring $E_0$. This gives fifteen columns of results. The first debt issuance retires 1/16 of $E_0$ or (1/16)/$18,015,699 = $1,125,981 or about $1.126M as seen in the first cell of Panel A. Each subsequent debt issuance retires the same amount of $E_0$ so that the 2/16 column retires $1.126M + $1.126M = $2.252M. This process repeats itself for all remaining choices from 3/16, 4/16, ... 14/16, 15/16. If there was a 16th debt issue then all $E_0$ would be retired and the firm would remain unlevered. The grey-shaded column is the optimal column and includes the max $G_1$ value of $0.388M. For Table 5, this is the last column. Here we see that the max $G_1$ is $0.338M. This column also shows that max $V_L$ is $18,353,494 or about $18.353M. The max $G_1$ increases $E_0$ by $337,794/$18,015,699 = 0.18750 or about 1.88%.

Insert Table 5 (about here)

As given in Table 3, CDV is 0.470 for NPHs. Our task is find the DV among the 15 columns that is the closest to 0.470 so we can deduce what current borrowing costs and values are associated with that point. To determine an approximation to 0.470, we look at the rows in Table 5 that have two leverage ratios: $D/E_0$ and $D/V_L$. Given that we only allow for fifteen debt-for-equity choices, the three columns in bold print in Table 5 are our best attempt to determine a reasonable leverage range where the current NPH median of 0.470 occurs. The leverage range for these three columns is 0.43 to 0.55. When we average the two leverage ratios for these three columns, we get 0.436, 0.498 and 0.559. The value of 0.498 (which is the average for $D/E_0 = 0.500$ and $D/V_L = 0.495$) is closest to 0.470 and so we choose this column to determine current values for NPHs. For this column, Fraction $E_0$ is 8/16 and the debt issuance is $9.008M. At this debt issuance, NPHs would experience a loss in value because $G_1$ is only $0.180M compared to the max $G_1$ of $0.338M in the last column. Thus, for every $1M in before-tax cash flow generated by its revenue sources, NPHs would lose $0.338M - $0.180M = $0.158M by not being at ODV. As a percent of $E_0$, this is a loss of 0.85% per year.

Panel B has the results for FPHs where $T_C$ is now 33.4%. This much greater $T_C$ causes lower $E_0$, $D$, and $V_L$ values but larger $G_1$ values compared to NPHs. Computing $E_0$ with the new $T_C$ gives $12,243,322. This $E_0$ value is seen on the Panel B line along with the CDV of 0.365. Once again, the $E_0$ value determines our fifteen debt issuances with the first debt issuance being $12,243,322/16 = $765,208 or about $0.765M as reported in the first cell of Panel

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9 The values that we report in Sections 5 and 6 (such as percent change in $E_0$ from max $G_1$ and the percent loss in $E_0$ by not being at ODV) do not occur in Tables 5 through 8. However, they will be in Table 9 at the end of Section 7 where we summarize the max $G_1$ and max $V_L$ results for the four models found in Tables 5 through 8.
B. The grey-shaded column with the max $G_t$ is once again the last column. The max $G_t$ of $3.834M$ found for FPHs is over eleven times greater than that of $0.338M$ for NPHs. This is due to the greater corporate tax shield for FPHs where they have a $T_e$ value of 33.4% compared to 2% for NPHs. This column also shows that the max $V_t$ is $16.077M$, which is lower than the $18.353M$ found for NPHs. Once again, this is due to the much lower $V_t$ value for NPHs causing a greater after-tax firm value of $18.353M - $16.077M = $2.276M$ compared to FPHs. This implies that to convert to an FPH, the NPH’s nongrowth efficiency must fall $2.276M/$18.353M = 12.40%, it also implies that FPHs must be $2.276M/$16.077M = 14.16% more efficient to be competitive with NPHs.

The numbers for $G_t$ and $E_t$ indicate that max $G_t$ increases firm value for FPHs by 31.31%, which is much greater than 1.88% found for NPHs. The CDV as first given in Table 3 for FPHs is estimated at 0.563. The three columns in bold print captures the range of DVs where 0.565 occurs. The column where Fraction $E_t$ is 10/16 contains the $D/E_t$ and $D/V_t$ values that are the closest to 0.565 as their average is 0.571. This column reveals that FPHs would issue $6.887M$ in debt and experience a loss because $G_t$ is only $2.556M$ compared to the max $G_t$ of $3.834M$. Thus, for every $1M$ in before-tax cash flow generated by its revenue sources, FPHs would lose $3.834M - $2.556M = $1.278M$ by not being at ODV. As a percent of $E_t$, this is a loss of 10.44% and is much greater than the loss of 0.88% found for NPHs by being at their CDV instead of ODV.

The major complaint against the MM model is that it suggests any firm, including a hospital will issue virtually unlimited debt as long as there is a corporate tax shield. This expected outcome of choosing the largest debt issue is seen in Table 5. For example, the weighted average cost of capital equation takes the factor of $(1-T_e)$ times the cost of debt. This factor can only be accurate by coincidence given that it ignores personal tax rates, agency effects, and financial distress costs. Thus, given MM’s disregard for factors other than a corporate tax shield, we should compare its results to those for other models as we will now do next using the Miller Model and subsequently by using two CSM models.

5.2 Miller Results

Table 6 provides results using the Miller $G_t$ equation given in (2). Once again, Panel A has results for NPHs. Assuming small profitable ventures that lead to small tax rates, Table 3 assigned the following tax rate values for NPHs: $T_e = 2.00\%$, $T_d = 1.00\%$, and $T_o = 1.908\%$. Inserting our designated values, we get: $E_t = (1-T_e)(1-T_o)C/V_t = (1-0.01)(1-0.02)(1,000,000)/0.054397 = 17,835,542$. As before, this $E_t$ value establishes our fifteen choices for debt issuance. The max $G_t$ given in the last column of Panel A is $0.183M$. This column also shows that the max $V_t$ is $18.018M$. Max $G_t$ increases $E_t$ by 1.02%. Thus, as was true for MM, the Miller model for NPHs causes a very small increase due to paying very small amounts of corporate taxes. The increase of 1.88% for MM falls to 1.02% for Miller for NPHs. The fall is because the small $T_o$ for NPHs is greater than their $T_e$.

Insert Table 6 (about here)

Table 6 has, in bold print, the columns that best represent the CDV of 0.497 for NPHs. The leverage range for these columns is 0.438 to 0.563. If we choose the column where Fraction $E_t$ is 8/16 with $8.918M$ for its debt issuance, then NPHs would experience a loss because $G_t$ is only $0.097M$. Thus, for every $1M$ in before-tax cash flow generated by its revenue sources, NPHs would lose $0.183M - $0.097M = $0.085M$ by not being at ODV. As a percent of $E_t$, this is a loss of 0.48%. Thus, as was found for MM, the loss of not being at ODV is relatively small for NPHs.

Panel B of Table 6 has the Miller results for FPHs where we now have $T_e = 33.40\%$, $T_o = 18.80\%$, and $T_d = 19.08\%$. $E_t$ is computed in Table 6 as $9,941,578$. The larger tax rates for FPHs compared to NPHs cause lower $E_t$, $D$, and $V_t$ values but larger $G_t$ values. This was the same pattern found for MM in Table 5. The max $G_t$ given in the last column of Panel B is $3.091M$, which is greater than $0.183M$ for NPHs due to the greater corporate tax shield for FPHs. This column also shows that the max $V_t$ is $13.033M$, which is lower than the $18.018M$ found for NPHs. This is due not only to the much lower $T_o$ for NPHs but also due to lower personal taxes for NPHs compared to FPHs. The end result is a much greater after-tax NPH firm value of $18.018M - $13.033M = $4.985M. This implies that to convert to an FPH, an NPH’s nongrowth efficiency must fall $4.985M/$18.018M = 27.67%. This Miller value is greater than the MM value of 12.40%. Max $G_t$ increases unlevered firm value by 31.10% for FPHs, which is much greater than the 1.02% found for NPHs. The three columns in bold print is our best attempt to determine a range of DVs where the CDV of 0.565 might occur for FPHs. The column where Fraction $E_t$ is 10/16 with $6.213M$ for its
debt issuance is the best choice as the average for our two leverage ratios is 0.571. For this column, FPHs experience a loss because \( G_L \) is only $2.061M in this column. Thus, for every $1M in before-tax cash flow generated by its revenue sources, FPHs would lose $3.091M - $2.061M = $1.03M by not being at ODV. As a percent of \( E_L \), this is a loss of 10.37% and is much greater than the loss of 0.48% found for NPHs. This finding of a greater loss for FPHs compared to NPH is agrees with the MM model.

How realistic are the Miller results? In answering this question, we should point out the Miller results depend on \( a \). For example, if \( a < 1 \) then all \( G_L \) results will be positive. However, if \( a > 1 \), all \( G_L \) results will be negative. When conducting NPH tests, \( a = 0.939 \) which compares to \( a = 0.668 \) for FPH tests. Thus, for Miller, NPH tests better represent what he believed, which is that \( a = 1 \) and \( G_L = 0 \) for all debt levels. He also believed that bankruptcy costs are negligible for most firms. The latter assumption will not hold for our next series of tests using the CSM because, unlike the MM and Miller models, the CSM has a second component in its \( G_L \) equation that shows bankruptcy costs occur especially as the leverage ratio becomes increasingly large as leverage increases. Thus, in answering our question, the Miller results (like the MM results) would only be realistic for the rarest of situations when other leverage-related factors are not present. In conclusion, it is imperative that we move on from the MM and Miller models to a model that contains more than just tax rates. The CSM that we will use next is a model that contains these other factors.

5.3 CSM Nongrowth Results

Table 7 provides results using the nongrowth CSM \( G_L \) equation given in (2). When \( D/V_L > 1 \) first occurs in a column, the firm would be controlled by debt owners and thus would revert back to an all-equity firm. Thus, all values in this column (and subsequent columns) would technically not occur but for illustration purposes we include them. For the NPH results in Panel A, \( E_L \) remains at Miller’s value $17,835,542 found in Table 6 since the same values for \( C, T_c, T_D, T_D \) and \( u_D \) still hold. The max \( G_L \) given in the grey-shaded column (where the optimal Fraction \( E_L \) is 4/16) is $2.334M, which is substantially greater than $0.338 for MM and $0.183M for Miller. Thus, despite the fact, the MM and Miller models include almost four times as much debt, they cannot attain the max \( G_L \) for NPHs found with the nongrowth CSM. We can explain this because the CSM’s first component captures a large positive agency effect in addition to a small positive tax effect. As explained by Hull (2007), a positive “agency shield” effect can be viewed as stemming from a synergistic impact due simply to how ownership claims are packaged and sold (with regard to risk) to shield the firm from costs associated with agency behavior. This column also shows that the max \( V_L \) is $20.170M, which is greater than $18.353M and $18.018M achieved by MM and Miller, respectively, for NPHs. Max \( G_L \) increases \( E_L \) by 13.09% for the nongrowth CSM, which is greater than the 1.88% and 1.02% attained respectively by MM and Miller. These results are consistent with the latter two models disregard for anything but a tax effect. The fact CSM attains negative values for \( G_L \), as seen in Panel A (and all panels of Table 7), serves to point out the insufficiency of the MM and Miller models to capture negative agency effects and bankruptcy costs as leverage increases with concomitant increases in costs of borrowing. While MM supplied formulas capturing the notion of a positive relation between debt and costs of borrowing, their \( G_L \) equation does not incorporate this notion. Miller’s belief that leverage-related costs are inconsequential at the firm level contradicts the notion that increasing costs of borrowing with increased leverage have a negative impact on a firm’s \( G_L \) and \( V_L \).

Panel A in Table 7 has, in bold print, the two columns that best represent the CDV of 0.470 for NPHs. The leverage range for these columns is 0.438 to 0.574. In terms of the average for the two leverage ratios, the best approximation for 0.470 is the column where Fraction \( E_L \) is 7/16. At this fraction, NPHs issue $7.803M in debt issuance and experience a loss because \( G_L \) is $-0.958M. For every $1M in before-tax cash flow generated by its revenue sources, NPHs would not only lose $0.958M but would also not achieve $2.334M at its optimal. Thus, NPHs lose $0.958M + $2.334M = $3.293M by not being at ODV. As a percent of \( E_L \), this is a loss of 18.46% and much greater than the 0.88% and 0.48% found for MM and Miller, respectively. Thus, the consequences of straying from ODV is quite large using the nongrowth CSM for NPHs.

Panel B of Table 7 has the nongrowth CSM results for FPHs where tax rates of \( T_c = 2.00\% \), \( T_D = 1.00\% \), and \( U_D = 1.908\% \) for the NPHs have changed to \( T_c = 33.40\% \), \( T_D = 18.80\% \), and \( U_D = 19.08\% \) for FPHs. This new array of
tax rates cause lower $E_d$, $D$, and $V_1$ values for FPHs compared to NPHs. These lower values were the same results as found in the previous two tables. However, the $G_L$ value is now smaller for FPHs compared to NPHs and this pattern differs from MM and Miller. Two reasons for the smaller $G_L$ for FPHs compared to NPHs include less agency benefit (as the first component is less positive) and greater financial distress (as the second component is more negative). The max $G_L$ given in the grey-shaded column (where 4/16 $E_d$ is retired) is $0.671M$, which is less than the respective MM and Miller values of $3.834M$ and $3.091M$ for FPHs. Whereas the nongrowth CSM gave greater $G_L$ values for NPHs due to a positive agency effect in the first component, we now have a less positive agency effect in the first component for FPHs. We also have a greater financial distress costs in the second component for FPHs compared to NPHs when using the nongrowth CSM. To illustrate, for the first component of $\left[1 - \frac{\alpha T_o}{r_L}\right]D$ in (3), we find $\left[1 - \frac{\alpha T_o}{r_L}\right]$ is larger at 0.6497 for FPHs compared to 0.5301 for NPHs but D is much smaller at $2.485M$ for FPHs compared to $4.459M$ for NPHs. To illustrate, we have $2.364M$ for NPHs for the first component compared to $1.615M$ for FPHs. Besides having a lower value for the first component for FPHs, we also find a more negative value for the second component for FPHs. For example, when comparing the second components, we have $-0.029M$ for NPHs and $-0.943M$ for FPHs. The grey-shaded column in Panel B also shows the max $V_1$ is $10.613M$ for FPHs. This max $V_1$ is less than that of $20.170M$ found for NPHs in Panel A. The difference in max $V_1$ values of $20.170M - 10.613M = 9.557M$ reflects the tax advantage achieved by nonprofits. This implies that to make conversion to an FPH profitable, an NPH’s nongrowth efficiency must fall $9.557M/20.170M = 47.38\%$. This nongrowth CSM value of 47.38\% is greater than the MM and Miller values of 12.40\% and 27.67\%. The difference can be explained by the CSM’s capacity to capture agency and financial distress costs through costs of borrowing that increase with leverage. Max $G_L$ increases $E_d$ for FPHs by $0.671M/9.942M = 6.75\%$, in Panel B which is less than 13.09\% found for NPHs in Panel A.

The columns in bold print are our best attempt to determine a reasonable range where the CDV of 0.565 for FPHs might occur. In terms of the average for $D/E_U$ and $D/V_L$, the best approximation for 0.365 is the column where Fraction $E_U$ is 8/16 (indicating half of $E_U$ is retired with debt). Using this column, FPHs would experience a loss because $G_L$ is $-1.236M$ if half of $E_U$ is retired. Thus, for every $1M$ in before-tax cash flow generated by its revenue sources, FPHs would lose $1.236M as well as the max $G_L$ of $0.671M$ if at ODV. Thus, by not being at ODV, the FPH loss is $1.2362M + 0.6714M = 1.908M$. The NPH loss of $3.293M$ is 173% greater than the FPH loss of $1.908M$. As a percent of $E_U$, the $1.908M$ loss is 19.19% for FPHs, which is slightly greater than the loss of 18.46% found for NPHs. This FPH loss of 19.19% is greater than that rendered by the MM and Miller models both of which were about 10.4%. This finding of a greater loss using the nongrowth CSM model occurs because it uses costs of borrowing that capture agency and financial distress effects.

5.4 Discussion of Results for the Three Nongrowth Models

The three models covered thus far have one characteristic in common: nongrowth. They also have one finding in common: an unlevered hospital can increase its value by issuing debt with each model dictating the amount of debt needed to maximize firm value. Given the CDVs that indicate limited use of debt, it is no surprise that the MM and Miller models find hospitals are underlevered because these models cannot capture negative agency effects and financial distress costs. For MM, the only condition for unrestrained debt is that $T_C > 0$ hold. For Miller, the only condition is that $\alpha < 1$ hold. Unlike MM and Miller, the nongrowth CSM finds hospitals are underlevered and, as will be shown in the next section, this underlevered finding also hold for the growth CSM that has virtually the same CDVs and ODVs. How accurate might the findings be for these models? Do they fit with what can be readily observed? Below we answer these two questions.

First, in regards to the accuracy of our nongrowth findings, the MM and Miller models do not capture negative leverage related costs as verified in Tables 5 and 6 where their values are positive and increase with debt. Thus, we doubt if these findings are accurate for most, if not, all hospitals. On the other hand, the nongrowth CSM has negative values captured by its second component and is capable of rendering a verdict other than the directive that a firm issues unconstrained amounts of debt. Thus, we conclude the CSM results are more accurate. Regardless of an appearance of accuracy, the CSM (like any model) is only as accurate as the values used for a model’s variables. However, as will be documented in Section 6.3, our results are robust to changes in values for variables used in our model.
Second, in regards to our results fitting with what we observe, our conclusion about hospitals being overlevered does have some readily observable support. For example, we find that the underlevered situation given by the CSM agrees with Ju, Parrino, Poteshman, and Weisbach (2005). They offer a TOT that predicts an ODV of 0.0599 for the year 2009 when the CDV is 0.3262 indicating that an overlevered condition for hospitals can exist. As a further case in point, the current high leveraged position of hospitals leads to lower rated bonds and higher interest payments indicating a high degree of financial distress costs. We can observe that it is frequently difficult to find hospitals issuing high grade or even upper medium grade bonds as they are often stuck in non-investment grade and highly speculative B rating range. The CSM suggests that hospitals should have debt levels that coincide more with higher B bond ratings. Further CSM tests suggest that even greater GL values than depicted in Table 7 could be achieved if A rated bonds were the norm. To illustrate, if we systematically lower the costs of debt below what they are, then GL can be substantially enhanced for all debt issuances choices. Perhaps the biggest negative impact on higher debt costs is that equity costs increase concomitantly. The CSM shows that this has a detrimental influence on Vt, causing the number of negative GI values to not only increase but the GI values become more negative. The overlevered conclusion associated with costly debt is consistent with the findings of Bowman (2015) who writes that hospitals and universities borrow more funds and pay more interest than other nonprofits. He adds that nonprofits spend over $20 billion a year on interest with the bulk of this on tax-exempt bonds and mortgages bonds where the latter comes with a high cost of borrowing. He calculates that the interest paid by nonprofits relative to the amount of mortgages and tax-exempt bonds outstanding is 3.7%, which is equivalent to about 4.41% cost of debt that is not tax-exempt and thus is a non-investment grade bond.

In Section 2.1, we gave hospital factoids that revealed profits are being pinched leading to less retained earnings and the fall in equity. The result is an overlevered situation as debt becomes greater relative to outstanding debt. As mentioned in Section 2.1, lawmakers and the public have begun to examine if the tax breaks are greater than the charity care and benefits provided by the hospitals. This suggests that perhaps NPHs get too much of an advantage as found in our valuation statistics that show NPHs get much greater valuation for every dollar from their revenue sources. Additionally, the increased use of participating bonds allows physicians and local community members to hold a part of the debt used by a hospital or a hospital project. In these situations, the cost of these alternative sources of capital can be high in terms of the transaction efforts and fees. At the same time, these options offer a tangible benefit by helping to solidify relationships between physicians and hospitals thereby reducing agency costs. Accordingly, hospitals will often utilize a joint venture approach to financing projects even if it may be more expensive in terms of transaction costs and other types of challenges than doing the project alone.

6 Growth Results

In this section, we begin by presenting our growth CSM results in Table 8. We end this section by summarizing our results in Table 9 for both nongrowth results from Section 5 and growth results in this section. Our summarized results include a number of major findings including the following three important discoveries produced by the CSM. First, we show that NPHs and FPHs are both overlevered and not attaining their maximum increase in E0 of nearly 13% by being at their ODVs. Second, the tax subsidies for NPHs create a situation where NPHs have to be 55% less efficient for a growth situation before they would convert to FPHs. This 55% compares to 47% for a nongrowth situations. Third, we can observe that NPHs have been converting to FPHs in greater numbers and the research cannot consistently show that NPHs produce greater or better charitable healthcare services compared to FPHs. Given the latter, we offer support for a waste-warlord theory presented in Section 2.5.

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10 Cathy Datcoff, Managing Director at Standard & Poor’s from 1989-2014, states that it is rare for a hospital to receive an “A” rating or above. This agrees with http://www.datcoff.com where we input our median values for EBIT and interest expenses and find an average hospital bond would have lower medium grade rated debt, which is also, what we report in Sections 5 and 6.


6.1 CSM Growth Results

Table 8 provides results using the growth CSM $G_t$ equation given in (4). When $D/V_t > 1$ first occurs in a column, the firm would be controlled by debt owners and thus would revert back to an all-equity firm. As we did in Table 7, we still include these $D/V_t$ values for illustration purposes. Panel A has growth results for NPHs. To find the optimal growth rate, we tried several back ratios (PBRs) until we maximized $G_t$ and then attained the highest $V_t$. We found that a PBR of 0.33 generates the greatest $G_t$ that occur at ODV, when the unlevered growth rate ($g_u$) is 2.625% and the levered growth rate ($g_L$) is 2.980%. Using our PBR and $g_u$ values along with the given tax rates for NPHs, we get an $E_U$ of $23,099,755$ as seen in the heading for Panel A. This growth value for $E_U$ is greater than the nongrowth $E_U$ of $17,835,452$ found in Panel A of Table 7. The max $G_t$ given in the grey-shaded column (where $4/16$ $E_U$ is retired) is $3.018M$, which is greater than $0.33M$ for MM, $0.183M$ for Miller, and $2.334M$ for nongrowth CSM, where the latter also occurs where Fraction $E_U = 4/16$. If we analyzed the first and second components for NPHs in Table 8, we can find sign differences compared to the corresponding nongrowth CSM values in Table 7. An explanation is that agency and financial distress effects become more prevalent with growth and can impact growth CSM components of (4) in a fashion that is opposite of that found for nongrowth components of (2). The grey-shaded column shows that the max $V_t$ is $26.118M$ and this is greater than $20.170M$ found for the nongrowth situations for NPHs in Panel A of Table 7. Max $G_t$ increases $E_U$ by 13.07%, which is virtually identical to the 13.09% achieved by the nongrowth CSM and greater than 1.88% and 1.02% for MM and Miller models, respectively. One can notice the extreme drop-off once the firm reaches its ODV. Besides the greater risk associated with growth and leverage when combined, the CSM model breaks down similar to the DVM when the growth rates get too high relative to the discount rate. It is also possible there are unresolved issues in the CSM equalizing $g_u$ formula that have yet to be discovered. For example, we might get a more accurate picture of the hospital growth situation if we could better account for the types of growth possible from both debt and equity. The growth CSM assumes that all growth is taking place from internal equity. For most industries and firms, this is not exactly the situation although one can assume that debt issued for growth can free up internal equity for other usage.

Insert Table 8 (about here)

Like the panels in prior tables, Panel A in Table 8 has bold print columns that best represent the ODV of 6.476 for NPHs. The leverage range for these columns is 0.313 to 0.813 and this range is much larger than found previously indicating the difficulty of identifying a precise range for a growth situation when we are limited to debt issuances based on fifteen bond rating categories. If we choose the column with Fraction $E_U = 5/16$ where the two leverage ratios average 0.456, NPHs experience a loss because $G_L$ is $-11.075M$. Since we only choose fifteen debt issuance points, this number can be exaggerated. If we choose a lower PBR giving smaller growth rates, the negativity would not drop off in a steep manner (as seen later in Figures 1 and 2) and the leverage range would be smaller. Using the numbers suggested by the growth CSM, we find that NPHs lose $3.018M + 11.075M = 14.093M$ by not being at ODV. Thus, unlike the smaller loss from straying from ODV of $0.185M$, $0.085M$ and $3.293M$ for MM, Miller and nongrowth CSM, respectively, the loss of not being at ODV is potentially quite large using the growth CSM for NPHs. As a percent of $E_U$, the growth CSM gives a loss of 61.01% that is also much higher than found for the three nongrowth models.

Panel B of Table 8 has the growth CSM results for FPHs where tax rates have increased with $T_e$ now at 33.40% causing lower $E_U$, $D$, $G_t$ and $V_t$ values when compared to NPHs. Using (4) and testing all possible PBR, we find that PBR = 0.38 generates the greatest max $G_t$ at ODV, where $g_u = 2.220%$ and $g_L = 3.487%$. With this PBR, we get a value of $10.415,193$ for $E_U$ as shown in the Panel B line of Table 8. The smaller FPH value for $E_U$ compared to the NPH value is the same result given in the prior three nongrowth tables. The max $G_t$ given in the grey-shaded column (where $5/16$ $E_U$ is retired) is $1.305M$, which is less than $3.018M$ given by the nongrowth CSM for NPHs. Max $G_t$ increases $E_U$ value for FPHs by $1.305M / 10.415M = 12.53%$, which is similar to 13.07% found for NPHs. The grey-shaded column also shows that the max $V_t$ for FPHs is $11.720M$, which is less than the $26.118M$ found for NPHs. As seen in the prior three tables, this difference in firm values between NPHs and FPHs reflects the tax advantages achieved by nonprofits. For the growth CSM, the result is a much greater after-tax firm value of $26.118M - 11.720M = 14.398M$ for NPHs over FPHs. This implies that to convert to an FPH, an NPH's growth efficiency must fall.
$14.398M / $26.118M = 55.13\%$. This percent is greater than the 47.38\% found for the NPH's nongrowth efficiency in Panel A. This growth CSM value is also greater than the MM and Miller values of 12.40\% and 27.67\%. Once again, the greater differences when using the CSM can be explained by its capacity to capture agency and financial distress effects.

The estimates in the four columns in bold print represent our attempt to determine a reasonable range where the CDV of 0.565 might occur for FPHs. The range for these five columns is 0.375 to 0.941. We choose the column where Fraction $E_U = 7/16$ as the best approximation for 0.565 because the average of our two leverage ratios is 0.588. At this point, FPHs would experience a loss because $G_L$ is \$4.237M in this column. Thus, for every $1M in before-tax cash flow generated by its revenue sources, FPHs would lose not only $4.237M but also the gain of $1.035M if at ODV. Thus, the FPH loss is $4.237M + $1.035M = $5.541M by not being at ODV. The NPH loss of $14.093M is 254\% greater than the $5.541M FPH loss for the growth CSM. This 254\% is larger than the 173\% found for the nongrowth CSM. As a percent of $E_U$, the $5.541M loss is 53.20\%, which is less than 61.01\% found for NPHs. These CSM losses are much greater than MM and Miller.

6.2 Discussion of Results for Growth Model

The growth results in Table 8 are arguably the most important since the hospital industry, like other industries, consists of companies that grow. The levered growth rates we computed at ODVs were 2.9801\% and 3.4870\% for NPHs and FPHs, respectively.\(^{13}\) These rates are consistent with the 3% annual growth in the U.S. GDP over the past thirty-five years as given by the World Bank and also indicate the hospital is growing greater than this rate. The large range of leverage ratios when using our $G_L$ growth equation can make it difficult to determine which of our fifteen leverage ratios best corresponds to a CDV median. This problem results from the steep drop off in value that occurs as we reach ODV. We lowered the plowback ratio to get lower growth rates and less steepness. We show these results in Figures 1 and 2 to help understand the relation between growth and firm value. Besides graphing $G_L$ versus the fraction of $E_U$ retired, each figure has an insert box at the top that provides values for the following variables: Fraction $E_U$, PBR, $G_L$, $E_U$, max $G_L$, $V_L$, and ODV for each of the three graphs.

Figure 1 supplies results for NPHs where the max $G_L$ are indicated in bold print where each maximum occurs with the same Fraction $E_U = 4/16$. Thus, the same percent of $E_U$ is retired to maximize $G_L$ for PBRs of 0.11, 0.22, and 0.33 albeit the dollar amount of debt issued increases because $E_U$ increases. Of importance, there is less risk with lower PBRs, which occurs from less steepness in the graphs when we have lower PBRs. Thus, the potential loss from being overlevered declines significantly with lower growth. For example, the loss given previously of $14.093M for PBR 0.33 would fall to $1.471M for PBR = 0.22 and to $2.713M for PBR = 0.11. Thus, the current overlevered situation for NPHs could be alleviated with less growth. Regardless, by being at ODV when undertaking a PBR of 0.33, NPHs maximize firm value as they attain a max $V_L$ of $26.118M compared to only $21.289M for PBR of 0.22 and $20.176M for PBR of 0.11. Finally, as shown in the insert box at the top of Figure 1, the CDV barely changed with a change in PBR.

(Figure 1 about here)

Figure 2 shows the results of lowering PBRs for FPHs. As can be seen in the insert box, the same Fraction $E_U = 4/16$ occurs when $G_L$ is maximized when the PBR is either 0.26 or 0.14. However, when PBR = 0.38, then Fraction $E_U$ increases to 5/16. This increase in the amount of $E_U$ retired with more growth comes with more risk as captured by greater steepness where the potential loss from being overlevered rises significantly. Were FPHs to choose a PBR of 0.26, the loss would fall to $0.208M compared to that of $5.541M for a PBR of 0.38. For a PBR of 0.14, the loss is $0.957M. As was true in Figure 1 for NPHs, the current overlevered situation for FPHs could be alleviated with less growth. Nonetheless, by being at their ODV when undertaking a PBR of 0.38, FPHs maximize firm value as they attain max $V_L$ of $11.729M compared to only $10.302M for PBR of 0.26 and $10.229M for PBR of 0.14. The Hull (2010) notion of a critical point is important in setting the PBR. For our FPH illustration, the critical point is $T_C = 0.334$ and so a PBR below this (such as 0.22 and 0.11) will not increase $E_U$. This is shown with our illustration where

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\(^{13}\) We provide these rates, like values for other key variables, in Table 9 when we summarize our results for the four $G_L$ models used in our tests.
the nongrowth $E_U$ is $9.942M$ and the growth $E_U$ values are less at $9.589M$ for $PBR = 0.11$ and $9.604M$ for $PBR = 0.22$. However, for $PBR = 0.33$, we have $E_U = 10.415M$ that is greater than the nongrowth $E_U$. However, Hull warns about setting a $PBR$ equal to $T_C$ if the firm cannot sustain it.

Insert Figure 2 (about here)

How can we explain our findings that suggest hospitals are overlevered? One possible explanation lies in a rush to grow that led to health systems taking on a lot of debt. The rush began with the Affordable Care Act (ACA) that incentivizes the consolidation of clinics into large integrated health delivery systems called Accountable Care Organizations (ACOs). This was by design since the ACA creators hoped that if health care systems were large and served more people, they could gain some efficiencies of scale when it came to using a shared electronic health record infrastructure and organizing care pathways that would keep people healthier and out of hospital beds (in fact, they are punished for readmission and keeping people as inpatients). This has implications in terms of hospitals being overlevered because leaders of health care systems saw an advantage to expanding and buying up smaller clinics as quickly as possible. It's pretty alarming how quickly this has happened so that consequences of growth and debt were never explored. Besides the rush to expand and take on debt, another explanation for the current overlevered situation is that health care systems saw an opportunity to take advantage of debt with low interest rates. Compared to other alternatives debt was often relative cheap credit or at least easier to acquire as a source of funding. In conclusion, the current hospital industry position of being overlevered – be it the need to grow or the need to acquire cheap debt while available – is a conscious decision that was made without fully understanding the agency and financial distress concerns that result. The fact both NPHs and FPHs are overlevered according to the CSM tests indicates this is not just a nonprofit problem or a for-profit problem.

Are the great losses from straying from ODV for hospitals credible, especially for NPHs? Since many of the costs associated with indirect bankruptcy costs and agency costs are difficult to observe in practice, it is hard to know if a typical industry firm can actually lose 61.01% of its value by straying (which is what we find for NPHs). We find a parallel loss in a study by Whited and Zhao (2016) who document huge losses from straying from ODV. Their findings suggest that there are enormous costs from agency costs that lead to massive losses from cross-sectional misallocation of financial liabilities across firms. In comparing the debt and equity markets of the U.S., with China, Whited and Zhao discover China would realize gains from 70% to 100% in firm value without misallocation of debt and equity. Even in the U.S., gains from an optimal allocation of debt could increase firm value up to 18%. They state that firms try to weigh the benefits and disadvantages of debt but the process goes awry because of informational or agency frictions in raising funds. The upshot is that firms are forced to choose inefficient allocations of debt and equity. The waste-warlord theory we have presented attempts to describe a situation where too much government subsidy can lead to agency problems where principals are not monitors and can be wasteful, inefficient, and take perquisites that are unnoticed.

6.3 Robustness Tests with Regard to Sensitivity to Changes in Variable Values

If results are sensitive to changes in values then we can question the model’s outcomes especially if there are disagreement over the values used. We tried to determine the sensitivity of the CSM findings by looking at values for variables that might be prone to have different opinions as to what value to use. For example, consider our use of the premium of $r_L - r_D = 2.86%$. Changing 2.86% to other reasonable and feasible values does not change the CSM finding about hospitals being overlevered. This is because we get the same optimal column for Fraction $E_U$ except for rare cases where the optimal column changes for the growth CSM. However, to get the same optimal column, we have to often change the PBR until we discover the new optimal $g_L$. This is true for NPHs and FPHs.

The same $G_L$ pattern found in Tables 7 and 8 holds as $G_L$ increases up to same optimal Fraction $E_U$ and then falls. As expected, we find that decreasing the premium of $r_L - r_D$ (by lowering $r_D$ with $r_L$ unchanged) increases the max $G_L$. This is because financial distress costs are lower when the levered equity rate is lower. As also expected, increasing the premium (by raising $r_L$ with $r_D$ unchanged) decreases the max $G_L$ since higher $r_L$ values cause increases in financial distress costs. For the nongrowth CSM, if we increase the premium by raising $r_L$ more than 0.9% for NPHs and or more than 0.5% for FPHs, then all $G_L$ values become negative and the hospital remains unlevered indicating even a greater overlevered situation than what we report. For the growth CSM, the respective values are 1.5% for
NPHs and 1.4% for FPHs before all negative values occur. Regardless, the least negative $G_t$ from a debt issuance is still typically in the optimal column of Fraction $E_{t0}$. Increasing the premium by lowering $r_p$ causes $G_t$ to rise, while decreasing the premium by raising $r_p$ causes $G_t$ to decrease. However, we are limited in how much we can decrease or increase $r_p$ as values for $r_p$ become unrealistic in that they would eventually become lower than $r_f$ and higher than $r_d$. Of importance, the same finding about hospitals being overlevered holds and the same optimal debt issuance doesn’t change except for some rare growth CSM tests. While these findings are believed to be airtight, there is less confidence in the actual numbers found in our tables. For example, how much $G_t$ increases $E_{t0}$ or the exact loss from straying are values subject to more dispute. However, the disputed values are not always that great in difference although more dramatic and unlikely changes in values for variables can cause larger differences.¹⁴

Suppose our tax rates are less than precise? For example, suppose $T_c$ for FPHs is not 33.4% but could be shown to be only 20% if tax credits could be correctly evaluated. As expected, the $G_t$ values are lower but the optimal Fraction $E_{t0}$ to attain ODV remains the same. This is true for almost any value for $T_c$ chosen even if unreasonable. Suppose $T_c$ or $T_d$ is changed? The same results occur as was found for $T_c$. Suppose we change all tax rates so that $\alpha$ is influenced by multiple tax rate factors. For the nongrowth CSM, the results are unchanged as long as $\alpha < 1.14$ holds for FPHs (for NPHs, all tax rates are negligible and, even if a large $\alpha$ could occur, we always get positive $G_t$ values). Most important, the finding about hospitals being overlevered remains with similarity in difference between the ODV for the CSM and for the CDV for what we reported in Tables 7 and 8. Increasing the risk-free rate ($r_f$) while having other rates of return increase in expected ways does not change results. Similarly, changing the market rate ($r_m$) renders the same general findings. Changing the market premium ($r_m - r_f$) by changing both $r_f$ and $r_m$ also, we still get the same optimal Fraction $E_{t0}$ with exceptions infrequently occurring for the growth CSM. We infer that once bond ratings determine the pattern of $r_m$, then the determination of ODV is set in motion and is determined with the only exceptions being for unusual situations such as highly unlikely values for tax rates. In conclusion, any disagreements over the precise values for variables only involve items like the amount of $G_t$ and the amount the firm loses by not being at its ODV. The findings about the optimal capital structure choice and hospitals being overlevered do not change.

7 Comparing Results for Four Models

Table 9 summarizes the results for four capital structure models used to investigate the financing of NPHs and FPHs. A test DV (TDV) is the average from the two computations of $D/E_{t0}$ and $D/V_t$ that best approximate a CDV. Thus, we use TDV to approximate CDV so that we can make comparisons with ODV, which is the average of $D/E_{t0}$ and $D/V_t$ at the optimal Fraction $E_{t0}$ where the firm maximizes $G_t$. Where applicable, all values in Table 9 occur at ODV. The last five rows of Table 9 give values to evaluate the performance of hospitals. First, $G_t\%E_{t0}$ is the max $G_t$ as a percent of $E_{t0}$. Second, loss is the value squandered from not being at ODV, which we define as $G_t$ given by CDV minus max $G_t$ given by ODV. Third, $L\%E_{t0}$ is loss as a percent of $E_{t0}$. LR is the loss ratio defined as: FPH loss divided by NPH loss. Fourth, CII is the conversion inefficiency index and is the fall in max $V_t$ that a typical NPH would have to attain to convert to a typical FPH. CII is defined as: (NPH's max $V_t$ minus FPH's max $V_t$ divided by max NPH's $V_t$. Fifth, CIE is the conversion efficiency index and is like CII with the same numerator except we divide by FPH's max $V_t$. CIE tells us the added efficiency needed for an FPH to overcome the disadvantage in tax subsidies and be on equal footing with an NPH. These added efficiencies can be overcome through innate advantages to FPHs such as being able to distribute earnings, to borrow from external markets, to avoid more costly agency conflicts, and to respond more quickly to changes in the economic and business environment.

Insert Table 9 (about here)

Table 9 shows NPHs have greater $E_{t0}$ values than FPHs for all four perpetuity $G_t$ models even though NPHs and

¹⁴ Our results do not change if we adjust the premium by values greater than 2.86% so that the values for levered equity for NPHs are the same as FPHs. This adjustment does not allow the cost of equity for NPHs to fall due to the tax-exempt nature of its cost of debt. This adjustment also ignores any value for which levered equity would have to in turn fall due to the impact of $T_c$ that serves to make the risk premium of 2.86% lower.
FPHs both have the same before-tax cash flow (CF_{BT}) of $1M. Given that Table 2 reveals the median industry CF_{BT} is $83M, we see that any difference in Table 9 can be magnified by the number 83 to get the difference between an atypical NPH and a typical FPH. To illustrate, the median E_{U} value for NPHs with growth would be about $1.917M compared to only $864M for FPHs. Thus, the difference is well over $1 billion in favor of NPHs when comparing the after-tax valuation advantage. This difference can be largely attributed to the tax advantage for NPHs. For example, given the personal tax rates in Table 3 for NPHs and FPHs, we see that NPHs pay roughly 17% less in personal taxes and 31.4% less in corporate taxes. Table 9 also reports that NPHs, compared to FPHs, have less cash to outstanding debt (CF_{BT}/D), lower values for CDV and TDV, and greater max V_{L} values. These latter findings are true for all models. We find the MM and Miller models have higher ODVs compared to CSM. They also have lower max G_{L} values for NPHs compared to CSM but higher max G_{L} values for FPHs compared to CSM. These latter two findings also hold for G_{L}E_{U}. The MM and Miller models experience noticeably smaller values for the loss and L%E_{U} variables compared to CSM.

In comparing the two CSM models in Table 9, we find that the nongrowth CSM model has smaller E_{U} values, less debt issued, greater CF_{BT}/D, smaller G_{L} and max V_{L} values, and smaller values for loss and L%E_{U}. We find high LR values of 8.11 and 12.80 for MM and Miller indicating much greater relative costs when straying from ODV for FPHs compared to NPHs. For the CSM models, the LR values are 0.58 and 0.39 indicating costs are greater for NPHs when straying. The conversion inefficiency index (CIH) is an attempt to capture how inefficient an NPH would have to be to make it profitable to convert to an FPH. All models indicate that CIH is greater than zero percent, indicating that FPHs must be more efficient than NPHs to convert. The percentages are 12.40% for MM, 27.67% for Miller, 47.38% for the nongrowth CSM, and 53.13% for the growth CSM. These results reflect the greater tax subsidy for NPHs that give inherent advantages leading to greater firm values when we consider taxes. The models we use consider this advantage (albeit the MM less so) and results in the last row of Table 9 are overwhelming in fully revealing FPHs are engaged in an uphill battle to overcome the NPH tax advantage.

Insert Figure 3 (about here)

Figures 3 and 4 display the four G_{L} models together with each figure plotting G_{L} versus fifteen DVs and two endpoints where DV is zero. The max G_{L} values for all four models are in bold print in an insert box at the top of each figure. Figure 3 covers NPHs and Figure 4 looks at FPHs. Each figure gives values for the following variables: Fraction E_{U}, ODV, E_{U}, max V_{L}, max G_{L}, G_{L}E_{U}, loss, and L%E_{U}. Figure 3 graphs the results for NPHs and reveals how small the MM and Miller results where the smaller G_{L} values for MM and Miller result from the failure of these models to capture agency and financial distress costs. Figures 3 and 4 depict the wide arrange of G_{L} values for the growth CSM. There is a steep upward increase at the end of each figure for the nongrowth CSM and growth CSM due to a return to the unlevered state when all E_{U} is retired. In reality, one would think the markets would start considering the probability of a return to state so that the steepness of the end of each figure would not occur. However, the CSM equations do not factor this probability into the greater debt issuances.

Insert Figure 4 (about here)

Figure 4 graphs the results for FPHs and reveal the impact of a greater corporate tax rate (T_{C}). For example, unlike Figure 3, the MM and Miller results now obtain greater max G_{L} values due to a T_{C} of 33.3% for FPHs compared to a T_{C} of 2% for NPHs. The wide arrange of G_{L} values for growth for NPHs still remain albeit they have been reduced substantially from a minimum G_{L} of −$16.132M for NPHs to −$4.880M for FPHs. One can notice from Figure 4 that the max G_{L} of $6.671M for the nongrowth CSM is below all other three models for the same Fraction E_{U}, which is 4/16. In comparing Figures 3 and 4, we can also find the percent less from straying from ODV is greater for FPHs for the three nongrowth models. For example, the MM, nongrowth CSM and growth CSM values for L%E_{U} are 0.83%, 0.48%, 18.46%, and 61.01%, respectively, for NPHs but less at 10.44%, 10.37%, 19.19%, and 53.20%, respectively, for FPHs.

Table 10 reports current values and optimal values for NPHs and FPHs focusing on borrowing and growth rates. We report the values for r_{D} and r_{L} at CDVs in order to compare them to values for r_{D} and r_{L} at ODVs. All of these values are identified by application of our nongrowth CSM and growth CSM equations. CDVs are assumed for growth hospitals but we use their values for both nongrowth and growth test. However, any lack of differentiation may not be a major concern
given the large gap between CDVs and ODVs where those larger CDVs indicate overlevered situations relative to ODVs. Some rows report two values in a cell. The first value is for a nongrowth situation and the second value is for a growth situation. Like $r_0$ and $t_1$, at the ODVs, $B_L$ and $t_{12}$ are determined from the fifteen DV choices based on the fifteen bond ratings categories when applying the nongrowth CSM and growth CSM equations where the values for $g_{i1}$ and $f_{12}$ correspond to their ODVs.

Insert Table 10 (about here)

The importance of Table 10 is in calling attention to the current state of the hospital industry that is characterized by high borrowing rates. Consider the nongrowth situation for FPHs as a case in point using the nongrowth CSM and our fifteen DV choices. We find that the current $r_0$ is 6.15% whereas the optimal $r_0$ is 3.15%. In terms of bond ratings, this indicates that FPHs are currently issuing bonds with a typical rating of Ba2/BB when they should be shooting for an A2/A rate assuming this latter rating is possible for a typical FPH. For a growth situation, we find that the current borrowing rate on debt ($r_0$) is 5.15% whereas the optimal $r_0$ is 3.65%. In terms of bond ratings, this indicates that FPHs are currently issuing bonds with a typical rating of Ba1/BBB+ when they should be shooting for an A3/A- rating. We find a similar disparity (albeit less) for NPHs for a nongrowth situation. Adjusting for the tax-exempt nature of NPHs debt, we estimate where NPHs are issuing Ba1/BBB+ rated tax-exempt bonds and the optimal is more like A2/A rated tax-exempt bonds. However, if we consider growth and look at NPHs, we find less disparity. For example, using the growth CSM and our fifteen DV choices, we find that the current borrowing rate on debt ($r_0$) is 2.9996% whereas the optimal $r_0$ is 2.5887%. We estimate that the typical current tax-exempt bond rating for NPHs is A3/A- (or possibly Ba2/BBB given the estimation of CDY for NPHs with growth) when they should be seeking a tax-exempt bond rating of A2/A. We conclude that hospitals are generally settling for lower medium grade and non-investment/speculative grade debt when they should be seeking upper grade debt. Thus, given their current bond ratings, hospitals face major ongoing uncertainties and exposure to adverse business, financial, or economic conditions which could lead to the bond issuer’s having inadequate capacity to meet its financial commitments.

Damodaran (2016) indicates what times interest earned ratio (TIE) should correspond with bond ratings. However, he does not specify the correspondence between the TIEs and bond ratings for the hospital industry or its ownership types. However, from what is given for large manufacturing, financial service and small/risky firms, we can estimate the correspondence between TIEs and bond ratings. In doing this, we find that our six nongrowth and growth tests involving NPHs and FPHs give TIE values found at or near our CDVs. For example, for our nongrowth FPHs we estimate a hospital bond rating with a TIE around 2.631 would be Ba2/BB. When conducting our nongrowth FPH test, we find that $\text{TIE} = 2.647$ at our CDV of 0.536 (that best represents the FPH median of 0.563) and for which the cost of debt is 6.15%. A Ba2/BB bond rating is what we get in Table 4 that corresponds to $r_{\text{FPH}} = 6.15\%$. This Ba2/BB rating is what we gave in the prior paragraph. However, there are two possible disagreements between what we compute for TIE and what Table 4 indicates and this is because values for TIE fall between our CDV and another nearby DV. First, for the nongrowth NPHs, it is possible we have overestimated the loss when the correspondence between TIE and bond ratings are considered. Instead of the loss being $3.293\text{M}$, the TIE indicates it may have an equal chance to be as low as $1.606\text{M}$. Thus, as a percent of $E_0$, the loss is possibly up to half of what we have reported in Table 9. However, our CSM growth results are the most important and there no indication from a TIE consideration that our results have overestimated the loss. Second, for the CSM growth test for FPHs, we could have slightly underestimated the CDV as the TIE can also correspond to a larger DV. While the TIE value indicates our CSM growth for FPHs may have underestimated the CDV, there is no significant impact on the loss because as seen in Figure 4 we have a large range of similar $G_i$ values after the steep drop-off. However, as seen in Figure 2, there could be some lower PBR that could lead to an underestimation of the loss. In conclusion, we feel that an analysis of TIE serves to verify the results of our tests, especially our growth tests that we believe are the most important.

Finally, we checked some actual hospitals to determine if there is agreement with our bond ratings. For example, we looked up the bonds for Select Medical Holdings Corp. and HealthSouth Corp., two publicly traded hospitals in our sample that have asset values near the median. Select Medical has a bond that matures in 2021 that initially had 8 years to maturity. Its current yield-to-maturity is 6.637% and the coupon rate at issuance was 6.375%. For HealthSouth, most of the bonds that it has issued over the past four years have had a coupon rate of 5.75% at issuance.
and the yield to maturity on the bond that matures in 2025 has a current yield to maturity of 5.915%. Based on this information, we find consistency with what we report.

8 Conclusions

Unlike MM and Miller, the Capital Structure Model (CSM) equations are properly equipped to determine the optimal debt-to-firm value ratio (ODV) that corresponds to maximum gain to leverage (max \( G_{L} \)) and maximum firm value (max \( V_{L} \)). This is because each CSM equation is derived by subtracting the definition for unlevered firm value \( (V_{0}) \) from the definition for \( V_{L} \). By using definitions with costs of borrowings, the derivation is able to incorporate these costs into a \( G_{L} \) equation. Costs of borrowing are dependent on the degree of the company's risk that increases with the size of the debt-for-equity transaction. By allowing for fifteen increasingly larger debt-for-equity transactions, we are able to discover max \( G_{L} \) and max \( V_{L} \) values with the end process being identification of the ODV. For this study, we investigate non-government hospitals focusing on its two ownership structures: nonprofit hospitals (NPHs) and for-profit hospital (FPHs).

When applying our \( G_{L} \) models, we find NPHs achieves a higher max \( V_{L} \) compared to FPHs and this holds for both nongrowth and growth situations. Due to the nature of nonprofits, NPHs pay very little corporate and personal taxes relative to FPHs creating an after-tax valuation advantage to NPHs. When using the MM \( G_{L} \) formula, both NPHs and FPHs maximize firm value and achieve their ODVs by issuing the largest amount of debt allowed by our choices based on fifteen bond ratings. Since FPHs have a higher corporate tax rate their gain is greater compared to NPHs for MM. To create value through a conversion to an FPH, an NPH's efficiency would have to fall 12.40% according to MM. When utilizing the Miller \( G_{L} \) equation, the results are similar as NPHs and FPHs maximize firm value by issuing the largest amount of debt allowed. To create value through a conversion to an FPH, an NPH's efficiency would have to fall about 28% according to Miller. For the Miller model, it is possible that NPHs would issue no debt due to the interplay of corporate and personal taxes. This is because NPHs only pay taxes if they have profitable side ventures and we assume, on average, they have small profitable ventures. However, if there are no small profitable, the Miller \( \alpha \) equals zero and so every leverage choice renders the same zero value for \( G_{L} \). A slight change in our assumptions about tax rates can cause a negative \( \alpha \) for NPHs meaning they would issue zero debt. This reflects an absence of positive agency effects in the Miller model.

When applying the CSM, we demonstrate that NPHs obtain higher \( V_{L} \) values for both nongrowth and growth situations compared to FPHs. We find both NPHs and FPHs to be inefficient from a financing standpoint by being overleveraged. By straying from their optimal debt level, we estimate that NPHs lose 18% to 61% of their potential value for nongrowth and growth situations, respectively. For and FPHs, the corresponding percentages are 19% to 53%. We attribute these losses to agency and financial distress costs. In terms of absolute dollars, the loss from straying from ODVs is between 173% and 254% greater for NPHs compared to FPHs. We find that the tax advantage gifted to NPHs require that FPHs must be more efficient compared to NPHs to achieve equality in firm value. We estimate NPHs must be about 47% and 55% more inefficient than FPHs for nongrowth and growth situations, respectively, to reach a point where they would want to convert to FPHs. Of practical importance, we find that both NPHs and FPHs attain similar ODVs of about 0.24 when using the nongrowth CSM. However, for the growth CSM, FPHs attain an ODV of roughly 0.30 while NPHs hold at their nongrowth value of 0.24.

In this paper, we offer a waste-warlord theory to explain our results that are consistent with research that discovers no significant difference in the quantity and quality of healthcare between NPHs and FPHs and finds over one in twenty NPHs converted to an FPH in an eight-year period. Given the massive tax subsidies, it could be relatively easy for NPHs to have "warlords" in place to syphon off the excess tax subsidies to their own advantage or just exercise wasteful behavior because equity owners are not in place to monitor the operational efficiency. While we believe waste in likely the main problem, we also think that overseeing an NPH can lead to a type of warlord management practice where the supervising warlords intercept goods for themselves that escape notice due to lack of transparency and glut of funds produced by the government subsidies. Others within the system bow to the warlords because the warlords provide job security in exchange for the extraction of their perquisites. Consistent with this warlord notion, a criticism of the nonprofit ownership structure is that the lack of equity owners and subsequent weak governance from the board of directors results in greater control by expert
workers and greater agency problems compared to their for-profit counterparts. Simply put, when no one is in charge to mind the store from a profit motivation standpoint, the store’s value is at a risk. Managers of nonprofit organizations (board members) or others who usurp power (like expert workers) have an unrivaled degree of sovereignty, which is all it takes to foster an atmosphere that ultimately leads to warlord behavior for at least a noticeable minority of nonprofits.

Finally, the waste-warlord theory can extend beyond NPHs to FPHs in certain financing and managerial areas and there could be areas that warlords do not or cannot inhabit. For example, Adellino, Lewellen, and Sundaram find that each dollar invested and spent by NPHs adds ten cents to capital expenditures in the following year and twenty-three cents in the following two years. They state that these results are similar to the results of prior studies of the sensitivity of capital investment to cash flow shocks for FPHs. The implication of these results is that the difference in governance quality between NPHs and FPHs is small at least for cash flow shocks. The areas that warlords inhabit and do not inhabit within the NPH and FPH ownership structures is an area for future research.

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FASB Staff Position, 2008. Endowments of not-for-profit organizations: Net asset classification of funds subject to an enacted version of the Uniform Prudent Management of Institutional Funds Act, and Enhanced Disclosures for All Endowment Funds. FSP FAS 117-1.


Myers, Stewart C., and Nicolas S. Majluf, 1984, Corporate financing and investment decisions when firms have information that investors do not have, Journal of Financial Economics 13(2): 187-221.


Valdovinos, Erica, Sidney Le, and Renee Y. Hsia, 2015, In California, not-for-profit hospitals spent more operating expenses on charity care than for-profits spent, Health Affairs 34(3): 146-155.

Hospitals Spent


Whited, Toni M., and Jake Zhao, 2016, Capital structure misallocation, Ross School of Business Paper No. 1295, University of Michigan.
Table 1. Key Features of Nonprofit and For-Profit Ownership Structures for Hospital

<table>
<thead>
<tr>
<th>(Nonprofit Hospitals (NPHs))</th>
<th>For-Profit Hospitals (FPHs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Owned By:</strong> Non-investors or members</td>
<td><strong>Owned By:</strong> Investors</td>
</tr>
<tr>
<td><strong>Board Members:</strong> Voluntary (self-perpetuating)</td>
<td><strong>Board Members:</strong> Elected by equity owners</td>
</tr>
<tr>
<td><strong>Official obligations:</strong> Maintain solvency to fulfill stated goals related to service, education, research</td>
<td><strong>Official obligations:</strong> Increase equity owners wealth by providing profitable services at desirable costs</td>
</tr>
<tr>
<td><strong>Major Goal:</strong> Provide quality healthcare</td>
<td><strong>Major Goal:</strong> Maximize profits for owners</td>
</tr>
<tr>
<td><strong>Mission:</strong> Described in terms of charitable care, quality of care, community service, growth</td>
<td><strong>Mission:</strong> Described in terms of efficiency, services, growth</td>
</tr>
<tr>
<td><strong>Decision-making and implementation:</strong> Slowed down by mission and diverse constituencies</td>
<td><strong>Decision-making and implementation:</strong> Quickly responds to profitable opportunities</td>
</tr>
<tr>
<td><strong>Sources of Revenues:</strong> Sales, services, investments, donations</td>
<td><strong>Sources of Revenues:</strong> Sales, services, investments</td>
</tr>
<tr>
<td><strong>Distributions:</strong> Non-distribution constraint</td>
<td><strong>Distributions:</strong> Dividends and capital gains</td>
</tr>
<tr>
<td><strong>Sources of Financing:</strong> External equity (charitable contributions), debt (usually tax-exempt debt), internal equity (retained earnings, depreciation), government inflows (grants, endowments)</td>
<td><strong>Sources of Financing:</strong> External equity (new equity issues), debt, internal equity (retained earnings, depreciation, deferred taxes), government inflows (ROE payments from Medicare and other third-party payers)</td>
</tr>
<tr>
<td><strong>Debt Tax Shield:</strong> Very little corporate tax shield from minor profitable ventures like gift shops (generally exempt from all taxes)</td>
<td><strong>Debt Tax Shield:</strong> Sizeable corporate debt tax shield (pay not only corporate taxes but also property and sales taxes)</td>
</tr>
<tr>
<td><strong>Personal Equity Taxes:</strong> Zero or very little resulting from minor taxable profitable ventures</td>
<td><strong>Personal Equity Taxes:</strong> Personal taxes paid on dividends and capital gains</td>
</tr>
<tr>
<td><strong>Personal Debt Taxes:</strong> Personal taxes paid on all levels either zero or very little</td>
<td><strong>Personal Debt Taxes:</strong> Personal taxes paid on interest from debt</td>
</tr>
</tbody>
</table>
Table 2 (Return to insert Table 2)

**Descriptive Statistics for Nonprofits Hospitals (NPHs) and For-Profits Hospitals (FPHs)**

Table 2 provides mean and median statistics for 338 non-government hospitals consisting of 310 nonprofit hospitals (NPHs) and eighteen for-profit hospitals (FPHs). We use data from Modern Healthcare Systems Financials (MHSE) database for the year 2014, which is the most recent year for annual hospital data. For the most part a hospital observation consists of a healthcare system with multiple hospitals and healthcare facilities. After removing 64 observations that did not have sufficient information or were government nonprofit hospitals, 310 non-government NPHs remain consisting of large nonprofit healthcare systems and large individual nonprofit hospitals. There are eighteen FPHs representing the eighteen largest for-profit healthcare systems that contain the overwhelming majority of for-profit hospitals and other for-profit healthcare facilities. We found two FPHs with an extreme outlier for a variable and deleted that value. Whereas most variables have no missing values, there were two noticeable exceptions. *First*, the Community Support (Charity Care) variable for FPHs have half of their observations missing. *Second*, the Medicare Revenue variable for NPHs have 31% missing. Except for minor profitable ventures undertaken by outside ownership, it is not legal for nonprofits to pay cash and so that explains the zero statistics for the Dividends Paid and Dividend Payout Ratio variables for NPHs. Relatedly, only five of the seventeen FPHs reported paying dividends for 2014. This implies profits made on invest in FPHs is largely in the form of capital gain.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Nonprofits Hospitals (n = 310)</th>
<th>For-Profits Hospitals (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>$1,959</td>
<td>$916</td>
</tr>
<tr>
<td>Total Income</td>
<td>$129</td>
<td>$48</td>
</tr>
<tr>
<td>Net Patient Revenue</td>
<td>$1,426</td>
<td>$729</td>
</tr>
<tr>
<td>Total Operating Expense</td>
<td>$1,527</td>
<td>$864</td>
</tr>
<tr>
<td>Operating Income</td>
<td>$736</td>
<td>$251</td>
</tr>
<tr>
<td>Total Margin Ratio</td>
<td>0.061</td>
<td>0.057</td>
</tr>
<tr>
<td>Operating Margin Ratio</td>
<td>0.034</td>
<td>0.032</td>
</tr>
<tr>
<td>Interest Expense</td>
<td>$23</td>
<td>$12</td>
</tr>
<tr>
<td>Community Support (Charity Care)</td>
<td>$100</td>
<td>$26</td>
</tr>
<tr>
<td>Bad Debt</td>
<td>$80</td>
<td>$43</td>
</tr>
<tr>
<td>Medicare Revenue Ratio</td>
<td>0.344</td>
<td>0.840</td>
</tr>
<tr>
<td>Total Assets</td>
<td>$2,636</td>
<td>$1,274</td>
</tr>
<tr>
<td>Total Liabilities</td>
<td>$1,266</td>
<td>$626</td>
</tr>
<tr>
<td>Net Assets in Equity</td>
<td>$1,370</td>
<td>$636</td>
</tr>
<tr>
<td>Long-Term Liabilities</td>
<td>$874</td>
<td>$456</td>
</tr>
<tr>
<td>Current Assets</td>
<td>$671</td>
<td>$331</td>
</tr>
<tr>
<td>Current Liabilities</td>
<td>$993</td>
<td>$157</td>
</tr>
<tr>
<td>Net Patient Accounts Receivable</td>
<td>$202</td>
<td>$106</td>
</tr>
<tr>
<td>Total Operating Revenue</td>
<td>$1,599</td>
<td>$503</td>
</tr>
<tr>
<td>Cash and Cash Equivalents</td>
<td>$126</td>
<td>$66</td>
</tr>
<tr>
<td>Depreciation and Amortization</td>
<td>$91</td>
<td>$49</td>
</tr>
<tr>
<td>EBITDA/EBIDA</td>
<td>$187</td>
<td>$88</td>
</tr>
<tr>
<td>EBITDA/EBIDA Margin</td>
<td>0.105</td>
<td>0.101</td>
</tr>
<tr>
<td>YOY Total Revenue Change</td>
<td>0.065</td>
<td>0.042</td>
</tr>
<tr>
<td>YOY Operating Revenue Change</td>
<td>0.078</td>
<td>0.057</td>
</tr>
<tr>
<td>Days Cash on Hand</td>
<td>35.923</td>
<td>29.297</td>
</tr>
<tr>
<td>Debt-to-Capitalization Ratio</td>
<td>0.418</td>
<td>0.397</td>
</tr>
<tr>
<td>Cash-to-Debt Ratio</td>
<td>0.192</td>
<td>0.172</td>
</tr>
<tr>
<td>Time Interest Earned (TIE)</td>
<td>12.224</td>
<td>3.399</td>
</tr>
<tr>
<td>Dividends Paid</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Payout Ratio</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>Total Liabilities to Total Assets</td>
<td>0.491</td>
<td>0.476</td>
</tr>
<tr>
<td>Before-Tax Cash Flow (EBIT)</td>
<td>$95</td>
<td>$38</td>
</tr>
</tbody>
</table>

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Table 3 reports median values for key variables for NPHs and FPHs. These values include those needed to get our gain to leverage ($G_t$) and firm value ($V_t$) results found in Sections 5 and 6. We describe the process to get these values in Section 4. We determine $r_D$ and $r_L$ later from our fifteen bond ratings categories when applying the nongrowth CSM and growth CSM equations where they correspond to their CDVs. We calculate $\beta_D$ and $\beta_L$ as points of interest using $\beta_D = (r_D - r_F)/(r_M - r_F)$ and $\beta_L = (r_L - r_F)/(r_M - r_F)$. Some rows report two values in a cell. The first value is for a nongrowth situation and the second value is for a growth situation.

<table>
<thead>
<tr>
<th>Variables</th>
<th>NPHs</th>
<th>FPHs</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r_M$ = Market return</td>
<td>8.1100%</td>
<td>8.1100%</td>
</tr>
<tr>
<td>$r_F$ = Risk-free rate</td>
<td>1.9000%</td>
<td>1.9000%</td>
</tr>
<tr>
<td>$\beta_U$ = Unlevered beta</td>
<td>0.5700</td>
<td>0.5700</td>
</tr>
<tr>
<td>$r_U$ = Cost of unlevered equity</td>
<td>5.4397%</td>
<td>5.4397%</td>
</tr>
<tr>
<td>CDV = Current DV</td>
<td>0.4704</td>
<td>0.5650</td>
</tr>
<tr>
<td>$r_D$ = Cost of debt</td>
<td>4.2323% / 2.9996%</td>
<td>6.1500% / 5.1500%</td>
</tr>
<tr>
<td>$r_L$ = Cost of levered equity</td>
<td>7.0923% / 5.8566%</td>
<td>9.0100% / 8.0100%</td>
</tr>
<tr>
<td>$\beta_D$ = Beta of Debt</td>
<td>0.3756 / 0.1771</td>
<td>0.6844 / 0.5233</td>
</tr>
<tr>
<td>$\beta_L$ = Levered equity beta</td>
<td>0.8361 / 0.6376</td>
<td>1.1499 / 0.9839</td>
</tr>
<tr>
<td>$T_C$ = Corporate tax rate</td>
<td>2.000%</td>
<td>33.400%</td>
</tr>
<tr>
<td>$T_E$ = Personal equity tax rate</td>
<td>1.000%</td>
<td>18.800%</td>
</tr>
<tr>
<td>$T_D$ = Personal debt tax rate</td>
<td>1.908%</td>
<td>19.080%</td>
</tr>
</tbody>
</table>
Table 4: Costs of Borrowing for Nonprofit Hospitals (NPHs) and For-Profit Hospitals (FPFs) for 2014

Table 4 provide details on the fifteen bond ratings, spreads, and costs of borrowing values for fifteen increasing debt-to-firm values (DVs). To get the cost of debt for FPFs ($r_{DFPH}$), we first identify fifteen spreads for fifteen bond ratings as supplied by Damodaran (2016). We then add each spread to our risk-free rate of 1.90% given by the twenty-year government security. This gives our fifteen $r_{DFPH}$ values. To illustrate, for the first bond rating of Aaa/AAA where the spread over 1.90% is 0.75%, we have: $r_{DFPH} = 1.90% + 0.75% = 2.65%$. In a similar fashion, we compute the other fourteen $r_{DFPH}$ values in sequence based on the highest to lowest bond ratings. To get the costs of debt for nonprofit hospitals ($r_{DNPH}$), we adjust $r_{DFPH}$ based on the weighted amount of tax-exempt debt (referred to as $W_{TED}$) for NPH. To get $W_{TED}$, we use our random sample of fifty NPHs with total interest-bearing debt and tax-exempt debt information to come up with a weight of 0.934 based on dividing tax-exempt debt by total interest-bearing debt. Consequently, personal taxes are paid on $(1-0.934) = 0.066$ of the remainder of the total debt. Thus, we use $W_{TED} = 0.934$ when adjusting $r_{DFPH}$ downward by the personal tax rate on debt for NPHs ($T_{DNPH}$). In formula form, we have: $r_{DNPH} = r_{DFPH}(1-T_{DNPH})W_{TED} + r_{DFPH}(1-W_{TED})$ where $T_{DNPH}$ is one of the fifteen costs of debt used for NPHs. Inserting our values where $T_{DNPH} = 19.8%$ (given in Table 3) and $r_{DFPH} = 2.65%$, we get: $r_{DNPH} = 2.65% (1-19.8%)(0.934) + 2.65% (1-0.934) = 2.1778%$ for the highest bond rating. In a similar fashion we compute the other fourteen values for $r_{DNPH}$. Using the fifteen $r_{DNPH}$ and $r_{DFPH}$ values we compute the fifteen $T_{DNPH}$ and $T_{DFPH}$ values by adjusting in the risk premium of equity over debt. The value of 2.86% that we use is our best estimate. Regardless, our results are invariant to the risk premium used.

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread</td>
<td>0.7500%</td>
<td>1.0000%</td>
<td>1.1000%</td>
<td>1.2500%</td>
<td>1.7500%</td>
<td>2.2500%</td>
<td>2.5000%</td>
<td>3.2500%</td>
<td>4.2500%</td>
<td>5.5000%</td>
<td>6.5000%</td>
<td>7.5000%</td>
<td>9.0000%</td>
<td>12.000%</td>
<td>16.000%</td>
<td>20.000%</td>
</tr>
<tr>
<td>$r_{DNPH}$</td>
<td>2.1778%</td>
<td>2.2632%</td>
<td>2.5864%</td>
<td>2.8487%</td>
<td>2.9920%</td>
<td>3.4105%</td>
<td>4.2232%</td>
<td>5.0341%</td>
<td>6.0813%</td>
<td>6.9031%</td>
<td>7.7234%</td>
<td>8.9379%</td>
<td>11.4273%</td>
<td>14.710%</td>
<td>17.997%</td>
<td></td>
</tr>
<tr>
<td>$r_{DFPH}$</td>
<td>2.6500%</td>
<td>3.9000%</td>
<td>3.3000%</td>
<td>3.1500%</td>
<td>3.6500%</td>
<td>4.1500%</td>
<td>5.1500%</td>
<td>6.1500%</td>
<td>7.4000%</td>
<td>8.4000%</td>
<td>9.4000%</td>
<td>10.9000%</td>
<td>13.9000%</td>
<td>17.9000%</td>
<td>21.9000%</td>
<td></td>
</tr>
<tr>
<td>$T_{DNPH}$</td>
<td>5.0378%</td>
<td>5.2432%</td>
<td>5.3524%</td>
<td>5.4487%</td>
<td>5.8596%</td>
<td>6.7096%</td>
<td>7.0232%</td>
<td>7.9141%</td>
<td>8.9413%</td>
<td>9.7631%</td>
<td>10.555%</td>
<td>11.818%</td>
<td>14.283%</td>
<td>17.570%</td>
<td>20.857%</td>
<td></td>
</tr>
<tr>
<td>$T_{DFPH}$</td>
<td>5.5100%</td>
<td>5.7600%</td>
<td>5.3600%</td>
<td>6.0100%</td>
<td>6.5100%</td>
<td>7.0100%</td>
<td>8.0100%</td>
<td>9.0100%</td>
<td>10.260%</td>
<td>11.260%</td>
<td>12.260%</td>
<td>13.760%</td>
<td>16.760%</td>
<td>20.760%</td>
<td>24.760%</td>
<td></td>
</tr>
</tbody>
</table>

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Table 5. MM Gain to Leverage and Firm Valuation Results (Return to Insert Table 5)

<table>
<thead>
<tr>
<th>Fraction (E_U)</th>
<th>1/16</th>
<th>2/16</th>
<th>3/16</th>
<th>4/16</th>
<th>5/16</th>
<th>6/16</th>
<th>7/16</th>
<th>8/16</th>
<th>9/16</th>
<th>10/16</th>
<th>11/16</th>
<th>12/16</th>
<th>13/16</th>
<th>14/16</th>
<th>15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CF_{PT}/D)</td>
<td>0.888</td>
<td>0.444</td>
<td>0.296</td>
<td>0.222</td>
<td>0.178</td>
<td>0.148</td>
<td>0.127</td>
<td>0.111</td>
<td>0.099</td>
<td>0.089</td>
<td>0.081</td>
<td>0.074</td>
<td>0.068</td>
<td>0.063</td>
<td>0.059</td>
</tr>
<tr>
<td>D/(V_L)</td>
<td>0.662</td>
<td>0.125</td>
<td>0.188</td>
<td>0.250</td>
<td>0.313</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.815</td>
<td>0.873</td>
<td>0.939</td>
</tr>
<tr>
<td>Q (in millions)</td>
<td>$0.023</td>
<td>$0.045</td>
<td>$0.068</td>
<td>$0.090</td>
<td>$0.113</td>
<td>$0.135</td>
<td>$0.158</td>
<td>$0.180</td>
<td>$0.203</td>
<td>$0.225</td>
<td>$0.248</td>
<td>$0.270</td>
<td>$0.292</td>
<td>$0.315</td>
<td>$0.338</td>
</tr>
</tbody>
</table>

Panel A: MM Optimal Results Compared to Current Results for NPHs (\(CDV = 0.470; \ E_U = $18,015,699\))

<table>
<thead>
<tr>
<th>Fraction (E_U)</th>
<th>1/16</th>
<th>2/16</th>
<th>3/16</th>
<th>4/16</th>
<th>5/16</th>
<th>6/16</th>
<th>7/16</th>
<th>8/16</th>
<th>9/16</th>
<th>10/16</th>
<th>11/16</th>
<th>12/16</th>
<th>13/16</th>
<th>14/16</th>
<th>15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>(CF_{PT}/D)</td>
<td>1.037</td>
<td>0.653</td>
<td>0.436</td>
<td>0.327</td>
<td>0.261</td>
<td>0.218</td>
<td>0.187</td>
<td>0.165</td>
<td>0.145</td>
<td>0.134</td>
<td>0.119</td>
<td>0.109</td>
<td>0.101</td>
<td>0.093</td>
<td>0.087</td>
</tr>
<tr>
<td>D/(V_L)</td>
<td>0.063</td>
<td>0.125</td>
<td>0.188</td>
<td>0.250</td>
<td>0.313</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.815</td>
<td>0.873</td>
<td>0.939</td>
</tr>
<tr>
<td>Q (in millions)</td>
<td>$0.256</td>
<td>$0.511</td>
<td>$0.767</td>
<td>$1.022</td>
<td>$1.278</td>
<td>$1.533</td>
<td>$1.789</td>
<td>$2.045</td>
<td>$2.300</td>
<td>$2.556</td>
<td>$2.811</td>
<td>$3.067</td>
<td>$3.323</td>
<td>$3.578</td>
<td>$3.834</td>
</tr>
</tbody>
</table>

Panel B: MM Optimal Results Compared to Current Results for FPHs (\(CDV = 0.563; \ E_U = $12,243,322\))
# Table 6. Miller Gain to Leverage and Firm Valuation Results

Table 6 gives results using the Miller gain to leverage (\(G_L\)) equation given in (2). \(D\) is the debt issued, \(\text{CF}_{\text{BT}}\) is the perpetual before-tax cash flows from revenue sources and equals $1,000,000. The current DV (\(\text{CDV}\)) and unlevered equity (\(\text{EU}\)) values are given in the panel headings. Panel A has nonprofit hospital (NPH) results. We assume small for-profit ventures causing small tax rates for NPHs and so set the corporate tax rate (\(T_C\)) at 2.00%, the personal tax rate on equity (\(T_E\)) at 1.00%, and the personal rate on debt (\(T_D\)) at 1.908%. \(\text{EU}\) (or \(V_L\)) is computed on an after-tax basis and discounted by the cost of unlevered equity (\(r_U\)) of 5.4397%. We have: \(\text{EU} = (1-T_F)(1-T_C)/C_n = (1-0.01)(1-0.02)\times$1,000,000 / 0.054397 = $17,835,542.\) Firm value \(V_L = \text{EU} + G_L\). We compute results for fifteen debt issuances where \(\text{Fraction of EU} = \frac{\text{EU}}{\text{EU} + G_L}\) refers to the fraction of \(\text{EU}\) that is retired by the debt issuance. This gives fifteen columns of results. Each debt issuance retires 1/16 of \(\text{EU}\) or \((1/16)\times$17,835,542\) = $1,114,721 or about $1,115 million as seen in the first cell. If there was a thirteenth debt issue, all \(\text{EU}\) would be retired and the firm would remain unlevered. Panel B has for-profit hospital (FPH) results where \(T_C, T_E\) and \(T_D\) are now 33.40%, 18.80%, and 19.08%, respectively. The bold columns represent range of outcomes to cover the medians using two leverage ratios of \(D/\text{EU}\) and \(D/V_L\) that best correspond to \(\text{CDV}\). The grey-shaded column contains values for the optimal leverage choice, which for Miller is the last column.

<table>
<thead>
<tr>
<th>Fraction of EU</th>
<th>1/16</th>
<th>2/16</th>
<th>3/16</th>
<th>4/16</th>
<th>5/16</th>
<th>6/16</th>
<th>7/16</th>
<th>8/16</th>
<th>9/16</th>
<th>10/16</th>
<th>11/16</th>
<th>12/16</th>
<th>13/16</th>
<th>14/16</th>
<th>15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\text{CF}_{\text{BT}}/D)</td>
<td>0.987</td>
<td>0.449</td>
<td>0.599</td>
<td>0.224</td>
<td>0.179</td>
<td>0.150</td>
<td>0.128</td>
<td>0.113</td>
<td>0.100</td>
<td>0.087</td>
<td>0.075</td>
<td>0.063</td>
<td>0.051</td>
<td>0.040</td>
<td>0.030</td>
</tr>
<tr>
<td>(D/\text{EU})</td>
<td>0.063</td>
<td>0.125</td>
<td>0.186</td>
<td>0.250</td>
<td>0.313</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.813</td>
<td>0.875</td>
<td>0.938</td>
</tr>
<tr>
<td>(D/V_L)</td>
<td>0.062</td>
<td>0.125</td>
<td>0.187</td>
<td>0.249</td>
<td>0.311</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.813</td>
<td>0.875</td>
<td>0.938</td>
</tr>
<tr>
<td>(G_L) (in millions)</td>
<td>$0.012</td>
<td>$0.024</td>
<td>$0.037</td>
<td>$0.049</td>
<td>$0.061</td>
<td>$0.073</td>
<td>$0.085</td>
<td>$0.097</td>
<td>$0.119</td>
<td>$0.122</td>
<td>$0.143</td>
<td>$0.146</td>
<td>$0.158</td>
<td>$0.171</td>
<td>$0.183</td>
</tr>
<tr>
<td>(V_L) (in millions)</td>
<td>$17.848</td>
<td>$17.860</td>
<td>$17.872</td>
<td>$17.884</td>
<td>$17.896</td>
<td>$17.909</td>
<td>$17.921</td>
<td>$17.933</td>
<td>$17.945</td>
<td>$17.957</td>
<td>$17.970</td>
<td>$17.982</td>
<td>$18.004</td>
<td>$18.026</td>
<td>$18.058</td>
</tr>
</tbody>
</table>

| Panel B: Miller Optimal Results Compared to Current Results for FPHs (\(\text{CDV} = 0.565; \text{EU} = $9,941,578\)) |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| \(\text{CF}_{\text{BT}}/D\) | 1.609 | 0.805 | 0.536 | 0.402 | 0.222 | 0.268 | 0.320 | 0.201 | 0.179 | 0.161 | 0.146 | 0.134 | 0.124 | 0.115 | 0.107 |
| \(D/\text{EU}\) | 0.063 | 0.125 | 0.186 | 0.250 | 0.313 | 0.375 | 0.438 | 0.500 | 0.563 | 0.625 | 0.688 | 0.750 | 0.813 | 0.875 | 0.938 |
| \(D/V_L\) | 0.061 | 0.120 | 0.177 | 0.231 | 0.283 | 0.334 | 0.382 | 0.429 | 0.474 | 0.518 | 0.560 | 0.601 | 0.640 | 0.678 | 0.715 |
| \(G_L\) (in millions) | $0.206 | $0.412 | $0.618 | $0.824 | $1.030 | $1.237 | $1.443 | $1.649 | $1.855 | $2.061 | $2.267 | $2.473 | $2.679 | $2.885 | $3.091 |
Table 7. CSM Nongrowth Gain to Leverage and Firm Valuation Results (Return to Insert Table 2)

Table 7 provides results using the nongrowth CSM gain to leverage (G_L) equation given in (3). D is the debt issued. CF_{BT} is the perpetual before-tax cash flows from revenue sources and equals $1,000,000. The current DV (CDV) and unlevered equity (E_U) values are given in the panel headings. Panel A has nonprofit hospital (NPH) results. We assume small-for-profit ventures causing small tax rates for NPHs and so set the corporate tax rate (T_c) at 2.00%, the personal tax rate on equity (T_e) at 1.00%, and the personal tax rate on debt (T_d) at 1.90%. We compute E_U (or V_U) on an after-tax basis and discounted by the cost of unlevered equity (n_U) of 5.4397%. We have: E_U = (1 - T_d)(1 - T_c)C/1 - T_e = 1 - 0.01). 1 - 0.02)(1 - 0.000000)/0.054397 = $17,835,542. Firm value (V_L) = E_U + G_L. We compute results for fifteen debt issuances where fraction E_U refers to the fraction of E_U that is retired by the debt issuance. This gives fifteen columns of results. Each debt issuance retires 1/16 of E_U or (1/16)*$17,835,542 = $1,114,721 or about $1.115 million as seen in the first cell. If there was a sixteenth debt issue then all E_U would be retired and the firm would remain unlevered. Panel B has for-profit hospital (FPH) results where T_c, T_e and T_d are now 33.40%, 18.80%, and 19.08%, respectively. The bold columns represent a range of outcomes to cover the medians using two leverage ratios of D/E_U and D/V_L that best correspond to CDV. The grey-shaded column contains values for the optimal leverage choice. When D/V_L > 1 first occurs in a column, debt owners would take over and values in this column and subsequent columns would technically not occur but for illustration purposes are included.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>1/16</th>
<th>2/16</th>
<th>3/16</th>
<th>4/16</th>
<th>5/16</th>
<th>6/16</th>
<th>7/16</th>
<th>8/16</th>
<th>9/16</th>
<th>10/16</th>
<th>11/16</th>
<th>12/16</th>
<th>13/16</th>
<th>14/16</th>
<th>15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>D (in millions)</td>
<td>$1.115</td>
<td>$1.229</td>
<td>$1.344</td>
<td>$1.459</td>
<td>$1.574</td>
<td>$1.688</td>
<td>$1.793</td>
<td>$1.898</td>
<td>$2.003</td>
<td>$2.108</td>
<td>$2.213</td>
<td>$2.318</td>
<td>$2.423</td>
<td>$2.528</td>
<td>$2.633</td>
</tr>
<tr>
<td>CF_{BT}/D</td>
<td>0.897</td>
<td>0.449</td>
<td>0.224</td>
<td>0.179</td>
<td>0.128</td>
<td>0.112</td>
<td>0.100</td>
<td>0.090</td>
<td>0.082</td>
<td>0.075</td>
<td>0.068</td>
<td>0.062</td>
<td>0.056</td>
<td>0.050</td>
<td>0.044</td>
</tr>
<tr>
<td>D/E_U</td>
<td>0.063</td>
<td>0.125</td>
<td>0.188</td>
<td>0.250</td>
<td>0.313</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.813</td>
<td>0.875</td>
<td>0.938</td>
</tr>
<tr>
<td>D/V_L</td>
<td>0.056</td>
<td>0.113</td>
<td>0.167</td>
<td>0.221</td>
<td>0.289</td>
<td>0.366</td>
<td>0.462</td>
<td>0.574</td>
<td>0.710</td>
<td>0.839</td>
<td>0.975</td>
<td>1.157</td>
<td>1.417</td>
<td>1.778</td>
<td>2.139</td>
</tr>
</tbody>
</table>

Panel A: CSM Nongrowth Optimal Results Compared to Current Results for NPHs (CDV = 0.470; E_U = $17,835,542)

<table>
<thead>
<tr>
<th>Fraction</th>
<th>1/16</th>
<th>2/16</th>
<th>3/16</th>
<th>4/16</th>
<th>5/16</th>
<th>6/16</th>
<th>7/16</th>
<th>8/16</th>
<th>9/16</th>
<th>10/16</th>
<th>11/16</th>
<th>12/16</th>
<th>13/16</th>
<th>14/16</th>
<th>15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF_{BT}/D</td>
<td>1.609</td>
<td>0.805</td>
<td>0.530</td>
<td>0.402</td>
<td>0.322</td>
<td>0.268</td>
<td>0.220</td>
<td>0.201</td>
<td>0.179</td>
<td>0.161</td>
<td>0.146</td>
<td>0.134</td>
<td>0.124</td>
<td>0.114</td>
<td>0.107</td>
</tr>
<tr>
<td>D/E_U</td>
<td>0.063</td>
<td>0.125</td>
<td>0.188</td>
<td>0.250</td>
<td>0.313</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.813</td>
<td>0.875</td>
<td>0.938</td>
</tr>
<tr>
<td>D/V_L</td>
<td>0.061</td>
<td>0.122</td>
<td>0.178</td>
<td>0.235</td>
<td>0.303</td>
<td>0.371</td>
<td>0.471</td>
<td>0.571</td>
<td>0.675</td>
<td>0.780</td>
<td>0.885</td>
<td>1.000</td>
<td>1.113</td>
<td>1.226</td>
<td>1.339</td>
</tr>
<tr>
<td>G_L (in millions)</td>
<td>$0.295</td>
<td>$0.272</td>
<td>$0.513</td>
<td>$0.671</td>
<td>$0.808</td>
<td>$0.906</td>
<td>$0.973</td>
<td>$1.007</td>
<td>$1.036</td>
<td>$1.065</td>
<td>$1.094</td>
<td>$1.123</td>
<td>$1.152</td>
<td>$1.181</td>
<td>$1.209</td>
</tr>
</tbody>
</table>

Panel B: CSM Nongrowth Results Compared to Current Results for FPHs (CDV = 0.565; E_U = $9,941,578)
Table 8. CSM Growth Gain to Leverage and Firm Valuation Results (Return to Insert Table 8)

Table 8 provides results using the growth CSM gain to leverage (Gt) equation given in (4). D is the debt issued. CFVT is the perpetual before-tax cash flows from revenue sources and equals $1,000,000. The current DV (CDV) and unlevered equity (Et) values are given in the panel headings. Panel A has for nonprofit hospitals (NPH) results. We assume small for-profit ventures causing small tax rates for NPHs and so set the corporate tax rate (Tc) at 2.00%, the personal tax rate on equity (Te) at 1.00%, and the personal rate on debt (Td) at 1.908%. Et (or Vt) is computed on an after-tax basis and discounted by the cost of unlevered equity adjusted for unlevered growth (rUE) of 2.84% based on PBR = 0.33 so that C = (1−PBR)|CFVT| = (1−0.33)$1,000,000 = $670,000 and Et = (1−Te)(1−Tc)C/rUE = (1−0.01)(1−0.02)$670,000/0.0284 = $23,099,755. Firm value (Vt) = Et + Gt. Fraction Et refers to the fraction of Et that is retired by one of the fifteen debt issuances. This gives fifteen columns of results. Each debt issuance retires 1/16 of Et or (1/16)$23,099,755 = $1,443,755 or about $1,444 million as seen the first cell. If there was a sixteenth debt issue then all Et would be retired and the firm would remain unlevered. Panel B has for-profit hospital (FPH) results where Tc, Te and Td are now 33.40%, 18.80%, and 19.08%, respectively, and rUE = 3.2192%. The bold columns represent a range of outcomes to cover the medians using two leverage ratios of D/UE and D/Vt, that best correspond to CDV. The grey shaded column contains values for the optimal leverage choice. When D/Vt > 1 first occurs in a column, debt owners would take over and values in this column and subsequent columns would not occur but for illustration purposes are included.

<table>
<thead>
<tr>
<th>Fraction of Et</th>
<th>1/16</th>
<th>2/16</th>
<th>3/16</th>
<th>4/16</th>
<th>5/16</th>
<th>6/16</th>
<th>7/16</th>
<th>8/16</th>
<th>9/16</th>
<th>10/16</th>
<th>11/16</th>
<th>12/16</th>
<th>13/16</th>
<th>14/16</th>
<th>15/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: CSM Growth Optimal Results Compared to Current Results for NPHs (CDV = 0.478; Et = $23,099,755)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFVT/D</td>
<td>0.693</td>
<td>0.346</td>
<td>0.231</td>
<td>0.173</td>
<td>0.139</td>
<td>0.115</td>
<td>0.099</td>
<td>0.087</td>
<td>0.077</td>
<td>0.069</td>
<td>0.063</td>
<td>0.058</td>
<td>0.053</td>
<td>0.049</td>
<td>0.046</td>
</tr>
<tr>
<td>D/Et</td>
<td>0.063</td>
<td>0.125</td>
<td>0.188</td>
<td>0.250</td>
<td>0.313</td>
<td>0.375</td>
<td>0.438</td>
<td>0.500</td>
<td>0.563</td>
<td>0.625</td>
<td>0.688</td>
<td>0.750</td>
<td>0.813</td>
<td>0.875</td>
<td>0.938</td>
</tr>
<tr>
<td>D/Vt</td>
<td>0.058</td>
<td>0.116</td>
<td>0.169</td>
<td>0.221</td>
<td>0.289</td>
<td>0.357</td>
<td>0.426</td>
<td>0.500</td>
<td>0.564</td>
<td>0.629</td>
<td>0.693</td>
<td>0.757</td>
<td>0.821</td>
<td>0.885</td>
<td>0.949</td>
</tr>
<tr>
<td>Gt (in millions)</td>
<td>$1.678</td>
<td>$1.389</td>
<td>$1.082</td>
<td>$0.775</td>
<td>$0.468</td>
<td>$0.161</td>
<td>$0.067</td>
<td>$0.073</td>
<td>$0.079</td>
<td>$0.086</td>
<td>$0.093</td>
<td>$0.100</td>
<td>$0.107</td>
<td>$0.114</td>
<td>$0.122</td>
</tr>
<tr>
<td>Vt (in millions)</td>
<td>$24.775</td>
<td>$29.489</td>
<td>$35.557</td>
<td>$42.118</td>
<td>$49.226</td>
<td>$57.025</td>
<td>$65.424</td>
<td>$74.393</td>
<td>$83.862</td>
<td>$93.862</td>
<td>$104.371</td>
<td>$115.500</td>
<td>$127.254</td>
<td>$139.543</td>
<td>$152.466</td>
</tr>
</tbody>
</table>

Panel B: CSM Growth Optimal Results Compared to Current Results for FPHs (CDV = 0.565; Et = $41,105,193) |
| CFVT/D | 1.536 | 0.768 | 0.512 | 0.348 | 0.284 | 0.226 | 0.192 | 0.171 | 0.154 | 0.138 | 0.123 | 0.114 | 0.110 | 0.102 |
| D/Et | 0.063 | 0.125 | 0.188 | 0.250 | 0.313 | 0.375 | 0.438 | 0.500 | 0.563 | 0.625 | 0.688 | 0.750 | 0.813 | 0.875 | 0.938 |
| D/Vt | 0.061 | 0.120 | 0.174 | 0.226 | 0.278 | 0.332 | 0.387 | 0.442 | 0.497 | 0.552 | 0.607 | 0.662 | 0.717 | 0.772 | 0.827 |
| Gt (in millions) | $0.316 | $0.465 | $0.787 | $1.096 | $1.405 | $1.713 | $2.021 | $2.329 | $2.636 | $2.943 | $3.250 | $3.556 | $3.862 | $4.168 | $4.474 |
Figure 1. Growth Results for Nonprofit Hospitals (NPHs): \( G(t) \) (in millions) versus Fraction \( E(t) \) Retired

Fraction \( E(t) = 0.15 \); \( PBR = 0.6 \); \( B(t) = 2.100 \); \( G(t) = 3.018 \) million; \( Max G(t) = 3.018 \) million; \( Max V(t) = 26.118 \) million; \( ODV = 0.236 \)

Fraction \( E(t) = 0.16 \); \( PBR = 0.22 \); \( B(t) = 1.700 \); \( G(t) = 2.063 \) million; \( Max G(t) = 2.063 \) million; \( Max V(t) = 21.230 \) million; \( ODV = 0.238 \)

Fraction \( E(t) = 0.16 \); \( PBR = 0.11 \); \( B(t) = 0.673 \); \( G(t) = 18.801 \) million; \( Max G(t) = 2.115 \) million; \( Max V(t) = 20.176 \) million; \( ODV = 0.237 \)
Figure 2. Growth Results for For-Profit Hospitals (FPHs): $G_t$ (in millions) versus Fraction $E_t$: Retired

Fraction $E_t$: 5/16; $PBR = 0.38$; $g_t = 3.4870\%$; $E_0$: $10.415$ million; Max $G_t$: $1.305$ million; Max $V_t$: $11.720$ million; ODV = 0.295
Fraction $E_t$: 4/16; $PBR = 0.26$; $g_t = 1.5846\%$; $E_0$: $9.604$ million; Max $G_t$: $0.698$ million; Max $V_t$: $10.302$ million; ODV = 0.242
Fraction $E_t$: 4/16; $PBR = 0.14$; $g_t = 1.7161\%$; $E_0$: $9.589$ million; Max $G_t$: $0.640$ million; Max $V_t$: $10.229$ million; ODV = 0.242
Table 9 summarizes the results discussed in Sections 5 and 6 for the four capital structure models used to investigate the financing of the hospital industry. Dollar values are in millions and n.a. stands for not applicable. Where applicable, we provide all values at ODV. CFBT is the perpetual before-tax cash flows from revenue sources and equals $1,000,000. E_u (or V_u) is unlevered firm value and was illustrated in prior tables using the formula applicable to each model. D refers to the debt issued to retire E_u. Debt-to-Firm Value is D/V_u or DV for short. CDV is the current DV. The CDV values are the same values as first given in Section 4.4. TDV is the test DV and is the average from our two computations for D/E_u and D/V_u given in Table 5 through Table 8 that best approximates CDV where the choice of TDV is limited by our finite DV choices based on fifteen bond ratings. ODV is the optimal DV, which is the DV where the firm maximizes its gain to leverage (called max G_t). Like TDV, it is the average of D/E_u and D/V_u. The cost of debt and levered equity are r_o and r_t. These r_o and r_t values occur at ODV. In Table 3, we provided the values for r_o and r_t corresponding to their CDV as approximated by TDVs. The growth rates for unlevered and levered equity are g_u and g_t. We compute G_t using equations (1), (2), (3) and (4) representing the respective four models of MM, Miller, nongrowth CSM and growth CSM. We apply each model to nonprofit hospitals (NPHs) and for-profit hospitals (FPHs). Maximum firm value (max V_u) equals E_u plus max G_t. G_t*E_u is max G_t as a percent of E_u. Loss is the value lost from not being at ODV. We define it as G_t given by CDV minus max G_t. L*E_u is loss as a percent of E_u. LR is the loss ratio defined as: FPH loss divided by NPH loss. CII is the conversion inefficiency index and is the fall in max V_t that a typical NPH would have to attain to convert to a typical FPH. CII is defined as: (NPH's max V_t minus FPH's max V_t) divided by NPH's max V_t. CIE is the conversion inefficiency index and is like CII with the same numerator except we divide by FPH's max V_t.

<table>
<thead>
<tr>
<th>Variable</th>
<th>NPH</th>
<th>FPH</th>
<th>NPH</th>
<th>FPH</th>
<th>NPH</th>
<th>FPH</th>
<th>NPH</th>
<th>FPH</th>
<th>NPH</th>
<th>FPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFBT/D</td>
<td>0.0592</td>
<td>0.0871</td>
<td>0.0978</td>
<td>0.1073</td>
<td>0.2243</td>
<td>0.4024</td>
<td>0.1732</td>
<td>0.3672</td>
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<tr>
<td>CDV</td>
<td>0.4704</td>
<td>0.5650</td>
<td>0.4704</td>
<td>0.5650</td>
<td>0.4704</td>
<td>0.5650</td>
<td>0.4704</td>
<td>0.5650</td>
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<tr>
<td>TDV</td>
<td>0.4975</td>
<td>0.5710</td>
<td>0.4986</td>
<td>0.5713</td>
<td>0.4999</td>
<td>0.5355</td>
<td>0.4564</td>
<td>0.5875</td>
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<tr>
<td>ODV</td>
<td>0.9289</td>
<td>0.8257</td>
<td>0.9327</td>
<td>0.8263</td>
<td>0.3455</td>
<td>0.3421</td>
<td>0.2356</td>
<td>0.2951</td>
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<tr>
<td>r_o</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>2.5887%</td>
<td>3.1500%</td>
<td>2.3887%</td>
<td>3.6500%</td>
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</tr>
<tr>
<td>r_t</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
<td>5.4487%</td>
<td>6.1000%</td>
<td>5.4487%</td>
<td>5.1000%</td>
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<td></td>
</tr>
<tr>
<td>PBR</td>
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<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.3300</td>
<td>0.3300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g_u</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>2.6257%</td>
<td>2.2205%</td>
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</tr>
<tr>
<td>g_t</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>0.0000%</td>
<td>2.9801%</td>
<td>3.4879%</td>
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</tr>
<tr>
<td>Max G_u</td>
<td>$9.338</td>
<td>$3.834</td>
<td>$0.193</td>
<td>$3.091</td>
<td>$3.334</td>
<td>$0.671</td>
<td>$3.016</td>
<td>$1.305</td>
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<td></td>
</tr>
<tr>
<td>G_t*E_u</td>
<td>1.88%</td>
<td>31.13%</td>
<td>1.02%</td>
<td>31.10%</td>
<td>13.09%</td>
<td>6.75%</td>
<td>13.07%</td>
<td>12.53%</td>
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<td></td>
</tr>
<tr>
<td>Loss</td>
<td>0.158</td>
<td>0.278</td>
<td>0.085</td>
<td>0.103</td>
<td>0.249</td>
<td>0.190</td>
<td>0.140</td>
<td>0.541</td>
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</tr>
<tr>
<td>L*E_u</td>
<td>0.88%</td>
<td>10.44%</td>
<td>0.48%</td>
<td>10.37%</td>
<td>18.40%</td>
<td>19.19%</td>
<td>61.91%</td>
<td>53.20%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LR: 8.11 12.08 0.58 0.39
CII (CIE): 12.40% (14.16%) 27.67% (38.25%) 47.38% (90.05%) 55.13% (122.86%)
Figure 3. Nonprofit Hospitals (NPHs): Gain to Leverage versus Debt-to-Firm Value Ratio (CDV = 0.470; Max stands for maximum)

<table>
<thead>
<tr>
<th>Nonprofit Type</th>
<th>Fraction (%)</th>
<th>ODV</th>
<th>$18.016M</th>
<th>Max V: $18.353M</th>
<th>Max G: $0.338M</th>
<th>G%E: 1.88%</th>
<th>Loss: $0.158M</th>
<th>L%E: 0.88%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miller Non-growth</td>
<td>15/16</td>
<td>ODV: 0.9287</td>
<td>$17.836M</td>
<td>$18.018M</td>
<td>$0.183M</td>
<td>G%E: 1.02%</td>
<td>Loss: $0.985M</td>
<td>L%E: 0.48%</td>
</tr>
<tr>
<td>CSM Non-growth</td>
<td>4/16</td>
<td>ODV: 0.2355</td>
<td>$17.836M</td>
<td>$20.170M</td>
<td>$2.334M</td>
<td>G%E: 13.09%</td>
<td>Loss: $3.293M</td>
<td>L%E: 18.46%</td>
</tr>
<tr>
<td>CSM Growth</td>
<td>4/16</td>
<td>ODV: 0.2356</td>
<td>$23.100M</td>
<td>$26.118M</td>
<td>$3.018M</td>
<td>G%E: 13.07%</td>
<td>Loss: $14.093M</td>
<td>L%E: 61.01%</td>
</tr>
</tbody>
</table>

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