

---

## Hospital Capital Budgeting During a Public Health Crisis

Alex J. Holcomb, PhD<sup>1</sup>, Dean G. Smith, PhD<sup>2</sup>

1. Department of Finance, Banking and Insurance, Walker College of Business, Appalachian State University, Boone, NC, USA
2. School of Public Health, Louisiana State University Health Sciences Center – New Orleans, LA, USA

### Abstract

This paper seeks to understand the current financial landscape in the context of hospital capital budgeting, as well as provide some guidance on how to navigate the capital markets in times of crisis. The focus is on the general weighted average cost of capital formulation and the relationship of its components: the risk free rate and its relationship with the costs of equity and debt, the cost of debt, and the cost of equity. We provide some practical implications for managing during the current crisis, as well as potential avenues that merit future research.

**Keywords:** COVID-19, Hospital, cost of capital

### Introduction

Modern hospitals in the U.S. are enormously capital intensive. The need for capital has grown as the practice of medicine has become increasingly complex and more reliant on specialist equipment and techniques. During periods of normal operations, much of a hospital's capital budget and investment decision-making concerns how to raise the necessary financial capital to fund the cost of replacing or upgrading aging and outdated equipment and facilities. For many hospitals, particularly aging ones, the amount of financial capital required to upgrade and retrofit their existing physical capital – both facilities and equipment – is significant enough to have caused decreased liquidity and higher debt ratios, associated with financial distress and bankruptcy (Puro, et al., 2019). This has been especially true in rural areas whose smaller hospitals typically operate much closer to the margin (Topchik, et al, 2020), and hospitals that operate in states that have not adopted Medicaid expansion (Lindrooth, et al., 2018). Even large hospitals in big cities have not been immune to the slow breakdown and dismantling that occurs when a hospital cannot keep up with its capital requirements (e.g. Hahnemann University Hospital in Philadelphia and St. Vincent Medical Center in Los Angeles). The current healthcare crisis caused by the novel coronavirus will only serve to both exacerbate the capital requirements

of hospitals,<sup>1</sup> and make it more difficult and costly to raise the needed capital to fund both their existing investments and novel ones brought up by the crisis. This paper seeks to understand the current financial landscape in the context of hospital capital budgeting, as well as provide some guidance on how to navigate the capital markets in times of crisis.

Small and big; private or publicly traded; for-profit and not-for profit; stand-alone or member of a hospital system; there is significant heterogeneity across business structures within the broader hospital industry. This diversity in organizational structure makes generalizations about hospitals and their capital budgeting difficult to make with confidence. That being said, we know that publicly traded hospitals have access to the same types of financial capital as any other publicly traded company, and that private hospitals (either investor-owned or not-for-profit) have access to a nearly equally wide variety of financing sources – with some differences between the two. The available sources of capital for hospitals include the main sources of financing that are available to any company, which are typically: equity, debt, and retained earnings. While a given hospital's relative ability to use a specific source of financing differs, most hospitals should have access to each of these three types of financing in at least some capacity.

During a non-crisis period the investment process and capital raising at a hospital looks largely the same as for any other firm (Reiter, et al., 2000; Smith, Wheeler & Wynne, 2006). Investment opportunities are typically identified throughout the year by the individual departments that make up the hospital as well as by the central management team.<sup>2</sup> These proposals would be put in front of the finance team, which then evaluates the projects to decide if they are financially beneficial to the firm and whether to invest in them. However, the hospital's capital budget would typically be raised all at once<sup>3</sup> rather than trying to raise financing for each individual investment as they arise. In part, this is done because raising financing is not free, a financial institution is typically used to facilitate raising equity or selling debt and they charge fees for this service. Thus, the finance team needs to anticipate the total capital needs for the hospital in a given year and then raise enough capital to cover that estimate in as few tranches as possible. Finally, the finance team must decide how to allocate the hospital's collective capital budget for the year across the set of potential projects that have been determined to be value creating.

The evaluation process for a capital investment project will be based on one of a series of rules<sup>4</sup>, which take a two-pronged approach to determining a project's value. First, a project can only create value if its direct cash flows (those cash flows either generated, or saved, by investing in the project) exceed the cost of investing in the project. Second, if the project has been financed externally – either by raising equity or borrowing – the project must provide enough cash flow to also cover the cost of the financing itself. The simplest way to think about this evaluation is to consider a firm that uses a traditional bank loan to raise financing for a new investment. The firm will only invest in the project if it creates value, however the project can only create value if the cash flows not only exceed the cost of the project, but also exceed the interest payments and fees on the loan. The value of such a project exists only in the cash flows that are left over after both types of costs are satisfied. This logic holds for projects that make use of any type of financing even though the costs of other types of capital are not always as obvious as the interest payments on debt. For example, funding expenditures to solicit donations to not-for-profit hospitals are a real cost. (Smith & Clement, 2019). Further, because hospitals are likely to use multiple sources

of financing to build their general capital budget, the projects they evaluate are expected to cover the average cost of all the different capital they utilize. This average cost is called the Weighted Average Cost of Capital (WACC) and the WACC is the hurdle rate that all projects must clear before they can be accepted by the finance team and implemented by the firm.<sup>5</sup>

Understandably, this means that the level of the WACC is an extremely important determinant of whether a project is accepted or not. In addition, because the costs of its component capital sources vary over time, a firm might reject a project during a period when its costs of capital are high that it would have accepted during a period when its costs of capital were lower (Reiter, Wheeler & Smith, 2008). It is in precisely this way that the general economic cycle and the behavior of public markets influences the capital budgeting of a firm – through the affect they have on the firm’s costs of capital. However, the ways in which the markets and general economic news affect a specific firm will be largely unique to that firm. This means that in times of crisis an otherwise financially healthy and creditworthy firm may find itself facing a cost of capital that makes investing in otherwise value creating projects impossible, because the markets general attitude towards risk has distorted any investor’s view of the firm’s unique characteristics. Thus, it is especially in times of crisis that a thorough understanding of how the WACC and its components are affected by the transitory and permanent market effects of a COVID-19 type crisis is so important. Particularly for firms like hospitals in which an inability to make capital improvements or investments may result in an inability to adequately respond to the crisis and care for those affected by it.

The remainder of the papers is broken down into two main sections. The next section covers the general WACC formulation and the relationship of its components: the risk free rate and its relationship with the costs of equity and debt, the cost of debt, and the cost of equity. The final section discusses the practical implications of the current crisis, how hospital managers should react to ever-changing capital markets, and some potential avenues that merit future research.

## **The Weighted Average Cost of Capital**

We can break our discussion of the weighted average cost of capital into three sub-sections: a discussion about the trajectory of the risk free rate and its effect on both the cost of equity and debt, a discussion about the value and cost of equity, and a discussion about the value and cost of debt. However, we should begin with a brief review of the formulation of the WACC itself, and its most common components.

The weighted average cost of capital is the value weighted average of each outstanding source of capital used by the firm, and is representative of both the average risk taken by investors in the firm (the providers of capital) and the average return required by those investors for taking that risk. This, in turn, implies that the WACC is the rate of return against which all the firm’s investment projects should be judged – if those projects are of a similar risk profile to the entire firm.<sup>6</sup> The components of the WACC should include the current costs of all the external sources of capital that are currently outstanding in the firm. The most common of which are debt and equity, but could include any number of less common sources like preferred equity or warrants. To keep this discussion straightforward we will restrict our discussion to debt and equity;

however, the formula can easily be adjusted to account for additional financing sources by adding additional terms. The general formula for the WACC is as follows:

$$WACC = \frac{E}{V} \times R_E + \frac{D}{V} \times R_D(1 - T) \quad (1),$$

where  $E$  is equal to the market value of the firms outstanding equity,  $D$  is equal to the market value of the firms outstanding interest bearing debt, and  $V$  is equal to the market value of the firm ( $V = E + D$ ).  $R_E$  is equal to the firms cost of equity,  $R_D$  to the firms cost of debt, and  $T$  is equal to the firms marginal tax rate.

The firms cost of equity  $R_E$  is the rate of return an investor demands when they provide equity financing by purchasing the firm's shares, and is thus typically represented by the expected return on the common stock of the firm, in the case of investor-owned firms. For privately held and not-for-profit hospitals and health systems, accounting-based estimates may be used in lieu of stock returns (Smith & Wheeler, 1989). A standard calculation for expected return uses the Capital Asset Pricing Model (CAPM):

$$E[R_A] = r_f + \beta(R_M - r_f) \quad (2),$$

where  $E[R_A]$  is the expected return on any stock,  $r_f$  is the return on the risk free asset,  $\beta$  is a measure of the firms exposure to the systematic risk in the market (and is commonly calculated as an estimate of the degree to which the firm's stock return varies along with the average return in the market), and  $R_M$  is the expected return for the market portfolio.

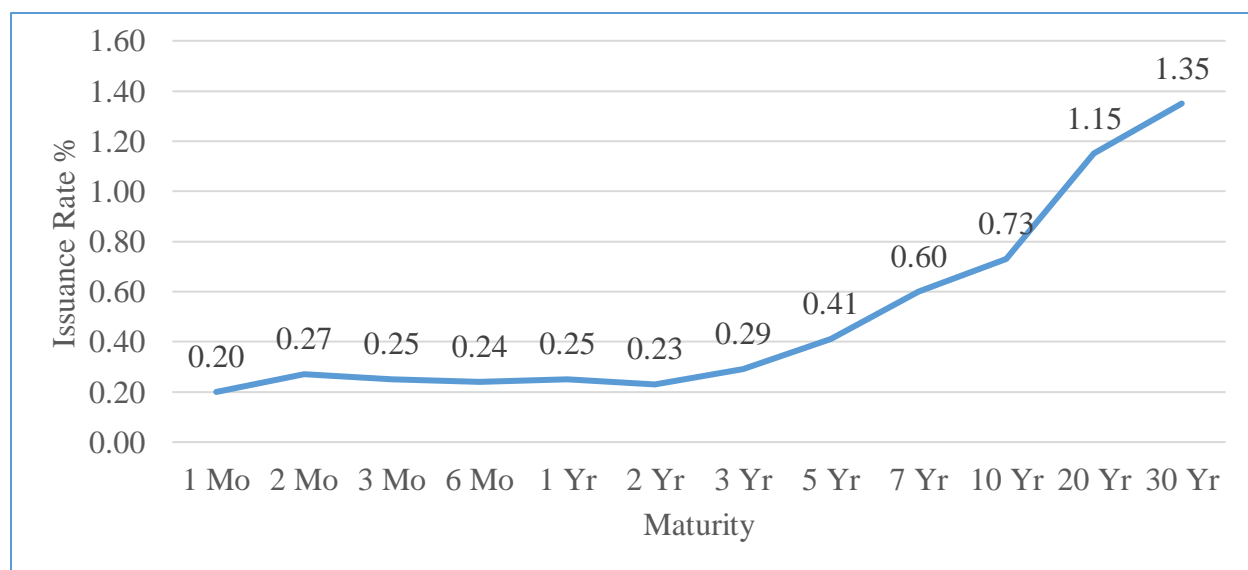
The firms cost of debt  $R_D$  represents the rate of interest a firm would be charged on a new debt issue, and is most appropriately measured as the value-weighted average of the Yield to Maturity's (YTMs) on the firms existing debt issues. However, in the event that those cannot be measured or observed<sup>7</sup>, the cost of debt can be estimated by adding a premium to a benchmark interest rate such as the risk free rate  $r_f$ . The premium is determined based on the credit risk of the borrowing firm, which can be estimated in a number of ways. The cost of debt is multiplied by  $(1 - T)$  in order to calculate the after tax cost of debt, which is done to account for the tax benefit generated by using debt financing. This benefit is called the interest tax shield, and it occurs because interest is considered a business expense and firms are allowed to deduct business expenses from the taxable income. Thus, paying interest will reduce a firm's overall tax bill, which in turn lowers its effective cost of debt. For hospitals that still enjoy a portion of revenues in the form of cost-based reimbursement, the last term can also include a cost of debt coverage component – a cost of capital reimbursement shield (Wheeler & Smith, 1988).

### *The Risk Free Rate*

The risk free rate  $r_f$  is the rate of return provided by the risk free asset. It is the baseline rate in most financial models, and the WACC is no exception;  $r_f$  is also the benchmark rate in the CAPM and is a typical benchmark used when calculating the cost of debt (particularly if the yields on the firms existing debt cannot be estimated directly). Its status as the benchmark rate

means that every other rate will typically change along with  $r_f$ , which is what makes the risk free rate a fundamental part of a firm's WACC and thus its capital budget and decision making. Practically speaking, the risk free rate is usually represented in the financial world by U.S. treasury bonds of short maturity (a common academic data resource uses the 1-month T-Bill rate). However, in the context of capital budgeting and investment it is often customary to instead try to match the maturity<sup>8</sup> of the treasury bond we intend to use as the risk free asset with the maturity of the cash flows generated by the investment under evaluation. Thus, if we are considering a plan to upgrade hospital facilities or upgrade existing equipment, which would be sufficient for the next 15 years, we might prefer a 10-20 year U.S. treasury bond as our risk free asset. These rates are easily observable and we know that the historical rate of return for short-term U.S. treasury bonds over the last 100 years has averaged approximately 3.1% whereas the historical average rate on longer maturity treasuries is about 5%.

In contrast to these historical rates, the current rates on US Treasury Bonds are near historic lows. The nominal issuance rates of all bonds with maturities shorter than 20 years are under 1%, and even the 30-year bond (the longest maturity bond currently sold by the treasury) is offering a paltry 1.35% (see Figure 1). The yield to maturities of these bonds in the secondary markets are markedly lower. Yields on the 5 – 30 year treasuries are all currently negative, and the 10-year treasury currently has a -0.40% real yield (see Figure 2). What's more, it is not currently outside the realm of possibility that we observe bonds sold by the U.S. Treasury with negative rates at issuance – an almost unthinkable occurrence – one that did not even occur during the 2008 financial crisis in the United State. Still it is becoming more likely, several European Nations including Germany, and the Japanese central bank, are already issuing debt at *negative* rates.<sup>9</sup> Thus far, the Treasury has resisted doing so in the U.S. Although, as the negative yields demonstrate, the demand for Treasuries is sufficiently high even with negative yields, and a lengthy crisis period could prompt the government to take an unprecedented move.

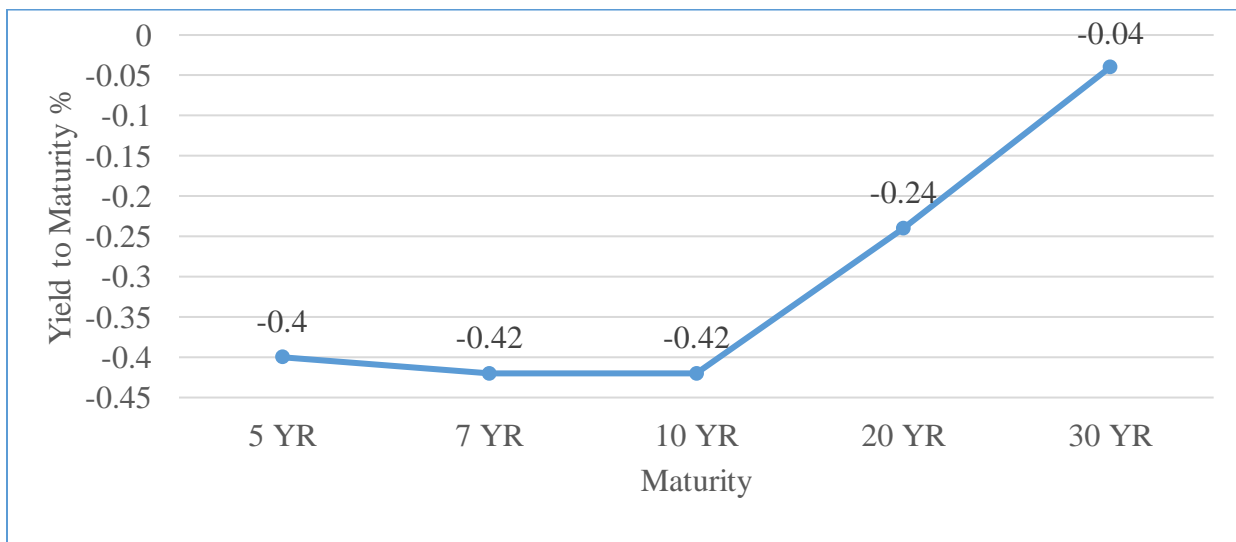


**Figure 1.** Issuance Rates for Treasury Bonds of Different Maturities. Source data: U.S. Department of the Treasury, April 9, 2020.

Because the risk free rate is the baseline rate it has a very direct impact on a firm's cost of capital, and as  $r_f$  climbs, raising money will get much more expensive for the average firm. Alternatively, if  $r_f$  falls (as it is currently doing) capital costs should shrink on average. Ceteris paribus, falling risk free rates should be a good thing for hospitals because a smaller baseline rate reduces the firm's WACC and this would mean that the firm's potential projects have a lower hurdle rate to clear before being acceptable. Thus, a careful analysis of the appropriate risk free asset can have a significant impact on the cost of capital for a hospital, and on the investment opportunities that are potentially valuable to it at any given time.

### The Cost of Debt

Hospitals in the U.S. have access to many different types of debt financing, ranging from a standard bank loan, to a publicly issued corporate or municipal bond. Each of these types of debt comes with different characteristics and different interest rates. A single hospital with multiple outstanding bond issues and several different bank loan facilities might pay a different rate on each individual security. It is even likely that this is the case given that each bond or loan was probably raised at different times, and because the market rate varies, the baseline rate would have been different when the interest rate was being determined for each security. Regardless of the rates the company has agreed to pay on its outstanding debt, a firm's cost of debt is the rate it would have to pay on a *new* debt issue at the current time. A firm looking to raise debt financing will try to identify the cheapest source of debt available and raise debt in that form. However, this is complicated during a crisis time, and particularly during this crisis, by the availability of creditors willing to provide different types of debt financing. Thus, a hospital facing an unprecedented capital crunch must assess potential debt financing on a number of levels: what type of debt is appropriate and available, and how their changing credit risk will affect the potential rate they may have to pay.



**Figure 2.** Yield to Maturity for Longer Term Treasury Bonds. Source data: U.S. Department of the Treasury, April 9, 2020.

The largest not-for-profit hospitals, and hospital systems, potentially have access to both the corporate and municipal (muni) bond markets. However, a much larger share of hospitals have access to the muni market without having access to the corporate bond market making muni's a dominant source of debt for hospitals. Municipal bonds are a type of debt security typically issued by non-federal government entities to fund any number of potential investments. However, they are often associated with specific projects that a local entity is pursuing (such as infrastructure or hospital improvements). They are a particularly attractive source of financing for investors because the interest paid on municipal bonds is typically tax-free at the federal level – and occasionally at the state and local level. They are also attractive to borrowers because the investors in municipal debt owe lower taxes on the interest income they receive, and thus are typically willing to accept lower interest rates on the debt they purchase. Since the majority of hospitals are not-for-profit, they have the ability to issue tax advantaged municipal debt, and they raise vast quantities of debt every year by selling public municipal bonds. In 2018, general acute care hospital municipal bond issuances exceeded \$21.5 billion, with more than \$253 billion outstanding, exceeding the amounts for higher education and highways (Kolchin, Sung & Podziemska, 2019).

Given that in normal times the rates on corporate debt typically move in tandem with treasury rates we might expect to see the yields on corporate bonds falling along with Treasuries. Likewise, we might expect issuers of municipal bonds, which typically exhibit the same behavior, to also enjoy falling rates. However, that truism of the debt market is just a simplification of the actual relationship between treasuries and other debt instruments. The actual rates on municipal and corporate debt are determined by adding a premium to the risk free rate of similar maturity; where that premium is based on the additional risk faced by the investor because of the borrowers unique characteristics. In times of crisis, the premium can diverge significantly from its historical average because the risk of any other borrower increases relative to the risk free Treasury bond. Thus even though Treasury rates have fallen to historic lows, we are likely to observe rising rates for other borrowers, and in the absence of rising rates we are likely to see a slow freezing of the debt markets. This happens as investors refuse to buy bonds at the lower “market rate” because they recognize that borrower risk is much higher during times of crisis, and estimates of premiums have not caught up with actual risk.

In large part, this appears to be what has occurred in the municipal, and corporate, bond markets over the last several weeks.<sup>10,11</sup> The evidence suggests that the availability of debt has been reduced significantly despite the recent moves by the Treasury and the Federal Reserve to reduce baseline rates and incentivize lending. This combined with an increase in the perceived and actual risk, and thus the cost of debt, of hospitals is likely to reduce the appeal of debt financing throughout the crisis period.

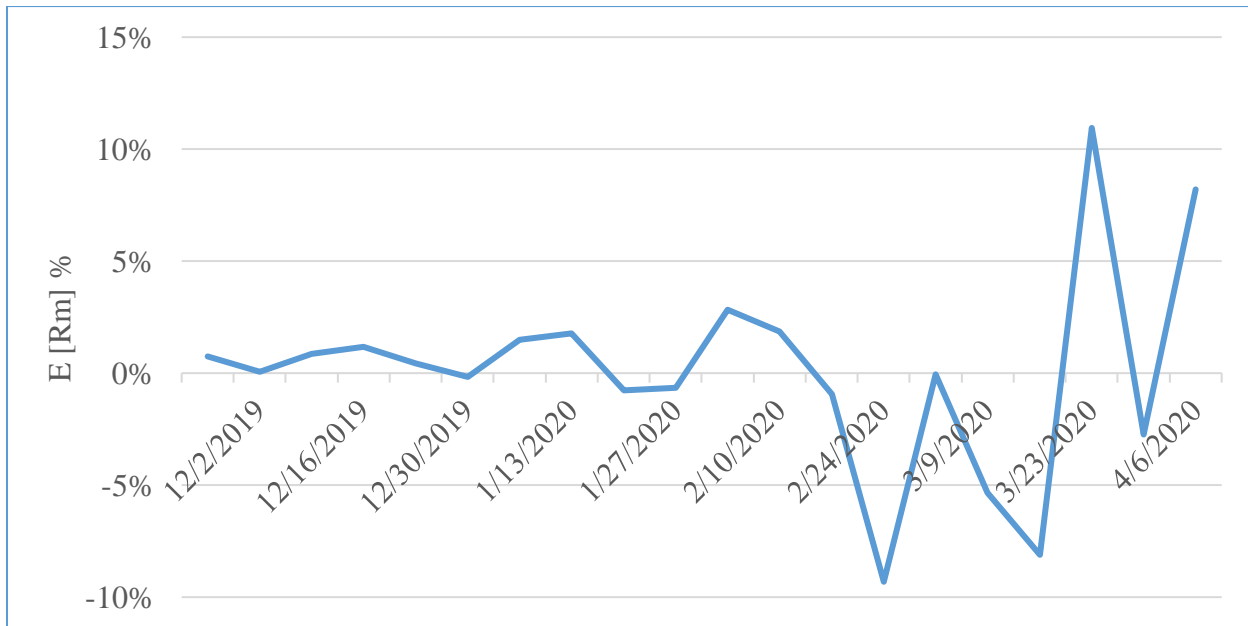
### *The Cost of Equity*

For those hospitals that have access to the equity markets the outlook is likely to be just as grim. Stock prices have fallen at a record-breaking pace, which ceteris paribus makes raising capital by issuing shares a much more expensive, and less appealing, process than just a few months ago. In addition, much like in the debt markets, we are now in a world where the traditional relationship



between the expected return (as calculated by the CAPM) and a firm's risk adjusted cost of capital has broken down.

While it is difficult to estimate the effect on hospitals' equity costs so early in the crisis, we can make a number of assumptions based on what we know about the components of CAPM<sup>12</sup> (see Equation 2). First, we know that the risk free rate  $r_f$  has fallen precipitously since the crisis began, from levels that were already below average historically, to a point that – at least in the US – is close to the lowest it has ever been. However, because  $r_f$  enters into the CAPM formula in two ways it's not immediately clear what impact this will have on expected returns. Second, the expected return on the market  $R_M$  has also fallen – with several broad market indices down 20 – 30% over the past few months from their record highs in January. Indeed the expected return on the market has fallen so much, and so quickly, that it was negative in February and March of 2020. The trajectory of this fall has been staggering. In 2019 the market risk premium (which is the name for the term  $(R_M - r_f)$  in the CAPM) was 28.28% on an annual basis, in February of 2020 alone it was -8.13% (see Figure 3)<sup>13</sup>.



**Figure 3.** Expected Return on the Market – Weekly S&P 500 Index. Source data: Yahoo Finance, April 9, 2020.

Finally, it is clear that firm betas  $\beta$  are rising across the stock market. However, it is too soon to tell whether we have observed a large scale break in the  $\beta$  for any firm, because the necessary amount of data to calculate  $\beta$  following the start of the crisis does not yet exist. As an estimate, when we use pre-crisis data to estimate firm  $\beta$ 's we still see an increase, which indicates that there may be a structural change in the market happening with regard to risk. Beta is a measure of a firm's exposure to systematic risk in the market (like a pandemic) and given the reaction of many firms stock prices to the pandemic, we should expect that there is going to be some



updating necessary in order to bring the old estimates of firms' systemic risk exposure in line with what we now know to be their actual exposure.

If we combine all of these market movements and changes we find that the expected return for most public firms must be negative in the current climate (unless their  $\beta$  is negative). In the context of a firm's cost of capital this implies that public hospitals right now should have a negative cost of equity. This in turn implies a negative or very small WACC, depending of course on the cost of debt for the firm and their relative capital structure weights. Does this mean that firms should rush out and raise capital by issuing equity? The answer is probably no – for a couple of reasons. First, the demand for new equity issues is likely to be very low at the current time; investors just are not willing to provide capital when the expected return is negative. In turn, because prices have fallen the management of a firm is unlikely to reach for equity capital and devalue the firm's existing equity, especially when they can remember record high prices from a few months ago.

## Practical Implications for Managers

The acuity of this crisis is likely to be felt more significantly among smaller hospitals with less access to different sources of financing, rather than larger hospitals or hospital systems that are likely to have outstanding financing available and the necessary relationships with financial providers in order to initiate new financing to go along with it. However, we should also be prepared for a situation in which even larger and more financially stable hospitals face some level of financial distress, especially if smaller and areas that are more rural start to face a similar level of hospitalizations as bigger metro areas like New York and New Orleans. If these smaller hospitals get overwhelmed, they will try to shift patients to larger metro facilities, which will prolong the crisis in areas that might otherwise start seeing a return to normality. This raises a number of concerns for managers as they try to plan for the short term and long-term future of their hospitals.

The main practical implication for hospitals and managers is clear, albeit probably not ideal for those hospitals facing an acute capital shortfall. Absent any pre-existing arrangements with favorable (pre-crisis) terms, hospitals must wait for markets to stabilize before attempting to raise any capital in traditional markets. It has been noted in the media that many hospitals are halting planned issuances of debt (Bannow, 2020). The extreme uncertainty caused by the coronavirus pandemic has brought financial markets into uncharted territory – with the IMF now predicting a contraction more severe than any time other than the great depression in the 1930s.<sup>14</sup> Which means that virtually no hospital is going to be able to analyze all these changes and come up with a coherent and practical plan to take advantage of a potentially low WACC. Unfortunately for managers, the optimal time to raise capital to survive a crisis is before the crisis ever begins – as precautionary capital. For those managers that are forced to try to raise capital via traditional markets during the current crisis it will almost certainly be at suboptimal terms and rates. We would encourage managers to first investigate alternative sources of capital, potentially via one or more of the governmental relief funds before turning to the traditional capital markets in these uncertain times.

## Future Research

The current crisis has raised a number of potential avenues for future research in the area of hospital financing. First, more research on the effect of the crisis on the market for municipal bonds and particularly for those issued by hospitals will be needed if it will ever be possible to prepare for the next one. Next, hospitals occupy an additional nexus in our current world and economy. We expect hospitals to both fund and capitalize themselves while at the same time providing for the public good. This is a seemingly untenable position that the current crisis is making increasingly distinct – what happens when hospitals must shut off their only profitable areas of practice in order to prepare for, or reduce, the impact of a pandemic? Can we expect hospitals to both operate in the same realm as any other firm in the economy – that is to be governed by profits, losses, and other financial performance metrics, and simultaneously require them to be able to become the front line against public health crises in any meaningful way? What will happen when these hospitals start to run out of capital and supplies during a prolonged crisis? It appears clear that a very fruitful line of analysis in the future will be trying to untangle this web of incentives, and at least attempt to point at a way out of the mess in which we find ourselves.

## References

- Bannow, T. (2020). Hospitals Putting Bond Issues on Hold amid COVID-19 Outbreak. *Modern Healthcare*, March 19. Last accessed April 12, 2020: <https://www.modernhealthcare.com/finance/hospitals-putting-bond-issues-hold-amid-covid-19-outbreak>.
- Daly, R. (2020). Coronavirus Leaves Hospital Financing in Flux. *Healthcare Financial Management Association*, March 19. Last accessed April 18, 2020: <https://www.hfma.org/topics/news/2020/03/coronavirus-leaves-hospital-financing-in-flux.html>
- Gopinath, G. (2020). The Great Lockdown: Worst Economic Downturn since the Great Depression. *IMFblog*, April 14. Last accessed April 18, 2020: <https://blogs.imf.org/2020/04/14/the-great-lockdown-worst-economic-downturn-since-the-great-depression/>
- Lindrooth, R. C., Perrailon, M. C., Hardy, R. Y., & Tung, G. J. (2018). Understanding the Relationship between Medicaid Expansions and Hospital Closures. *Health Affairs*, 37(1), 111-120.
- Kolchin, K., Sung, S., Podziemska, J. (2019). *Municipal Bond Credit Report*. New York, NY: Securities Industry and Financial Markets Association. Last accessed April 12, 2020: <https://www.sifma.org/wp-content/uploads/2019/02/US-Municipal-Report-2019-02-11-SIFMA.pdf>.
- Puro, N., Borkowski, N., Hearld, L., Carroll, N., Byrd, J., Smith, D.G., Ghiasi, A. (2019). Financial Distress and Bankruptcy Prediction: A Comparison of Three Financial Distress Prediction Models in Acute Care Hospitals. *Journal of Health Care Finance*, 46(2), 1-15.

- Reiter, K.L., Wheeler, J.R.C., Smith, D.G. (2008). Liquidity Constraints on Hospital Investments when Credit Markets are Tight. *Journal of Health Care Finance*, 35(1), 24-33.
- Reiter, K.L., Wheeler, J.R.C., Smith, D.G., Rivenson, H. (2000). Capital Investment Strategies. *Journal of Health Care Finance*, 26(4), 31-41.
- Smith, D.G., Clement, J.P. (2013). Hospital Philanthropy. *Journal of Health Care Finance*, 39(3), 52-57.
- Smith, D.G., Wheeler, J.R.C. (1989). Accounting-Based Risk Measures for Not-for-Profit Hospitals. *Health Services Management Research*, 2(3), 221-226.
- Smith, D.G., Wheeler, J.R.C., Wynne, J. (2006). Capital Budgeting Practices in Hospitals. *International Journal of Healthcare Technology and Management*, 7 (1/2), 117-128.
- Topchik, M., Gross, K., Pinette, M., Brown, T., Balfour, B., Kein, H. (2020). The Rural Health Safety Net Under Pressure: Rural Hospital Vulnerability. Chicago, IL: Chartis Center for Rural Health, The Chartis Group. Last accessed April 12, 2020: [https://www.ivantageindex.com/wp-content/uploads/2020/02/CCRH\\_Vulnerability-Research\\_FiNAL-02.14.20.pdf](https://www.ivantageindex.com/wp-content/uploads/2020/02/CCRH_Vulnerability-Research_FiNAL-02.14.20.pdf)
- Verlaine, J.A., Timiraos, N. (2020). State Funding Woes Are Dragging the Fed Into Muni-Market Reboot. *The Wall Street Journal*, April 8. Last accessed April 18, 2020: <https://www.wsj.com/articles/state-funding-woes-are-dragging-the-fed-into-muni-market-reboot-11586338203>
- Wheeler, J.R.C., Smith, D.G. (1988). The Discount Rate for Capital Expenditure Analysis in Health Care. *Health Care Management Review*, 13(2), 43-51.

## Endnotes

---

- 1 The capital needs of a hospital during a pandemic are likely to be severe and multidimensional. Hospitals are dealing with increased equipment and personnel costs; for instance a vastly increased need for ventilators and other equipment, as well as for nurses and doctors trained to handle patients requiring this level of care. In addition, they are reducing the other normal functions of a hospital in favor of care for the critically ill, or in preparation for a swath of critically ill patients. For many hospitals this shift, in tandem with these additional capital requirements, is causing increased pressure on their current capitalization and might potentially cause a wave of acute financial distress throughout the hospital system in the U.S.
- 2 For instance, the critical care unit might require an additional automated medication dispensing system, the imaging department might require a new CT scanner, or the administration might determine it is time to expand into a new building or retrofit an older one.

- 
- 3 Or rather, a given source of financing would typically be tapped all at once. Thus, if the firm is expecting to raise debt by issuing a bond – they would try to raise sufficient capital in one bond issue. Likewise with another source of financing such as equity. The firm probably doesn't meet all of its financing needs in one fell swoop, but it is likely to raise all of its debt at the same time and then separately all of its equity at the same time (if both sources of financing are required).
  - 4 The principal of these rules is called the Net Present Value (NPV) rule, and it is considered the principal rule because the NPV of a project provides the firm with a direct measure of the estimated financial value that a project will generate. The NPV is the amount of money left over after both the projects costs and the financing costs are paid, and if it is a positive amount, the project is a good one.
  - 5 Some discussion of the cost of capital is potentially necessary here in order to provide a deeper understanding of the capital budgeting process. First, there is a difference between the capital users (the firm's) point of view and the capital provider's (the investor's) point of view. To the firm, raising capital externally comes with a cost, while to the provider, supplying capital comes with a return on their investment. For instance, the cost of a loan is the interest payments a borrower must pay, which is precisely the return on investment to the lender for providing the loan. This implies that the return on any investment the firm undertakes with that financing must be greater than the return demanded by the suppliers of capital to the firm, and is what gives rise to the term "hurdle rate". The projects return must clear the hurdle rate in order to create additional value for the firm and be acceptable.
  - 6 This is an important caveat. The WACC is only an appropriate hurdle rate for projects that have similar risk characteristics to the firm as a whole, because the WACC is the average of *all* the financing provided to the firm not just the financing used in a specific project. Thus, if a particular project carries significantly more, or less, risk than the average project in the firm, some adjustment to the WACC is required in order to correctly estimate the required return for the project.
  - 7 There are a multitude of reasons this might be true, but the primary reason is typically a lack of trading. This would result in an inaccurate market price and thus an inaccurate yield to maturity. This issue might be particularly severe when estimating the cost of debt for hospitals, because hospital debt is generally issued in the municipal bond market and municipal bonds are some of the least traded financial instruments – the average municipal bond trades only once per year, and a slight majority of issues never trade throughout their lifetime.
  - 8 The maturity of a debt instrument is the length of time from the current date until the debt matures. The naming convention in the debt market often uses the original maturity of the bond as its name, while the remaining maturity will shorten as time goes on. Thus you might have a 10-year Treasury bond, with five years remaining until the bond matures. We try to match the remaining maturity with the estimated investment horizon.

- 
- 9 Purchasing a negative rate bond means that investors are essentially paying these governments to allow them to lend the government money, rather than the other way around which is the obvious norm.
- 10 “Up until two weeks ago, the market was phenomenal” for hospital debt refinancing and new project financing, said Philip Kaplan, a managing director for Hammond Hanlon Camp (also known as H2C). But since then, “our understanding is that most healthcare bond issues have been put on hold.” That view was echoed by Eric Jordahl, managing director of the treasury and capital markets practice of Kaufman Hall (Daly, 2020). “As of right now, the long-term debt markets are pretty much frozen,” Jordahl said about the last week-to-10-days.
- 11 “Reviving the market for bonds sold by state and local governments is shaping up as one of the stiffest tests in the Federal Reserve’s campaign to restore financial normalcy. The Fed has committed trillions of dollars to keep money flowing through markets vital to economic growth, including huge purchases of government and mortgage securities and new programs to backstop money-market funds and corporate-debt markets.” (Verlaine & Timiraos, 2020).
- 12 The formula for the CAPM is:  $E[R_A] = r_f + \beta(R_M - r_f)$ , where  $E[R_A]$  is the expected return on any stock,  $r_f$  is the return on the risk free asset,  $\beta$  is a measure of the firms exposure to the systematic risk in the market (and is commonly calculated as an estimate of the degree to which the firm’s stock return varies along with the average return in the market), and  $R_M$  is the expected return for market portfolio.
- 13 It is important to note that the risk free rate  $r_f$  has fallen to nearly zero, and so the fall in the market risk premium is almost entirely due to a decrease in the expected market return  $R_M$ .
- 14 “Under the assumption that the pandemic and required containment peaks in the second quarter for most countries in the world, and recedes in the second half of this year, in the April [World Economic Outlook](#) we project global growth in 2020 to fall to -3 percent. This is a downgrade of 6.3 percentage points from January 2020, a major revision over a very short period. This makes the Great Lockdown the worst recession since the Great Depression, and far worse than the Global Financial Crisis.” (Gopinath, 2020).

---