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ABSTRACT
The nature of how capital structure can affect firm value is often investigated in the discipline of financial economics. Less investigated is how the nature of the type of assets can affect the choice of capital structure! I demonstrate that in the context of a Modigliani-Miller-type model that a firm financing social capital and physical capital will favor equity financing over debt financing without bankruptcy. With bankruptcy, debt financing will be used, but equity financing will be favored by firms that use large amounts of social capital, as it will increase their value. This demonstrates that social capital alters the financing relationship and helps to explain the preference of firms for equity financing.

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1. Introduction

It has been said that every academic paper on social capital begins by defining social capital. The field is now old and robust enough for this trend to be broken. This paper is not about social capital per se, but about the effect that social capital has on the financing decisions of the firm.

Unlike physical capital, firms cannot operate without investment in social capital. The memberships in groups and networks secure benefits that allow a firm to secure the inputs to produce and the revenues to obtain cash flow to survive in a capitalist society. It provides social relations that protect competitive positions and norms and values which guide competitive rules. Or to be bold, it provides the framework which prevents utter chaos from governing. Thus, it is the primary or first form of capital and thus enjoys a unique position.

It has been argued by Ostrom (1999) that social capital is also unique in that it does not depreciate with use as physical capital does. Making use of social capital may increase the stock of social capital for future use. However, over time, with deaths, retirements, loss of employees, sociological and economic changes, etc., society will change, and social capital can depreciate over time. In this study, I take the perspective that without regular investment, such as re-hiring, training, and community involvement, a firm's social capital will depreciate over time.

Following Robinson, Schmid, and Siles (2002), social capital is dealt with here as a form of capital that shares many traits as physical capital: first, it has service potential in the capacity to provide services valued more than the cost of providing the service; second,

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social capital has durability through social connections and legal relationships; third, social capital has flexibility from the range of services it can offer; fourth, social capital offers substitutability to gain alternative sources of information and alternative sources of physical capital; fifth, social capital, as demonstrated above, can decay; sixth, social capital can be reliable like physical capital through family and legal ties; seventh, social capital, like physical capital, can be used to create other capital. In this paper, I assume that social capital has these properties.

In the following model, I assume that along with the state of nature, that a firm's profitability is determined by its level of social capital. This is borne out by the available evidence. Lins, Servaes, and Tamayo (2017) find that firms with higher social capital experienced higher profitability relative to firms with lower social capital during the 2008–09 financial crisis. Wu (2008) finds that social capital makes firms more competitive. Carter et al. (2003) examines the social capital of women entrepreneurs and finds that women with more social capital rely more on internal equity for financing. Lawson, Tyler, and Cousins (2008) find that increases in social capital lead to improvements in operational performance. Aggarwal, Chomsisengphet, and Liu (2011) discover that personal social capital is tied to lower levels of personal bankruptcy. Hasan et al. (2017) find that firms headquartered in the U.S. with higher levels of social capital incur lower bank loan spreads. Huang and Shang (2019) find that firm leverage and short-term debt ratios are inversely related to social capital levels. The relation is found to be more pronounced in cases where information asymmetry problems are more severe.

Fogel, Jandik, and McCumber (2018) find that the social capital of a firms' chief financial officer is inversely related to the spread and the number of covenant restrictions on private debt for the years 1998–2010. They also find that the spread reductions are stronger for opaque firms and when CFOs lack objective reputation verification. The results hold when controlling for CFO personal characteristics and firm attributes. Li, Tang, and Jaggi (2018) find that for counties in the United States with higher measures of social capital, the lower the municipal bond yield. They also find that counties with higher social capital are more likely to issue general obligation bonds without insurance.

This paper also adds to the long line of research in corporate finance on capital structure. Modigliani and Miller (1958) first proposed the propositions that underlie modern finance, that debt financing adds value to the corporation due to tax effects and bankruptcy. Jensen and Meckling (1976) proposed that debt financing had the added incentive of inhibiting managers from overspending on pet projects with negative net present value and thus inhibited agency costs. The pecking order hypothesis of Myers and Majluf (1984) predicts that due to information asymmetry between managers and investors, managers will have a preference ranking over financing sources. Beginning with internal funds, followed by debt, and then equity, managers will work their way up the pecking order to finance investment in an effort to minimize financing costs. The evidence in support of these theories has been mixed (see Leary and Roberts 2010; Ahmeti and Prenaj 2015; Panda and Leepsa 2017).

This paper's contributions are as follows: I demonstrate that in the context of a Modigliani-Miller-type model that a firm financing social capital and physical capital will favor equity financing over debt financing without bankruptcy. This is in stark contrast to the original Modigliani and Miller results that found that financing does not matter for firm value. With bankruptcy, debt financing will be used, but equity financing will be favored by firms that use large amounts of social capital, as it will increase their value. Social capital is not a strict substitute for debt. Rather, because it is made up of fixed and variable costs and is needed to make revenues, it competes with debt for revenues as a form of operating leverage. Thus, I argue there is a trade-off for firms in deciding to finance with debt or equity in making asset purchasing decisions. The more they need to make purchases of fixed-cost social capital, the more they need to avoid debt financing.

2. The model

2.A. Social capital investment

The purpose of this section is to rigorously define what is meant by social capital for this paper, what is meant by investment in social capital for the firm and how that investment is made up as a mixture of variable and fixed costs to the firm, where variable costs are determined as costs due to units sold. Only one variable carries over to the rest of the paper.

I distinguish between two types of social capital for the firm, individual social capital which is owned by individual agents employed by the firm, rented and paid for by the firm, and firm entity social capital, social capital that is owned by the firm as a legal entity. Individual social capital is as defined by Glaeser, Laibson, and Sacerdote (2002) is a person's social characteristics – including social skills, charisma, memberships in organizations, and the size of his electronic database of connections, etc. I represent individual social capital as a stock variable NI_t. $\widehat{NI}_t$ is aggregate per capita social capital. The payoff, consisting of both market and non-market returns to social capital to the individual, is $R(\widehat{NI}_t)$. Market returns may include higher salaries or better future employment prospects for a person with higher social capital. Non-market returns may include improvements in the quality of the individual's relationships, improvements in his health, or even happiness. The literature on social capital strongly argues that there are positive complementarities to the accumulation of social capital for individuals. I assume to capture these effects that $R'(\widehat{NI}_t) > 0$, that, is the first derivative is positive.

Following Glaeser, Laibson, and Sacerdote (2002), I assume that the individual's social capital stock follows the dynamic budget constraint $NI_{t+1} = \delta_{NI}NI_t + SI_t$, because of depreciation over time, the stock of social capital falls to proportion $\delta_{NI} < 1$ of the previous period's value and must be replenished by investment SI_t. The level of investment, SI_t has a time cost, $C(SI_t)$, where, $C(SI_t)$ is increasing and convex. The opportunity cost of time is w_t, the wage rate or salary rate. I assume that individuals have a known lifespan of T periods and that they discount the future with discount factor β. I assume that each individual has a fixed probability of leaving the company designated as θ. When people leave the company, their social capital that is joined with the company's reputation declines by proportion $\lambda<1$. I let φ designate the depreciation factor arising from leaving the firm. Let $\varphi = (1- \theta)+ \theta\ \lambda$.

The individual's maximization problem can now be expressed as:

$$MAX \sum_{t=0}^{T} \beta^t [NI_t R(\widehat{NI}_t) - wC(SI_t)] \quad (1)$$

$$s.t. NI_{t+1} = \delta_{NI}\ \varphi\ NI_t + SI_t \quad (2)$$

The equation that describes the evolution of the capital stock incorporates the expected depreciation that arises from mobility. The individual maximizes their objective function, taking aggregate per-capita social capital, $\widehat{NI}_t$, as fixed.

The first-order condition associated with this investment problem is given by:

$$C'(SI_t) = \frac{1 - (\beta \delta_{NI} \varphi)^{T-t+1}}{1 - (\beta \delta_{NI} \varphi) w} \; R(\widehat{NI}_t) \tag{3}$$

This comes from taking the derivative of Equation (1) with respect to $C'(SI_t)$ subject to the constraint in Equation (2). I then solve for $C'(SI_t)$. The intuition is that the marginal time cost of investing social capital by the individual is a function of the following factors. Individuals make investments in social capital when (1) the discount rate β rises; (2) social capital investment declines with mobility θ; (3) Social capital investment declines with the wage rate, *w*; (4) investment in social capital increases with the return to social skills $R(\widehat{NI}_t)$; (5) social capital investment goes up in firms with more social capital $(\widehat{NI}_t)$; (6) declines with the rate of social capital depreciation due to relocation (1- λ); (7) and investment in social capital declines with age.

The nature of investment in social capital by individuals is critical. Particularly for firm management. Firm managers are often older, with greater experience. They often have greater mobility. They often have greater salaries or wages. Their depreciation in social capital due to relocation is often going to be very low. For the firm to get management to invest in social capital is going to be very costly for them, requiring substantial upfront and fixed costs that are not tied to units sold that will be transferred to the firm in the form of membership fees, stock options fees, salary guarantees, etc. These will largely be in the form of fixed costs to the firm. They will also be largely in the form of fixed costs as managers are likely to not to update their social capital continuously, but discretely, over time, due to the cost curve of $C(SI_t)$ being increasing and convex.

Social capital for other members of the firm will likely be a mixture of variable and fixed costs for similar reasons. Annual meetings and seminars, membership fees, weekly meetings, sales meetings, etc. For people lower down on the corporate ladder, the depreciation in social capital due to relocation is probably going to be higher, they probably have less mobility, investing social capital less costly, as they are lower down on the cost curve of $C(SI_t)$ and can make more frequent adjustments, so one can make the argument that their investments in social capital function are more like variable costs, with a minority of fixed costs.

For the firm as a legal entity, I measure the social capital as membership in organizations and the social status the firm enjoys in its society through its charitable works. I represent this as NF_t. The payoff to the firm from this social capital comes in the form of market and non-market returns $R(NF_t)$. Again, I assume that $R'(NF_t) > 0$. The social capital stock follows the dynamic budget constraint, $NF_{t+1} = \delta_{NF} NF_t + SFI_t$, where SFI_t is the firm's investment in the firm's social capital as a legal entity. Again, because of depreciation, each period, the legal entity's social capital falls by $\delta_{NF} < 1$. The level of investment, SFI_t has a time cost which is increasing and convex, $C(SFI_t)$.

There is a firm discount factor β_F. Given this, the firm seeks to maximize:

$$MAX \sum_{t=0}^{T} \beta_F^t [NF_t R(NF_t) - C(SFI_t)] \quad (4)$$

$$s.t.\ NF_{t+1} = \delta_{NF} NF_t + SFI_t \quad (5)$$

The first-order condition associated with this investment problem is given by

$$C'(SFI_t) = R(NF_t) \frac{(1 - \beta_F \delta_{NF})^{T-t+1}}{(1 - \beta_F \delta_{NF})} \quad (6)$$

Similar as for the individual, I take the derivative of Equation (4) with respect to $C(SFI_t)$ subject to the constraint in Equation (5). I then solve for $C'(SFI_t)$, the marginal investment in firm social capital as a function of the following variables. Social capital investment for the legal entity will (1) rise with the firm-level discount factor, β_F; (2) increase with the total returns to social capital to the firm, $R(NF_t)$ and; (3) decline with the rate of social capital depreciation, δ_{NF}; and (4) investment declines with the age of the firm.

For the firm entity social capital costs, I expect a lot of fixed costs, as these will primarily be memberships in large organizations for the firm and charitable donations that will involve a lot of large fixed costs. While these may vary year-to-year, they will not vary by units sold, per se.

For the firm as a whole, I define social capital as $N_t = NF_t + \sum_{i=1}^{I} NI_{it}$ where $\sum_{i=1}^{I} NI_{it}$ is the aggregate individual social capital of the firm. As described above N_t, will be a mixture of fixed and variable costs.

2.B. The firm

Similar to Stiglitz (1967), I consider a firm, j, that needs to raise an amount of physical capital, A_j. It can do this in two ways: by issuing new shares of stock, S_j sold at a price p_j or by issuing new bonds B_j. Also, to operate in the physical world and generate profits, it needs to produce a stock of social capital, N_{tj}. I begin by assuming the firm has no outstanding bonds and shares outstanding. The profits, before paying bondholders, are uncertain. The profits, denoted $Y_{jt}(\theta, N_{tj})$ are a function of the state of the world, defined over the interval, $0<\theta<1$, and the amount of social capital, N_{tj}.

The stock of social capital, $N_{tj,}$ provides a set of services that are essential to the output of firm profits. Each period, the stock of social capital declines by n_{jt}, over time unless the firm spends n_{jt} to maintain it, where $n_{jt} = \delta_{NF} NF_t + \delta_{NI} NI_t$. As argued above, social capital requires both fixed and variable costs to maintain it. For simplicity, I assume that the firm must spend a fixed cost n_{jt} to maintain N_{tj} in this example.

I assume there exists a riskless government bond with a return, r. I denote by r_j the return on the bond of the jth firm, which is determined primarily by the number of bonds issued. I assume investors can borrow and lend at the government bond rate. I also assume that there are no information asymmetries.

In Figure 1, I illustrate for a firm one possible configuration of $Y_{jt}(\theta_t, N_{tj})$, the gross profits of the firm. If the firm issues B_j bonds and has to replace uses n_{jt}units of natural capital in production, then the probability of bankruptcy is given by the area OA.

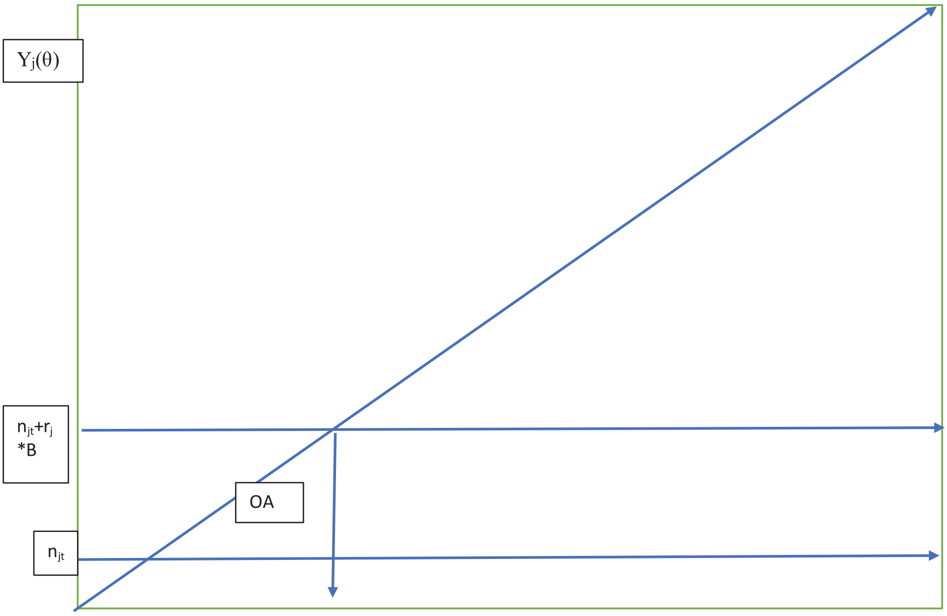

Figure 1. The Revenues, debt and investment in social capital of the firm.

As $n_j+r_jB_j$ increases, so does the probability of bankruptcy and the r_j of the firm. When the firm is not bankrupt, i.e. when $Y_j(\theta_t,N_{jt}) > r_jB_j+n_{jt}$, then the return on the bond is r_j. If the firm goes into bankruptcy because $Y_j(\theta_t,N_{jt}) < r_jB_j+n_{jt}$, then the return is $(Y_j(\theta_t)-n_{jt})/B_j$, that is, the debt holders divide up the net proceeds that are leftover.

Figure 1 has some interesting implications. First, it implies for firms using social capital with fixed costs that there is a tradeoff between the use of social capital and the use of debt, with greater use of social capital precluding the use of debt. Second, it implies that greater use of fixed cost social capital, all other things being equal, leads to a greater cost of debt if there is a chance of bankruptcy. Third, if firms do not have as much social capital with fixed costs, these effects will still be present, though less prominent.

Without social capital investments, then Figure 1 above just drops n_{jt} and one ends up with the results of Modigliani and Miller (1958).

2.C. The investors

The purpose of this section is to define the characteristics of the investor for the following sections in which I derive the values of the firm.

As per usual, the ith individual is assumed to be endowed with wealth W_i which they allocate between stocks and bonds to maximize expected utility:

$$\max E\left[U\left(\sum_j e_jS_{ij}+\sum_j r_jB_{ij}\right)\right] \tag{7}$$

Subject to the wealth constraint:

$$W_i = \sum_j p_i S_{ij} + \sum_j B_{ij} \tag{8}$$

Where p_j is the stock price and *E[]* is the expectations operator. Allowing for short sales and the restriction that the second derivative of the utility function is negative, then the first order conditions can be written as:

$$E[U'(e_j)] = \lambda p_j \tag{9}$$

$$E[U'(r_j)] = \lambda \tag{10}$$

where λ is the marginal utility of wealth.

3. Propositions

3.A. The case of no taxes and no bankruptcy

First, I consider the case of no corporate taxes and no bankruptcy. If a firm issues debt, the income pattern from a dollar invested in a firm's equity by a typical investor will be:

$$\frac{Y(\theta_t, N_t) - r_L B - n_t}{P_L S} = \frac{Y(\theta_t, N_t) - r_L B - n_t}{(A - B)P_L} \tag{11}$$

The left-hand side of Equation (11) is the per dollar return to the investor in the levered firm with social capital. The denominator is the number of shares, S_L, times the stock price, p_L. The right-hand side is its equivalent expressing the denominator in terms of financial and physical assets, i.e. tradable assets, (I assume social assets are not tradeable). That is, physical assets (A) minus debt (B) equals the number of shares issued (S), i.e. the book value identity.

The cost of the firm's debt, r_L reflects both the firm's debt level and the firm's fixed costs to maintaining its social capital, N_t. As n_t is partly a fixed cost and $Y_t(\theta_t, N_t)$ is a variable return, there is always an element of risk involved for the investor, that they may not be paid in full during this period due to the firm's commitment to fixed social capital investment, hence they charge a higher cost than the risk-free rate of return, *r*. This leads to the first proposition:

Proposition. 3.A.1: *With social capital investments, no corporate taxes and no bankruptcy, the value of the unlevered firm is at least as great as the value of the levered firm, if not greater, that is*:

$$V_U \geq V_L$$

where V = B + S.

***Proof*:** . The return on one dollar invested in a levered firm, as illustrated above, will be:

$$\frac{Y(\theta_t, N_t) - r_L B - n_t}{(A - B)p_L} \tag{12}$$

On the other hand, an investor who borrows at the risk-free rate, r and invests in a share of an unlevered firm with the same assets and social capital investments. Assuming the same share price, then the investor borrows up to the proportion of debt to the level of debt financing in the levered firm to his own wealth:

$$\frac{B^*}{W_i} = \frac{B}{V_L} \tag{13}$$

And with the proceeds of the loan and their own capital, invests in shares of the unlevered firm, the investors' income per dollar in the state (θ_t,Nu_t) will be:

$$\frac{Y(\theta, N_t) - rB^* - n_t}{(A - B^*)p_U} \tag{14}$$

And it follows that in comparison to investing in the levered firm that:

$$\frac{Y(\theta, N_{ut}) - rB^* - n_{ut}}{(A - B^*)p_U} > \frac{Y(\theta, N) - r_L B - n_{Lt}}{(A - B)p_L} \text{ as } r_L > r \tag{15}$$

Which will be greater than the income to the investor in the levered firm as long as r_L>r. The left-hand-side of Equation (15) is the per dollar return to the partially debt-financed investment in the unlevered firms' shares. The right-hand side is the per dollar return in the levered firms' shares. As a result, in equilibrium, investors will bid up the price of the unlevered shares so that $V_U > V_L$.

For the firm that uses up their social capital without re-investment, they will be charged the risk-free rate, and the Modigliani-Miller results obtain and $V_u = V_L$. The results of Proposition 3.A.1 will be tempered by how much it is expected that Y(θ,N_{Lt}) > r_LB +n_{Lt}, over the future, but the possibility that the firms' future income might not cover n_j does raise the risk to bondholders, even though it does not raise the possibility of bankruptcy, even if the firm makes up missed bond payments, there are the cost of missed opportunities. Also, the greater that the firm's social capital is paid in variable costs, the less likely that Proposition 3.A.1 will hold as the levered firm will become more valuable as the gap between r_L and r will decrease.

The key here is that investors can borrow at lower rates than the firm that commits to financing fixed social capital investments with debt. This may not hold with information asymmetries, an issue which I will deal with in a later section.

3.B. The case with corporate taxes and no bankruptcy

Second, I consider the case of corporate taxes and no bankruptcy. If a firm issues debt, the income pattern from a dollar invested in a levered firm's equity will be:

$$\frac{(Y(\theta, N_t) - r_L B - n_t)(1 - \tau)}{p_L S_L} = \frac{(Y(\theta_t, N_t) - r_L B - n_t)(1 - \tau)}{(A - B)p_L} \tag{16}$$

where τ is the corporate tax rate. Using the previous assumption, the income from borrowing B^* and investing the proceeds in an unlevered firm's equity will be

$$\frac{(Y(\theta_t, N_t) - rB^* - n_t)(1-\tau)}{(A - B^*)p_U} \tag{17}$$

Which is once again greater than the income derived from the levered firm as long as $r < r_L$, therefore, Proposition 3.B.2 results:

Proposition. 3.B.2: *With social capital investments, corporate taxes and no bankruptcy, the value of the unlevered firm is at least as great as the value of the levered firm, if not greater, that is*:

$$V_U \geq V_L$$

That is, corporate taxes do not affect the financing of the firm with social capital investment. Again, this is in contrast with the Modigliani and Miller (1958) results that found that corporate taxes created a 'tax shield' that favored the use of debt for financing. With social capital, this is not found as the use of social capital in the levered firm alters the return on debt due to the fixed cost nature of replacing social capital.

3.C. The case with corporate taxes and bankruptcy

Assume now there is a probability of default, $\rho(\theta_t, N_t)$, in which case the claims of bondholders have priority over the claims of shareholders. In case of default, the per dollar return to bondholders will be:

$$\frac{(Y(\theta_t, N_t) - n_t)(1-\tau) + A}{B} \tag{18}$$

If the firm is levered.

In this case, the return of a dollar invested in the levered firm is:

$$(1 - \rho(\theta_t, N_t, B))\frac{(Y(\theta_t, N_t) - r_L B - n_t)(1-\tau)}{(A - B)p_L} + \rho(\theta_t, N_t, B)\frac{(Y(\theta_t, N_t) - n_t)(1-\tau) + A}{B} \tag{19}$$

where $\rho(\theta_t, N_t, B)$ is the probability of bankruptcy given the state of nature, the level of social capital, and the amount of debt issued. It is assumed that

$$\frac{\partial \rho(\theta, N, B)}{\partial B} > 0, \quad \frac{\partial \rho(\theta, N, B)}{\partial n} > 0, \quad \frac{\partial \rho(\theta, N, B)}{\partial \theta} < 0.$$

Using the previous assumption, the income pattern from borrowing B^* and investing the proceeds in an unlevered firm's equity will be

$$\frac{(Y(\theta_t, N_{Ut}) - rB^* - n_{Ut})(1-\tau)}{(A - B^*)p_U} \tag{20}$$

This leads to Proposition 3.C.3

Proposition. 3.C.3: *With corporate bankruptcy and corporate taxes the value of the levered firm may be greater than, equal to, or lessor than to the value of the unlevered firm, dependent on the probability of bankruptcy, the replacement of social capital, and the value of physical assets in place.*

$$V_L >=< V_U \tag{21}$$

The decision criteria here is that the following condition is met:

$$\begin{aligned}(1-\rho(\theta_t, N_{Lt}, B))\frac{(Y(\theta_t, N_{Lt}) - r_L B - n_t)(1-\tau)}{(A-B)p_L} \\ + \rho(\theta_t, N_{Lt}, B)\frac{(Y(\theta_t, N_{Lt}) - n_t)(1-\tau) + A}{B} \\ > \frac{(Y(\theta_t, N_{Ut}) - rB^* - n_{Ut})(1-\tau)}{(A-B^*)p_U}\end{aligned} \tag{22}$$

If this condition is met, then $V_L > V_U$, so at some levels of debt, it is conceivable that the value of the levered firm will be greater than the value of the unlevered firm, particularly in situations where the value of bankruptcy, $\rho(\theta_t, N_t, B)\frac{(Y(\theta_t, N_t) - n_t)(1-\tau) + A}{B}$, is valuable enough to offset the difference in the interest rates between what the levered firm can borrow at and what the investor can borrow at. This will be more likely for firms with lower levels of social capital investment and higher levels of physical capital. However, it is also possible that Equation (22) could be an equality or that the unlevered firm could be more valuable than the levered firm. The firm's financing strategy would be dependent on what type of assets dominated its' asset makeup. For firms with predominantly physical assets, what would result is likely similar to the pecking order strategy of Myers and Majluf (1984), where the firm with large amounts of physical assets would use up relatively cheap debt financing first until debt financing became too expensive relative to equity financing. For firms with more social assets, they would likely issue less debt, while firms with more physical assets would issue more debt.

The model's findings are in-line with recent empirical findings on social capital and leverage. Huang and Shang (2019) find a negative relationship between leverage and social capital for 56,840 firm-year observations with 7,811 unique firms from `1985 to 2015. Hasan et al. (2017) also find that debt levels are negatively related to higher levels of social capital, using a group of firms accessing bank loan facilities between 1990 and 2012. Lins, Servaes, and Tamayo (2017) also find a negative relationship between long-term debt and social capital.

However, these aforementioned papers mention a paradox. While social capital is negatively related to long-term debt, there is evidence that social capital makes raising debt, through superior networking connections, 'cheaper', lowering the risk spread for the firm. I deal with these issues in the next section.

4. Information asymmetries and size

4.A. Information asymmetries

The above results rely on the idea that investors can borrow on their accounts at a rate that is lower than that which firms can borrow on their own. In an era in which brokerage firms advertise margin rates as low as 0.75% (https://www.interactivebrokers.com pulled July 11, 2020) while Moody's Seasoned Corporate Aaa bonds on July 9, 2020, yielded 2.16%, this doesn't seem unlikely. However, with information asymmetries, there is the possibility that firm bond rates might be lower than investor borrowing rates. Plus, the results with Hasan et al. (2017), where they found that firms in the U.S. that have high degrees of social capital have lower bank loan spreads, further complicates the picture.

I assume that with information asymmetry that social capital can help to overcome the information asymmetry between firm management and the investor, so that r_L is now a function of N_t and $r_L'(N_t) < 0$, that is increasing the stock of social capital decreases the corporate bond rate. This seems borne out by the empirical results of Hasan et al. (2017), Huang and Shang (2019), and Fogel, Jandik, and McCumber (2018), who all find that higher amounts of social capital are associated with lower interest rates.

I also assume that investors face information asymmetry and can overcome this by their social capital, NI_{it}. Their interest rate to borrow is now $r_i(NI_{it})$, where, again, $r_i'(NI_{it}) < 0$. I also assume that $r_L(N_t = 0) > r$ and $r_i(NI_{it} = 0) > r$. I define $r_i(\widehat{NI}_{it})$ as the aggregate wealth-weighted average interest rate of investors.

This leads to Proposition4.A.4:

Proposition. 4.A.4: *With corporate bankruptcy, corporate taxes and information asymmetry the value of the levered firm will be greater than, equal or less than the value of the unlevered firm, dependent on the tradeoff of the firm's investment in social capital to lower the cost of debt versus raising the probability of bankruptcy.*

In order to have:

$$V_L > V_U$$

One must have:

$$\begin{aligned}(1-\rho(\theta_t, N_t, B))&\frac{(Y(\theta_t, N_t) - r_L(N_t)(B-n_t)(1-\tau)}{(A-B)p_L}\\ +\rho(\theta_t, N_t, B)&\frac{(Y(\theta_t, N_t) - n_t)(1-\tau)+A}{B}\\ > &\frac{(Y(\theta_t, N_{Ut}) - r(\widehat{NI}_{it})B^* - n_{Ut})(1-\tau)}{(A-B^*)p_U}\end{aligned} \tag{24}$$

Therefore, with debt, the firm is once again left with a balancing act. It may increase the value of the firm, but by raising the probability of bankruptcy, it might lower the value of the firm, unless it has a lot of physical assets. The model is indeterminate in general over whether levered firms are more valued than unlevered firms, it will depend on the individual firms' situation in regards to their use of physical and social capital. Overall, one would again expect a Myers and Majluf (1984) type pecking order to prevail. For firms with a lot of social capital, even though they can issue debt at very low rates, it may be more sensible for them to issue equity. One might argue that $r'_L(N_t) << r'_i(NI_{it})$ and that one would expect debt to strictly to predominate, but this is an empirical question and I have found no evidence to guide on this.

4.B. Size effects

So far, I have neglected the issue of firm size on social capital. Huggins and Johnson (2010) find a positive correlation between firm size and firm social capital, as do Florin, Lubatkin, and Schulze (2017).

For small firms, entrepreneurial firms, it is expected that the effects of social capital on financing decisions would be strongest, as they have to make the largest relative investments in firm social capital. As a result, the model would predict that entrepreneurs would avoid debt financing and rely more on internal financing, a prediction that seems to correlate well with the results of Carter et al. (2003).

For larger firms that have established firm social capital, this eases the decision to make debt financing if needed. The decision, as stated above, comes down to whether the firm is more valuable with the debt offering or not. This is dependent on its physical capital, its social capital, the prevailing interest rate environment, and the business cycle. As Proposition 4.A.4 shows, firms with more social capital, though they can borrow at lower rates, are less likely to take advantage of these lower rates as they will lower the value of the firm.

Of interest is the question of whether firms increase the proportion of investment in social capital as the size of the firm increases or not. There is also the possibility that there may be a 'U' shaped cost-curve effect of size on social capital investment that would affect capital structure decisions. This is beyond the scope of this paper and is left to future research.

5. Conclusion

I propose a model of capital structure financing a firm with both physical and social capital. Without bankruptcy, the firm is always more valuable with equity-only financing if it is making investments in social capital. Only when it neglects making investments in social capital is the value of the levered firm equal to the value of the unlevered firm. This is due to the costs of social capital investments acting as a cost that threatens the returns to firm debt-and share-holders.

With bankruptcy, the relationship is indeterminate. The issuance of debt will depend upon the individual firms' situation in regard to its stock of physical and social capital. Most likely, a pecking order along the lines of Myers and Majluf (1984) will occur, with internal funds being used first, followed by low-cost debt. It is expected that firms with a large amount of physical assets will have more debt, while firms with more social capital will use less debt.

With bankruptcy and information asymmetry, interest rates are affected by the degree of social capital the firm has. Again, the relationship between levered and unlevered firms is indeterminate and will depend on the individual firms' situation as under bankruptcy. The difference is that firms with large amounts of social capital will face situations where they face very low debt costs, possibly lower than the costs of internal funding, but still will not issue debt as it will lower the value of the firm.

Of course, the results here obtain for any form of capital that the firm invests in that cannot be traded easily to another firm that requires regular replenishment of capital. It could also apply to types of ecological capital and human capital as well, as long as those types of invested capital depreciate and have to be reinvested in and they cannot be obtained by bond investors in bankruptcy proceedings.

The results here open up several new avenues for research. First, what are the effects of natural and human capital on capital structure decisions? Second, what are the effects of the combination of social, natural, and human capital on capital structure decisions? Third, at what level of debt does the positive effects of social capital in lowering the cost of new debt become offset by the increase in the cost of existing debt? Fourth, event studies on the issuance of new equity by firms sorted by size of social capital investment should show that firms with higher social capital investment have less negative, perhaps even positive, market reactions to new equity issues as predicted by the model. Fifth, event studies on debt issues should show that firms with higher social capital investments have less positive stock market reactions to debt issuances, or perhaps even negative reactions.

Extending the model further into other fixed cost investments that are necessary to firm survival that is related to corporate social responsibility (CSR) is relatively straight forward. Empirical investigations for CSR investigation along similar lines outlined above are also straight forward. Also, I have assumed perfect capital markets. Dropping this assumption and adding frictions may add additional insights.

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References

Aggarwal, S., S. Chomsisengphet, and C. Liu. 2011. "Consumer Bankruptcy and Default: The Role of Individual Social Capital." *Journal of Economic Psychology* 32: 632–650.

Ahmeti, F., and B. Prenaj. 2015. "A Critical Review of Modigliani and Miller's Theorem of Capital Structure." *International Journal of Economics Commerce and Management* 3 (6): 914–924.

Carter, N., C. Brush, P. Greene, E. Gatewood, and M. Hart. 2003. "Women Entrepreneurs Who Break Through to Equity Financing: The Influence of Human, Social and Financial Capital." *Venture Capital: An International Journal of Entrepreneurial Finance* 5 (1): 1–28.

Florin, J., M. Lubatkin, and W. Schulze. 2017. "A Social Capital Model of High-Growth Ventures." *Academy of Management Journal* 46 (3): 374–384.

Fogel, K., T. Jandik, and W. McCumber. 2018. "CFO Social Capital and Private Debt." *Journal of Corporate Finance* 52: 28–52.
Glaeser, E. L., D. Laibson, and B. Sacerdote. 2002. "An Economic Approach to Social Capital." *The Economic Journal* 112: 437–458.
Hasan, I., C. K. Hoi, Q. Wu, and H. Zhang. 2017. "Social Capital and Debt Contracting: Evidence From Bank Loans and Public Bonds." *Journal of Financial and Quantitative Analysis* 52 (3): 1017–1047.
Huang, K., and C. Shang. 2019. "Leverage, Debt Maturity and Social Capital." *Journal of Corporate Finance* 54: 26–46.
Huggins, R., and A. Johnson. 2010. "Knowledge Flow and Inter-Firm Networks: The Influence of Network Resources, Spatial Proximity and Firm Size." *Entrepreneurship & Regional Development: An International Journal* 22 (5): 457–484.
Jensen, M., and W. Meckling. 1976. "Theory of the Firm: Managerial Behavior,Agency Costs and Ownership Structure." *Journal of Financial Economics* 3: 305–360.
Lawson, B., B. Tyler, and P. D. Cousins. 2008. "Antecedents and Consequences of Social Capital on Buyer Performance Improvement." *Journal of Operations Management* 26: 446–460.
Leary, M. T., and M. R. Roberts. 2010. "The Pecking Order, Debt Capacity, and Information Asymmetry." *Journal of Financial Economics* 95: 332–355.
Li, P., L. Tang, and B. Jaggi. 2018. "Social Capital and the Municipal Bond Market." *Journal of Business Ethics* 153: 479–501.
Lins, K. V., H. Servaes, and A. Tamayo. 2017. "Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility During the Financial Crisis." *Journal of Finance* 72 (4): 1785–1824.
Modigliani, F., and M. H. Miller. 1958. "The Cost of Capital, Corporation Finance, and the Theory of Investment." *American Economic Review* 48: 261–297.
Myers, S., and N. Majluf. 1984. "Corporate Financing and Investment Decisions When Firms Have Information That Investors do not Have." *Journal of Financial Economics* 13: 187–221.
Ostrom, E. 1999. "Social Capital: A Fad or a Fundamental Concept." In *Social Capital: A Multifaceted Perspective*, edited by P. Dasgupta and I. Serageldin, 195–198. Washington, DC: World Bank.
Panda, B., and N. M. Leepsa. 2017. "Agency Theory: Review of Theory and Evidence on Problems and Perspectives." *Indian Journal of Corporate Finance* 10 (1): 74–95.
Robinson, L. J., A. A. Schmid, and M. E. Siles. 2002. "Is Social Capital Really Capital?" *Review of Social Economy* 60 (1): 1–21.
Stiglitz, J. E. 1967. "A Re-Examination of the Modigliani-Miller theorem." Cowles Foundation Discussion Paper No. 242.
Wu, W. 2008. "Dimensions of Social Capital and Firm Competitiveness Improvement: The Mediating Role of Information Sharing." *Journal of Management Studies* 45 (1): 122–146.