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ABSTRACT

Noted scholars argue that (1) economic models of capital taxation have been inadequately adapted to owner-managed enterprises and (2) capital structure researchers have used the wrong models while also improperly measuring key variables. Thus, a model that can overcome these problems should be of interest to academics when teaching capital structure theory and practitioners when determining optimal debt levels. This paper contributes to capital structure practice by using a model that is adaptable to owner-managed enterprises like pass-throughs while also containing relevant variables that are measurable. This paper should be valuable to academics and practitioners in the following ways. First, we examine the effects of personal tax rates on a pass-through's capital structure choice. Second, we offer rules for managers of pass-throughs on how to choose an optimal amount of debt. Third, we show that increasing market risk by doubling betas does not affect our major conclusions governing a pass-through. Fourth, we compare the pass-through and C Corp gains to leverage values when all factors are the same except tax rates that are unique to the ownership type.

Keywords: Pass-Through Valuation, Tax Rates, Capital Structure Decision-Making
JEL Codes: C02, G32, M13

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I. Introduction

In contrast to C Corps that are taxed at the corporate and personal levels, pass-throughs only pay personal taxes[1]. Since the interest paid on debt lowers corporate taxes, a pass-through will ceteris paribus have a tax disadvantage when issuing debt compared to a C Corp. The tax differences between pass-throughs and C Corps lead to research questions governing pass-throughs such as: What will be the role of personal taxes in determining the amount of debt issued by a pass-through? What rules of thumbs might we offer to pass-through executives when making their debt-equity choice? Can we say anything about the role of market risk in the decision-making process for pass-through executives? How much debt should a pass-through issue compared to a C Corp? These questions are of considerable important and interest to both capital structure researchers who seek to explain the capital structure choice and practitioners who are charged with choosing the capital structure for companies. In this paper, we will supply answers to all of these questions.

Before we can answer the above-mentioned questions, we need an adequate model. Discovering such a model is problematic for owner-managed enterprises as characterized by pass-throughs. Henrekson and Sanandaji (2011) point out that economic models of capital taxation have been inadequately adapted to owner-managed enterprises. In their review of the capital structure literature, Graham and Leary (2011) argue that researchers have explained only part of the observed behavior. They add that researchers have also studied the wrong models and issues while improperly measuring key variables.

In trying to identify an adequate model for both pass-throughs and C Corps, we can began by examining the popular model of Modigliani and Miller (1963), referred to in this paper as MM. This model offers a corporate tax-based equation for computing a company's gain to leverage (G_L) that focuses on C Corps and the deductibility of their interest payments. Extensions of MM provide insight that are applicable to modeling pass-throughs. For example, a number of post-MM researchers (Farrar and Selwyn, 1967; Myers, 1967; Stapleton, 1972; Stiglitz, 1973) have explored the implications of

[1] Throughout this paper, we will not use the word corporation to avoid the confusion between a C Corporation that pays corporate taxes and an S Corporation that is a pass-through tax entity that does not pay corporate taxes. We will refer to a C Corporation as a C Corp and an S Corporation as an S Corp.

personal taxes for choosing a capital structure. As noted by Myers, a key point of Farrar and Selwyn's argument was all-equity financing is possible when personal taxes enter the capital structure decision-making process. Copeland et al. (2004) mention arguments, as early as Farrar and Selwyn and Brennan (1970), for optimality in the face of personal and corporate taxes. Jensen and Meckling (1976) show optimality without taxes due to agency considerations.

The personal tax rate research culminated with Miller (1977) whose G_L equation can be applied to pass-throughs even if corporate taxes are nonexistent. Many papers since the work of MM and Miller have relaxed the assumption of taxes. For example, Copeland et al. discuss this issue to include the work of Miller and Scholes (1978). Regardless, the two traditional G_L equations given by MM and Miller are limited since the role of discount rates are not fully incorporated. For example, there is nothing in their equations to tell us how a change in equity's discount rate (caused by issuing debt) directly affects G_L. This paper addresses this inadequacy by using the Capital Structure Model (CSM) perpetuity framework. Thus, this is the model we have identified as adequate for computing G_L for both a pass-through and C Corp.

The seminal work on the CSM is given by Hull (2007) who uses the MM-Miller framework that includes an unlevered firm with level perpetuities, two security types where debt is issued to retire equity, and no growth. Equity is valued by perpetuity models because it has no maturity date. Even though debt has a maturity date, it can also be valued as a perpetuity because companies set long-run target leverage ratios. This implies that a chosen amount of outstanding debt can be rolled over endlessly to maintain the target. The CSM's G_L equation is derived by subtracting the definition for unlevered firm value from the definition for levered firm value. By using definitions with discount rates (or borrowing costs), the derivation is able to incorporate these rates into a G_L equation. Discount rates are dependent on the degree of the company's market risk and the extent of the debt-for-equity transaction and allows maximum gain to leverage (max G_L) and maximum firm value (max V_L) to be discovered from a variety of possible debt-for-equity choices.

We will now overview this paper's four major findings stemming from its four research questions. First, we apply the CSM for two situations concerning the effective personal tax rates on equity earnings (T_E) and on debt earnings (T_D). To begin we apply the CSM for the situation where $T_E > T_D$ and then for the situation where $T_D > T_E$. When comparing the outcome for these two situations, we find that a pass-through achieves a higher max G_L and a greater optimal debt-equity ratio (ODE) where relatively more debt is issued when $T_E > T_D$. However, the pass-through achieves a lower max V_L than it would if $T_D > T_E$ held. Thus, a greater max G_L advantage with a lower personal tax rate on debt cannot offset the loss from paying greater taxes on equity income that still causes a lower max V_L. Of importance to pass-through managers, our results are robust for innumerable tests where we vary the two personal tax rates within a large range of possible values.

Second, and of practical importance, we offer rules for managers of pass-throughs on how much equity to retire in a debt-for-equity transaction. These rules are robust in their applicability for pass-throughs that are in a position to profit from issuing debt.

Third, we discover that different assumptions about an enterprise's beta do not affect our major conclusions even though G_L and V_L are much smaller when betas are doubled (due to before-tax cash flows remaining fixed while discount rates increase). Thus, despite the disagreement about the size of betas for smaller enterprises (like pass-throughs) that are backed by venture capitalists (VCs) and angel investors, this disagreement does not materially affect pass-through decision-making.

Fourth, we compare a pass-through to a C Corp where we assume matching before-tax cash flows and matching discount rates that serve to generate equal unlevered equity values before taxes are considered[2]. We conduct tests using four sets of tax rates and two sets of market risk. For all of these tests, we find a pass-through attains lower max G_L values and lower ODEs compared to a C Corp. Despite lower G_L values, we illustrate that the pass-through form of ownership consistently achieves higher V_L values for all debt-for-equity choices. While a C Corp achieves a greater max G_L value from its use of debt, its max V_L remains below that for a pass-through since its greater max G_L value cannot overcome its disadvantage of paying corporate taxes.

The remainder of this paper is as follows. In Section II, we discuss two general ownership structures; identify effective tax rates associated with each ownership structure; and, examine the nature of equity and debt for pass-throughs and C Corps. Section III introduces the CSM equation used in this paper and relevant computations to get values for variables used in our analysis. Section IV applies the CSM equation to

[2] The after-tax unlevered equity value used in our illustrations and comparison will be about \$12 million. For the past fifteen years, a typical size for an IPO has been over \$100 million. While we use equity values that are relatively small, the results of our comparison should hold for a variety of other sizes.

a pass-through. Section V compares our pass-through results with those of a C Corp. Section VI offers final comments and avenues for future research.

II. Ownership Structures, Tax Rates, and Borrowing Forms

This section briefly discusses ownership structures for a pass-through and a C Corp. We next identify expected effective tax rates applicable to each ownership structure. These rates will be used in our illustrations. Finally, we examine the nature of debt and equity borrowings as pertains to both a pass-through and a C Corp.

A. Two ownership structures: Pass-throughs and C Corps

There are two distinct ownership forms in terms of tax structures. First, the pass-through structure pays taxes at only the personal level thereby avoiding corporate taxes. Individual pass-through types include sole proprietorship, partnership (general or limited), limited liability company and S Corp. Second, the C Corp structure pays corporate taxes and its owners of equity and debt pay personal taxes. Thus, a C Corp is double taxed by paying at both the corporate and personal levels.

With double taxation for C Corps, a new enterprise should find a pass-through ownership structure as potentially more favorable. This notion is supported by Knittel et al. (2011). They write that about 93% of small businesses file as pass-throughs with about half of these being sole proprietors. Although companies are more likely to file as a pass-through ownership form, some of these companies will become a C Corp ownership form especially if they arrive at a stage where limited liability is desired and more funds are needed by going public with an initial public offering (IPO). An IPO helps broaden a firm's investor base through ongoing seasoned equity offerings and large bond issuances.

B. Effective tax rates for pass-throughs and C Corps

The IRS (2015) writes that pass-through owners pay a personal income tax and the full self-employment tax of 0.153. Pomerleau (2015) reports that a pass-through can pay a rate as high as 0.396 at the federal level. In addition, like all enterprises, it can be subject to state, county, city, unemployment, disability, and sales taxes. However, there are also factors reducing what all companies pay. These include the graduated rate structure and allowable tax deductions and tax credits.

SBA (2009) cites a study by the Government Accountability Office that the average effective personal tax rate is 0.25 for pass-throughs. Using an equal-weighted average measurement based on ownership category, they report a lower effective tax rate of 0.22. They also provide numbers for smaller pass-throughs where they estimate an average effective tax rate of 0.20. In terms of the pass-through types, they report that S Corps have an average effective tax rate of 0.27 followed by partnerships at 0.24 and sole proprietorships at 0.13. The graduated rate structure can help explain why larger pass-throughs have higher average effective tax rates than smaller pass-throughs.

The above numbers are consistent with that reported more recently by the National Federation of Independent Business (2013) for pass-throughs where estimates range from 0.15 to 0.32 for personal effective tax rates. Regardless of the source, it should be pointed out that personal tax rate estimates for pass-throughs can vary depending on the size, industry, applicable special tax provisions and the type of pass-through. Thus, robust tax rate tests are needed before any general conclusions can be made when valuing a pass-through. For this paper's purposes when testing an average pass-through's gain to leverage, it appears that a range from 0.20 to 0.25 is a reasonable effective personal tax rate range.

Pomerleau (2015) writes that if a C Corp pays the maximum U.S. corporate tax rate of 0.35, then it faces an average total tax rate of near 0.57 with average state and personal taxes considered. This compares with pass-throughs that face an average total tax rate of 0.47. While these numbers may represent an average ceiling, there is also an average floor. Lyon (2015) notes that the alternate minimum corporate rate of 0.20 sets a floor for what a profitable C Corp will pay in federal taxes. State and local governments can impose income taxes adding to this floor. Consistent with what analysts believe C Corps pay, Harpaz (2013) and Ro (2013) suggest a range from 0.20 to 0.30 for the effective corporate rate. The National Federation of Independent Business (2013) offers an estimate of 0.27.

Spiegelman (2015) notes that the maximum personal tax rate for both dividends and long-run capital gains will remain at 0.20 for 2015. However, for short-term capital gains, investors in C Corps can pay the same effective personal tax rate of 0.396 that is paid by investors in pass-through earnings. For C Corp owners, a top rate of 0.15 applies to qualified dividends and the sale of most appreciated assets held over one year. Long-term capital gains tax can be avoided if C Corps shares are never sold. The new Medicare tax rate can push all personal tax rates up by 0.038.

Given the above tax rate numbers, what effective personal tax rates might one reasonably use for pass-throughs and C Corps? For a typical pass-through, we suggest personal tax rates from 0.20 to 0.25. For C Corps, we estimate personal tax rates of 0.05 for equity income and 0.15 for debt income. These latter rates factor into consideration not only lower rates for investors in C Corps compared to pass-throughs but also the fact personal taxes paid by equity investors on capital gains can be deferred by not selling stocks that have gone up significantly in price. Pass-throughs can avoid corporate taxes altogether so we assign zero corporate tax rates for a pass-through, while we estimate that a typical C Corp will pay an effective corporate tax rate from 0.20 to 0.30 as suggested by the research given above.

In light of the above discussion, we can ask the question: Does the pass-through ownership form have an overall tax advantage? According to current tax laws, it appears that on the surface that the answer is "yes." Gale and Brown (2013) write the largest benefit that many businesses receive through the tax code is being able to organize as a pass-through and avoid the dual taxation of corporate income found with C Corps. Even if pass-throughs have a tax advantage given current laws, it is problematic to predict this advantage will last in the long-run. This is because federal, state, local government, and other tax rates change frequently and major legislative acts can completely shift an advantage from one ownership structure. For example, the Tax Reform Act of 1986 lowered the personal tax rate below the corporate rate causing pass-throughs to increase in popularity. To illustrate this increase in popularity, Sullivan (2011) notes that S Corps accounted for 4.6% of business receipts in 1985 but 17.5% of receipts by 2008. He adds that limited liability companies (LLCs) provided less than 1% of business receipts in 1988 but accounted for 7.3% twenty years later. The growth in LLCs was boosted by the 1988 IRS ruling that allowed LLCs to be taxed as partnerships. Burnham (2012) illustrates how the increase in pass-throughs since 1986 has come at the expense of C Corps. In conclusion, any tax advantage an ownership structure provides an enterprise should be considered as somewhat tenuous.

C. Two forms of borrowings: Equity and Debt

We will now discuss the nature of the equity and debt involved for both pass-throughs and C Corps. While there are differences and similarities, we cannot make a definite judgment as to whether one form of ownership should unequivocally have riskier forms of borrowing than the other.

The most common source of equity funding for pass-throughs comes from VCs consisting of wealthy individuals, government-assisted sources, or major financial institutions. Prior to VC funding, angel investors are often vital to pass-throughs with some research suggesting that angel investors are as important for high-growth startup investments as are VC firms (Kerr et al., 2014; Shane, 2012). The common source of equity fund for C Corps is public offerings of stock where many individuals and institutional clienteles are likely to be found. As residual owners, equity investors of all ownership forms are more willing to take a long-term view of the business in hopes of making capital gains. By not requiring immediate cash flows, more funds are available from equity capital compared with debt capital where investors require timely and regular interest payments. This should hold regardless of ownership structure.

For large companies, there are agency conflicts involving the separation of management from owners. To the extent that pass-throughs are more apt to be owner-managed enterprises, they are more likely to avoid these agency conflicts compared to large C Corps where the owner and manager functions are separate. One agency conflict involves dilution of ownership. For example, when new equity investors enter an enterprise as owners, current equity owners can have their cash payments and voting rights diluted. This creates agency problems between the current owners and potential investors. Researchers such as Leland and Pyle (1977) and Myers and Majluf (1984) address this issue in an information asymmetry context. They do this by suggesting that when current owners dilute their ownership such as selling ownership to outsiders, then this signals negative news to the market about the company's future prospects. Furthermore, it can be expensive to reverse this dilution process as buying back ownership shares can require expensive premiums over current market prices. This dilution issue and its effects can hold regardless of ownership structure.

Like C Corps, some pass-throughs can take on debt by issuing notes, bonds, and other obligations. While large C Corps can float large bond issues and undertake a variety of large short-term borrowings, pass-through debt financing can include regional and national mezzanine borrowings. Silbernagel and Vaitkunas (2010) write that while there are no hard and fast rules for optimizing a company's capital structure, companies that are ahead of the curve use an efficient combination of senior debt, mezzanine debt, and equity capital to minimize their true cost of capital. This implies that any agency costs are also minimized. Regardless of whether the debt belongs to a pass-through or C Corp, debt has the advantage of being a less expensive form of borrowing as it attracts investors who are willing to accept a rate of return below equity owners in exchange for more secure payments. Of importance to C Corps, the interest paid to debtholders lowers the corporate taxable income.

For both pass-throughs and C Corps, agency costs and benefits from debt can be present. For example, debt owners have the power to restrict management decision-making leading to a variety of possible agency costs including those related to paying out of earnings, project selection and financing of operating assets. Researchers such as Masulis (1980), Leland (1998), Myers (1977) and Gay and Nam (1998) document these agency costs including those related to underinvesting and overinvesting when debt and equity owners have different agendas.

Beside negative agency effects related to debt, Jensen and Meckling (1976) argue that agency effects can also be positive. Jensen (1986) suggests the agency effect of debt has a way of restraining unnecessary extravagant behavior that squanders free cash flows. In regards to the latter agency notion, pass-throughs should be more immune from squandering as managers and owners are more likely to be the same person. Bathala et al (2006) examine debt-equity agency conflicts for small firms and find results supporting the Smith and Warner (1979) costly contracting hypothesis that suggests control of debt-equity conflicts through financial contracts can increase the value of the firm.

III. Capital Structure Model (CSM)

In this section, we describe the G_L equation used in this paper. We also introduce the four sets of tax rates and two discount rates scenarios used in our major tests. Finally, we illustrate computations for G_L, V_L, ODE and other variables that contain useful information associated with capital structure decision-making.

A. CSM non-growth equation

Hull (2007) coined the phrase the Capital Structure Model (CSM) to describe his approach to evaluate a debt-for-equity transaction. Hull (2014) recently reviewed both the mainline capital structure research and the CSM research related to this paper. The intuition or insight behind the CSM is to begin with the definition that $G_L = V_L - V_U$ where levered firm value (V_L) and unlevered value (V_U) are each defined in terms of a perpetuity after-tax cash flow that is discounted by its cost of borrowing. A clear-cut optimal debt-to-equity ratio (ODE) can result since each increasing debt-for-equity choice generates an increasing cost of levered equity and cost of debt that causes G_L to eventually begin falling.

The CSM extends the perpetuity G_L line of research originating in Modigliani and Miller (1963), referred to as MM, and continued by Miller (1977). Unlike MM and Miller, the CSM debt-for-equity G_L equations lead to well-defined ODEs consistent with trade-off theory (DeAngelo and Masulis, 1980; Hackbarth et al., 2007; Berk et al., 2010; Korteweg, 2010; Van Binsbergen et. al., 2010). The CSM also offers equity-for-debt G_L equations yielding ODEs. The CSM represents an innovative approach that generates a set of G_L equations with multi-component equations. Besides discount rates, the CSM framework can incorporate growth rates, wealth transfers (with a levered situation as the starting point), and changes in tax rates.

Keeping the MM and Miller unlevered and non-growth conditions where the plowback ratio (PBR) is zero, Hull (2007) derived the non-growth G_L equation utilized in this paper. This equation is

$$G_L^{D \to E} = \left[1 - \frac{\alpha r_D}{r_L}\right] D - \left[1 - \frac{r_U}{r_L}\right] E_U \tag{1}$$

where $D \to E$ indicates a debt-for-equity transaction; $\alpha = \frac{(1-T_E)(1-T_C)}{(1-T_D)}$ with T_E, T_C and T_D as the effective tax rates on equity, corporate, and debt incomes; r_D, r_U and r_L are the costs of debt, unlevered equity and levered equity; $D = \frac{(1-T_D)I}{r_D}$ with I as the perpetual interest payment; and, E_U (also referred to as V_U) = $\frac{(1-T_E)(1-T_C)C}{r_U}$ with C = $(1-PBR)(CF_{BT})$ where $PBR = 0$ since (1) assumes non-growth and CF_{BT} is the perpetual cash flow before taxes.

The 1st component of (1) is positive given $\frac{\alpha r_D}{r_L} < 1$ should hold under reasonable scenarios. Hull (2007) argues this component represents a positive tax-agency effect. This positive agency effect is explained because this component is positive when $\alpha = 1$, which represents a situation where tax rates are offsetting such that $(1-T_E)(1-T_C) = (1-T_D)$ with one combination being $T_E = T_C = T_D = 0$. The 2nd component is negative because

$\frac{r_U}{r_L} < 1$ holds. Hull states this component embodies a negative financial distress effect caused by increasing r_L values as debt increases such that the component becomes more negative as debt increases. Thus, Hull asserts (1) can be described as

$$G_L^{D \to E} = \text{POS} + \text{NEG} \tag{2}$$

where POS = $\left[1 - \frac{\alpha r_D}{r_L}\right] D > 0$ and NEG = $-\left[1 - \frac{r_U}{r_L}\right] E_U < 0$. With a negative component, it becomes possible to identify an optimal leverage ratio.

B. Variables, values and computations

Table 1 defines variables and reports values used in this paper's applications. This table reports four sets of tax rates as determined by the two general ownership structures and two sets of discount rates based on two schools of thought about a smaller enterprise's market risk as determined by its beta (β). These two sets of discount rates cause before-tax unlevered firm values to range from about \$7.3 million to about \$15 million. These values are smaller company values if we compare them to the median IPO offer size that has been over \$100 million since 2000. The justification for the four sets of tax rates with their assigned values were given earlier in Section II.B. We now discuss the rationale for these two sets of discount rates.

A first school of thought is that discount rates for smaller entrepreneurial enterprises (such as those backed by VCs and angels) are similar to an average publicly traded stock that would have a market beta (β_M) of 1. Thus, smaller firms can be classified as "normal market risk." An argument for a normal market risk classification (or even lower) is that larger firms outperformed smaller firms during the 1990s and the first decade of the 21st century. Furthermore, historically high returns for small publicly traded stocks have been explained in terms of a number of factors other than greater market risk. These factors include a January effect as first documented by Rozeff and Kinney (1976) as well as transactions costs and illiquidity. Thus, discount rates computed using the CAPM can reasonably assume that the beta of an unlevered smaller company (B_U) is similar to β_M, which is to say B_U = 1. However, what about smaller companies associated with VCs and private equity companies? Cochrane (2005) finds that, after controlling for selection bias, VC investments perform like public traded stocks. Malinowski and Wittlin (2013) suggest private equity does not outperform public equity in a manner that would be expected especially if one adjusts for greater leverage for private equity. Thus, the assumption of B_U = 1 for smaller firms appears to be a reasonable assumption.

A second school of thought is that smaller entrepreneurial enterprises are riskier than a typical traded stock due to greater market risk. Thus, they should be classified as "high market risk." This is consistent with the notion that smaller firms are often financed by investors who require much larger returns. Thus, if this notion holds, it follows that B_U for small firms should be much larger than one. The assumption that B_U > 1 is consistent with Reyes (1990) who reports betas from 1 to near 4 for VC backed enterprises. Cochrane (2005) suggests B_U = 2 for IPOs (1/3 of which are VC backed) but also points out the difficulty in accurately measuring betas.

Due to lack of clarity as what beta to use for a smaller enterprise when estimating discount rates, this paper's analysis as seen in the bottom of Table 1 will consider beta assumptions of B_U = 1 and B_U = 2 when examining a pass-through and a C Corp. Another reason to test two divergent betas is simply to determine if beta's size actually influences capital structure decision-making when using the CSM framework. This latter reason is a strong motivation for considering two contrasting betas.

Table 1: Variables Defined and Values Assigned

1st Set of Pass-through Tax Rates: $T_{C\,\text{Pass-Through}} = 0$; $T_{E\,\text{Pass-Through}} = 0.20$; $T_{D\,\text{Pass-Through}} = 0.25$

$$\alpha_{\text{Pass-Through}} = \frac{(1-T_E)(1-T_C)}{(1-T_D)} = \frac{(1-0.20)(1-0)}{(1-0.25)} = 1.066667$$

2nd Set of Pass-through Tax Rates: $T_{C\,\text{Pass-Through}} = 0$; $T_{E\,\text{Pass-Through}} = 0.25$; $T_{D\,\text{Pass-Through}} = 0.20$

$$\alpha_{\text{Pass-Through}} = \frac{(1-T_E)(1-T_C)}{(1-T_D)} = \frac{(1-0.25)(1-0)}{(1-0.20)} = 0.937500$$

1st Set of Corporation Tax Rates: $T_{C\,\text{Corporation}} = 0.20$; $T_{E\,\text{Corporation}} = 0.05$; $T_{D\,\text{Corporation}} = 0.15$

$$\alpha_{\text{Corporation}} = \frac{(1-T_E)(1-T_C)}{(1-T_D)} = \frac{(1-0.05)(1-0.20)}{(1-0.15)} = 0.894118$$

2nd Set of Corporation Tax Rates: $T_{C\,\text{Corporation}} = 0.30$; $T_{E\,\text{Corporation}} = 0.05$; $T_{D\,\text{Corporation}} = 0.15$

$$\alpha_{\text{Corporation}} = \frac{(1-T_E)(1-T_C)}{(1-T_D)} = \frac{(1-0.05)(1-0.30)}{(1-0.15)} = 0.782353$$

Cash Flow before Taxes = CF_{BT} = \$1,654,135.34 r_F = risk-free rate = 0.05 r_M = market rate = 0.11

1st Discount Rate Scenario: Normal market risk (risk of average public traded stock) with unlevered beta = B_U = 1

E_U rate = $r_U = r_F + B_U(r_M - r_F) = 0.05 + 1(0.11 - 0.05) = 0.11$ Interest for retiring 30%E_U: I = \$269,473.68

2nd Discount Rate Scenario: High market risk (double all betas) with unlevered beta = B_U = 2

E_U rate = $r_U = r_F + B_U(r_M - r_F) = 0.05 + 2(0.11 - 0.05) = 0.17$ Interest for retiring 30%E_U: I = \$169,670.50

We will use (where applicable) the values for variables given in the prior CSM application by Hull (2008) that uses equation (1). Despite our attempt to use similar values for variables, there are several major differences between this paper and prior CSM applied illustrations.

First, tax rates now depend on the ownership structure. In addition, this paper examines different sets of tax rates. This is seen in Table 1 where we introduce the four primary sets of tax rates used in this paper's comparison: two sets for a pass-through and two sets for a C Corp. As described later, other sets are used in robustness tests.

Second, in keeping with our intent of analyzing smaller entrepreneurial enterprises, we reduce the size of the cash flows from billions used in prior CSM illustrations to millions for this paper's illustration. In essence, we simply divide the before-tax perpetuity unlevered cash flows used in prior CSM illustrations by one thousand. Of importance, the pass-through and the C Corp that we compare in this paper will have the same before-tax cash flows and the same discount rates. Thus, the only difference will be tax rates that are determined by ownership structure.

Third, we test two different discount rate scenarios with one scenario having betas twice that of the other scenario. We see in Table 1 that the cost of unlevered equity (r_U) = 11% when B_U = 1 but r_U = 17% when B_U = 2. The computation for these values use the CAPM and its risk-free and market rates given in Table 1. When we use the β_U = 2 assumption, we also double all other betas used by Hull (2008) when computing his levered equity returns and debt returns. Because before-tax unlevered equity cash flows are fixed, greater betas lead to greater discount rates and thus smaller firm values. This explains why the interest in Table 1 is smaller for the 2nd discount rate scenario where betas are doubled. When E_U is smaller, the amount of debt to retire the same percentage is less.

C. Illustration for a tax rate set and a discount rate scenario

In the upper portion of Table 2, we report values for variables for each designated P value where P refers to the debt choice or percentage of E_U retired by debt. To illustrate, the P = 50% choice means that enough debt was issued to retire 50% of outstanding shares with the value of these shares equal to 50% E_U. For brevity's sake, Table 2 only reports values for the first of our four sets of tax rates and the first of our two discount rate scenarios. Values using this tax rate set with the second discount rate scenario are computed in the same way. Similarly, values for the other three tax rate sets combined with a discount rate scenario are also computed in the same way.

Like prior CSM illustrations and for practical reasons, we focus on a finite number choices of debt-for-equity transactions with each subsequent choice increasing by 10%. The range of choices or P values in Table 2 are from 0% to 100% where 0% and 100% are the same since a 100% debt-for-equity transaction would by law make the debt owners become equity owners. The "30%" column where debt retires 30% E_U is given in bold print to highlight the fact that this column gives optimal G_L and V_L values. With the risk-free rate and market return given in Table 1 and the beta information in Table 2, costs of borrowing for debt and equity (r_D and r_L) are computed for each P using the CAPM. The r_D and r_L values reported in Table 2 for the normal risk scenario were first formulated by Hull (2008) to be consistent with the betas and debt ratings advocated by Pratt and Grabowski (2008).

In the lower portion of Table 2, we use costs of borrowings, tax rates and the perpetual cash flows for equity and debt to show how E_U, D and G_L are calculated for the optimal debt choice of P = 30%. While the computations are not shown in Table 2 for the last five values, they can be calculated as follows. $V_L = G_L + E_U$. $E_L = V_L - D$, $\%\Delta E_U = G_L / E_U$ in percentage form, $NB = G_L / D$ in percentage form and $\frac{D}{E} = \mathrm{D} / E_L$. NB refers to the "net benefit to leverage factor" and when multiplied by the amount of after-personal tax debt equals G_L. The optimal $\frac{D}{E}$ value is *ODE*.

The $\%\Delta E_U$ of 7.77% in the "30%" column of Table 2 for *ODE* of 0.386 is consistent with the research (Graham, 2000; Korteweg, 2010; Van Binsbergen et al., 2010). For example, this research collectively suggests that G_L can be as much as 10% of a typical C Corp's value at its *ODE*. In addition, the $\%\Delta E_U$ values reported later in Tables 3 and 4 are also consistent with prior research. This is especially true for our normal risk results. All G_L values in Table 2 for each P choice are computed using (1) with each G_L composed of POS and NEG values given in (2). If desired, more details on computations can be found in Hull (2008).

IV. CSM Applied to a Pass-Through

This section examines an unlevered non-growth pass-through enterprise as it undergoes a debt-for-equity transaction. The following section will investigate a C Corp with the same before-tax unlevered value. By assuming a pass-through and C Corp of the same size, we can use identical before-tax cash flows and discount rates. Regardless, our analysis would not be hampered with different cash flows because we include

Table 2: Illustration using 1st Set of Pass-through Tax Rates of $T_C = 0$, $T_E = 0.20$ and $T_D = 0.25$ and 1st Discount Rate Scenario with Normal Market Risk where $\beta_U = \beta_M = 1.0$

NOTE: When $P = 0$, we have: β_D is not applicable or 0; equity beta (B_E) = B_U or 1; $r_D = r_F$ or 0.05; and, $r_L = r_U$ or 0.11. Where applicable, values are in millions of dollars. Bold print gives values for optimal G_L and V_L values.

	P = Debt Choice or Percentage of E_U Retired by Debt (or %E_U Retired)										
Variables	0%	10%	20%	**30%**	40%	50%	60%	70%	80%	90%	100%
$D = P(E_U)$	0.000	1.203	2.406	**3.609**	4.812	6.015	7.218	8.421	9.624	10.827	0.000
B_D	0.000	0.010	0.050	**0.100**	0.170	0.270	0.390	0.530	0.690	0.880	0.000
B_E	1.000	1.020	1.060	**1.140**	1.250	1.380	1.550	1.750	1.980	2.240	1.000
r_D	0.0500	0.0506	0.0530	**0.0560**	0.0602	0.0662	0.0734	0.0818	0.0914	0.1028	0.0500
r_L	0.1100	0.1112	0.1136	**0.1184**	0.1250	0.1328	0.1430	0.1550	0.1688	0.1844	0.1100
POS	0.000	0.619	1.209	**1.788**	2.340	2.817	3.266	3.681	4.066	4.389	0.000
NEG	0.000	-0.130	-0.381	**-0.853**	-1.444	-2.065	-2.776	-3.493	-4.191	-4.854	0.000
G_L	0.000	0.489	0.827	**0.935**	0.896	0.751	0.490	0.188	-0.125	-0.465	0.000
V_L	12.030	12.519	12.857	**12.965**	12.927	12.781	12.520	12.218	11.905	11.565	12.030
E_L	12.030	11.316	10.451	**9.356**	8.114	6.766	5.302	3.797	2.281	0.738	12.030
$\%\Delta E_U$	0.00%	4.07%	6.88%	**7.77%**	7.45%	6.24%	4.07%	1.56%	-1.04%	-3.87%	0.00%
NB	0.00%	40.7%	34.4%	**25.9%**	18.6%	12.5%	6.79%	2.23%	-1.30%	-4.30%	0.00%
$\frac{D}{E}$	0.000	0.106	0.230	**0.386**	0.593	0.889	1.361	2.218	4.219	14.671	0.000

Before-tax: E_U (or V_U) = $\frac{C}{r_U} = \frac{(1-PBR)CF_{BT}}{r_U}$ with $PBR = 0$ (non-growth), $CF_{BT} = \$1,654,135.34$

and $r_U = 0.11$, we get: $E_U = \frac{(1-0)\$1,654,135.34}{0.11} = \mathbf{\$15,037,593.98}$

After-tax: E_U (or V_U) = $\frac{(1-T_E)(1-T_C)C}{r_U} = \frac{(1-T_E)(1-T_C)(1-PBR)CF_{BT}}{r_U}$ with $PBR = 0$ (non-growth),

$CF_{BT} = \$1,654,135.34$, $T_E = 0.20$, and $T_C = 0$, we get:

$$E_U = \frac{(1-0.20)(1-0)(1-0)\ \$1,654,135.34}{0.11} = \frac{\$1,323,308.27}{0.11} = \mathbf{\$12,030,075}$$

For the optimal choice of $P = 30\%$ where debt retires $30\% E_U$ and $I = \$269,473.68$, we have:

$$D = P(E_U) = 0.3(\$12,030,075) = \mathbf{\$3,609,023} \text{ or } D = \frac{(1-T_D)I}{r_D} = \frac{(1-0.25)\$269,473.68}{0.0560} = \$\mathbf{3,609,023}$$

Using equation (1) we have: $G_L^{D\to E} = \left[1-\frac{\alpha r_D}{r_L}\right]D - \left[1-\frac{r_U}{r_L}\right]E_U =$

$$\left[1-\frac{1.066667(0.056)}{0.1184}\right]\$3,609,023 - \left[1-\frac{0.11}{0.1184}\right]\$12,030,075 = \$1,788,254 - \$853,485 = \mathbf{\$934,769}$$

percentage changes and fractions in our analysis and we could normalize other values as needed. Despite this paper's similar use of values found in prior CSM exercises and applications, the results of this paper can deviate from prior applications because we use tax rates based on two different ownership structures and discount rates based on two divergent beta scenarios.

A. Non-growth pass-through with normal market risk

For our pass-through applications for a non-growth situation using (1), we test the two sets of personal tax rates on equity and debt income that were introduced in Table 1. As argued previously, both sets are feasible for a pass-through enterprise. Regardless, as described later, our results are largely invariant to both the size of the personal tax rates and the differential between them especially for realistic values and differentials.

As shown earlier in Table 1 and repeated in the first rows of Panels A and B in Table 3, our first set of tax rates are T_E = 0.20, T_D = 0.25 and T_C = 0. For the normal risk results in Panel A, we report an after-tax unlevered equity (E_U) of \$12.030M (where M = millions) for which this E_U was computed in Table 2. For our second set of tax rates, we maintain the 0.05 differential between personal tax rates but switch the values for T_E and T_D by using T_E = 0.25, T_D = 0.20 and T_C = 0. This gives an after-tax E_U of \$11.278M in the second row of Panel A, which is smaller than the E_U in the first row due to its higher personal tax on equity. Both of these after-tax E_U values of \$12.030M and \$11.278M have the same before-tax E_U value that was computed as \$15,037,593.98 in Table 2.

For the first set of tax rates, the first row of Panel A in Table 3 reports that firm value is maximized by issuing debt to retire 30% E_U. This gives maximum G_L (called max G_L) of \$0.935M; maximum levered firm value (called max V_L) of \$12.965M; %ΔE_U of 7.77%; *NB* of 25.90%; and, *ODE* of 0.386. Thus, in after-tax dollars, debt increases firm value by 7.7%, the firm can add \$25.9 to E_U for every \$100 of debt issued; and, the firm optimally finances with \$38.6 in debt for every \$100 of equity. These values given in the first row of Panel A in Table 3 were also shown in Table 2 in the "30%" column. Values for other *P* choices between 0% and 100% were also shown in Table 2. There we get insight into the concave relation between G_L and V_L with leverage that is respectively visualized in Figure 1 and Figure 2. This concave relation is consistent with trade-off theory.

Table 3: Non-growth results for a pass-through using equation (1)

	$\%E_U$ Retired	E_U	Max G_L	Max V_L	$\%\Delta E_U$	*NB*	*ODE*
Panel A Normal Risk							
T_E = 0.20; T_D = 0.25; T_C = 0	30%E_U	12.030M	0.935M	12.965M	7.77%	25.90%	0.386
T_E = 0.25; T_D = 0.20; T_C = 0	40%E_U	11.278M	1.121M	12.399M	9.94%	24.85%	0.572
Panel B High Risk (double betas)							
T_E = 0.20; T_D = 0.25; T_C = 0	30% E_U	7.784M	0.808M	8.593M	10.39%	34.62%	0.373
T_E = 0.25; T_D = 0.20; T_C = 0	40% E_U	7.298M	0.861M	8.159M	11.80%	29.50%	0.557

For the second set of rates in the second row of Panel A where T_E = 0.25, T_D = 0.20 and T_C = 0, we find firm value is now maximized by issuing debt to retire 40%E_U instead of 30%E_U found in the first row. This is caused by T_D being lower at 0.20 so that there is now more advantage to debt because debt owners pay less taxes. With 40%E_U retired, we get max G_L = \$1.121M, max V_L = \$12.399M, %ΔE_U of 9.94%, *NB* = 24.85%, and *ODE* = 0.572. Despite the advantage for equity valuation when T_E = 0.20, the highest max G_L results occur when T_E = 0.25 because a lower T_D = 0.20 leads to more debt and thus a higher G_L. However, the lower T_D does not create enough of an increase in G_L to offset the advantage of a lower T_E when valuing V_L. This is seen from the max V_L values of \$12.965M for when T_E is 0.20 in the first row of Panel A compared to max V_L of \$12.399M when T_E is 0.25 in the second row.

Figure 1: G_L for two sets of tax rates and normal risk

1st Set: T_C = 0, T_E = 0.20, T_D = 0.25; Max G_L = \$0.935M; *ODE* = 0.386
2nd Set: T_C = 0, T_E = 0.25, T_D = 0.20; Max G_L= \$1.121M; *ODE* = 0.572

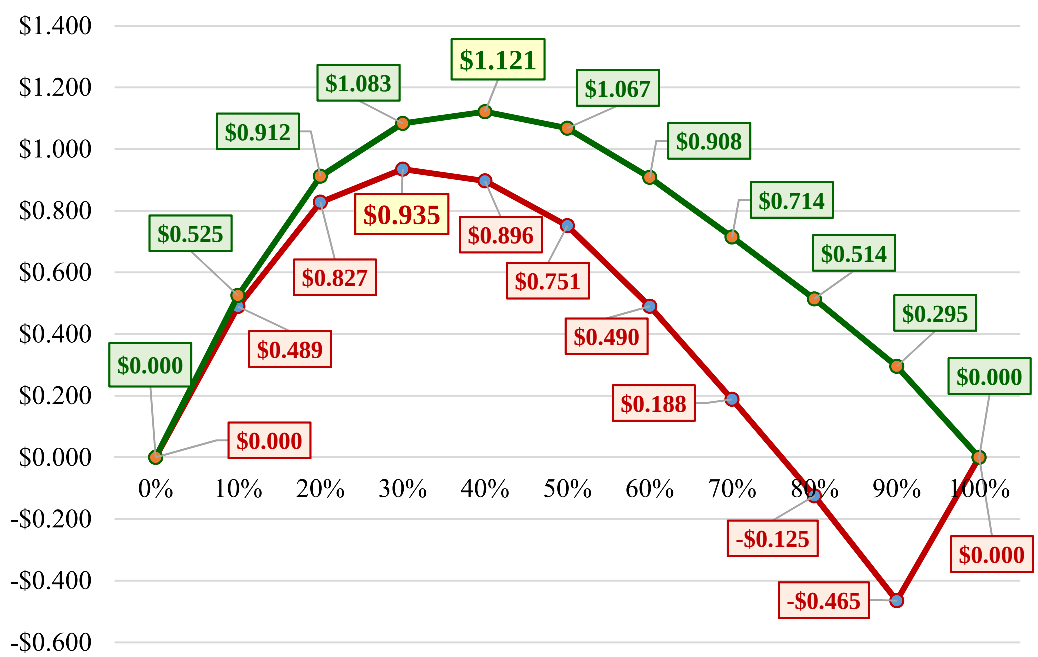
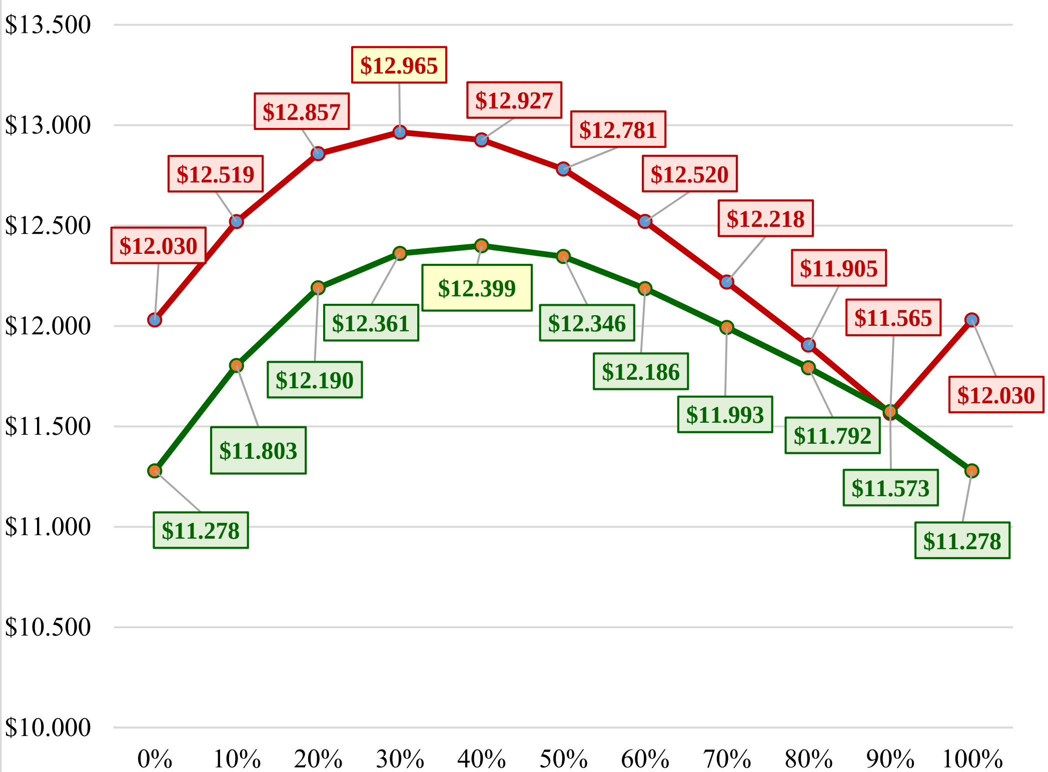


Figure 1 presents Panel A's two sets of results for G_L for each choice from 0% to 100% where if P = 100% the enterprise legally reverts back to its unlevered condition. In this figure, G_L is plotted along the vertical axis (with values in millions of dollars) and the percent of unlevered equity retired (or P values representing debt choices) along the horizontal axis. This figure clearly portrays that a pass-through gains more from leverage if it can get financing from debt owners who have a lower personal tax rate of T_D = 0.20 (instead of T_D = 0.25). The pass-through will also end of up issuing more debt and have a higher *ODE*.

Figure 2: V_L for two sets of tax rates and normal risk
1st Set: T_C = 0, T_E = 0.20, T_D = 0.25; Max V_L = \$12.965M; *ODE* = 0.386
2nd Set: T_C = 0, T_E = 0.25, T_D = 0.20; Max V_L= \$12.399M; *ODE* = 0.572



In Figure 2, we graphically illustrate that V_L is higher when T_E = 0.20 (instead of T_E = 0.25) for all debt choices except the highest debt choices. In this figure, V_L is plotted along the vertical axis (with values in millions of dollars) and the percent of unlevered equity retired along the horizontal axis. With higher debt choices, the advantage to equity of a lower tax rate is lost because most of the equity has been retired. The results for doubling the market risk are discussed later but we could also show the same patterns found in Figure 1 and Figure 2 if we doubled the market risk.

B. *Robustness of Results*

We tested other T_E and T_D values and found the same pattern of results. For example, we examined personal tax values from 0 to as high as 0.70 but, as long as there was a 0.05 differential between T_E and T_D, the general results were alike in that the same 30%E_U and 40%E_U were retired when generating the max G_L. As might be expected, whenever T_E and T_D values were lower but with the same 0.05 differential, the G_L and V_L values were higher since values are reported on an after-tax basis (which for pass-throughs are simply on an after-personal tax basis) and less personal taxes mean higher after-tax values. Despite the fact max G_L and max V_L increase as personal tax rates fall, differences between max G_L and max V_L differ very little whenever rates fall as long as the 0.05 differential is maintained. This is true regardless as to whether $T_E > T_D$ by 0.05 or $T_D > T_E$ by 0.05.

We also tried a 0.10 differential and for reasonable personal tax rates (e.g., those under the current maximum of 0.396), the same two debt choices of 30%E_U retired and 40%E_U retired were always found to maximized value. When we tried a 0.15 differential, we got similar results with one exception. When T_E was greater than T_D by a 0.15 differential, the 40%E_U retired increased to 50%E_U retired but the increase in value (as measured by %ΔE_U variable) was very minor and virtually unnoticeable. Thus, the 40%E_U and 50%E_U choices yield about the same increase in value. Regardless, as T_E separates itself from T_D by becoming increasingly greater, then more debt is likely to result since the personal tax advantage to issuing debt increases.

What if $T_E = T_D$? We examined this question for rates from 0 to 0.70 and found that as long as personal tax rates were equal, then the enterprise retired 40%E_U. Thus, these results are the same as that for the tax rates set of $T_E = 0.25$, $T_D = 0.20$ and $T_C = 0$.

C. *Capital structure decision rules for managers of pass-throughs*

From our analysis just completed, an important conclusion can be made: our choice of how much E_U to retire for a pass-through is generally invariant to the size of T_E and T_D and a reasonably large differential between T_E and T_D. Thus, even if our sets of tax rates are not found for a particular enterprise, our general results still hold as to what percent of equity should be retired. This is important for managers of pass-throughs in the U.S.A. or countries with similar tax rate structures as they simply need to follow this general rule when making their capital structure decision.

General Rule for Normal Market Risk

If $T_E > T_D$ then retire 30% E_U and if $T_D \geq T_E$ then retire 40% E_U.

To determine to what extent this rule is confined to the differential range of 0.05 to 0.15 mentioned previously, we tested other differentials in personal tax rates on debt and income equity to determine if we could drop the 0.05 cut-off or increase the 0.15 cut-off. We found the lower cut-off could be dropped down to 0.01. To illustrate, when we tested a 0.01 differential in personal tax rates, the %E_U retired was not altered and this test was true for T_E and T_D values up to 90%. We did further tests to refine the 0.15 differential as a cut-off and found that a more precise cut-off could not be made that covered both $T_E > T_D$ and $T_D > T_E$. When $T_E > T_D$, the cut-off depended on the size of the personal tax rates as the cut-off fell below the 0.15 differential as the personal tax rates increased. When $T_D > T_E$, the 0.15 cut-off did hold but this 0.15 cut-off increased to a 0.19 differential as the personal tax rates become smaller.

Thus, a more precise statement of our general rule for managers of a non-growth pass-through is:

Precise Rule for Normal Market Risk

If $T_E > T_D$ then retire 30% E_U if the differential is between 0 and 0.10 with the differential increasing from 0 to 0.15 for smaller personal tax rates, and if $T_D \geq T_E$ then retire 40% E_U if the differential is between 0 and 0.15 with the differential increasing from 0 to 0.19 for smaller personal tax rates.

As will be covered next, both the general and the precise rule are similar for high market risk.

D. Non-growth pass-through with high market risk

Up to this point, we have assumed that the discount rates for our pass-through are those for a normal company with average market risk. Let us now assume that our pass-through has twice as much market or nondiversifiable risk by doubling the betas we have been using. For example, we took the betas of Hull (2008) that we have been using to compute costs of borrowing and doubled them. Thus, the unlevered equity beta increased from $\beta_U = 1$ to $\beta_U = 2$. Similarly, we doubled all other debt and levered equity betas of Hull and used the CAPM to recompute discount rates, all of which became much greater when beta increases. The results when doubling betas are reported in Panel B of Table 3. In comparing the two panels in this table, we can find many general similarities in terms of how values change from the first set of tax rates to the second set of tax rates. However, there are fall-offs in perpetuity values when cash flows are discounted by higher costs of borrowings. For example, the reported max G_L values of \$0.935M and \$1.121M in Panel A fall to \$0.808M and \$0.861M in Panel B. While max G_L and max V_L values fall, $\%\Delta E_U$ values increase noticeably. With betas doubled, the *NB* values increase while the *ODE* values decrease slightly.

All of these changes with betas doubled give the appearance of a substantial difference. However, the key variable of the "% E_U Retired" does not change as the first rows in both panel are 30% E_U retired and the second rows are both 40% E_U retired. Thus, despite the differences, the pass-through's managerial decision-making is unchanged because the same percent of unlevered equity is retired. We conducted further high market risk tests and found results similar to those reported earlier for normal market risk tests including differential cut-offs. However, one dissimilarity was a tendency to retire less unlevered equity. To illustrate, when personal tax rates are equal, the rules given earlier for normal market risk change so that the ">" and "≥" signs are switched. Thus, we have this general rule for a pass-through manager for high market risk:

General Rule for High Market Risk

If $T_E \geq T_D$ then retire 30% E_U and if $T_D > T_E$ then retire 40% E_U.

Similarly, we have this precise rule for a pass-through manager for high market risk:

Precise Rule for High Market Risk

If $T_E \geq T_D$ then retire 30%E_U if the differential is between 0 and 0.10 with the differential increasing from 0 to 0.15 for smaller personal tax rates, and if $T_D > T_E$ then retire 40%E_U if the differential is between 0 and 0.15 with the differential increasing from 0 to 0.19 for smaller personal tax rates.

Thus, any rule offered to managers would be very similar regardless of the market risk assumed to hold. The only minor alteration would be switching the ">" and "≥" signs as dictated by the market risk.

V. Pass-Through versus C Corp Comparison Using CSM

Pass-throughs and C Corps can take on an array of similar sizes and thus analogous characteristics.[3] This means we can do a comparative analysis assuming a situation where a pass-through and a C Corp are alike in terms of cash flows and risk factors leading to similar discount rates. Thus key variables can be identical except for corporate and personal tax rates that are unique to each of the two ownership structures. In this section, we compare a pass-through and C Corp to determine if there are any differences in these two ownership structures. We repeat our prior analysis for a pass-through by doing it for a C Corp. For our C Corp analysis, we use the same before-tax cash flow and discount rates that were used for our pass-through. The major difference in our C Corp analysis are in tax rates as C Corps are governed by different tax laws. While pass-throughs pay no tax on corporate or business income, profitable C Corps can pay a high effective tax rate and also have lower effective personal tax rates (especially for equity income) stemming from U.S.A. tax legislation described in Section II.B. For reasons described there, we fix T_E at 0.05 and T_D at 0.15 for all C Corp tests. We examine two T_C values of 0.20 and 0.30 for reasons also explained previously in Section II.B.

A. Comparison of the results for the two ownership structures

Table 4 reports our C Corp results. We will highlight five observations when comparing the seven columns in this table with those in Table 3. In this comparison, we remind the reader that whereas our assigned tax rates are reasonable estimates, they are not applicable to all pass-throughs and C Corps.

First, we find after-tax firm values given for the pass-through in Table 3 are greater than the corresponding C Corp values in Table 4. This is seen by comparing the

[3] Whereas we can associate pass-throughs with small companies like a sole proprietorship, there are no restrictive limits on size as there are plenty of multi-million and even multi-billion dollar pass-throughs. For example, large LLC pass-throughs include Chrysler Group, Kaiser Permanente, and Mars Chocolate North America. A sole proprietorship might also desire to be a corporation for a number of reasons including a desire to have limited liability, establish a plan making its health costs deductible, and deduct a number of fringe benefits.

"E_U" and "Max V_L" columns in Tables 3 and 4. Computing averages for E_U and max V_L values in each table and comparing the percentage difference in averages for both E_U and max V_L, we find that the pass-through has percentage differences that yield an 8.1% greater E_U and a 5.8% greater max V_L. The difference between corporate tax rates for the pass-through and C Corp is vast enough so that the personal tax advantage that the C Corp enjoys over the pass-through cannot overcome the disadvantage that the C Corp has from having to pay corporate taxes. However, the firm valuation advantage for the pass-through does not appear to be as great as one might expect. This is especially true for max V_L where the difference amounts to only 5.8%. This difference would be greater were it not for the greater advantage of leverage for C Corps as discussed next.

Second, in comparing Tables 3 and 4, we discover a greater advantage to leverage is achieved for the C Corp. This is seen by comparing the "Max G_L" and "%ΔE_U" columns in Tables 3 and 4 where we find that a C Corp has higher values. Computing averages for max G_L and %ΔE_U values in each table and comparing the percentage difference in averages for max G_L and %ΔE_U, we find that the C Corp has percentage differences that yield a 15.1% greater max G_L and a 21.0% greater %ΔE_U. We attribute these greater gains from leverage to the C Corp's capacity to lower their corporate taxable income through the interest deduction that lowers its corporate tax payment. For a pass-

Table 4: Non-growth results for a C Corp using equation (1)

	%E_U Retired	E_U	Max G_L	Max V_L	%ΔE_U	*NB*	*ODE*
Panel A Normal Risk							
T_E = 0.05; T_D = 0.15; T_C = 0.20	40% E_U	11.429M	1.232M	12.660M	10.78%	26.94%	0.565
T_E = 0.05; T_D = 0.15; T_C = 0.30	50% E_U	10.000M	1.333M	11.333M	13.33%	26.66%	0.789
Panel B High Risk (double betas)							
T_E = 0.05; T_D = 0.15; T_C = 0.20	40% E_U	7.395M	0.918M	8.313M	12.41%	31.03%	0.552
T_E = 0.05; T_D = 0.15; T_C = 0.30	40% E_U	6.471M	0.905M	7.375M	13.98%	34.96%	0.662

through that does not pay corporate taxes, the interest they pay cannot lower its corporate tax payment because it is already zero.

Third, we find higher debt levels are achieved for the C Corp. This is seen in comparing the "%E_U Retired" and "*ODE*" columns in Tables 3 and 4. This finding is consistent with the fact C Corps achieve a greater advantage from leverage compared to pass-throughs. With a greater advantage from leverage, it stands to reason that such an advantage would be positively correlated with greater levels of debt. Computing averages for %E_U Retired and *ODE* values in each table and comparing the percentage difference in averages for both %E_U Retired and *ODE*, we find that the C Corp has percentage differences that yield a 17.65% greater %E_U Retired and a 26.48% greater *ODE*. As might be expected, these percentages are comparable to 15.11% greater max G_L and a 20.99% greater %ΔE_U.

Fourth, the *NB* values do not fully reflect the greater C Corp gain from leverage since an *NB* value focuses on efficiency by considering the dollar of total firm value added per dollar of debt added. In this regards, the C Corp is slightly more efficient. Computing averages for *NB* values in each table and comparing the percentage difference in averages, we find that the C Corp has a percentage difference that yields a 3.95% greater *NB*. Thus, whereas the C Corp issues more debt, it is still more efficient than the pass-through. With less of a tax advantage, the pass-through still has other positive leverage related effects that can be explained in terms of a positive agency shield notion advocated by Hull (2007) who states:

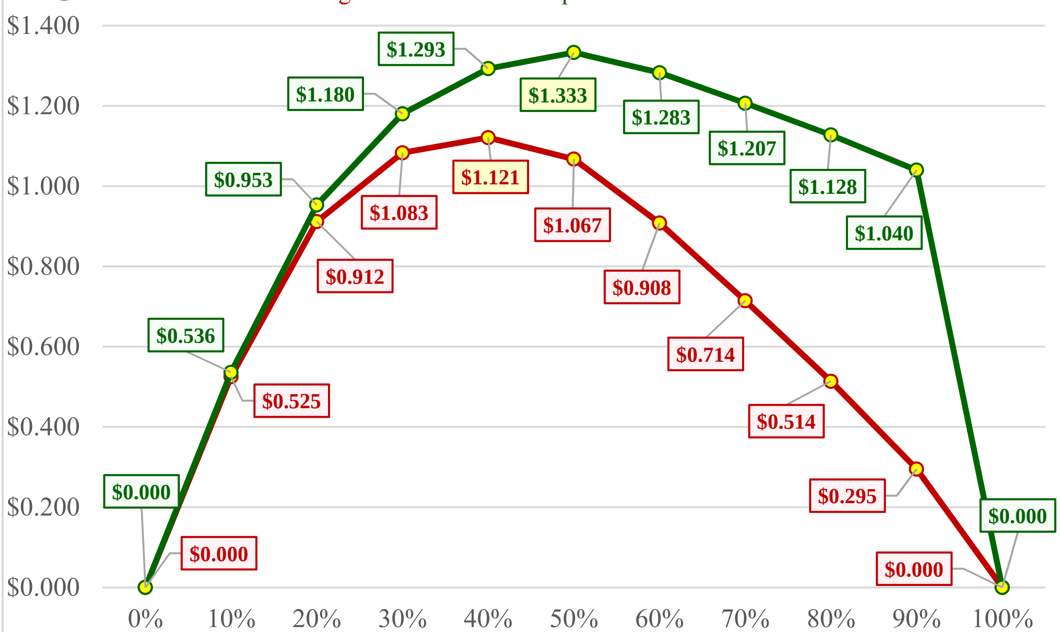
> *Thus, instead of being just a tax shield component, the 1st component takes on an additional category that can be identified with an "agency shield" effect because it is consistent with agency theory that hypothesizes debt can be positive for reasons other than a tax shield. A positive agency shield 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.*

Related to the packaging and selling of securities is the fact that the cost of debt is lower than the cost of equity even without any deduction of interest.

Fifth, we find that the reactions to the doubling of betas do not differ a lot when we compare the pass-through and C Corp. For example, all of the four general conclusions just given above are true for both normal and high market risk. Regardless, there are differences in the degrees of reaction to an increase in market risk. For example, pass-throughs fare better (e.g., less negatively affected) from leverage compared to C Corps when betas double, and C Corps take on less leverage when market risk increases while pass-throughs are virtually unaffected. Below we supply more details when comparing normal market risk results with high market risk results for the seven variables in Tables 3 and 4.

In terms of firm values when market risk doubles, the average percentage drop in E_U is the same as both enterprises fall 35.3%. Similarly, for V_L, as the respective declines in pass-through and C Corps are largely indistinguishable at 34.0% and 34.7%. In terms of what ownership structure profits the most from leverage when betas double, the results indicate that the pass-through benefits more. To illustrate, the average percentage drop in max G_L for the pass-through is 18.4% while the C Corp declines 28.8%, and the average percentage increase in $\%\Delta E_U$ for the pass-through is 26.2% while the C Corp only increases 10.0%. How does increased market risk affect the debt level? While a pass-through is unaffected in its $\%\Delta E_U$, the C Corp has less leverage when T_C is higher at 0.30. This result is reflected in the *ODE* variables where the average percentage decrease in *ODE* for the pass-through is only 3.0% compared to 9.2% for the C Corp. In term of the net benefit to leverage, both ownership structures are positively affected by doubling betas. To illustrate, the increase in *NB* is 26.2% for the pass-through, which is slightly better than the 23.2% for the C Corp.

Figure 3: $G_{L\,\text{Pass-Through}}$ versus $G_{L\,\text{CCorp}}$



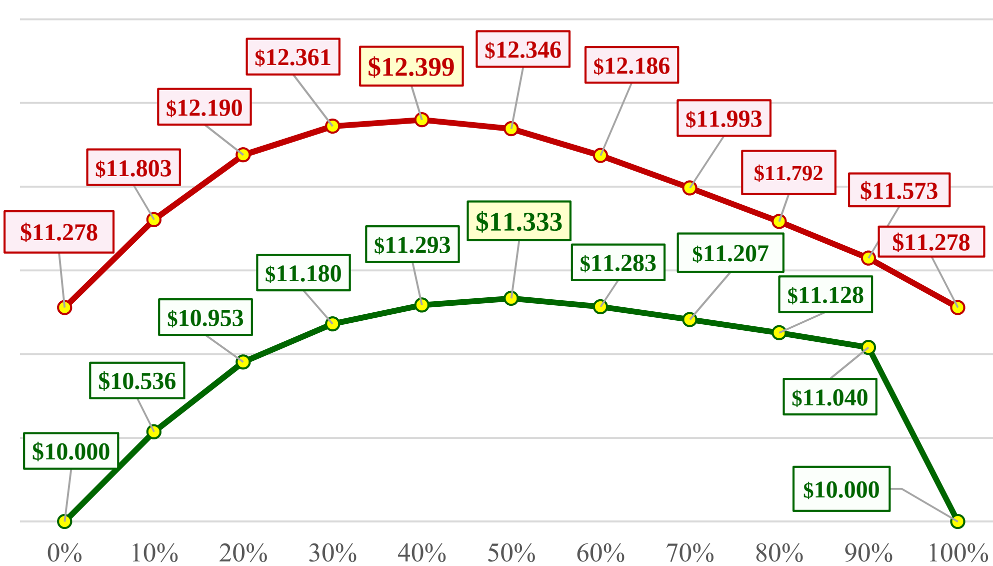
B. *Comparing the two ownership structures for each debt choice*

Given the pass-through's huge advantage of not paying corporate taxes, its firm value (V_L) is not as great as one might expect compared to the C Corp. As noted in the last section, the reason is that a C Corp gains more from debt due to its capacity to lower its taxable income. We now investigate in more detail as to why the pass-through's V_L advantage dwindles as more debt is issued to retire equity. We do by looking at Figures 3, 4 and 5. In Figure 3, we will compare G_L values between our two ownership structures for each debt choice or P value given in Table 2. Each debt choice represents the percentage of unlevered equity retired by debt. In Figure 4, we compare the V_L values for the pass-through and the C Corp for each debt choice. In Figure 5, we analyze the difference when subtracting pass-through V_L values from C Corp V_L values.

Figure 3 illustrates a comparison of G_L results for the pass-through versus the C Corp as greater debt-for-equity transactions are undertaken. For this figure, $G_{L\,\text{Pass-Through}}$ refers to G_L for the pass-through and $G_{L\,\text{Corporation}}$ refers to the C Corp with G_L values in million. In this figure, G_L values are plotted along the vertical axis (with values in millions of dollars) and the percent of unlevered equity retired (or P values representing debt choices) along horizontal axis. For this figure's comparison, we choose sets of tax rates that generate the largest max G_L. For our pass-through, Table 3 reveals the set of tax rates giving max G_L is $T_E = 0.25$, $T_D = 0.20$ and $T_C = 0$. For our C Corp, Table 4 shows that max G_L is achieved with $T_E = 0.05$; $T_D = 0.15$; $T_C = 0.30$.

As seen in Figure 3, the max $G_{L\,\text{Corporation}}$ of \$1.333M is greater than that of \$1.121M for max $G_{L\,\text{Pass-Through}}$. Part of the greater max $G_{L\,\text{Corporation}}$ is achieved by issuing debt to retire 50% E_U compared to 40% E_U for $G_{L\,\text{Pass-Through}}$. At the 40% E_U level for both the C Corp and pass-through, the advantage for the C Corp is only \$1.293M – \$1.121M = \$0.072M. However, at the 50% E_U level, the advantage for the C Corp increases almost four-fold to \$1.333M – \$1.067M = \$0.266M. Thus, as greater debt-for-equity transactions take place, the advantage to a C Corp becomes greater. While the details are omitted, it can be noted that the general pattern of G_L differences given in Figure 3 can be found for other sets of tax rates since the C Corp's G_L is always greater when the level of market risk is the same.

Figure 4: $V_{L\,\text{Pass-Through}}$ versus $V_{L\,\text{C Corp}}$



Since V_L is just E_U plus G_L, we can get a clearer understanding of how increasing G_L values cut into the pass-through's valuation compared to a C Corp by looking at V_L values. We do this in Figure 4 where $V_{L\,\text{Pass-Through}}$ refers to V_L for the pass-through, $V_{L\,\text{C Corp}}$ refers to the V_L for C Corp and V_L values are in millions of dollars. In this figure, V_L values correspond with the vertical axis (with values in millions of dollars) and the percent of unlevered equity retired along horizontal axis. For this figure's comparison of the two ownership structures, we use the same set of tax rates used in Figure 3. From Figure 4, we can visualize how greater increasing G_L values for the C Corp causes the difference between $V_{L\,\text{Pass-Through}}$ and $V_{L\,\text{Corporation}}$ to decrease as the debt choice increases. The decrease in differences between firm values continues steadily up to the debt choice of P = 90% (recall for P = 100% the levered firm reverts to an unlevered firm by legal definition).

Figure 5: $V_{L\,\text{Pass-Through}}$ minus $V_{L\,\text{CCorp}}$

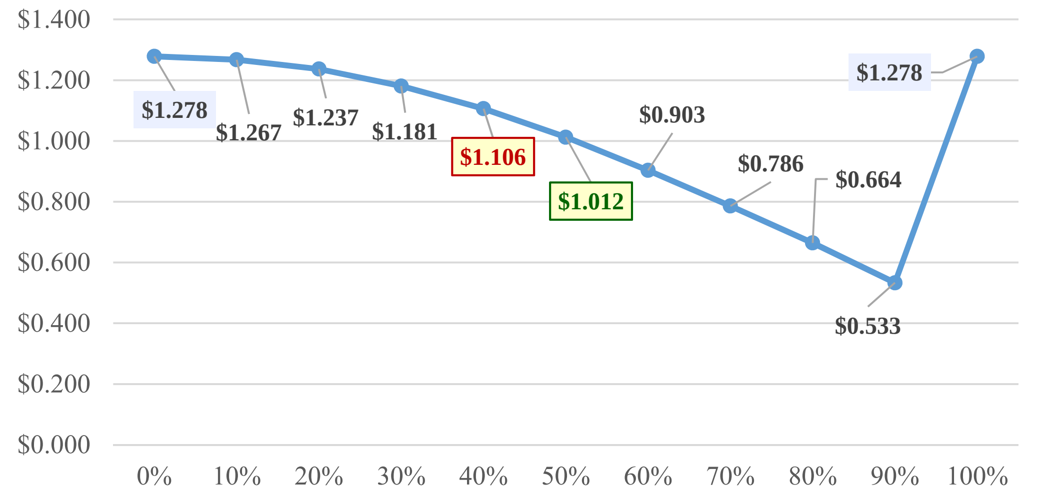


Figure 5 presents the differences between the V_L values in Figure 4. Each difference for a debt choice represents $V_{L\,\text{Pass-Through}}$ minus $V_{L\,\text{C Corp}}$ where differences are expressed in millions of dollars and these differences are plotted along the vertical axis and the percent of unlevered equity retired (or debt choices) along horizontal axis. From Figure 5, we see the initial difference of \$1.278M falls as more and more debt is issued to retire equity. It falls to \$1.106M at the point where the pass-through maximizes G_L, which is the retirement of 40% E_U. The difference falls to \$1.012M when the C Corp maximizes G_L by retiring 50% E_U. If 90% retirement was achieved, the difference would only by \$0.533M, which represents a fall of nearly 60% from the unlevered difference of \$1.278M. It is conceivable that any advantage a pass-through might have over a C Corp can be overcome, in some cases at least, when we consider the effect of leverage especially if the C Corp achieves its *ODE* as a high debt level. In fact, this is almost the case if we compare the other two sets of tax rates. For this latter comparison, $V_{L\,\text{C Corp}}$ becomes greater than $V_{L\,\text{Pass-Through}}$ at P = 70%, which is the P choices after both would have already achieved their max V_L values.

Together Figures 3, 4 and 5 highlight the superior values obtained by the pass-through as well as the deterioration of these superior values as the firm issues more debt. Obviously, the degree of the differences between pass-throughs and C Corps can differ based on many factors with two important factors including costs of borrowings and tax rates. While the values we have chosen to use are believed to be realistic, more research is needed to understand comparisons between pass-throughs and C Corps. Hopefully, this paper has begun the process by supplying a model of taxation – albeit this taxation model occurs within a larger context that also includes agency effects and financial distress effects. For the CSM, these latter two effects are inherently contained in its framework. In conclusion, we have shown that the CSM provides a model applicable to two general ownership structures of pass-throughs and C Corps.

VI. Final Comments and Future Research

This paper determines the optimal debt-equity ratio (*ODE*) that maximizes firm value for pass-through and C Corp ownership structures. Our valuation process relies on the non-growth Capital Model Structure (CSM) framework by Hull (2007) that generates the debt-to-equity gain to leverage (G_L) equation used in this paper when determining the maximum levered firm value (max V_L).

When applying the CSM, we are able to show that a pass-through achieves a higher max G_L, a lower max V_L and a greater *ODE* when its personal tax rate on equity (T_E) is greater than its personal tax rate on debt (T_D). A greater G_L advantage with a lower personal tax rate on debt cannot offset the loss in equity value from paying greater taxes on equity income. Thus, a lower max V_L results. Our results are robust for innumerable tests where tax rates are altered and this is particularly true if the tax rates fall within statutory limits. Also, we find that market risk does not influence the percent of unlevered equity that is retired.

We offer rules for managers of pass-throughs on how much equity to retire. The general rule for normal market risk (β = 1) is:

> If $T_E > T_D$ then retire 30% E_U and if $T_D \geq T_E$ then retire 40% E_U.

Our more precise rule for normal market risk that considers the differential between T_E and T_D is:

> If $T_E > T_D$ then retire 30% E_U if the differential is between 0 and 0.10 with the differential increasing from 0 to 0.15 for smaller personal tax rates, and if $T_D \geq T_E$ then retire 40% E_U if the differential is between 0 and 0.15 with the differential increasing from 0 to 0.19 for smaller personal tax rates.

For greater market risk (β = 2), these two rules are only slightly modified by switching the ">" and "≥" signs.

After analyzing capital structure decision-making for a pass-through, we next illustrate that an enterprise's max G_L, max V_L and *ODE* can fluctuate based on ownership structures that exhibit differences in corporate and personal tax rates. We find that pass-throughs tend to issue less debt leading to lower *ODEs* compared to C Corps. Pass-throughs also attain lower max G_L values. Despite lower max G_L values, we show that the pass-through ownership structure consistently achieves higher max V_L results. Finally, while affecting the valuation process by lessening values, greater betas do not change general conclusions when comparing a pass-through and a C Corp.

While the findings we present might be expected given we assume a typical pass-through and C Corp, the CSM framework we used to generate these findings can also yield less likely results for other possible situations. For example, the CSM framework can be used to generate results for enterprises that might have atypical tax rates. To illustrate, if we had used a situation where a pass-through achieved the maximum statutory personal tax rates, we could have demonstrated the pass-through now has lower values than the C Corp for E_U and V_L for all debt choices. This would conflict with what we report in this paper. Or consider a C Corp with a lower effective corporate tax rate such as 0.10 instead of 0.20 and 0.30. This would also change the outcomes because lower effective corporate tax rates will increase E_U and also increase V_L for all debt choices even though G_L values fall. Once again, results divergent from those reported in this paper would result.

Besides not examining less likely tax rate scenarios, this paper did not investigate other areas covered by the current CSM research. For example, this paper did not use the CSM with growth given by Hull (2011). Future research can explore the new equations of Hull (2014) that allow changes in tax rates within two G_L components. Before Hull discovered a second "α" factor in his 2nd component, there was only one α in a CSM equation that considered personal and corporate tax rates and that was the Miller (1977) α factor. Hull has offered evidence that his newly discovered α factor can be a more decisive factor than the Miller α factor on capital structure decision-making. It remains to be seen if future research on pass-throughs can show the relevance of this second α factor in an extension of this paper's study.

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