Project Proposal – Determinants of Debt Capacity: Leverage Ratio

1. Problem statement – Phenomenon of Interest and Motivation for the Study

Traditional academic literature regularly refers to "Optimum Capital Structure" and "Debt Capacity". The interpretation of the terminology is rooted in the seminal Modigliani and Miller papers of 1958 and 1963. Theoretical literature abounds discussing optimum capital structure, and debt capacity in trade-off theory, pecking order theory, and agency theory. The concept of optimum capital structure resides in the belief that the levels of debt and equity of an enterprise are primarily at the discretion of management, and that they seek to maintain idealized levels of leverage, without consideration of the creditor view. The notion of "Optimum Capital Structure" is construed as to reside somewhere at the inflection point of the lowest Weighted Average Cost of Capital, which blends the after-tax costs of debt and equity, with debt interest being deductible and therefore the interest rate being multiplied by (1-tax rate). The belief is that enterprises seek a balance of leverage, striving to maintain some constant ratio.

While an enterprise's choice of leverage and optimum debt may be theoretically possible for investment-grade companies, which maintain relatively low and relatively typical levels of debt for their industries, such idealized leverage levels are not always possible as enterprises drift below investment grade credit ratings and towards its inflection point (S&P BBB-).

This paper seeks to provide insight into the creditor determinants of optimum leverage by exploring typical levels of leverage by comparing BBB- and BB debtors. This study explores the public bond and liquid bank loan markets, for which data is available through COMPUSTAT, Capital IQ, Securities Data Corporation (SDC), and Loan Pricing Corporation. Based on common practice among lenders, I believe the primary determinant of a borrower's debt capacity from an affordability standpoint is the Leverage Multiple of Net Debt to EBITDA ("Net Debt" being total Debt net of Cash and Investments). A second measurement criterion, which is more applicable than EBITDA is Free Cash Flow. However, while there may be a general understanding of the concept of free cash flow, there is very little consensus on the formula for calculating free cash flow, which differs by industry and often by how each company decides to run their business.

While much academic literature refers to debt capacity and leverage in terms of debt to assets or debt to an enterprise value of the firm, I believe the primary leverage ratio in use by lenders is the ratio of Debt to EBITDA. This paper seeks to explore enterprise debt capacity levels for different credit ratings as expressed by credit rating agencies and compare those levels to the actual leverage ratios of borrowers. Because the cash flow leverage ratio of debt to EBITDA, known as "Leverage Multiple", is so important, I believe credit ratings will be driven primarily around this ratio rather than by the ratio of debt to book value of assets. A second important factor in determining debt capacity from a lender's perspective is the amount of available "valuable" collateral. While academic papers often refer to PPE as a determinant of an enterprises' asset levels, I believe lenders primarily look at its liquid, or "self-liquidating" assets as a primary source of collateral and as such debt capacity. The most important collateral to a

lender is therefore its' accounts receivable and its inventory. The assets it will easily collect (convert to cash) over a short period of time.

The research question I wish to investigate is: Does an enterprise's leverage multiple have more importance to it achieving higher debt levels in absolute terms or is an enterprise's balance sheet leverage more important to it maximizing its' debt levels?

I propose that the relative levels of an asset-light company's debt are influenced by its multiple of EBITDA, more than balance sheet leverage ratios. Additionally, debt levels of asset-intensive enterprises, are influenced more by balance sheet leverage levels than multiples of EBITDA. In addition, I believe that enterprises with more volatile earnings have a reduced ability to otherwise maximize debt levels, due the additional cushion lenders require as they consider advancing additional debt. Accordingly, I develop the following hypothesis (see Figure 2):

H1a: Enterprise Debt/EBITDA (Leverage Multiple - IV) is the primary determinant of Debt / Enterprise Value (Enterprise Leverage - DV) for asset-light enterprises.

H1b: Enterprise low asset levels (Moderating IV) positively affects the Leverage Multiple (IV) effect on the level of Debt / Enterprise Value (DV).

H1c: Enterprise low earnings volatility (Moderating IV) positively affects the level of Leverage Multiple (IV) effect on the level Enterprise Leverage (DV).

H2a: Enterprise Book Leverage (Debt/Assets – IV) is the primary determinant of Enterprise Leverage (DV) for asset-intensive enterprises.

H2b: Enterprise High Asset Intensity (Moderating IV) positively affects the Book Leverage on the level of Debt / Enterprise Value (DV).

H2c: Enterprise Low Earnings Volatility (Moderating IV) positively affects the Book Leverage (IV) on the level of Debt / Enterprise Value (DV).

Moderating Variable (IV): Industry Asset Intensity

Controls: Enterprise Size of Assets, Enterprise Size of Revenues, Enterprise Liquidity,

2. Method

    a. Participants / Subjects

I intend to operationalize the hypotheses, by comparing the Book Leverage (BL) and Leverage Multiple (LM) of publicly traded BBB- and BB+ companies over a ten-year period from 2011 to 2021 (financial statement reporting periods). The data regarding each company will be collected from Capital IQ/COMPUSTAT and SDC as well as LPC, which are S&P Global companies. The data set was originally 893 potential subjects, however once I removed those companies not listed on US, Canada, UK, Australian, New Zealand and Japan, the resulting data set fell to 301 companies. I then removed all subsidiaries of parent companies, financial institutions, or public funds, including REITS and BDCs, which resulted in a data set of 249 companies. I will use as a

measure of asset intensity EV/BV (see below). Using the mean of EV/BV I will categorize each company as being below the mean of EV/BV (Lo-EV/BV) or above the mean (Hi-EV/BV). Likewise, I will determine the mean of earnings volatility, represented by the standard deviation of EBITDA for each company, expressed as Eσ. The companies will then be segmented into subgroups, to create the four groups of companies by parsing the data set between Lo and Hi EV/BV and those Lo and Hi Eσ.

b. Design

The design uses a longitudinal study technique looking at multi-group analysis to compare the coefficients of Leverage Multiple and Book Leverage in determining the Enterprise Leverage for four groups: (i) low asset intensity and low earnings volatility, (ii) low asset intensity and high earnings volatility, (iii) high asset intensity and low earnings volatility, and (iv) high asset intensity and high earnings volatility. Using the group results of independence and difference, I will use a regression analysis wherein the Enterprise Leverage will be regressed against the Leverage Multiples and Book Leverage levels for each company over a longitudinal time series of ten (10) years. If there were any acquisitions and credit rating changes during the analysis period, those activities did not alter the regression model, because the purpose of the analysis is intended to capture the impact of leverage multiples regardless of corporate events.

c. Variables

The independent variables of the Leverage Multiple, and Book Leverage, will be operationalized and measured as follows, all of which are continuous:

Leverage Multiple (IV) = Net Debt/ EBITDA (LM_i) (1)

Book Leverage (IV) = Net Debt/Book Value of Assets (BL_i) (2)

Enterprise Value (EV) = Market Capitalization - Book Value of Equity + Total Liabilities (EV_i) (3)

Book Value of Total Assets (BV) = Accounting Book Value of Total Assets (BV_i) (4)

I intend to operationalize the moderating independent variable (Enterprise Asset Intensity) with the enterprise value to book value ratio, which is calculated as: (EV_i/BV_i) (5)

I intend to operationalize the moderating independent variable (Enterprise Earnings Volatility) with the enterprise standard deviation of EBITDA: ($E\sigma_i$)

The Dependent Variable of Capital Structure, which is continuous, will be operationalized as:

Enterprise Leverage = Net Debt/ EV_i (EL_i) (7)

3. Proposed Analyses

The hypothesized and operationalized model is described below (excluding control variables), which is applied to each of the four classes of company:

$$EL_i = \beta_0 + \beta_1 * LM_i + \beta_2 * BL_i + \varepsilon \quad (8)$$

The data will be parsed into four groups combining the categorical variables:

Group 00: low asset intensity and low earnings volatility – Lo-EV/BV & Lo-Vol (e.g. a utility)

Group 01: Lo-EV/BV & Hi-Vol (e.g. a Transportation)

Group 02: Hi-EV/BV & Lo-Vol (e.g. an internet retailer)

Group 03: Hi-EV/BV & Hi-Vol (e.g. a consulting firm)

The path regression model analysis will be performed as follows:

Step 1: To test the path regression model, I will first test each independent variable (LM and BL) and develop estimates of their respective coefficients and the significance of each variable using structured equation modeling in SPSS AMOS for each of the groups (see Figure 1).

Step 2: I will constrain the paths, then compare the coefficients for LM and BL separately and together for independence between each group using a delta chi-squared test for significance based on the degrees of freedom: to determine $\Delta\chi^2 = \chi^2$Group 0 = χ^2Group 1 = χ^2Group 2 = χ^2Group 3

Step 3: Depending on the determination of difference between the groups, I will use the coefficients established in Step 1, for the predictor variable LM and BV, for each group.

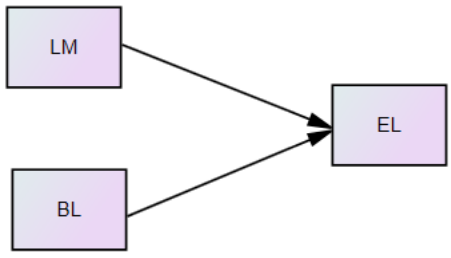

Fig 1: The graphical representation of the Structured Equation Model

Figure 2: Diagram of Hypothesis

Citations:

Mansi, S, Maxwell, W, and Miller, D, (2004), Information, Analysts, and the Cost of Debt, psu.edu