**Capital Structure I**

* Business risk vs. Financial risk
  + Business risk: risk a firm’s shareholders would face even if the firm had no debt
    - Arises from uncertainty in firm’s business and cash flows
    - Focuses on **operating income (EBIT)** ~before interest
  + Financial risk: additional risk placed on shareholders as a result of using debt
    - Higher debt level, higher financial risk
    - Focuses on **net income** ~after interest
* Levered firms will have lower net income because they pay interest, potentially lower ROE
* Unlevered firms will have higher net income because no interest payments, potentially higher ROE
* Interest payments are fixed🡪good during good years, can cause huge losses during bad years
* **ROIC** measures **business risk** (NOPAT/TNOC)
* **ROE** measures **total risk** (NI/CE)
  + Difference between them is financial risk
* Factors of business risk
  + Uncertainty about demand (unit sales)
  + Uncertainty about output prices, input costs (COGS, SG&A)
  + Product and other types of liability (D&A)
  + Degree of operating leverage (OL)
    - OL=ΔEBIT caused by ΔSales
    - High operating leverage comes from a high proportion of fixed costs
    - For a firm with stable capital requirements, business risk can be measured as uncertainty in future EBIT
    - OL=ΔEBIT/ΔSales
      * If more than 1, means that a 1% change in sales will cause over a 1% change in EBIT
* Business risk vs. Financial risk
  + ROIC (defined as NOPAT/TNOC=EBIT(1-T)/TA for these two firms) is **unaffected** by financial leverage
  + Levered firm has a higher expected ROE: tax savings and smaller equity base
  + Levered firm has wider ROE swings because of fixed interest charges🡪higher expected return is accompanied by higher risk
  + Levered firm’s financial risk is σROE-σROIC=4.24%-2.12%=2.12%
  + Unlevered firm’s financial risk is 0
* How can capital structure affect the value of a firm?
  + Effect of additional debt on **WACC**
    - Increases rs (cost of equity)
      * Debtholders have first claim on CFs relative to stockholders
      * Debtholders “fixed” claim increases risk of stockholder’s “residual” claim
      * Rs increases because stock becomes riskier
        + Rs always > rd because stock is riskier
    - Increases rd because financial risk increases
    - Increases wd and decreases ws
      * Puts more weight on low cost debt and less weight on high cost equity
    - Decreases taxes
      * Interest payment are tax deductible
      * Reduces the after-tax cost of capital
    - **Net effect: uncertain**
  + Effect of additional debt on **FCF**
    - Increases probability of bankruptcy (financial distress costs)
      * Direct costs
        + Legal fees🡪need advisors to guide company through
        + “Fire” sales🡪selling off assets quickly at a discount
      * Indirect costs
        + Lost customers
        + Reduction of productivity🡪employees worried about jobs
        + Reduction in credit (AP) offered by suppliers🡪suppliers will want cash
      * Impact of indirect costs
        + NOPAT decreases due to lost customers and drop in productivity
        + Require more TNOC leading to lower efficiency
      * **Net effect: FCF decreases**
  + Agency costs
    - Conflict between managers and shareholders
    - Can affect the behavior of managers
      * Decrease in agency costs: debt pre-commits FCF for use in making interest payments so managers’ hands are tied and are less likely to waste FCF on perks or non-value adding acquisitions
      * Increase in agency costs: debt can make managers too risk averse, causing underinvestment in risky but positive NPV projects
  + Asymmetric info and signaling
    - Managers know firm’s future prospects better than investors
    - Managers tend to issue equity when stock is overvalued, so investors often perceive an additional issuance of stock as a negative signal
    - Issuance of additional debt🡪perceived as a neutral/positive signal

**Capital Structure II**

* **MM Theory: Zero Taxes** 
  + Assumes a **perfect capital market** 
    - No brokerage costs
    - No taxes
    - No bankruptcy costs
    - Investors can borrow at the same rate as corporations
    - All investors have the same information as management about the firm’s future investment opportunities
    - EBIT not affected by the use of debt

|  |  |  |
| --- | --- | --- |
|  | **Unlevered** | **Levered** |
| EBIT | 3000 | 3000 |
| Interest | 0 | 1200 |
| Net Income | 3000 | 1800 |
|  |  |  |
| CF to SH | 3000 | 1800 |
| CF to DH | 0 | 1200 |
| FCF | **3000** | **3000** |

* + Vu: firm has no growth so it doesn’t need to invest in any new net assets and pays no taxes, so it can pay out all of its EBIT in the form of dividends (CF=EBIT)
  + VL: contains all of the levered firm’s stock (SL) and debt (D)
    - If interest rate is rd then interest= rd\*D
    - Because firm is not growing and pays no taxes, it can pay dividends of EBIT- rd\*D
    - If you owned all of the debt and equity, CF would be equal to sum of interest and dividends: rd\*D+(EBIT- rd\*D)=EBIT
  + So the two firms have the same value:
    - **VL=VU=SL+D**
  + The firms’ values are unaffected by their capital structure
  + Because FCFs are the same and WACC is based on the risk of FCFs, their WACCs are equal
  + What is the implication on beta?
    - WACC=wdrd+wsrs
    - Unlevered: WACC= rs,u =rf+bu(rm-rf)
    - Levered: WACC= wdrd+(1-wd)rs,L
      * rs,L = rf+bL(rm-rf)
      * **bL=bu\*[1+ D/S]**
    - Levered beta>Unlevered beta by debt/equity
    - When you increase leverage, you increase beta
* **MM Theory: Corporate Taxes** 
  + Corporations can deduct interest payments as an expense, but dividend payments to stockholders are not deductible
    - Reduces taxes paid by levered firms
  + More cash flows go to investors and less to the government (as taxes) when leverage is used, therefore debt “shields” some of the firm’s CF from taxes
  + Encourages corporations to use debt🡪corporations prefer debt financing over equity financing
  + VL=Vu+PV of Tax Shield
    - PV of Tax Shield=T\*D
  + **VL=Vu+TD**
  + If T=40%, then every $1 of debt adds $0.40 of extra value to the firm, instead of going to the government
  + Concludes that the optimal tax structure under this theory is 100% debt
  + Also concludes that rs increases when debt is added, but not as fast as it does with no taxes, so as D increases, WACC decreases
  + Hamada’s Equation
    - **BL=bu\*[1+(1-T)(D/S)]**
    - **Bu=bL/[1+(1-T)(D/S)]**
* **Miller’s Theory: Corporate and Personal Taxes** 
  + Effects of corporate and personal taxes
    - Debt (bond) income: interest which is taxed as personal income at rates (Td) up to 35%
    - Stock income: partly from dividends, partly from capital gains
      * LT gains are taxed at a lower rate and tax is deferred until the stock is sold and cap gain is realized
    - Td>Ts
    - Theory argues that investors are willing to accept a lower before-tax return on a stock relative to a before-tax return on a bond
  + Corporate taxes (deductibility of interest) favors debt financing
  + Personal taxes (more favorable tax treatment of stock income) favors equity financing
  + **VL=Vu + [1-[(1-Tc)(1-Ts)/(1-Td)]]D**
    - Tc=corporate tax rate
    - Ts=personal tax rate on stock income
    - Td=personal tax rate on debt income
  + Use of debt financing remains advantageous, but benefits are less than under only corporate taxes
  + Firms should still use 100% debt
* **Trade-Off Theory (Financial Distress)**
  + MM Theory assumes no bankruptcy/financial distress costs, which increase as more leverage is used
    - High legal and administrative costs
    - Lost customers, suppliers, and employees
    - Forces firms to liquidate/sell assets for less than their worth
  + Firms with volatile earning are at a greater risk of bankruptcy and should use less debt than stable firms
  + Firms whose assets are illiquid should use less debt
  + At low leverage levels, tax benefits outweigh the bankruptcy costs
  + At high leverage levels, bankruptcy costs outweigh tax benefits
  + An optimal capital structure exists that balances costs and benefits
  + Trade-Off
    - **VL=Vu+Tax Shield-Financial Distress costs**
  + Increasing debt will increase financial distress costs substantially for some firms if:
    - Volatile sales/earnings
    - High operating leverage
    - Young firms with risky yet possibly positive investment opportunities
    - Special purpose assets (hard to liquidate)
    - Extra debt would negatively impact the credit rating
* **Signaling Theory**
  + MM assumed symmetric info but in reality its asymmetric
  + Managers often have better information
  + Raising capital:
    - If firm has positive prospects and the stock is undervalued🡪use debt, avoid selling stock (this will make the stock price go down)
    - If firm has negative prospects and stock is overvalued🡪sell stock to bring in new investors to share the losses
      * Because when you issue stock it decreases the price
  + Stock offering announcements are usually a bad sign🡪avoid selling shares when investors are suspicious
* **Pecking Order Theory**
  + RE🡪no flotation costs or negative signals
    - Pay less dividends so more RE
  + Debt🡪lower flotation costs than equity and neutral signals
  + Equity🡪as a last resort, would have to accept the higher rs
* **Reserve Borrowing Capacity**
  + Maintain RBC so that debt can be used if a good investment opportunity comes along (since issuing equity is seen as negative)
  + Firms with many profitable opportunities should maintain a low level of debt and maintain reserve borrowing capacity
    - The low level of debt causes the manager to take more risks in potentially profitable projects
  + Firms with few profitable opportunities should maintain a high level of debt to impose managerial constrain
    - Keeps them from investing in poor projects
* **Agency Costs/Disciplining Managers**
  + Problems arise when managers have too much cash at their disposal🡪they can use the funds for non-value maximizing purposes
  + Managers with less “excess CF” are less likely to waste money
    - Use debt:
      * Locks up free cash flow
      * Forces discipline on managers to avoid perks and non-value adding acquisitions
* **Windows of Opportunity**
  + Managers try and “time the market” when issuing securities
  + Issue equity when stocks are abnormally high and after big stock price run-ups (when stocks increase suddenly)
  + Issue debt when stock market is low and when interest rates are low
  + Different from signaling theory because no asymmetric information is involved
* **Empirical Evidence**
  + Firms benefit from tax deductibility of interest payments
    - Typical firm increases by $0.10 for every $1 of debt
    - More consistent with the Miller theory rather than MM corporate tax theory
  + Cost of bankruptcies can be 10-20% of firm’s value
    - Trade-Off theory supported
  + Firms often maintain RBC
  + After big positive earnings and big stock price run-ups, debt ratios fall, and firms tend to issue equity over debt
    - Debt ratio: D/E, would fall when equity increases
    - Consistent with windows of opportunity🡪managers try and time the market
    - Inconsistent with trade-off theory
    - Inconsistent with pecking order theory
    - Inconsistent with signaling theory
* **Summary—More debt is associated with:**
  + Tax benefits
  + Financial distress costs
  + Negative signaling effect if asymmetry is high
  + Windows of opportunity
  + Agency costs🡪CEO owns small % of company
* **Implications for Managers**
  + Take advantage of tax benefits, especially firms with high tax rate and stable pre-tax income
    - Firms with stable sales can safely take on more debt and incur higher fixed charged than a company with volatile sales
    - Firms with low operating leverage are better able to handle more debt because less business risk and less volatile earnings
  + Avoid financial distress costs by maintaining low debt if
    - Volatile sales/earnings
    - High operating leverage
    - Many growth opportunities that require substantial investment
    - Special purpose assets
  + Avoid issuing stock if asymmetric info
  + For stable and mature businesses, to reduce agency cost, issue debt as a disciplinary tool to curb inefficient investment
  + Factor credit rating into decision

**Capital Structure III**

* Recapitalization🡪should issue enough additional debt to optimize capital structure and then use debt proceeds to repurchase stock
* After debt issue, but before repurchase:
  + New firm value=$257.86
  + New debt value=257.86\*40%=$103.14
  + Debt increased by $53.14🡪the amount that was raised in the debt issuance but was not yet used to repurchase stock
  + Issuing debt has caused:
    - WACC decrease
    - Vop increase
    - SH wealth increase
    - Stock price increase
* Post-repurchase
  + Repurchase does not change the stock price after debt issuance
  + The entire amount of cash raised by the debt is used to repurchase stock
    - Total debt raised=53.14
  + Number of shares repurchased=cash raised by issuing debt/stock price
    - 53.14/20.79=2.56 shares
  + New number of shares outstanding=10-2.56=7.44 shares