CHAPTER 18

HOW MUCH SHOULD A FIRM BORROW?

DEBT POLICY IN THE REAL WORLD

• MM SHOW THAT WITH PERFECT CAPITAL MARKETS DEBT POLICY DOESN’T MATTER
• BUT IT DOES MATTER IN THE REAL WORLD
  – FIRMS IN A GIVEN INDUSTRY HAVE SIMILAR DEBT-RATIOS
  – AIRLINES, UTILITIES, BANKS TYPICALLY RELY HEAVILY ON DEBT
  – DRUG COMPANIES TYPICALLY RELY LESS ON DEBT DESPITE HEAVY REQUIREMENTS FOR CAPITAL
WHAT WE LEFT OUT

• TAXES
• WE ASSUMED BANKRUPTCY WAS CHEAP
• WE IGNORED COSTS OF FINANCIAL DISTRESS EVEN WITHOUT BANKRUPTCY
• WE IGNORED POTENTIAL CONFLICTS OF INTEREST BETWEEN FIRM’S SECURITY HOLDERS
  – WHAT HAPPENS TO OLD BONDHOLDERS WHEN NEW DEBT IS ISSUED
  – WHEN NEW STRATEGY TAKES FIRM INTO RISKIER BUSINESS

WHAT WE LEFT OUT

• WE IGNORED INFORMATION PROBLEMS THAT FAVOR DEBT OVER EQUITY
• WE IGNORED INCENTIVE EFFECTS OF FINANCIAL LEVERAGE ON MANAGEMENT’S INVESTMENT AND PAYOUT DECISIONS
• WE WANT THEORY THAT INCLUDES INSIGHTS OF MM PLUS REAL WORLD EFFECTS OF
  – TAXES
  – COSTS OF BANKRUPTCY AND FINANCIAL DISTRESS
CORPORATE TAXES

• PAYMENTS TO BONDHOLDERS (INTEREST) ARE TAX-DEDUCTIBLE; PAYMENTS TO SHAREHOLDERS (DIVIDENDS) ARE NOT
• HOW DOES THIS AFFECT FIRM VALUE?
• Consider 2 identical firms except one has no debt (Firm U) and one has borrowed $1000 at 8% (Firm L)
  • Both firms have EBIT=$1000; tax rate is 35%
  • Tax for Firm U = 1000 x .35 = $350
  • Tax for Firm L = (1000-80) x .35 = $322
    – Firm L has $28 more to payout to security holders

TAX SHIELDS

• The interest payment to the bondholders provides a valuable tax shield to the levered firm
• How valuable is the tax shield?
• If debt of L is permanent, a continuous stream of $28 per year
• Stream is less risky than operating cash
• Risk depends on:
  • ABILITY OF L TO EARN ENOUGH TO COVER FUTURE INTEREST
  • EVEN IF L DOES NOT COVER INTEREST IN SOME FUTURE YEAR, TAX SHIELD MAY NOT BE LOST
    – L CAN CARRY BACK THE LOSS THREE YEARS
    – IF NECESSARY, CARRY FORWARD LOSS INTO SUBSEQUENT YEARS
• DISCOUNT INTEREST TAX SHIELDS AT LOW RATE
INTEREST TAX SHIELD

- Discount tax shield at rate required by bondholders
- \( PV (\text{TAX SHIELD}) = \frac{28}{0.08} = \$350 \)
- More generally,
  \[
  PV (\text{TAX SHIELD}) = \left( \frac{\text{TAX RATE} \times \text{INTEREST PAYMENT}}{\text{DISCOUNT RATE}} \right) = \frac{T_c (r_D D)}{r_D} = T_c D
  \]

MM PROPOSITION I WITH TAXES

Value of firm = Value if all-equity financed + PV (tax shield)
...or in the special case where debt is permanent and the firm is expected to be able to use all the tax shields in the future...

\[
\text{Value of firm} = \text{Value if all-equity financed} + T_c D
\]

WHAT ARE WE MISSING?

- MM PROPOSITION I IMPLIES THAT FIRMS SHOULD BE “ALL DEBT”
- HOWEVER, MANY WELL-RUN FIRMS HAVE LOW DEBT LEVELS
- THIS SUGGESTS THAT THERE MUST BE SOME DISADVANTAGES OF DEBT
- WE WILL NEXT CONSIDER
  – PERSONAL TAXES
  – BANKRUPTCY COSTS
  – COSTS OF FINANCIAL
EFFECT OF PERSONAL TAXES

• OBJECTIVE OF THE COMPANY IS NO LONGER TO MINIMIZE CORPORATE TAX BILL BUT MINIMIZE PV OF ALL TAXES PAID ON CORPORATE INCOME

• Some notation
  – \( T_p \) PERSONAL TAX RATE ON INTEREST
  – \( T_{pe} \) EFFECTIVE PERSONAL RATE ON EQUITY INCOME
  – TWO RATES EQUAL IF EQUITY INCOME RECEIVED AS DIVIDENDS
  – \( T_{pe} < T_p \) IF EQUITY INCOME IS CAPITAL GAINS
  – IN 1997, TOP RATE 39.6% ON ORDINARY INCOME, INCLUDING DIVIDENDS
  – TAX RATE ON REALIZED CAPITAL GAINS IS 20%
  – BUT CAPITAL GAINS TAXES CAN BE DEFERRED UNTIL SHARES ARE SOLD
  – TOP EFFECTIVE CAPITAL GAINS RATE LESS THAN 20%

SUPPOSE INTEREST ATTRACTS MORE PERSONAL TAX THAN EQUITY INCOME

\[
\begin{align*}
\text{\$1 operating income} & \quad \text{Paid out as interest} & \quad \text{Paid out as equity income} \\
\text{Corporate Tax} & \quad \text{NONE} & \quad \text{T}_C \\
\text{Income After Corporate Tax} & \quad 1 & \quad (1 - T_C) \\
\text{Personal Tax} & \quad T_p & \quad T_{pe} (1 - T_C) \\
\text{Income After All Taxes} & \quad (1 - T_p) & \quad 1 - T_C \cdot T_{pe} (1 - T_C) \quad = (1 - T_{pe}) (1 - T_C)
\end{align*}
\]

If \((1 - T_p)\) is greater than \((1 - T_{pe}) (1 - T_C)\) corporate borrowing is still advantageous. But, since \(T_p\) is greater than \(T_{pe}\), the tax advantage is smaller than in the case with no personal taxes.
DEBT AND TAXES: The main points

• Debt provides a corporate tax shield. Most important for firms with high marginal tax rates.
• The more a firm borrows, the less sure it is of being able to use the tax shield. Increasing leverage decreases marginal value of tax shield.
• Equity investors get tax break relative to lenders; may partially offset corporate tax shield.

CONCLUSIONS
a) Some net tax advantage for profitable firms.
b) Firms with tax-loss carry forwards, low marginal tax rates and/or uncertain future prospects should borrow less.

FINANCIAL DISTRESS

• Firm has “difficulty” meeting its financial obligations
  – Suggests firm skating on thin ice; may lead to bankruptcy
• Investor concern about financial distress suggests the following “tradeoff model” of capital structure:

VALUE OF FIRM

  = VALUE IF ALL EQUITY-FINANCED
  + PV(TAX SHIELD)
  - PV(COSTS OF FINANCIAL DISTRESS)

• The costs of financial distress depend on:
  – the magnitude of costs encountered if distress occurs
  – the probability of distress
• We will focus on the bankruptcy and agency costs of financial distress
COSTS OF FINANCIAL DISTRESS REDUCE THE OPTIMAL DEBT RATIO

At low debt levels PV of tax shield gradually increases as firm borrows more. At moderate debt levels PV (Financial distress) is small so tax advantage dominates. With more debt, probability of financial distress increases AND tax advantage of debt starts to decline since firm is less certain it will be able to fully utilize tax shield in the future.

Bankruptcy Costs

• Why is bankruptcy bad?
  – Bad financing outcome or bad investment outcome?

  The fact that bondholders are not paid in full is not a cost of bankruptcy, i.e., if creditors could costlessly take the remaining value of the firm, the potential for bankruptcy would not be considered a “disadvantage of debt”.

Direct bankruptcy costs
• Lawyers, accountants and other professional fees
  – optimal contracting technology
• Managerial time administering and settling disputes
  – Costly conflicts between various claimholders

Indirect bankruptcy costs
• Effects on the firm’s operations
  – Loss of sales, weakened assurance of delivery (e.g., warranties,) inability to take profitable projects
EVIDENCE ON BANKRUPTCY COSTS

• Warner (1977) looked at data on 11 railroad bankruptcies; found average direct cost was $2 million.
• Although large, was only 5.3% of RR’s market values just prior to bankruptcy... and only 1.4% of market value 5 years prior to bankruptcy.
• What does this suggest about expected direct costs of bankruptcy? (- Miller’s “Horse and Rabbit Stew”)
• The indirect costs of bankruptcy are hard to measure
  – Anecdotal evidence suggests they are significant, e.g., the Texaco-Pennzoil case

Agency Costs of Debt

• How can stockholders hurt bondholders once the bonds are issued?
  – Asset substitution
  – Dividend payout
  – Underinvestment; refusing to contribute new capital
  – Claim dilution
• How do these conflicts affect firm value?
  – Bondholders are rational, they “price protect” themselves
  – Restrictive covenants in debt agreements
Agency Costs

- **Agency relationship:**
  - Agent is entrusted by principal to act in his or her behalf
  - Incentive problems arise due to conflicts of interest
- **Conflicts can arise between:**
  - Managers (agent) and shareholders (principal)
  - Shareholders (agent) and bondholders (principal)
- **Agency costs:**
  - Opportunity losses
  - Monitoring losses

COSTS OF DISTRESS VARY WITH TYPE OF ASSET

- **Hotels vs. high tech growth companies**
- **Assets differ in difficulty to sell off**
  - Commercial real estate
  - Technology, brand name capital, human capital
- **Difficulty in carrying on as going concern**
  - Defections by key employees
  - Assurances to customers that firm will be around to service product (e.g., value of warranties)
  - Continued need for R&D in techs
- **May explain why debt-equity ratios are low in the pharmaceutical and high tech industries**
TRADE-OFF THEORY OF CAPITAL VALUE

• Target debt ratios should vary from firm to firm
  – Companies with safe assets and plenty of taxable income should have high target debt ratios
  – Marginally profitable companies with risky intangible assets should rely primarily on equity financing, i.e., have low target debt ratios

• Trade-off theory more realistic than MM, but does it agree with the facts?
  – Explains many industry differences in capital structure
    • High techs with risky, intangible assets often use little debt
      – Assets are tangible and relatively safe
  – Explains which firms go private in LBO’s
    • Mature, “cash-cow” businesses with established markets
    • Not high growth companies with more uncertain prospects

TRADE-OFF THEORY OF CAPITAL VALUE

• Some failures of the trade-off theory
  – Why do some of the most successful companies use no debt and thus give up the interest tax shields?
    • For example, Merck is all equity financed
      – True that assets are risky, still large tax bill and very high credit rating...could save millions in taxes
    • Merck is an example of the general rule that in an industry, the most profitable companies borrow the least
      – The trade-off theory predicts the opposite
  – In early 1900’s tax rates low or zeros, but debt ratios just as high as today
  – Firms in countries which do not allow for tax shields have debt ratios similar to firms in the US
PECKING ORDER OF FINANCING CHOICES
• Based on asymmetric information
  – Managers know more about their firm than outsiders
• Managers are reluctant to issue new stock when shares are undervalued. More likely to issue when shares are overvalued- Why?
• Investors realize that managers know more and that they try to “time” issues
• Investors therefore interpret equity issues as bad news
• Firms that “need” external equity may pass up good investment opportunities because shares can’t be sold at a fair price

Some implications
• Firms prefer internally generated funds
  – Adapt dividend payout ratio to investment opportunities
• Financial slack is valuable
• If external capital is required, debt is better
  – Less room for difference of opinion about what debt is worth
• When the capacity to issue debt is exhausted, firms issue equity as a “last resort”
• No well-defined debt-equity ratio
  – Observed debt-equity ratios a function of past profitability and past needs for capital
ASYMMETRIC INFORMATION

• EXPLAINS DOMINANCE OF DEBT FINANCING OVER NEW EQUITY ISSUES
• FIRMS WITH ADEQUATE INTERNALLY GENERATED FUNDS DON’T HAVE TO SELL DEBT
• LESS PROFITABLE FIRMS HAVE TO SELL DEBT
  – NOT ENOUGH INTERNAL FUNDS FOR INVESTMENT NEEDS
• EXPLAINS INVERSE RELATIONSHIP IN AN INDUSTRY BETWEEN PROFITABILITY AND FINANCIAL LEVERAGE
  – FIRMS INVEST TO TRY TO KEEP UP WITH THE GROWTH IN THEIR INDUSTRY
  – LEAST PROFITABLE FIRMS HAVE LESS INTERNAL FUNDS
  – BORROW MORE

FINANCIAL SLACK

• BETTER TO BE AT TOP OF PECKING ORDER THAN AT BOTTOM
  – WON’T HAVE TO PASS UP GOOD INVESTMENTS
• FINANCIAL SLACK VALUABLE
  – CASH, MARKETABLE SECURITIES
  – READY ACCESS TO FINANCIAL MARKETS
  – BANK FINANCING
• NEGATIVE SIDE TO FINANCIAL SLACK
  – MAY ENCOURAGE MANAGERS TO TAKE IT EASY OR INVEST EXTRA CASH IN PET PROJECTS, PERKS, ETC.
  – DEBT IS A WAY TO GET MANAGERS TO PAY OUT CASH RATHER THAN WASTE IT