CHAPTER 17

DOES DEBT POLICY MATTER?

CAPITAL STRUCTURE

• WHEN A FIRM ISSUES DEBT AND EQUITY SECURITIES ITS CASH FLOWS ARE SPLIT INTO TWO STREAMS
  – A SAFE STREAM TO BONDHOLDERS
  – A RISKY STREAM TO STOCKHOLDERS
• CAPITAL STRUCTURE
  – FIRM'S MIX OF DIFFERENT SECURITIES
• FUNDAMENTALLY MARKETING PROBLEM
  – FIND COMBINATION THAT MAXIMIZES OVERALL MARKET VALUE
• IS IT WORTHWHILE TO TRY TO FIND OPTIMAL MIX?
  – PERHAPS MIX DOESN'T MATTER!
CAPITAL STRUCTURE

• NOBEL PRIZE WINNERS MODIGLIANI & MILLER 1958 (MM) SHOWED THAT FINANCING DECISIONS DON’T MATTER IN PERFECT CAPITAL MARKETS

• PROPOSITION 1
  – FIRM CANNOT CHANGE TOTAL VALUE OF ITS SECURITIES BY SPLITTING CASH FLOWS INTO DIFFERENT STREAMS
  – FIRM’S VALUE IS DETERMINED BY ITS REAL ASSETS
  – CAPITAL STRUCTURE IS IRRELEVANT AS LONG AS INVESTMENT DECISIONS ARE FIXED

• ALLOWS COMPLETE SEPARATION OF INVESTMENT AND FINANCING DECISIONS

• IN PRACTICE, FINANCING DECISIONS DO MATTER
  – WE NEED TO UNDERSTAND WHEN MM HOLDS

EFFECT OF LEVERAGE IN A COMPETITIVE TAX-FREE ECONOMY: The Wapshot example

• POLICY THAT MAXIMIZES MARKET VALUE OF FIRM ALSO MAXIMIZES WEALTH OF SHAREHOLDERS

• D AND E ARE MARKET VALUES OF DEBT AND EQUITY OF WAPSHOT MARKETING COMPANY

• 100 SHARES AT $50 A SHARE

• \( E = 1,000 \times 50 = 50,000 \)

• WAPSHOT HAS BORROWED $25,000

• MARKET VALUE OF ALL SECURITIES
  \( V = D + E = 75,000 \)

• WAPSHOT’S STOCK IS LEVERAGED EQUITY
EFFECT OF LEVERAGE: The Wapshot example (continued)

• WPS “LEVERS UP” AGAIN BY BORROWING ADDITIONAL $10,000
  – PAYING OUT SPECIAL DIVIDEND OF $10 PER SHARE
  – SUBSTITUTES DEBT FOR EQUITY
• NO IMPACT ON WPS ASSETS OR TOTAL CASH FLOWS
  – WHAT IS NEW VALUE OF EQUITY?
• \( V = \$75,000, \) UNCHANGED
• \( D = \$35,000 \)
• \( E = 75,000 - 35,000 = \$40,000 \)
• STOCKHOLDERS HAVE SUFFERED $10,000 CAPITAL LOSS
  – EXACTLY OFFSET BY $10,000 SPECIAL DIVIDEND

EFFECT OF LEVERAGE: The Wapshot example (continued)

• BUT WHAT HAPPENS IF \( V = \$80,000 \)
  – BECAUSE OF THE CHANGE IN CAPITAL STRUCTURE?
• THEN \( E = 80,000 - 35,000 = \$45,000 \)
• ANY INCREASE OR DECREASE IN \( V \) AS A RESULT OF CHANGE IN CAPITAL STRUCTURE
  – ACCRUES TO SHAREHOLDERS
• A POLICY OF MAXIMIZING FIRM’S MARKET VALUE ALSO MAXIMIZES SHAREHOLDER WEALTH
• SO, WHAT’S THE RIGHT COMBINATION OF DEBT AND EQUITY?
MODIGLIANI AND MILLER

• ANY COMBINATION OF SECURITIES IS AS GOOD AS ANY OTHER
• EXAMPLE: TWO FIRMS, SAME OPERATING INCOME
  – DIFFER ONLY IN CAPITAL STRUCTURE
  – FIRM U UNLEVERED, \( V_U = E_U \)
  – FIRM L IS LEVERED, \( E_L = V_L - D_L \)

MODIGLIANI AND MILLER

• TWO STRATEGIES:
  • STRATEGY 1
    – BUY 1% OF FIRM U’s EQUITY
    – DOLLAR INVESTMENT \( .01V_U \)
    – DOLLAR RETURN \( .01 \) PROFITS
  • STRATEGY 2
    – BUY 1% OF FIRM L’s EQUITY AND DEBT
    – DOLLAR INVESTMENT
    – DOLLAR RETURN
      FROM OWNING \( 0.01D_L \)
      FROM OWNING \( .01E_L \)
      TOTAL
MODIGLIANI AND MILLER

• CONSIDER TWO ALTERNATIVE STRATEGIES:
  • STRATEGY 3
    – BUY 1% OF FIRM L’s EQUITY
    – DOLLAR INVESTMENT
    – DOLLAR RETURN
  • STRATEGY 4
    – BUY 1% OF FIRM U’s EQUITY
    – BORROW ON YOUR OWN ACCOUNT .01D_L
    – DOLLAR INVESTMENT .01(V_U - D_L)
    – DOLLAR RETURN

VALUE ADDITIVITY

• WE CAN SLICE A CASH FLOW INTO AS MANY PARTS AS WE LIKE
  – SUM OF THE PRESENT VALUE OF THE PARTS ALWAYS EQUAL TO
    PRESENT VALUE OF THE ORIGINAL STREAM
  – LAW OF CONSERVATION OF VALUE
• FIRM VALUE IS DETERMINED BY LEFT HAND SIDE OF BALANCE SHEET, I.E. BY THE REAL ASSETS
  – REGARDLESS OF CLAIMS AGAINST IT
• SHOULD FIRM ISSUE PREFERRED OR COMMON STOCK?
  – PROPOSITION 1 SAYS CHOICE IS IRRELEVANT
  – IF IT DOESN’T AFFECT INVESTMENT, BORROWING AND OPERATING POLICIES
• ALSO APPLIES TO MIX OF DEBT SECURITIES
  – LONG-TERM VS SHORT-TERM
  – SECURED VS UNSECURED
  – CONVERTIBLE VS STRAIGHT
MM PROPOSITION 1

- CORPORATE DEBT CAN BE RISKY
  - ONLY LIMITATION IS THAT FIRMS AND INDIVIDUALS CAN BORROW AT SAME RATE
- BUT SHAREHOLDERS HAVE LIMITED LIABILITY
- MANY INDIVIDUALS WOULD LIKE TO BORROW WITH LIMITED LIABILITY
  - MIGHT BE PREPARED TO PAY SMALL PREMIUM FOR LEVERED SHARES
  - IF SUPPLY OF LEVERED SHARES INSUFFICIENT
    - NO EVIDENCE THAT IS THE CASE

HOW LEVERAGE AFFECTS RETURNS

- EXPECTED RETURN ON THE ASSETS OF A FIRM
  \[ r_A = \frac{\text{EXPECTED OPERATING INCOME}}{\text{MARKET VALUE OF ALL SECURITIES}} \]
- SUPPOSE INVESTOR HOLDS ALL DEBT AND EQUITY OF THE COMPANY
- EXPECTED RETURN ON PORTFOLIO, \( r_A \), IS WEIGHTED AVERAGE OF EXPECTED RETURNS ON INDIVIDUAL SECURITIES:
  \[ r_A = \frac{D}{V}r_D + \frac{E}{V}r_E \]
- REARRANGING YIELDS:
  \[ r_E = r_A + \frac{D}{E}(r_A - r_D) \]
  WHICH IS THE BASIS OF MM PROPOSITION 2
LEVERAGE AND THE EXPECTED RETURN ON EQUITY

AS LEVERAGE INCREASES, $V_A$ AND $r_A$ ARE UNCHANGED BUT THE EXPECTED RETURN ON EQUITY INCREASES

FOR RISKY DEBT, $r_D$ INCREASES AS LEVERAGE INCREASES

![Graph showing expected return vs debt-equity ratio (D/E)]

**MM PROPOSITION 2**

- **BONDS ARE ALMOST RISK-FREE AT LOW DEBT LEVELS**
  - $r_D$ IS INDEPENDENT OF LEVERAGE
  - $r_E$ INCREASES LINEARLY WITH DEBT-EQUITY RATIO EXPRESSED IN MARKET VALUES
  - INCREASE IN EXPECTED RETURN REFLECTS INCREASED RISK

- **AS FIRM BORROWS MORE, RISK OF DEFAULT INCREASES**
  - $r_D$ STARTS TO INCREASE
  - $r_E$ INCREASES MORE SLOWLY
    - HOLDERS OF RISKY DEBT BEAR SOME OF THE FIRM'S BUSINESS RISK
$r_E$ - THE EXPECTED EQUITY RETURN

• INCREASE IN EXPECTED EQUITY RETURN REFLECTS INCREASED RISK
• INCREASE IN LEVERAGE INCREASES AMPLITUDE OF VARIATIONS IN CASH FLOWS AVAILABLE TO SHAREHOLDERS
  – SAME CHANGE IN OPERATING INCOME NOW DISTRIBUTED AMONG FEWER SHARES
• WE CAN UNDERSTAND THE INCREASED RISK IN TERMS OF $\beta$s
  WE KNOW THAT
  $$\beta_A = (D/V)\beta_D + (E/V)\beta_E$$
  $$\beta_E = \beta_A + (D/E)(\beta_A - \beta_D)$$

THE TRADITIONAL POSITION

• WHAT DID FINANCIAL EXPERTS THINK BEFORE MM?
• NOT MUCH
• WEIGHTED-AVERAGE COST OF CAPITAL
  – USED IN CAPITAL BUDGETING DECISIONS TO CALCULATE NPV
  – EXPECTED RETURN ON PORTFOLIO OF ALL COMPANY’S SECURITIES
  $$r_A = (D/V)r_D + (E/V)r_E$$
WACC: AN EXAMPLE

- EXAMPLE: FIRM HAS $2MM DEBT
  - 100,000 SHARES PRICE $30 PER SHARE
  - CURRENT BORROWING RATE 8%
  - EXPECTED RATE OF RETURN ON COMMON STOCK 15%
- \( D = $2\text{MM}, \ E = 100,000 \times $30 = $3\text{MM}, \ V = D + E = 2 + 3 = $5\text{MM} \)
- \[ \text{WACC} = \left(\frac{D}{V}\right)r_D + \left(\frac{E}{V}\right)r_E \]
  \[ = \left(\frac{2}{5}\right)0.08 + \left(\frac{3}{5}\right)0.15 \]
  \[ = 0.122 \text{ OR } 12.2\% \]

WARNING 1

- SOMETIMES OBJECTIVE STATED
  - NOT AS "MAXIMIZE TOTAL MARKET VALUE"
  - BUT "MINIMIZE WACC"
  - EQUIVALENT IF MM PROPOSITION 1 HOLDS
- BUT...IF MM PROPOSITION 1 DOES NOT HOLD,
  - CAPITAL STRUCTURE THAT MINIMIZES WACC ALSO
    MAXIMIZES VALUE OF FIRM ONLY IF OPERATING
    INCOME IS INDEPENDENT OF CAPITAL STRUCTURE
WARNING 2

• ATTEMPTS TO MINIMIZE WACC CAN LEAD TO ‘LOGICAL SHORT-CIRCUITS’, e.g.

   “SINCE DEBT IS CHEAPER THAN EQUITY ($r_D < r_E$) WE SHOULD BORROW MORE.”

THE PROBLEM: $r_E$ INCREASES AS WE ADD MORE DEBT (MM PROPOSITION 2)

WHAT HAPPENS IF THE EXPECTED RETURN DOES NOT RISE?

• THIS IMPLIES THAT WACC, $r_A$, DECLINES WITH INCREASING LEVERAGE

• EXAMPLE: NO-GROWTH FIRM
  – SHAREHOLDERS ALWAYS WANT 12% RATE OF RETURN INDEPENDENT OF THE AMOUNT OF DEBT
  – BONDHOLDERS ALWAYS WANT 8%
  – CONSTANT OPERATING INCOME $100,000 A YEAR
  – WITH ALL EQUITY FIRM, WACC IS 12%
    \[ V = \frac{100,000}{.12} = 833,333 \]
  – WITH “ALL DEBT” FIRM, WACC IS 8%
    \[ V = \frac{100,000}{.08} = 1,250,000 \]
WHAT HAPPENS IF THE EXPECTED RETURN DOES NOT RISE?

- GAIN OF $416,667 GOES TO SHAREHOLDERS

- FIRM WITH ALMOST 100% DEBT HAS TO BE BANKRUPT
  - OR EQUITY WOULD HAVE SOME VALUE

- BUT IF FIRM IS BANKRUPT, LENDERS ARE ITS NEW SHAREHOLDERS
  - REQUIRE SAME 12% RATE OF RETURN
RATES OF RETURN ON LEVERED EQUITY -
THE TRADITIONALIST POSITION

• TRADITIONALISTS HAVE AN INTERMEDIATE POSITION
• MODERATE DEGREE OF FINANCIAL LEVERAGE MAY INCREASE \( r_E \)
  – BUT LESS THAN PREDICTED BY MM PROPOSITION 2
• HIGH DEGREE OF FINANCIAL LEVERAGE INCREASES \( r_E \)
  – BUT MORE THAN PREDICTED BY MM PROPOSITION 2
• WACC, \( r_A \), THUS DECLINES AT FIRST, THEN RISES WITH INCREASING LEVERAGE
• ITS MINIMUM POINT IS POINT OF OPTIMAL CAPITAL STRUCTURE

THE TRADITIONALIST POSITION

AS LEVERAGE INCREASES, \( r_E \) AT FIRST INCREASES MORE SLOWLY THAN MM PREDICT BUT EVENTUALLY SHOOTS UP WITH “EXCESSIVE” BORROWING
MINIMUM IN WACC INDENTIFIES OPTIMAL D/E RATIO
ARGUMENTS IN FAVOR OF THE TRADITIONALIST POSITION

• ARGUMENT 1
  • INVESTORS DON’T NOTICE RISK OF “MODERATE” BORROWING
  • THEY WAKE UP WHEN DEBT IS “EXCESSIVE”
  • ARGUMENT IS EITHER NAIVE OR REFLECTS CONFUSION BETWEEN DEFAULT RISK AND FINANCIAL RISK
    – DEFAULT MAY NOT BE A SERIOUS RISK FOR MODERATE LEVERAGE
    – FINANCIAL RISK IN TERMS OF INCREASED VOLATILITY OF RETURN AND HIGHER BETA EVEN WITH NO RISK OF DEFAULT

ARGUMENTS IN FAVOR OF THE TRADITIONALIST POSITION

• ARGUMENT 2
  • ACCEPTS MM PROPOSITION 2 IN PERFECT CAPITAL MARKETS
    – BUT ARGUES THAT THERE ARE IMPERFECTIONS IN REAL MARKETS
    – FIRMS THAT BORROW PROVIDE SERVICE TO INVESTORS
    – CORPORATIONS CAN BORROW MORE CHEAPLY THAN INDIVIDUALS
    – LEVERED FIRMS TRADE AT PREMIUM TO THEIR VALUES IN PERFECT MARKETS
  • IS CORPORATE BORROWING REALLY CHEAPER?
    – MORTGAGE RATES NOT VERY DIFFERENT FROM RATES ON HIGH-GRADE CORPORATE BONDS
  • AREN’T THERE ENOUGH LEVERED FIRMS TO SATISFY THIS CLIENTELE?
WHEN DOES MM NOT HOLD?

• MM DEPENDS ON PERFECT CAPITAL MARKETS
• MARKETS ARE GENERALLY WELL-FUNCTIONING BUT NOT ALWAYS PERFECT
• MM SOMETIMES WRONG
• FINANCIAL MANAGER’S JOB TO KNOW WHEN