

Chapter 3: Theories of Debt

Corporate Finance - MSc in Finance (BGSE)

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In this chapter...

- The positive role of debt
- Debt promoting efficient liquidation
- Debt preventing inefficient investment
- Summary

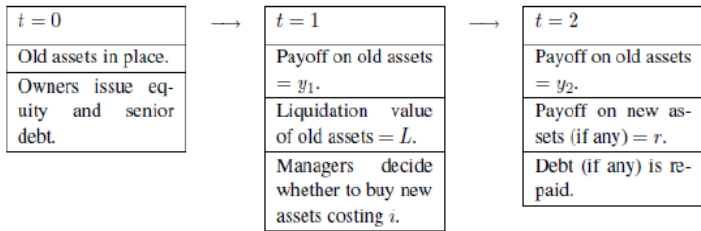
Leverage

- In chapter 2, leverage imposed agency costs
 - Due to conflicts between shareholders and bondholders:
 - Shareholders might invest in risky $NPV < 0$ projects (“asset substitution”)
 - Shareholders may choose not to invest in $NPV > 0$ projects if large share of the returns accrue to bondholders (“debt overhang”)
- We now show that leverage can also alleviate other agency problems:
 - Conflicts between manager and owners (shareholders/bondholders)
 - Managers act in their own interests: entrenchment/empire building
 - Here, show that disciplinary role of debt can be a solution
 - Others: Managerial compensation, firing, takeover threat...
- How much debt? Which type (long-term vs short-term, senior vs junior)?

The Positive Role of Debt (Hart, 1993)

- Conflicts between management and ownership:
 - Owners assumed to be interested in firm value (debt + equity)
 - Managers assumed to be entrenched/‘empire builders’ (avoid efficient liquidation/overinvest)
 - Not possible to write a “complete contract” (specifying managerial actions in each situation)
 - If possible, an appropriate managerial reward scheme would suffice
- No discounting

Timing for both models



Model 1 (about liquidation): $i = r = 0$

Model 2 (about investment): $L = 0$

Model 1: Debt preventing inefficient continuation

- At $t = 0$:
 - firm has some assets
 - owners decide on the amount of debt to be issued
- At $t = 1$:
 - Value of the assets at $t = 1$ and $t = 2$ publicly observed (y_1, y_2)
 - Liquidation value, L , observed
 - **Manager decide** whether to liquidate at $t = 1$ (if not, done at $t = 2$)
 - “First best” FB efficient solution: liquidate at $t = 1$ if only if $L > y_2$

Entrenchment

- Manager might resist liquidation because of private benefits of control
 - If company equity financed, liquidation never occurs
- How can owners ensure efficient liquidation at $t = 1$?
 - Assume: not able to draw contract based on realisations of (y_1, y_2, L)
 - Tool (1): issue senior short-term debt at $t = 0$ for redemption at $t = 1$
 - Tool (2): issue senior long-term debt at $t = 0$ for redemption at $t = 2$
 - Denote respective face value of debt as P_1 and P_2
 - Caution: manager can issue junior debt at $t = 1$
- Two cases:
 - No uncertainty: (y_1, y_2, L) publicly known at $t = 0$ (benchmark)
 - Uncertainty: (y_1, y_2, L) publicly known only at $t = 1$

Benchmark: No Uncertainty

- For any given (P_1, P_2) , what will happen? Case (i): what if $y_1 > P_1$?
 - Manager pays P_1
 - Value of the firm: $y_1 + y_2$
- Case (ii): what if $y_1 < P_1$ and $y_1 + y_2 \geq P_1 + P_2$?
 - Manager avoids default by issuing $P_1 - y_1$ of junior debt
 - Value of the firm: $y_1 + y_2$
- Case (iii): what if $y_1 < P_1$ and $y_1 + y_2 < P_1 + P_2$?
 - Default can't be avoided
 - Value of the firm: $y_1 + L$
- Can owners implement efficient solution (FB)?

Benchmark: No Uncertainty

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- Case (iii): what if $y_1 < P_1$ and $y_1 + y_2 < P_1 + P_2$?
 - Default can't be avoided
 - Value of the firm: $y_1 + L$
- Can owners implement efficient solution (FB)?

If $y_2 > L$: set $P_1 = 0$

If $y_2 < L$: set P_1 and P_2 such that $P_1 > y_1$ and $P_1 + P_2 > y_1 + y_2$

Uncertainty about cash flows and liquidation values

- Two potential realisations of y_2 and L : (y_1^A, y_2^A, L^A) or (y_1^B, y_2^B, L^B)
- If always efficient to invest ($y_2^A \geq L^A$ and $y_2^B \geq L^B$) set $P_1 = 0$
- If always inefficient ($y_2^A < L^A$ and $y_2^B < L^B$) set P_1 and P_2 large
- If inefficient in one but not in other ($y_2^A > L^A$ and $y_2^B < L^B$)
 - $y_1^A + y_2^A > y_1^B + y_2^B \rightarrow$ FB: $P_1 = y_1^A + y_2^A, P_2 = 0$
 - $y_1^A + y_2^A \leq y_1^B + y_2^B$ and $y_1^A > y_1^B \rightarrow$ FB: $P_1 = y_1^A, P_2 = \text{large}$
 - $y_1^A + y_2^A \leq y_1^B + y_2^B$ and $y_1^A \leq y_1^B \rightarrow$ FB can't be achieved
 - Liquidation in B (efficient) only if also in A (inefficient)
 - Liquidation in both states if

$$\pi^A L^A + \pi^B L^B > \pi^A y_2^A + \pi^B y_2^B$$

Conclusions

- Debt may put necessary pressure on managers to align incentives
- Inefficient continuation can be prevented...
 - With a combination of short and long term senior debt
 - If it was junior, managers could issue senior debt and continue
- Alternatives to debt to induce acting in owners' best interests:
 - management compensation packages
 - takeover threats

Model 2: Debt preventing inefficient investment

- Same model as before, with two changes
 - L is very low, hence liquidation is no longer a viable alternative
 - Possible project at $t = 1$ (cost i at $t = 1$ with payoff $r > 0$ at $t = 2$)
 - **Manager decide** whether to invest in the project
 - Not able to draw up contract based on realisations of (y_1, y_2, i, r)
- Two cases:
 - No uncertainty: (y_1, y_2, i, r) publicly known at $t = 0$ (benchmark)
 - Uncertainty: (y_1, y_2, i, r) publicly known only at $t = 1$

Benchmark: No uncertainty

- Suppose first $y_1 < i$. Without debt, managers will invest as long as

$$y_1 + y_2 + r > i$$

- “First best” efficient solution: invest if only if

$$r > i$$

- Again, set P_2 to induce managers to act in the interest of owners
 - Managers make the new investment if and only if:

$$y_1 + y_2 + r - P_2 > i$$

- Can owners implement the efficient solution?
 - $r > i$: set $P_2 = 0$
 - $r < i$: set P_2 such that $P_2 > y_1 + y_2 + r - i$

Uncertainty about cash flows and investment values

- Two possible states: $(y_1^A ; y_2^A ; i^A ; r^A)$ and $(y_1^B ; y_2^B ; i^B ; r^B)$
- Investment profitable in A but not in B: $r^A > i^A$ and $r^B < i^B$
- Subcase (i): $(y_1^A + y_2^A) + (r^A - i^A) > (y_1^B + y_2^B) + (r^B - i^B)$
 - Total firm value is higher when project is profitable (A)
 - Choose debt level between the two total asset values:

$$(y_1^A + y_2^A) + (r^A - i^A) > P_2 > (y_1^B + y_2^B) + (r^B - i^B)$$

- Subcase (ii): $(y_1^A + y_2^A) + (r^A - i^A) \leq (y_1^B + y_2^B) + (r^B - i^B)$
 - Total value is greater when the project is unprofitable (B)
 - Impossible to find P_2 to maximise value irrespective of the state

Conclusion

- Increases in leverage tend to increase the firm's value
 - managers are deterred from making unprofitable investments
- Negative correlation between profitability and leverage
 - relatively less profitable firms need more debt to restrain managers
- What if $y_1 > i$?
 - Manager could use funds to invest in project (not always with $NPV > 0$)
 - Role for short-term debt

Overall summary

- Conflicts of interest between managers and owners can explain
 - Why increases in leverage may increase firm value
 - By putting pressure to liquidate when optimal
 - By putting pressure to not invest in $NPV < 0$ projects
 - Why firms issue senior debt
 - Junior debt puts no pressure on managers