Corporate Finance

Lecture 8: Taxes and Bankruptcy and the Modigliani and Miller Theorem

Albert Banal-Estanol

Aside: Valuing Perpetuities

A perpetuity is a constant level cash flow that continues forever.

(it turns out that a project/firm with *indefinite* life is valued with the same technique as a project/firm with truly *infinite* life)

Examples: i) Firms
              ii) Consol Bonds
              iii) Preferred Stock
              iv) Some specific Projects (e.g. rental arrangements)

Aside: Valuing Perpetuities (2)

The present value of a perpetuity is (for constant cash flows Cf and constant r):

$$\text{PV(perp.)} = \sum_{t=1}^{\infty} \frac{Cf}{(1+r)^t} = \frac{Cf}{r}$$

Proof:

$$V = \frac{CF}{(1+r)} + \frac{CF}{(1+r)^2} + \frac{CF}{(1+r)^3} + \ldots$$

$$(1+r)V = CF + \frac{CF}{(1+r)} + \frac{CF}{(1+r)^2} + \ldots$$

subtract the first equation from the second

$$rV = CF \quad \text{(or)} \quad V = \frac{CF}{r}$$

Corporate Taxes

- Taxes have major effect on cash flows & capital structure
- M&M: without taxes, bankruptcy, etc,. companies should be indifferent between debt and equity
- Objective: minimise taxes
- Suppose for the moment that…
  - companies are taxed (interest is tax-deductible) but…
  - investors are not (e.g. pension funds)
- In order to minimize corporate taxes…
  - Interest payments are tax-deductible while dividends are not
  - Firms prefer debt to equity

Corporate Taxes, Cash Flows and Value

- **Assume that the firm is financed with equity and risk-free perpetuity bond (pays r_D forever)**
- **After-(corporate) tax payments are:**

$$C_t = (X_t - r_D D)(1 - T_C) + r_D D$$
$$= X_t(1 - T_C) + T_C \, r_D D$$

  where T_C are the corporate taxes

- **Therefore..**
  - Given that the cash flow that would be achieved by an unlevered firm is $X_1(1 - T_C)$, $X_2(1 - T_C)$, $X_3(1 - T_C)$, and,
  - The second term of the period cash flow is constant, we have that $V_L = V_U + T_C D$

Personal Taxes

- Non tax-exempt shareholders prefer to receive income as capital gains rather than interest or dividends

- As a result, $T_E < T_D$ on average

- Assume that all shareholders have identical tax rates

Personal and Corporate Taxes and Value

- After-tax payments are:

$$C_t = (X_t - r_D D)(1 - T_C)(1 - T_E) + r_D D(1 - T_D)$$

or

$$C_t = X_t(1 - T_C)(1 - T_E) + r_D D[(1 - T_D) - (1 - T_C)(1 - T_E)]$$

- The present value of the second summand perpetual stream is $T_g D$ where

$$T_g = 1 - [(1 - T_C)(1 - T_E)/(1 - T_D)]$$

- Therefore, $V_L = V_U + T_g D$

Bankruptcy costs

- Important only if bankruptcy (or the threat of bankruptcy) affects revenues or costs

- Classification:

  - Direct costs: legal process of restructuring (court costs, advisory fees)
    (on average 2-3% of the assets)

  - Indirect costs: firms engage in operations harmful for debt holders and other stakeholders

Example: direct costs of bankruptcy

- Westlake wants to borrow $1m for one year from a bank

- Firm has 10% of going bankrupt, in which case assets can be sold for $600,000

- Legal costs would be $100,000

- How much will the bank charge if it wants an average return of 10%? How much is affected by the costs of bankruptcy?

Indirect bankruptcy costs

- Conflict of interests between debt holders and shareholders

- Managers maximise shareholder's wealth, often at the expense of debtholders and even at the expense of the value of the firm

- However, debt holders take into account this possibility when asking for a return rate and the costs are then shared

How equity holders can expropriate debt holder wealth

- Debt overhang problem: underinvestment, when benefits will mostly go to debt holders

- Asset substitution problem: take too much risk

- Shortsighted investment problem: tendency to take up projects that pay up early

- Reluctance to liquidate problem: keep operating even when its liquidation value exceeds its operation value