15.415x Foundations of Modern Finance

Leonid Kogan and Jiang Wang
MIT Sloan School of Management

Lecture 9: Introduction to Corporate Finance

Key Concepts

- Corporate financial decisions
- Opportunity cost of capital and Net Present Value (NPV)
- Objective of financial manager
- Value maximization
- Additional issues

Key Concepts

- Corporate financial decisions
- Opportunity cost of capital and Net Present Value (NPV)
- Objective of financial manager
- Value maximization
- Additional issues

What is corporate finance?

- Using the principles and tools we have developed, we would like to know how corporations should make their financial decisions:

Changes to the asset side come primarily from the firm's real investments.

- Capital budgeting: What projects (real investments) to invest in?
  - Expansions, new products, new businesses, acquisitions, …

Changes to the liability side are related to several financial decisions

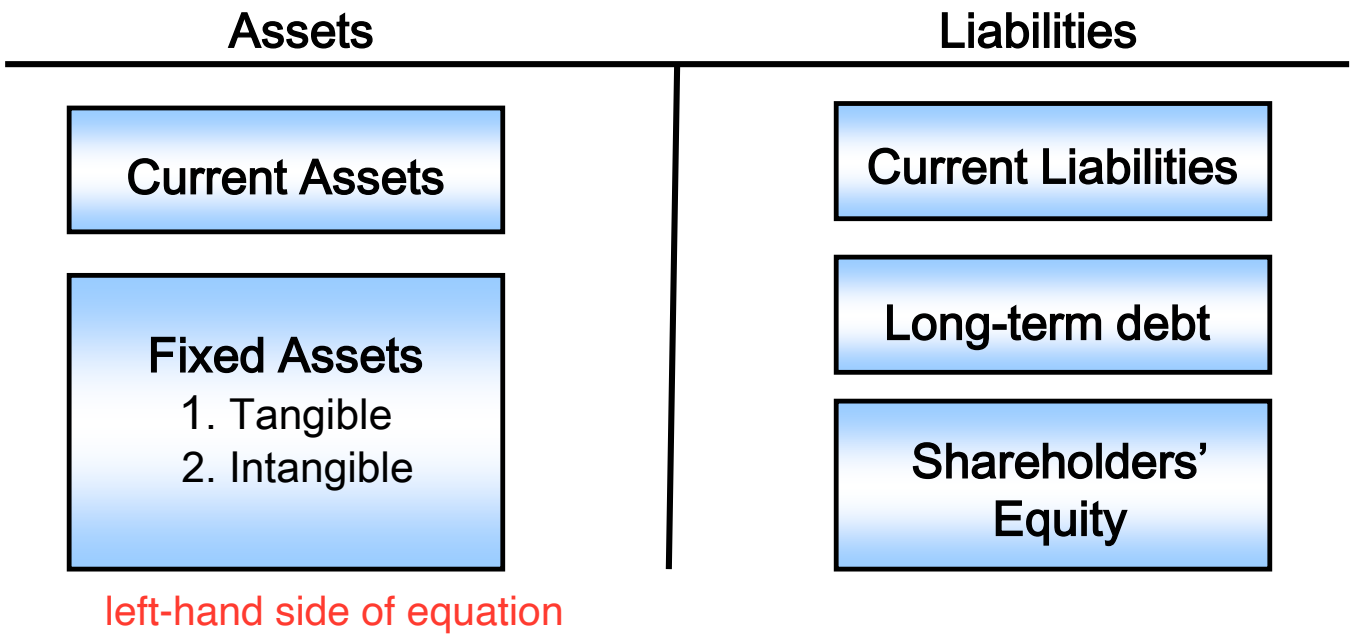
- Financing: How to finance a project?
  - Selling financial assets/securities/claims (bank loans, public debt, stocks, convertibles, …)

Since payout is primarily about servicing the stockholders, it can also be viewed as part of financing.

- Payout: What to pay back to shareholders?
  - Paying dividends, buyback shares, …
- Risk management: What risk to take/to avoid and how?

Task of financial manager

Balance sheet view of a firm:



- Asset side (LHS): Real investments.
- Liability side (RHS): Financing, payout and risk management.

market value balance sheet:
- asset in market value
- debt and equity in market value

regular balance sheet:
- asset in book value
- debt and equity in book value

focus our attention on the market-value balance sheet, Assets = Liabilities

if the change increase assets, it will also increase liabilities indirectly

case1: use cash to build factory:
regular balance sheet: asset cash convert to long term asset, total asset and total liability do not change
market value balance sheet: if NPV>0, total asset and total liability increase, stock price increase

case2: good CEO die
regular balance sheet: no change
market value balance sheet: asset drop, stock price drop

case3: issue debt to pay dividend
regular: increase liability debt and decrease liability equity by the same amount, total asset does not change
market: besides the above, if investors positively interpret this information, equity and stock price increase

Task of financial manager

Amazon.com (1996 – 1997) (in thousands)

	Assets		Liabilities	
1996	Cash and securities	6,248	Accounts payable	2,852
	Inventories	571	Accrued expenses	2,018
	Pre-paid expenses	321	Debt	---
	Fixed assets	1,131	Net worth (Equity)	3,401
	Total assets	**8,271**	**Total liab + Net worth**	**8,271**
1997	Cash and securities	125,066	Accounts payable	32,697
	Inventories	8,971	Accrued expenses	9,621
	Pre-paid expenses	3,298	Debt	78,202
	Fixed assets	11,671	Net worth	28,486
	Total assets	**149,006**	**Total liab + Net worth**	**149,006**

It issued new equity through its IPO in 1997 and also issued new debt.

Task of financial manager

Amazon.com (2018) (in thousands) These are all in book value, not market value

	Assets		Liabilities	
2018	Cash and securities	31,750,000	Accounts payable	61,855,000
	Inventories	17,174,000	Accrued expenses	6,536,000
	Net receivables	16,677,000	Debt	23,495,000
	Fixed assets	61,797,000	Other liabilities	27,213,000
	Other assets	11,202,000	Net worth (Equity)	43,549,000
	Total assets	**162,648,000**	**Total liab + Net worth**	**162,648,000**

Source: http://www.nasdaq.com/symbol/amzn/financials?query=balance-sheet

Task of financial manager

THE WALL STREET JOURNAL.

Amazon to Buy Whole Foods for $13.7 Billion

Whole Foods would continue to operate stores under its brand

Amazon Sells $16 Billion of Bonds to Finance Whole Foods Deal

In rare trip to bond market, Amazon is greeted with strong demand from investors

Amazon.com Inc. AMZN +0.65% ▲ sold $16 billion of bonds Tuesday to help fund its purchase of Whole Foods Market Inc., meeting strong demand from investors as it made a rare trip to the debt market.

August 15, 2017

after these transactions, Amazon's asset site will now have Whole Foods as its new assets, and its liabilities side will see an increase of debt by $16 billion.

Task of financial manager

Three parts on corporate finance:

A. Investment – Capital budgeting
   1. Capital budgeting
   2. Real options

B. Financing – Capital structure
   1. Capital structure
   2. Interaction between investments and financing
   3. Payout policies

C. Risk management

Capital structure refers to how firm's assets are financed, which in addition to equity can include various forms of debt. It also reflects the ownership structure of a firm's assets by different claim holders, including bondholders and stockholders.

We consider topic A.1 first, and A.2, B and C later (in Part II).

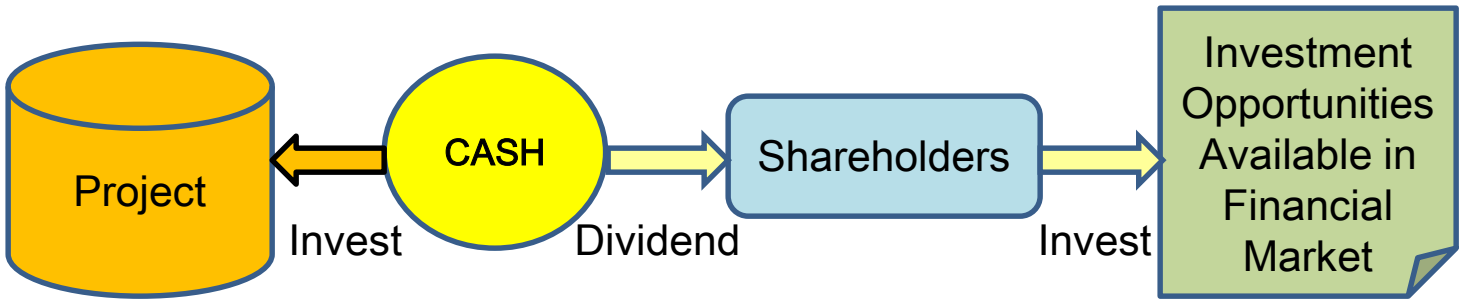
Key Concepts

- Corporate financial decisions
- Opportunity cost of capital and Net Present Value (NPV)
- Objective of financial manager
- Value maximization
- Additional issues

Opportunity cost of capital

Valuation of a project

- A firm can always give cash back to shareholders,
- A shareholder can invest in the financial market.



COC

Opportunity cost of capital is the expected rate of return offered by **equivalent** (in time and risk) investments in financial markets.

It is not related to factors like the firm's cost of financing by borrowing

Market valuation of the project (i.e., its CF): cash flow

- Good if it offers higher return than its cost of capital,
- Bad if it yields lower return than its cost of capital.

since COC is evaluated in market, idiosyncratic risk of the firm is diversifiable by the market, only systematic risk is concerned

Net present value (NPV)

Consider a project with the following cash flows:

- Initial investment I,
- Future cash flow CF_1,
- Opportunity cost of capital (COC). r

Whether to take the project depends on the value of CF_1.

What is the value net present value created by the project?

$$NPV = -I + \frac{E[CF_1]}{1+r}$$

Take the project only if its NPV is positive!

We assume COC is given for now and return to its determination later.

find a project's cost of capital: find the risk loadings of the project's return or cash flow. Then by the arbitrage pricing theory, or APT, we can determine the project's required rate of return by the market.

Key Concepts

- Corporate financial decisions
- Opportunity cost of capital and Net Present Value (NPV)
- Objective of financial manager
- Value maximization
- Additional issues

Objective of financial manager

Potential considerations in financial decision making:

- Timing
- Risk
- Accounting performance
- "Long-run" value …

in this part of our analysis, we assume that the firm is wholly owned by its shareholders. Thus, they are the sole stakeholders of the firm. Such simplification avoids the potential conflicts of interest where the firm has different stakeholders, such as bondholders and stockholders.

balance between near-term earnings with long-term payoffs?

Objective: Maximize current market value of the firm!

unbiased, realizable

- Current market value is the only plausible financial objective.
- Current market value incorporates present value of all current and future cash flows, adjusted for timing and risk.
- Current market value rule is independent of shareholders' differences.

Objective of financial manager

Shareholders can diversify risk on their own. Diversifying a firm's business is not always desirable

Justification for value maximization:

1. Shareholders' financial objectives:
   a) Increase wealth,
   b) Optimal time pattern for consumption,
   c) Optimal risk profile for future consumption.

deploy the wealth to best meet the household's economic needs which is to achieve the optimal time pattern and risk profile for its consumption

2. Shareholders can do b) and c) on their own through financial markets.
3. Financial manager can help only with a), by increasing the firm's market value (i.e., shareholder wealth).

The household does not need the manager of a firm it invests into do any of these (B, C). It's also impossible for the firm's manager to worry about these decisions as different shareholders may have very different financial needs along these dimensions.

Key Concepts

- Corporate financial decisions
- Opportunity cost of capital and Net Present Value (NPV)
- Objective of financial manager
- Value maximization
- Additional issues

caveats:

First: two assumptions about the financial market:
well-functioning, meaning accessible to everyone with no frictions for various transactions.

rich, meaning it's efficient for resource allocation in time and risk.

In particular, you don't need to agree with the market prices.

Second: it is assumed that the shareholders mainly care about the financial wealth generated from the firm

Third: it's assumed that there is no asymmetric information, especially between corporate insiders and the market, the market valuation on plan A and B reflects all the information available in the market.

Objective of financial manager

Example. Mass Biz, a NASDAQ listed company, is choosing between two business plans, A and B:

better!

- Both have positive NPV: NPV(A) = $50 million, NPV(B) = $80 million;
- A pays off in 3 years and B pays off in 10 years;
- A expands current business with relatively low risk, B ventures into a new business with high risk.

shareholders' views are dictated by their own financial objectives and perspectives, which are perfectly reasonable, but also quite divergent. Fortunately, as far as the firm's decision is concerned, it need not to be influenced by shareholder preferences

The board consists of three controlling shareholders from the founding family. Here are their views:

a) Grandma: "B is no good. Already 80, I probably won't see it paying off even if it eventually does."

Some investors in the market will live to see these payoffs. That is why they are willing to pay $80 million today for it. If grandma needs money for current use, she can simply sell some of her shares at a high price now to raise cash.

b) Dad: "B is way too risky. I am about to retire and have no stomach for this kind of risk."

He does not have to bear the risk of plan B. If he prefers, he could sell his shares at a high price now for cash and then use the cash to buy safer assets,

c) Son: "B is overvalued due to the market hype for this new line of business."

As the CEO, how would you respond?

some investors in the market are willing to pay $80 million for plan B. If son is not sure about this valuation, he can liquidate his shares after taking out plan B at high prices and then get out of the business.

Objective of financial manager

Example. Tang Associates is reopening King Solomon's mine:

- Total capacity 0.11 million oz of gold;
- Time for production 1 year;
- Initial investment $86 million;
- Current gold price $800/oz;
- Cost of capital 10%.

Shares owned by optimists (50%) and pessimists (50%):

- Optimists are bullish in gold price, forecasting 20% growth next year;
- Pessimists are bearish in gold price, forecasting only 5% growth.

Objective of financial manager

For optimists (in millions):

$$NPV = -86 + \frac{(0.11)(800)(1+0.2)}{1+0.1} = -86 + \frac{(0.11)(960)}{1.1} = 10$$

For pessimists:

$$NPV = -86 + \frac{(0.11)(800)(1+0.05)}{1+0.1} = -86 + \frac{(0.11)(840)}{1.1} = -2$$

What should the CFO do?

Objective of financial manager

- The key is how to value 1oz of gold next year -- different shareholders have different views.
- What we need to know is its current market value, that is:

$$\text{PV (1oz of gold next year)} = ?$$

- Gold is mostly held as a long-term investment with no interim payoffs. Thus, 1oz of gold is the same as 1oz of gold today. It is often viewed as a storage value or hedge against inflation
- Gold has no interim payoffs and no storage costs (almost).
- Since 1oz gold today is \$800, we then have:

$$\text{PV (1oz of gold next year)} = \$800$$

- Thus, the NPV of the mine is:

$$NPV = -86 + (0.11)(800) = +2$$

by reopening the mine, the value of Tang Associates will increase immediately by \$2 million, which will make all shareholders richer. As for the shareholders themselves, with their own views on future gold prices, they can use the market to speculate on their forecasts. For example, for their pessimistic shareholders, they can sell the shares at a high price now. If that is not enough, they can even short gold in the market.

Key Concepts

- Corporate financial decisions
- Opportunity cost of capital and Net Present Value (NPV)
- Objective of financial manager
- Value maximization
- Additional issues

Objective of financial manager

Conclusions:

1. Financial manager should maximize firm's current market value.
2. Shareholder differences can be settled in financial markets by trading on their own account.
3. Perfect financial markets allow potential separation of ownership and management.

As long as the management adheres to value maximization as the objective, they don't need to be attached to the shareholders or their preferences and views.

Practical issues:

- Other stakeholders;

such as bond holders in addition to stockholders. Their interests will not always be aligned. In particular, bondholders are mostly concerned about getting their principal back and interest paid.

- Agency problems – Management may put its own interest first;
- Imperfections in financial markets ...

Summary

- Corporate financial decisions
- A framework for corporate financial analysis
- Opportunity cost of capital
- Net present value (NPV)
- Objective of a corporate (financial) manager