



# 15.401 Finance Theory

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***Lecture 1: Introduction and Course Overview***

- Motivation
- Dramatis Personae
- Fundamental Challenges of Finance
- Framework for Financial Analysis
- Importance of Time and Risk
- Six Principles of Finance
- Course Overview
- How to Get the Most Out of This Course

## Readings:

- Brealey, Myers, and Allen Chapters 1–2

Mathematics + \$\$\$ = Finance

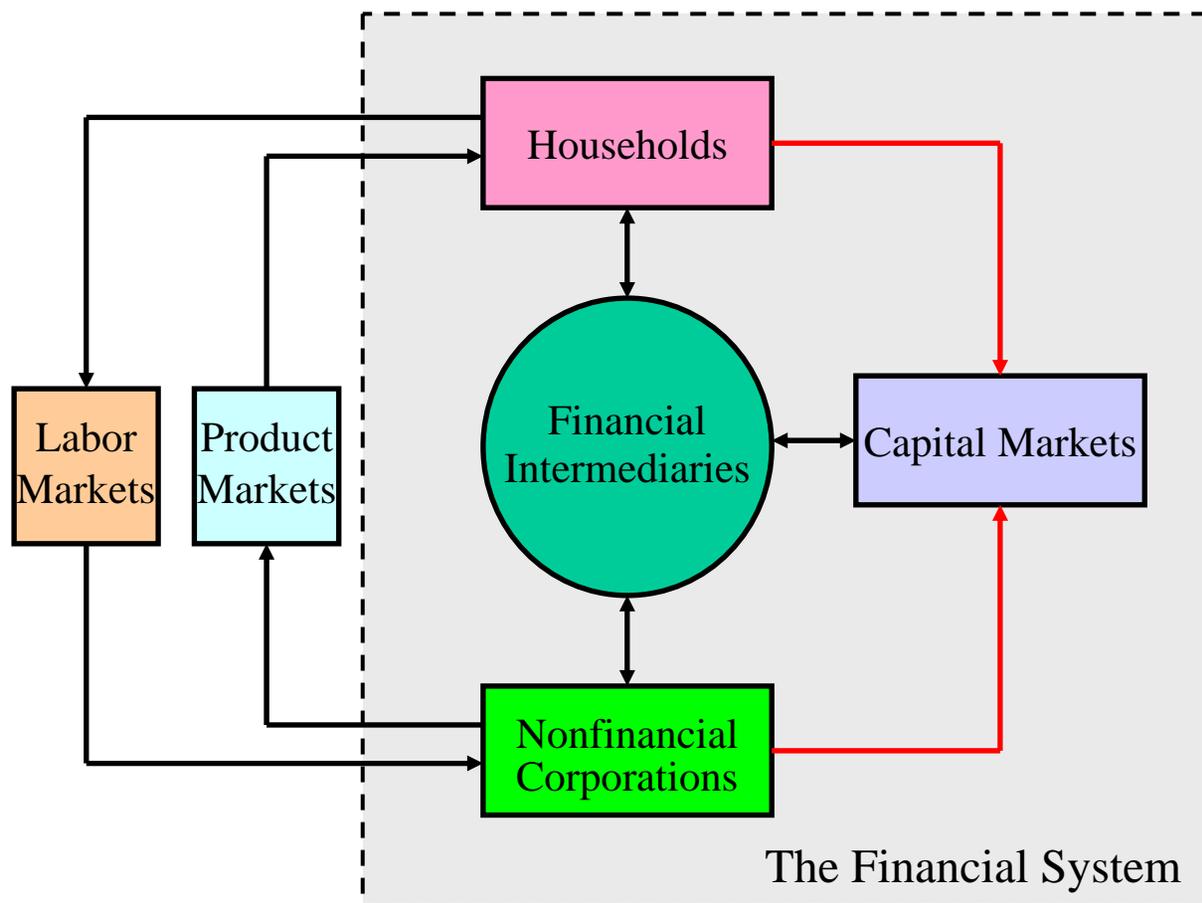
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**James Simons**  
Renaissance Technologies

**Jack Welch**  
General Electric

**Warren Buffett**  
Berkshire Hathaway

## A Flow Model of the Economy



## All Business Activities Reduce To Two Functions:

- Valuation of assets (real/financial, tangible/intangible)
- Management of assets (acquiring/selling)

## Business Decisions Involve Valuation and Management

- “You cannot manage what you cannot measure”
- Valuation is the starting point for management
- Once value is established, management is easier

**Objectives + Valuations  $\Rightarrow$  Decisions**

- Valuation is generally independent of objectives (why?)
- Role of financial markets and the “price discovery” process

## Valuation

- How are financial assets valued?
- How *should* financial assets be valued?
- How do financial markets determine asset values?
- How well do financial markets work?

## Management

- How much should I save/spend?
- What should I buy/sell?
- When should I buy/sell?
- How should I finance the transaction?

**Applies To Both Personal and Corporate Financial Decisions (How?)**

## Accounting

- The language of finance
- Vocabulary, syntax, grammar, prose, and poetry!
- Language frames and circumscribes the analysis
- Basic concepts should be familiar to you by now
- “Stock” (not equities) vs. “flow” variables

## Balance Sheet and Income Statement Perspectives

- Balance sheet: snapshot of financial status quo (stock)
- Income statement: rate of change of the status quo (flow)
- Financial status  $\Leftrightarrow$  balance sheet
- Financial decisions  $\Leftrightarrow$  income statement
- What about the “rate of change of the rate of change”?

## Balance Sheet

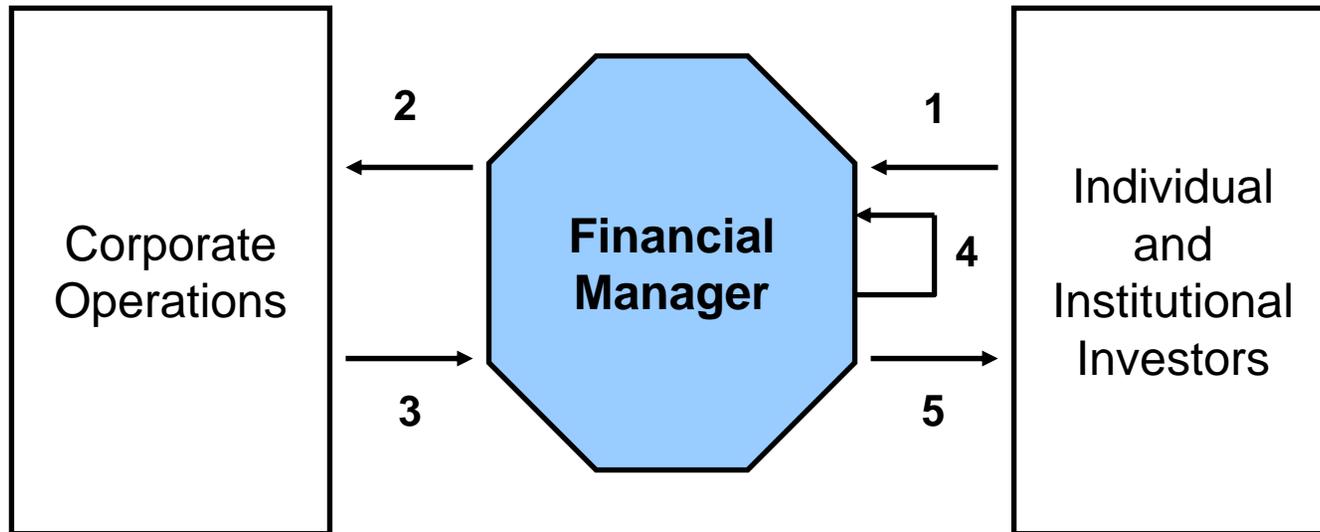
<b>Assets</b>	<b>Liabilities</b>
Cash	Equity
Capital	Debt
Intangibles	
<b>Value</b>	<b>Value</b>

## Income Statement

$$\begin{aligned} \text{Sources of Funds} &= \text{Uses of Funds} \\ \Delta S + \Delta B + NI &= I + D + T + C \end{aligned}$$

## Corporate Financial Decisions

1. Cash raised from investors (selling financial assets)
2. Cash invested in real assets (tangible and intangible)
3. Cash generated by operations
4. Cash reinvested
5. Cash returned to investors (debt payments, dividends, etc.)



## Corporate Financial Decisions

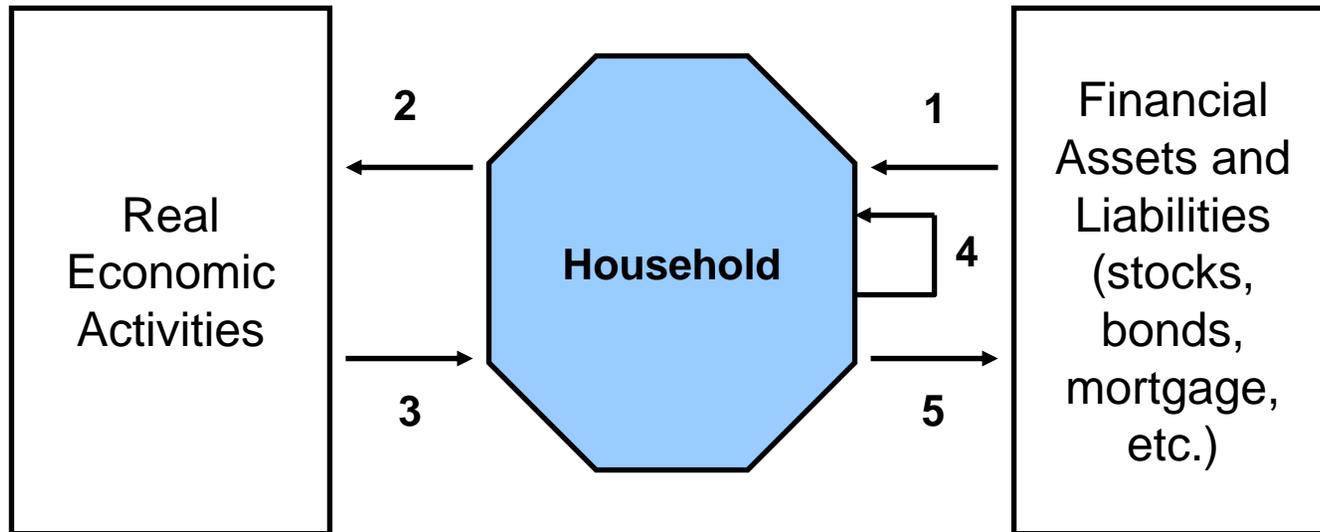
1. Cash raised from investors (selling financial assets)
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5. Cash returned to investors (debt payments, dividends, etc.)

## Management

- Real Investment: 2, 3
- Financing: 1, 4
- Payout: 5
- Risk management: 1, 5
- Objective: create and maximize shareholder value

## Personal Financial Decisions

1. Cash raised from financial institutions (selling financial assets)
2. Cash invested in real assets (tangible and intangible)
3. Cash generated by labor supply
4. Cash consumed and reinvested in real assets
5. Cash invested in financial assets



## Personal Financial Decisions

1. Cash raised from financial institutions (selling financial assets)
2. Cash invested in real assets (tangible and intangible)
3. Cash generated by labor supply
4. Cash consumed and reinvested in real assets
5. Cash invested in financial assets

## Management

- Real investment: 2, 3
- Consumption/financing: 1, 4
- Saving/investment: 5
- Risk management: 1, 5
- Objective: maximize lifetime “happiness” or expected utility

## Two Other Factors That Make Finance Challenging

### 1. Time

- Cashflows now are different from cashflows later
- Time flows in only one direction (as far as we know)
- How should we model temporal differences?

### 2. Risk

- Under perfect certainty, finance theory is complete
- Risk creates significant challenges
- How should we model the unknown?

## To Address These Two Issues:

- Use historical data
- Use mathematics (probability and statistics)
- Challenges can easily overwhelm current mathematical abilities

**P1: There Is No Such Thing As A Free Lunch**

**P2: Other Things Equal, Individuals :**

- **Prefer more money to less (non-satiation)**
- **Prefer money now to later (impatience)**
- **Prefer to avoid risk (risk aversion)**

**P3: All Agents Act To Further Their Own Self-Interest**

**P4: Financial Market Prices Shift to Equalize Supply and Demand**

**P5: Financial Markets Are Highly Adaptive and Competitive**

**P6: Risk-Sharing and Frictions Are Central to Financial Innovation**

## Four Sections

### A. Introduction

- Fundamental challenges of finance
- A framework for financial analysis
- Six principles of finance
- Cashflows and the time-value of money

### B. Valuation

- Discounting and the mathematics of net present value
- Pricing stocks, bonds, futures, forwards, and options

### C. Risk

- Measuring risk
- Managing risk (portfolio theory)
- Incorporating risk into valuation methods

## Four Sections

### D. Corporate Finance

- Capital budgeting and project finance

### **Final Lecture: Market Efficiency (putting it all together)**

- Do financial markets always work well in discovering prices?
- What about behavioral biases and human psychology?
- How should finance theory be used in practice?

## Course Requirements

- Lectures and Readings (attendance and participation, 10%)
- *Acid Rain Case Study* (10%)
- Mid-Term (25%) and Final (55%) Examinations

## Implicit Contract

- Faculty should
  - Come to class on time and be well prepared
  - Provide clear and time-appropriate exposition of material
  - Manage class discussions effectively
- Students should
  - Come to class on time and be well prepared
  - Contribute to class discussions
  - Refrain from non-class activities (email, newspapers, etc.)

## Theory vs. Practice

- Most of this course will be devoted to theory
- What about practice?
- The origins of theory is common elements deduced from practice!

## Some Helpful Hints

- Do readings ahead of time (skim textbook chapters in advance)
- Take copious notes during lectures (lecture notes are not complete)
- Review the lectures afterwards with your study group
- Work on assignments in groups and alone
- “Finance is not a spectator sport”
- Ask Ask Ask Questions!

**Finance Is One of The Most Difficult Subjects You Will Ever Love!**

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# Additional References

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- Bernstein, P., 1993, *Capital Ideas*. New York: Free Press.
- Lo, A., 1999, “The Three P’s of Total Risk Management”, *Financial Analysts Journal* 55, 13–26.
- Malkiel, B., 1996, *A Random Walk Down Wall Street*. New York: W. W. Norton and Company.

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