The Macroeconomics of Imperfect Capital Markets

Lecture 1: Introduction

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Motivation

Why do we care about imperfections in capital markets?

In particular, why do we care about it in macroeconomics?

- Financial markets are the "brain" of a market economy, coordinating
  - most intertemporal allocations
  - a great deal of intratemporal allocations
- Examples of the critical role of financial markets:
  - Real estate bubble and subprime mortgage crisis
  - Emerging market financial crises
  - ...

Class Outline

Intro	Week 1	Perfect Capital Markets
Micro foundations	Week 2	Credit Rationing
	Week 3	Equity Rationing and Imperfections in Risk Markets
	Week 4	Capital Structure and Firm Behavior
	Week 5	Limited Commitment in International Borrowing
	Week 6	Liquidity and Role of Banks
Macro applications	Week 7	Financial Accelerator and Persistence
	Week 8	Presentation & Discussion of Research Proposals
	Week 9	Imperfect Capital Markets in Monetary Economics
	Week 10 - 11	Booms, Bubbles and Crashes
	Week 12 - 13	Selected Topics on International Capital Flows
	Week 14	Presentation & Discussion of Research Proposals
	Week 15	Conclusion

Perfect Capital Markets

- Classical Arrow-Debreu world:
  - complete markets
  - perfect information
  - ...

Among the first important results:

- Fisher (1930): Separation Theorem
- Modigliani-Miller (1958): Irrelevance of Financial Policy

Fisher Separation Theorem

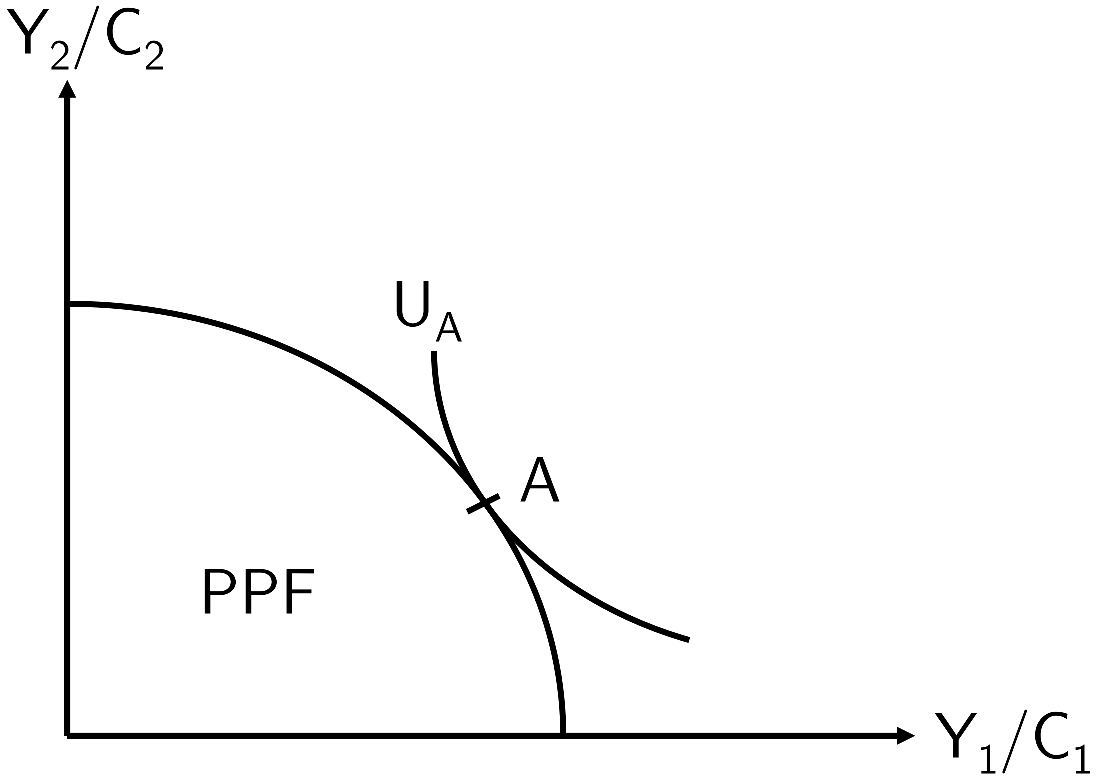
Fisher (1930): Theory of Interest

In perfect capital markets, a firm's financing/investment decision and its owner's saving/consumption decision can be analyzed separately.

(1) The firm's objective function is to maximize its market value, given its PPF.

(2) The owner's decision is to maximize utility, given his wealth.

Fisher Separation Theorem

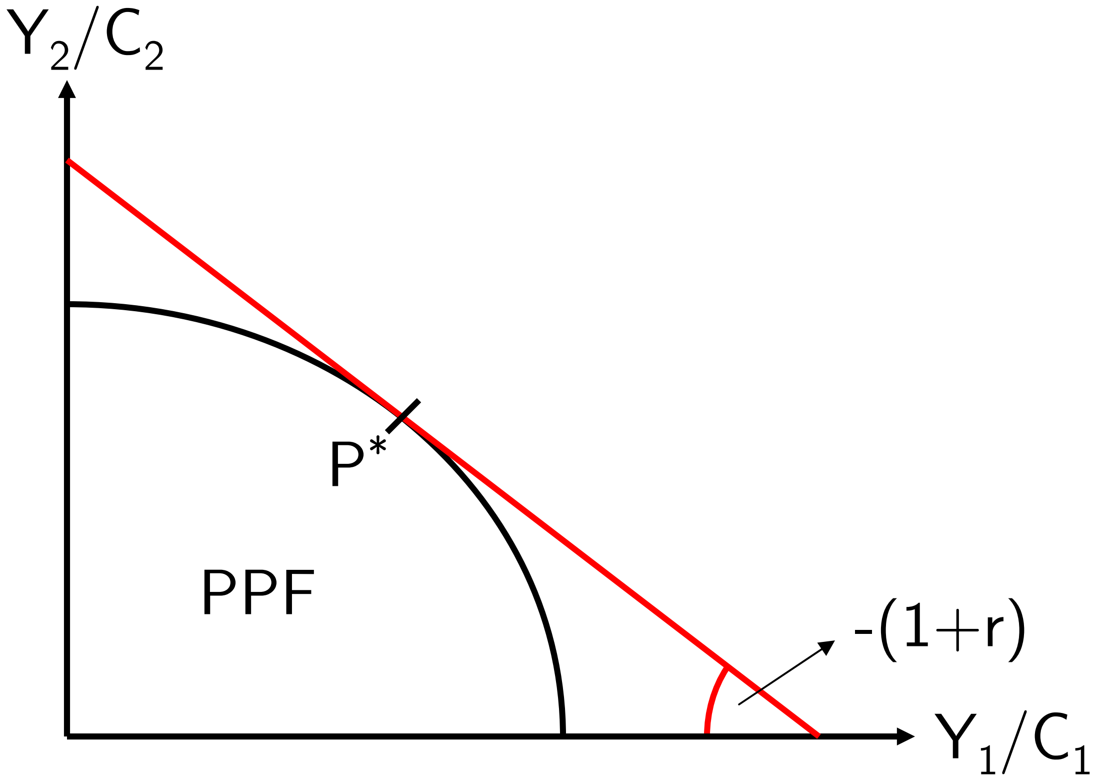


In financial autarky:

A = production = consumption

Note: entrepreneur's saving decision and firm's investment decision integrated

Fisher Separation Theorem



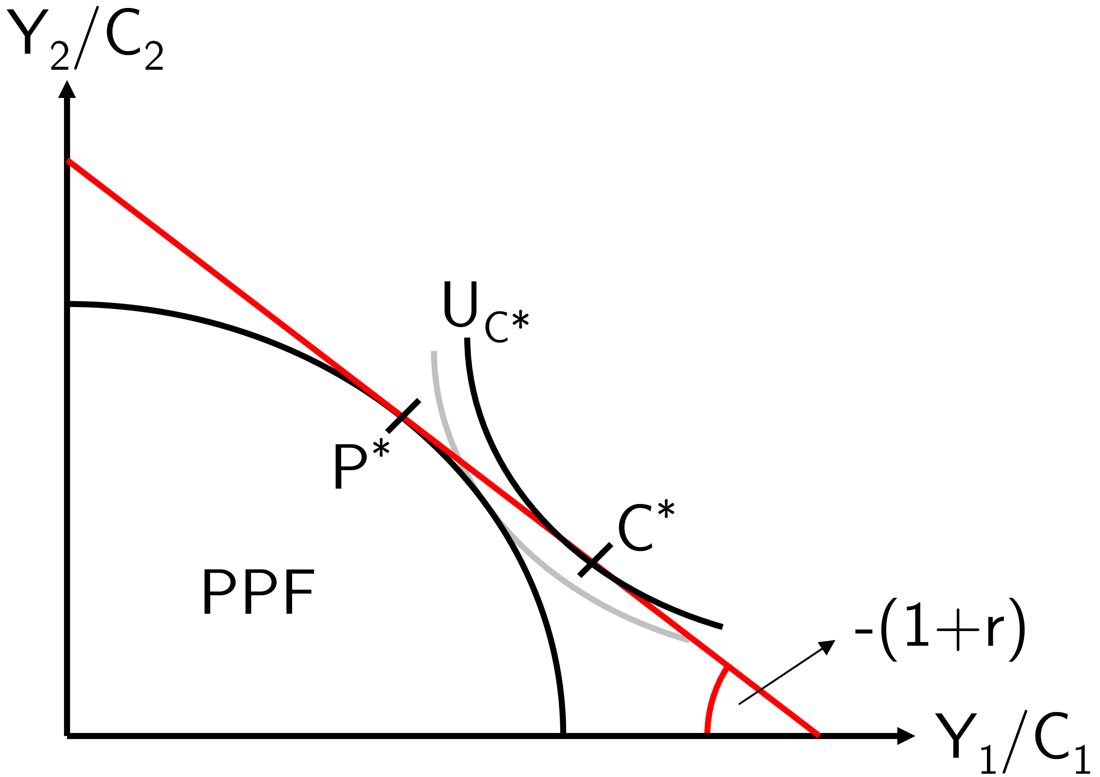
Under perfect capital markets: analyze problem in 2 steps:

$P^* =$ optimum level of production given PPF, interest rate (1+r)

→ firm value is maximized ("unanimity principle")

Note: production decision independent of firm's financing

Fisher Separation Theorem



C^* = optimum level of consumption given wealth, (1+r)

→ utility is maximized

Note: production decision independent of entrepreneur's preferences

Modigliani-Miller

Franco Modigliani and Merton H. Miller (1958),
"The Cost of Capital, Corporation Finance and the Theory of Investment," *American Economic Review* 48(3)

Background:

- o Cost of capital for firms taken as given, usually bond interest rate
- o Adjustment for risk of different assets in an ad-hoc manner
- o Useful as an approximation, e.g. in Keynes' investment function

But does answer the following questions:

- → What is the correct cost of capital for firms?
- → What is the optimal mix of debt and equity?

Modigliani-Miller

Notation:

- Market value of stock of firm j is S_j
- Market value of debt of firm j is D_j
- Total market value of firm j is $V_j = S_j + D_j$

- Group firms into "risk classes" with identical characteristics (e.g. firms in the same industry w/o idiosyncratic shocks)
- Required return on payoffs in risk class k is ρ_k
- If a firm j in risk class k yields earnings of $E[X_j]$ then the price of payoffs $P_j = \frac{E[X_j]}{\rho_k} = E\left[\widetilde{M} X_j\right]$
- Homogenous and risk free bonds: required return r

Modigliani-Miller

Theorem 1: Irrelevance of Financial Policy

The market value of a firm is independent of its capital structure and is given by capitalizing its expected return at the rate ρ_k appropriate to its class:

$$V_j = S_j + D_j = E[X_j]/\rho_k$$

The average cost of capital to a firm is independent of its capital structure and is to the capitalization rate of a pure equity stream of its class:

$$\frac{E[X_j]}{S_j + D_j} = \frac{E[X_j]}{V_j} = \rho_k$$

Modigliani-Miller

Proof by arbitrage argument:

- Assume firms 1 and 2 both generate payoffs X (same risk class)
- Firm 1 is unlevered: $V_1 = S_1,\qquad D_1 = 0$
- Firm 2 is leveraged: $V_2 = S_2 + D_{2,}\qquad D_2 > 0$

- Investor holds fraction α of firm 2: value in period 1: αS_2
  payoff in period 2: $Y_2 = \alpha(X - rD_2)$

- Alternative: borrow αD_2 and invest $\alpha(S_2 + D_2)$ in firm 1:
  → receive fraction $\beta = \frac{\alpha(S_2+D_2)}{V_1} = \frac{\alpha V_2}{V_1}$ of firm 1
  portfolio value in period 1: αS_2
  portfolio payoff in period 2: $Y_1 = \beta X - r\alpha D_2 = \alpha\left(\frac{V_2}{V_1}X - rD_2\right)$

- By arbitrage: $Y_1 = Y_2$ since we paid the same price
  → the only way for this to hold is $V_1 = V_2$