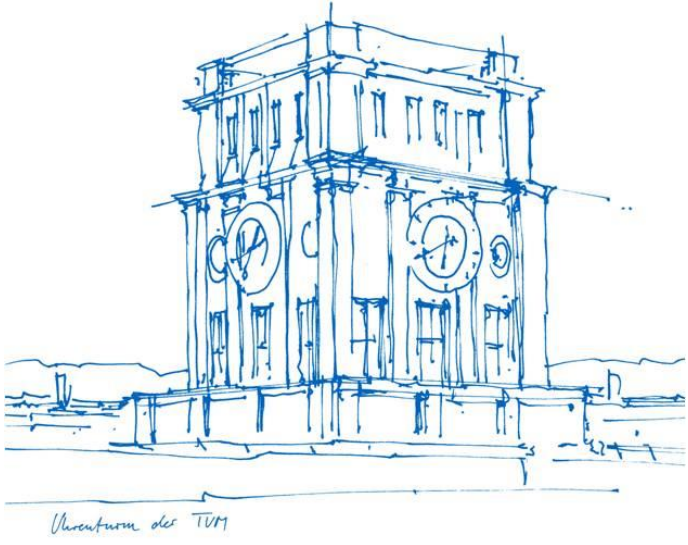
Economics II – Macroeconomics

VII. Credit, Banks and Money



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Outline

I. Introduction to macroeconomics (chapter 1)
II. Technological change and economic growth (chapter 2)
III. The aggregate economy (chapter 13)
IV. Aggregate demand and fiscal policy (chapter 14)
V. The labour market (chapters 6 and 9)
VI. Aggregate demand and unemployment (chapter 14)
VII. Credit, banks and money (chapter 10)
VIII. Inflation and monetary policy (chapter 15)
IX. Technological progress, unemployment and living standards in the long run (chapter 16)
X. Economic and financial crises (chapter 17)

VII. Credit, Banks and Money

The Economy Ch. 10

I. Income, borrowing, lending, investing
II. The banking system

The context

- Markets for goods and services allow parties to interact in mutually beneficial ways.

- In most markets, money is the medium of exchange.
  - How do banks create money?
  - How do banking systems affect individual consumption choices and economic outcomes?
  - What are the limitations of the banking system?

- We will learn about
  - models of individual borrowing, lending, and investment decisions
  - role of banks in the economy
  - successes and failures of the banking system.

VII. Credit, Banks and Money

The Economy Ch. 10

I. **Income, borrowing, lending, investing**
II. The banking system

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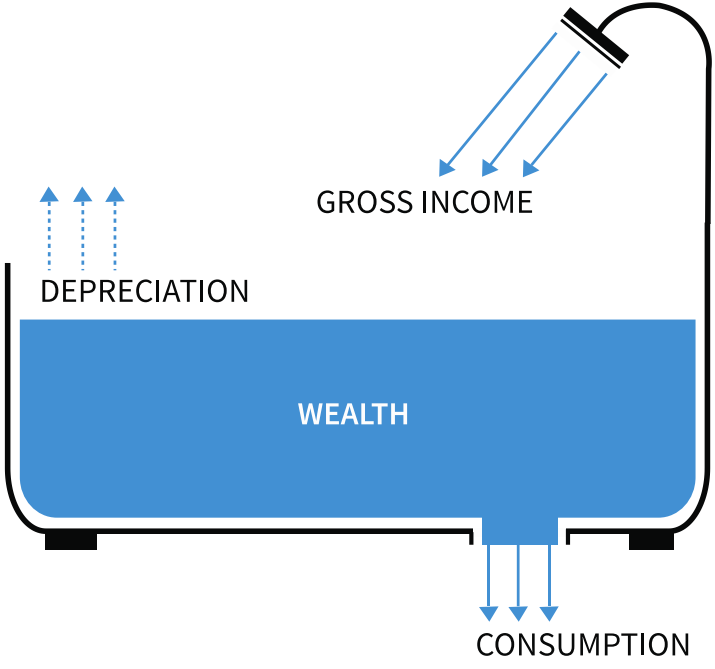
Key concepts

1. **Money** = medium of exchange used to purchase goods or services.
2. **Wealth** = value of things owned (**stock** variable).
3. **Gross Income** = amount of payments received over a period of time (**flow** variable).
4. **Depreciation =** reduction in the value of a stock of wealth over time.



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Other key concepts

Net income = The maximum amount that one could consume without running down wealth.

Net income = gross income – depreciation

Earnings = Wages, salaries, and other income from labour.

Savings = Income that is not consumed.

Investment = Expenditure on newly produced capital goods.

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Consumption over time

- What is the role of financial markets in an economy?
- **Borrowing, lending, and investing** allows to rearrange our capacity to buy goods and services across time
- Allows allocating consumption over time according to our preferences

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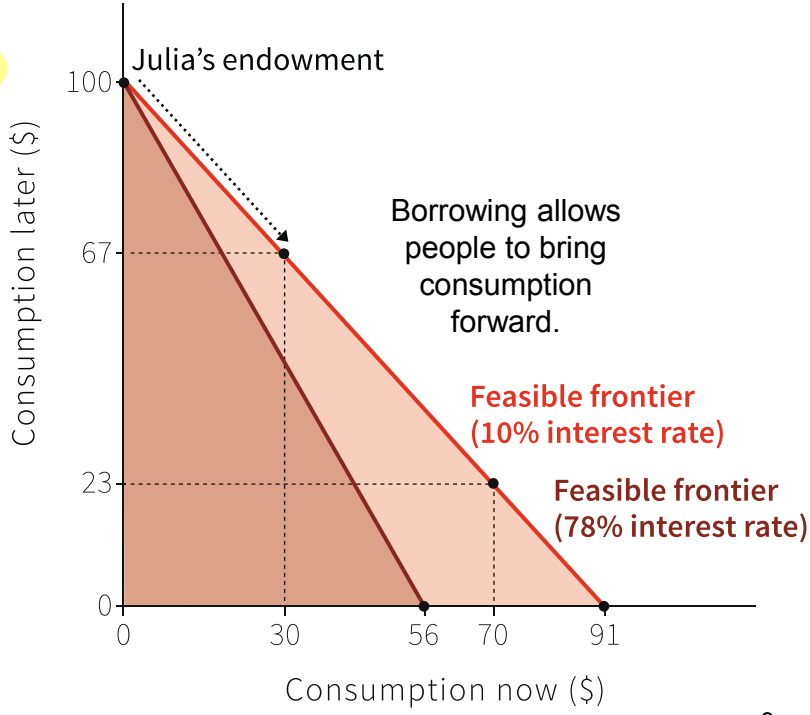
Borrowing

Interest rate (**r**) = The price of bringing some buying power forward in time.

(1+r) = Tradeoff between current and future consumption
→ Marginal Rate of Transformation (MRT)

Consumption now has ***opportunity costs:*** give up 1+r consumption in the future

Example:
repayment = principal + interest
= 91+91r
= 91(1+r)
~ $100



Preferences for consumption

- **Borrowing allows us to bring consumption forward**

- How much consumption an individual will bring forward depends on:
  - **consumption smoothing**
  - **impatience**

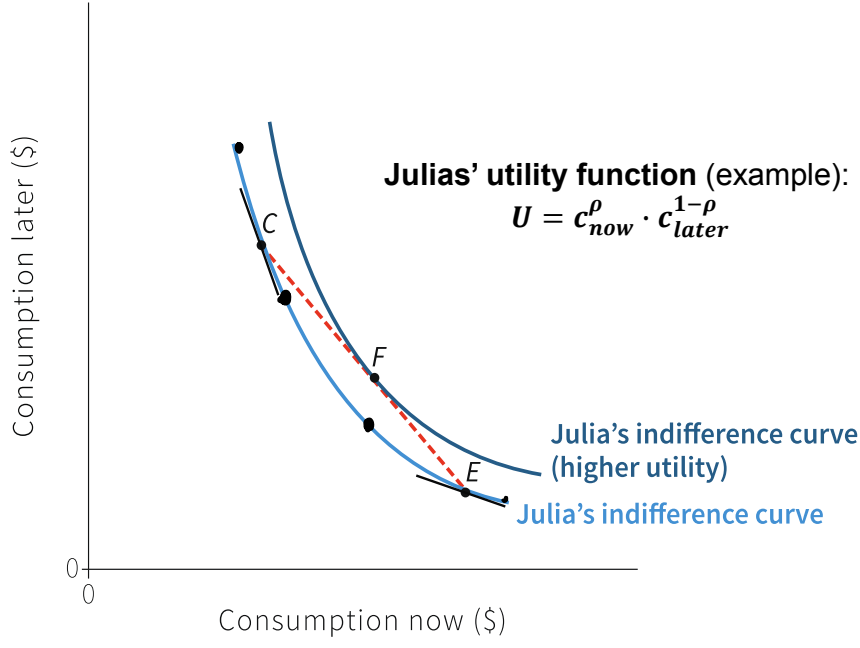
Borrowing decisions

Impatience = any preference for present consumption over future consumption.

The **slope** of the indifference curve = marginal rate of substitution (MRS) between consumption now and consumption later.

Individuals with **diminishing marginal returns to consumption** prefer to smooth consumption.

These factors determine an individual's **discount rate** ρ (a measure of impatience), which affects borrowing decisions.

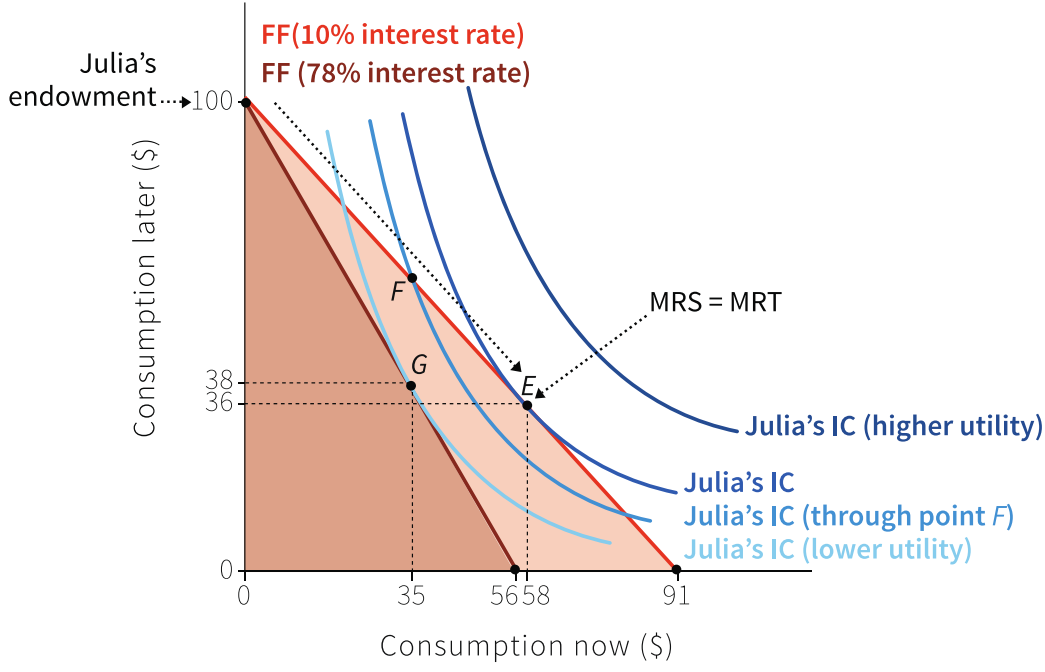


Optimal decision-making

Individual borrows at the point where discount rate = interest rate:

MRS = MRT

$1+\rho = 1+r$



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Lending decisions

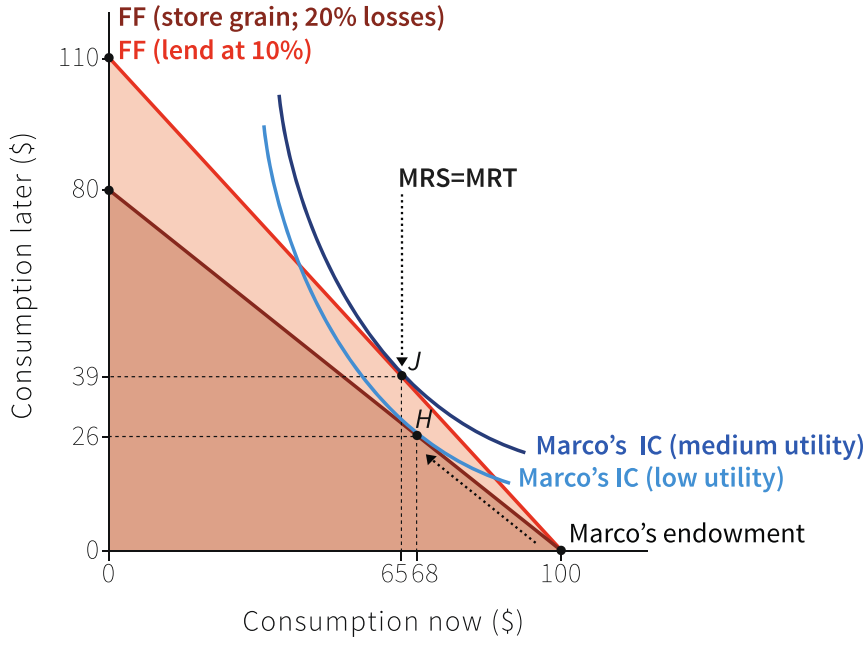
Lending allows individuals to move consumption *to the future.*

Lending expands the feasible frontier, making individuals better off (relative to storage).

The optimal amount of lending is where

MRS = MRT

$1+\rho = 1+r$

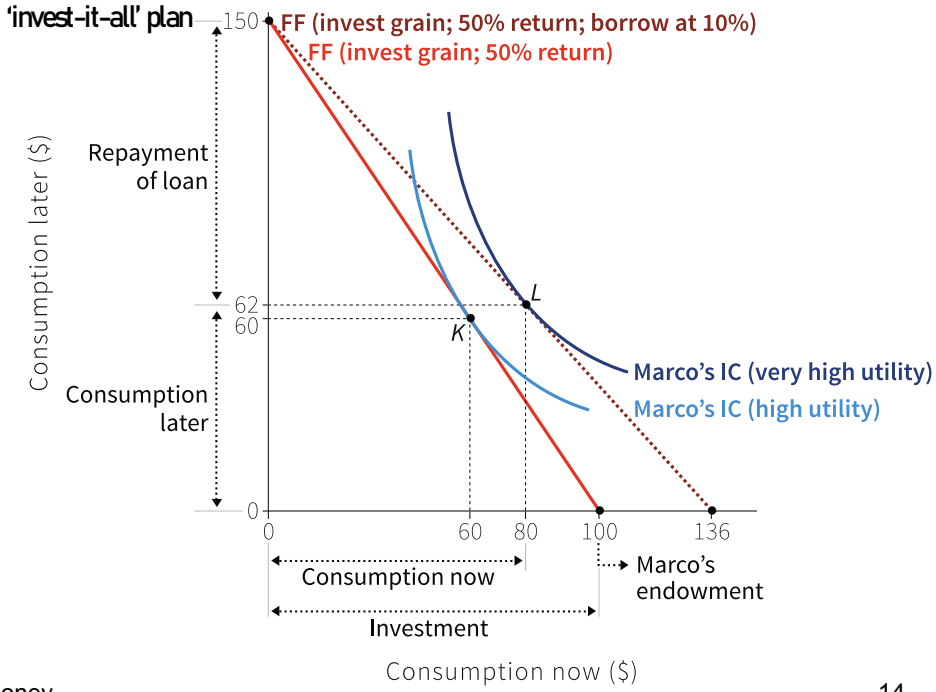


Investment

Investment is another way to move consumption to the future.

Combination of investing and borrowing can increase consumption in both periods.

An individual's situation, e.g. wealth, current or future income, affects their opportunities to engage in these activities!



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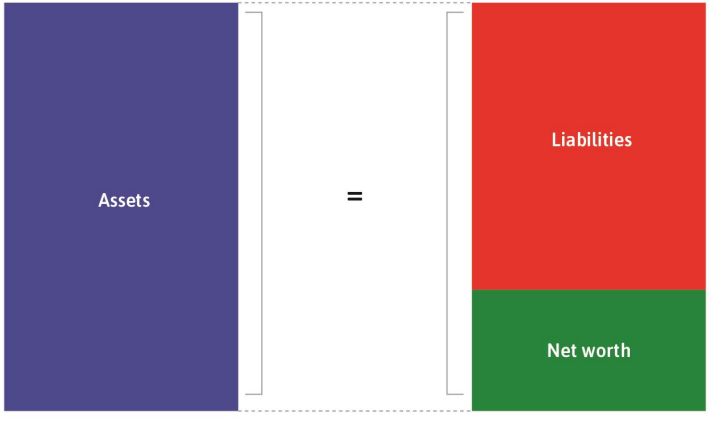
Balance sheet

A **balance sheet** summarises what the household or firm owns, and what it owes to others.

- **Assets** = Anything of value that is owned.
- **Liabilities** = Anything of value that is owed.
- **Net worth** = assets – liabilities

Assets = Liabilities + Net worth



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Measuring wealth

An individual's wealth is an important factor in their decisions to borrow, lend, or invest.

<u>A loan adds both assets and liabilities to the balance sheet</u>:

- the borrowed money (cash) is an asset
- the debt is an equal liability

Summary

- Simple two-period model provides much of what we need in order to understand the ***role of the financial system*** in the economy.

  Borrowing, lending and investing can make people better off.
  The extent to which someone benefits depends on initial endowments.
  [--> We ignored transaction costs and moral hazard.]

  → But we need to introduce two more actors on the economic stage: **banks and the central bank**.

VII. Credit, Banks and Money

The Economy Ch. 10

I. Income, borrowing, lending, investing
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Banks

- A **bank** is a firm that makes profits by lending and borrowing.
- Banks borrow from households (**deposits**), other banks, and the central bank.
- The interest they pay on deposits is lower than the interest they charge on loans, which is how banks make profits.

Central bank

- **Base money/high-powered money** = notes and coins. Money as legal tender.

- Legal tender has to be accepted as payment by law.

- The **central bank** is the only bank that can create legal tender.
  - The central bank is usually owned by the government.
    - The European Central Banks (ECB) belongs the national central banks.
  - Acts as the banker for the commercial banks, who have accounts at the central bank that hold legal tender.
  - By crediting these accounts, the central bank can create money.

Key concepts

Commercial banks create money by making loans

- this is called **bank money** ≠ legal tender
- it is a liability to the bank, not an asset, banks earn profits by charging interest on bank money
- **Bank money** = Money created by commercial banks when they extend credit to firms and households.

Broad money = base money + bank money

Marco puts 100$ into bank account:

Abacus Bank's assets		**Abacus Bank's liabilities**	
Base money	$100	Payable on demand to Marco	$100

Money creation by banks

Marco pays his grocer with his debit card:

Bonus Bank's assets		Bonus Bank's liabilities	
Base money	$20	Payable on demand to Gino	$20

Abacus Bank's assets		Abacus Bank's liabilities	
Base money	$80	Payable on demand to Marco	$80

Gino borrows $100 from Bonus Bank:

Bonus Bank's assets		Bonus Bank's liabilities	
Base money	$20	Payable on demand to Gino	$120
Bank loan	$100		
Total	**$120**		

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Money creation by banks

Gino employs Marco to work in his shop and pays him $10:

Abacus Bank's assets		Abacus Bank's liabilities	
Base money	$90	Payable on demand to Marco	$90

Bonus Bank's assets		Bonus Bank's liabilities	
Base money	$10	Payable on demand to Gino	$110
Bank loan	$100		
Total	**$110**		

The total money in the banking system has grown:

Abacus Bank and Bonus Bank's assets		Abacus Bank and Bonus Bank's liabilities	
Base money	$100	Payable on demand	$200
Bank loan	$100		
Total	**$200**		

Default risk and liquidity risk

Important: the money banks create is a liability, not an asset, because it has to be paid on demand to the borrower. It is the corresponding loan that is an asset for the bank.

- Banks provide the service of maturity transformation:
  - deposits can be withdrawn at any time
  - but loans only need to be repaid after a specified time
- This is also liquidity transformation:
  - deposits are liquid
  - loans to borrowers are frozen (illiquid)
- This exposes the bank to risks:
  1. **Default risk**
  2. **Liquidity risk**

Banking crisis

- Banks make money by lending much more than they hold in legal tender.
- **Bank run** = situation when all depositors demand their money at once; may result in bank failure.
- Banks can also fail by making bad investments, such as by giving loans that do not get paid back.
- The government may intervene, because unlike the failure of a firm, a banking crisis can bring down the financial system.

Banking runs

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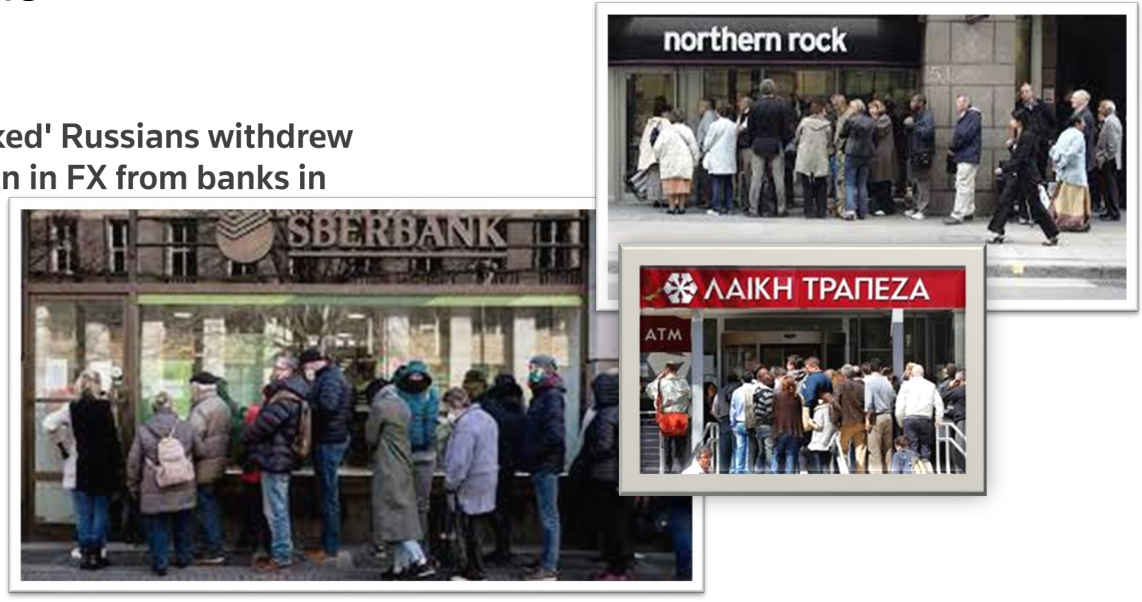
Finance

'Panicked' Russians withdrew $9.8 bln in FX from banks in March



The money market

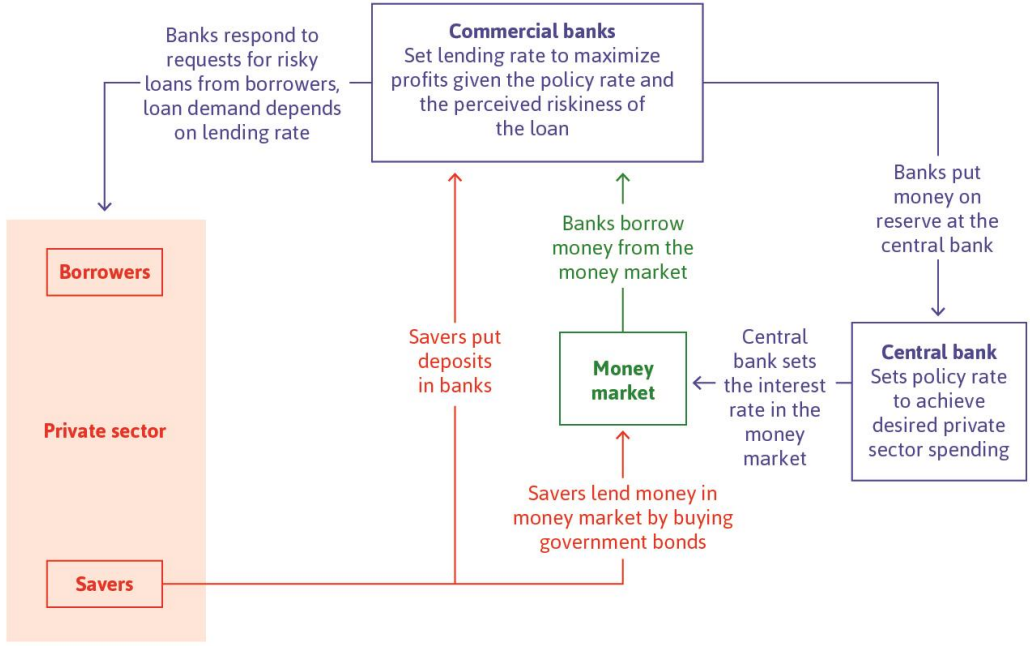
- Banks need enough base money to cover their net transactions.

- They borrow base money on the **money market** at the short-term interest rate.
  - The *demand for base money* depends on how many transactions commercial banks have to make.
  - The *supply of base money* is a decision by the central bank.

The banking system

Policy interest rate = The interest rate on base money set by the central bank.

Bank lending rate = The average interest rate charged by commercial banks to firms and households.



The business of banking

Bank's costs:

- operational: the salaries of bank officers, branch rents
- interest costs: paying interest on their liabilities (deposits and other borrowing)

Bank's revenue:

- interest and repayment of loans

Expected return = The return on the loans, taking into account the default risk.

A bank's balance sheet

Assets include
- Base money
- Loans to other banks/customers
- Financial assets
- Bank assets e.g. buildings

Liabilities include
- Bank deposits
- Borrowing from other banks
- Unsecured borrowing

Net worth = Assets – Liabilities = **Equity**

Leverage ratio = The value of assets divided by the equity stake in those assets (measures a company's reliance on debt):

$$leverage = \frac{total\ assets}{net\ worth}$$

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Barclays Bank balance sheet in 2006 (£m)

ASSETS		LIABILITIES	
1. Cash and reserve balances at the central bank	7,345	1. Deposits	336,316
2. Wholesale reverse repo lending	174,090	2. Wholesale repo borrowing secured with collateral	136,956
3. Loans (e.g. mortgages)	313,226	3. Unsecured borrowing	111,137
4. Fixed assets (e.g. buildings, equipment)	2,492	4. Trading portfolio liabilities	71,874
5. Trading portfolio assets	177,867	5. Derivative financial instruments	140,697
6. Derivative financial instruments	138,353	6. Other liabilities	172,417
7. Other assets	183,414		
Total assets	996,787	Total liabilities	969,397

NET WORTH	
Equity	27,390

Memorandum item: Leverage (Total assets/Net worth)

996,787/27,390 = 36.4

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Honda Motor Company balance sheet in 2013 (¥m)

ASSETS		LIABILITIES	
1. Current Assets	5,323,053	1. Current liabilities	4,096,685
2. Finance subsidiaries-receivables net	2,788,135	2. Long-term debt	2,710,845
3. Investments	668,790	3. Other liabilities	1,630,085
4. Property on operation leases	1,843,132		
5. Property, plant and equipment	2,399,530		
6. Other assets	612,717		
Total assets	13,635,357	Total liabilities	8,437,615

Memorandum item: Leverage as defined for banks: (Total assets/Net worth)
13,635,357/5,197,742 = 2.62

Memorandum item: Leverage as normally defined for non-banks: (Total Liabilities/ Total assets)
8,437,615/13,635,357 = 61.9%

NET WORTH	
Equity	5,197,742

Comparison: Barclays and Honda

- Barclays' total assets are 36 times their net worth.
- This means that given the size of its liabilities (its debt), a very small change in the value of its assets (1/36 ≈ 3%) would be enough to wipe out its net worth and make the bank insolvent.
- By contrast, using the same definition, we see that Honda's leverage is less than three.

- Compared to Barclays, Honda's equity is far higher in relation to its assets. Another way to say this is that Honda finances its assets by a mixture of debt (62%) and equity (38%), whereas Barclays finances its assets with 97% debt and 3% equity.

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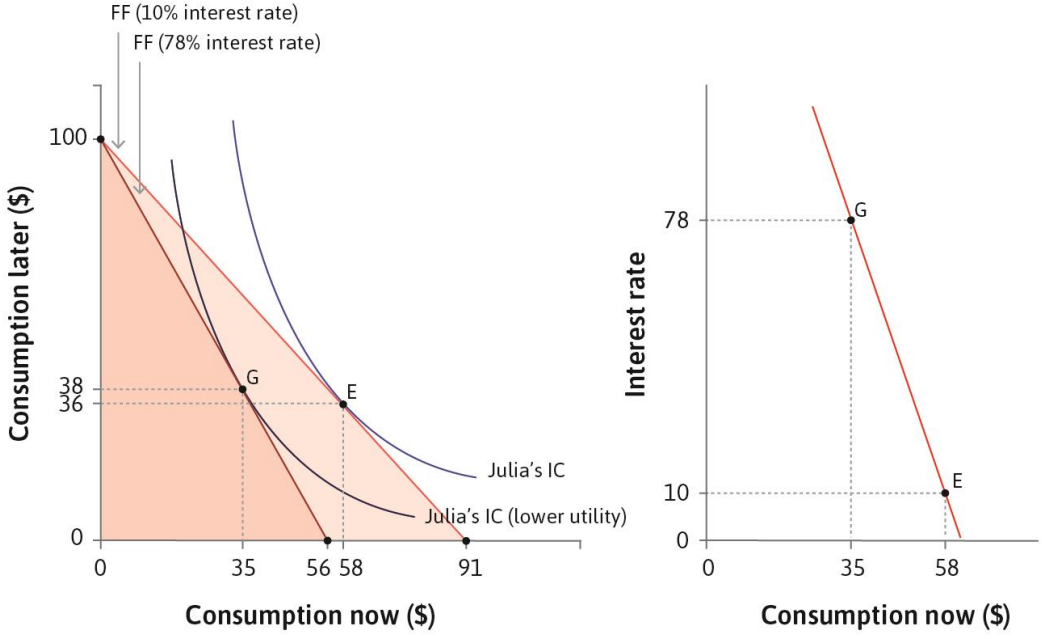
Policy rate and the economy

The central bank's policy rate affects the level of spending in the economy, because households and firms borrow to spend.

higher interest rate → lower spending today



Credit rationing

Principal-agent problem

Principal-agent problem =
a conflict of interest between principal and agent, about some hidden action or attribute of the agent that cannot be enforced or guaranteed in a binding contract.

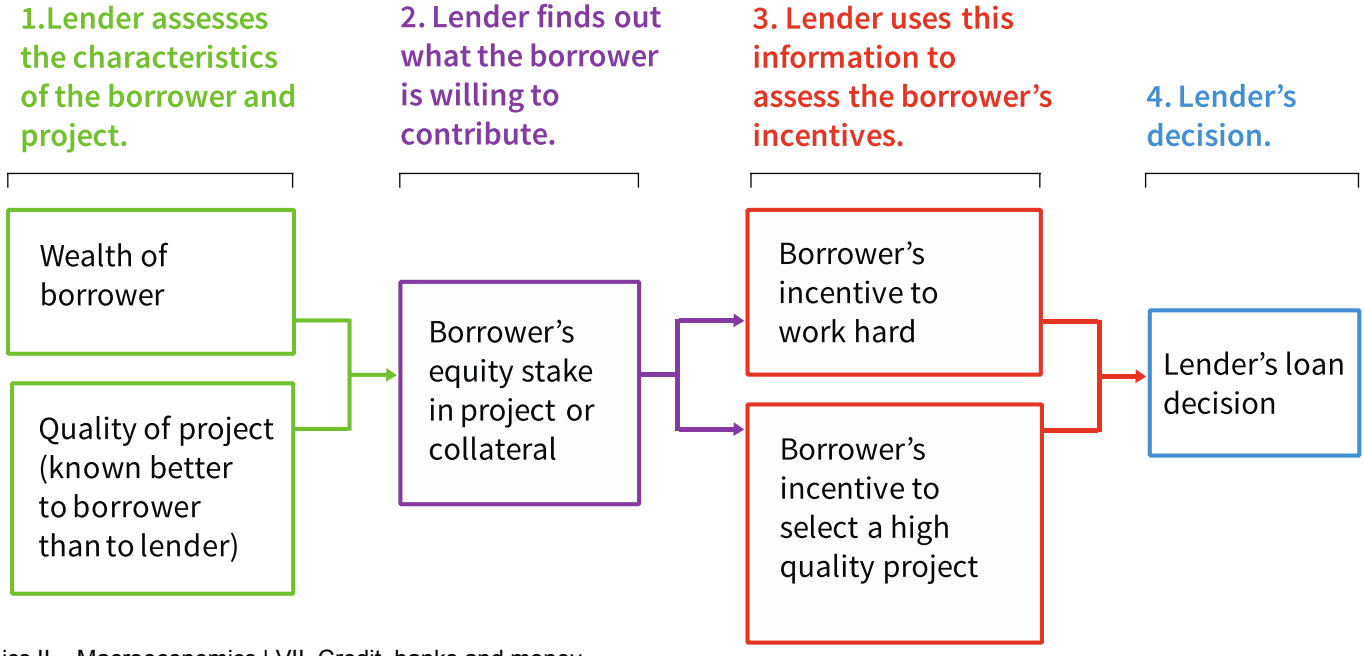
- **Example: Financing a start-up's project**

Lenders face the risk that money borrowed will not be repaid, but lack information about the project's success or borrower's effort
→ cannot ensure that the project succeeds.

- **Collateral** and **equity** reduce this conflict of interest.

However, less-wealthy borrowers may face **credit rationing** (more unfavorable borrowing terms, or refused a loan)

Wealth and credit



Banking: failures and successes

- Money and credit are useful for exchange and innovation.
- The banking system helps bring these benefits to society.

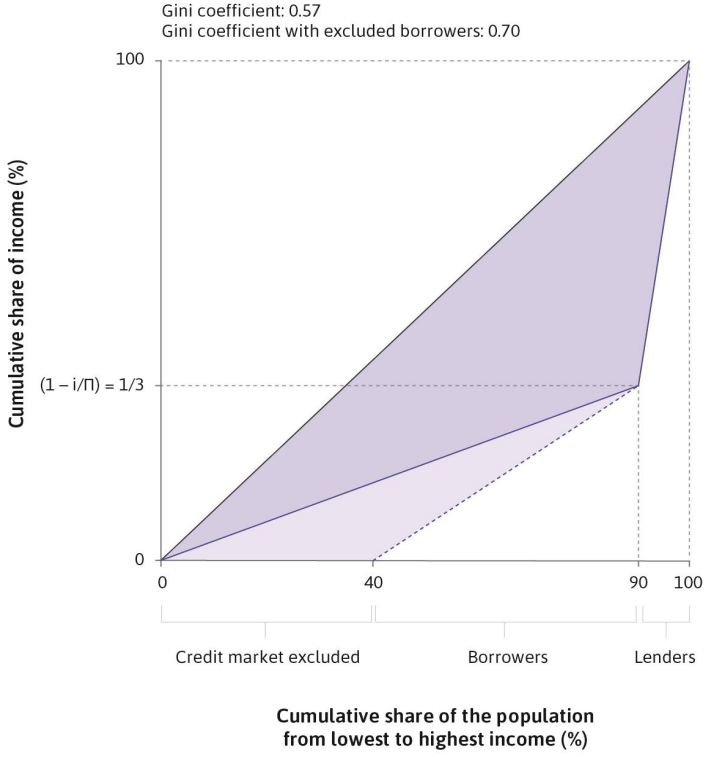
However, credit markets can also fail:

- **Credit constraints:** Borrowers with no collateral or equity are often excluded from credit market

- **Negative external effects**: Bank owners do not bear the full costs of bankruptcy (some costs borne by other banks, or “too big to fail”), leading to excessive risk-taking.

Lending and inequality

- Example: An economy is composed of 90 farmers who borrow from 10 lenders.
- Interest rate i = 0.10 and profit rate Π = 0.15
- The lender receives a share of i/Π of total output, and the borrower receives a share of 1 − i/Π
- The lenders' share of total income is 2/3 and the borrowers' is 1/3. The Gini coefficient is 0.57.
- **If 40% are excluded from borrowing, Gini increase to 0.7!**
- Credit-rationing increases inequality: people with limited wealth are not able to profit from the investment opportunities that are open to those with more assets.



Summary

1. Ways to move consumption forward/into the future
    - Borrowing, lending, saving, investing
    - Options available depend on individual's endowment.
    - Optimal choice depends on individual's **discount rate.**

2. Outline of the banking system
    - Banks create money and lend to make profits
    - Central bank sets the **policy rate**, which influences spending
    - Issues: principal-agent problem → **credit constraints**

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