Introduction to Finance

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CY Cergy Paris University

Who we are?

- Me ...
  - Assistant Professor at CY Cergy University.
  - Research on firms' taxation and firms' tax avoidance.
  - Expect me to ask you questions.
  - Course website with slides: https://sebastien-laffitte.eu/teaching_intro.html
- You ...
  - Don't hesitate to participate ! We learn by interacting together.

What is this course about?

- Introduction to Finance
  - Introduction to the **technical** details of finance.
  - Finance is traditionnaly divided between the study of Corporate Finance and the study of financial markets.
  - Corporate Finance studies the financial decisions of firms.
  - Most of finance consists in valuing assets: that's what we will learn here.
  - Importantly, finance is also part of the economic life: we'll keep an eye on real world problems.

What is this course about?

- Introduction
- Objective of the Company and Net Present Value
- Analysis of Financial Statements
- Time value of money
- Investment Strategies and Investment selection
- Portofolio Theory
- Valuation

Course organization

- 8 classes of 3 hours.
- Grading.
  - In-class short test (October, 7th) (25%)
  - Homework (25%)
    - Homework consists in exercises.
    - I will grade one of your homework.
    - In any case (graded or not), you need to prepare them and participate to the correction in class.
  - Final Exam during last session (November, 4th) (50%)
  - Participation (Bonus)

Any question?

For you, what is finance?

The Financial System

What is Finance?

- “The process of raising funds for any kind of expenditure.” (*Encyclopedia Britannica*)
- More importantly it is a *system* that is part of the economy.
- The system puts into relationship economic agents with excess money (*e.g.* savings) and economic agents demanding money (*e.g.* to buy a house, to launch a corporation).
- Generally households supply money and want to minimize risk and keep liquidity
- While firms and the State demand money for medium to long-run investments.
- The problem of the financial system is to create institutions to deal with these different time horizons that intrinsically generate instability.
- The notion of time is central in finance.

What is Finance?

The Financial Industry

- Nowadays finance is mostly indirect *i.e.* it goes through intermediaries that transform the maturity of money against a commission.

- Actors of the financial industry: banks (they create money), institutional investors (insurance companies, pension funds, asset management), central banks, regulators, *etc.*

- Institutional investors: Pool money to invest following defined objectives in terms of yield, risk, etc.

What is Finance?

The Financial Industry

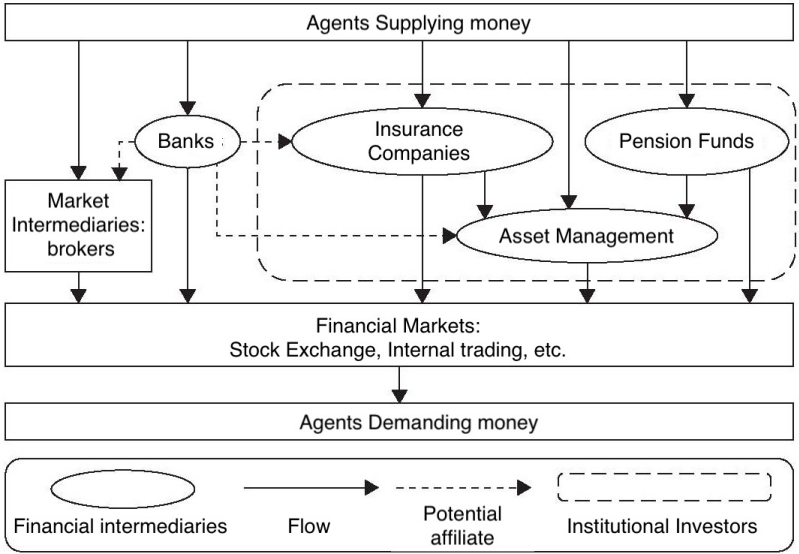
- Everything is interconnected and banks have many of these activities.
  - The financial sector is concentrated, with many conglomerates.
  - Conglomerates might be *too big to fail*.
  - Knowing that they will be backed by Central Banks in case of problem increase risk-taking by these actors (moral hazard).

  $\longrightarrow$ Need of regulation: Basel Agreements.

- The financial system is intrinsically connected to the economic system.
  - Transmission of financial crisis to the real economy.
  - Financial Capitalism creates systemic actors.

What is Finance?

The Financial Industry



What is Finance?

The Financial Industry

	Total	Public Financial Institutions	Central Banks	Banks	Non-Bank Financial Corporations									
	10^{12} $	%	%	%	%									
					Total	Insurance Companies	Pension Funds	Investment Funds	Money market funds	*Hedge funds*	Real Estate Funds	Special Purpose Vehicles	*Broker-dealers*	Financial Auxiliaries
2002	116,2	10,0	4,3	47,9	37,8	13,2	11,4	4,9	2,8	0,0	0,2	2,1	2,9	0,4
2009	215,1	6,3	5,9	48,8	38,9	9,8	10,0	8,9	2,4	0,3	0,3	3,7	3,3	0,3
2019	362,4	5,0	8,4	42,9	43,7	10,0	10,9	14,0	1,9	1,5	0,7	1,5	2,8	0,4

What is Finance?

Finance and the State

- The development of finance is historically associated to the public finances.
  - *e.g.* Paris Stock Exchange was created in 1724 to fund royal debt.
- In Europe, the competition between relatively small countries and cities created a symbiosis between politicians' interests (demand of money) and merchants interests (supply of money).
- This can be seen as the origin of the European capitalism at the end of the 12th century.
- This is the moment when banks develop, from Genova, to Venice and Florence.
- Private titles develop on European places from the 19th century.
- Nowadays Treasury Bonds are used by financial institutions for risk management as they provide (almost) risk-less investments.

What is Finance?

Financial Assets

- Real assets: used to produce goods and services.
    - Examples:

What is Finance?

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- Derivatives: claims on other financial assets (options, futures, interest rate swap, credit default swap, etc.).

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- Derivatives: claims on other financial assets (options, futures, interest rate swap, credit default swap, etc.).
  - "An option is a contract that allows the holder the right to buy or sell an underlying asset or financial instrument at a specified strike price on or before a specified date, depending on the form of the option." (*source*: Wikipedia).
  - Allows to bet on the decrease of an stock price: buy an option to sell (*put*).
  - *e.g.* Exercise price $= 100$, premium$= 10$. When the price falls below 90, the owner of the option buys the stock at the current price (90) and sells it at the exercise price (100).

What is Finance?

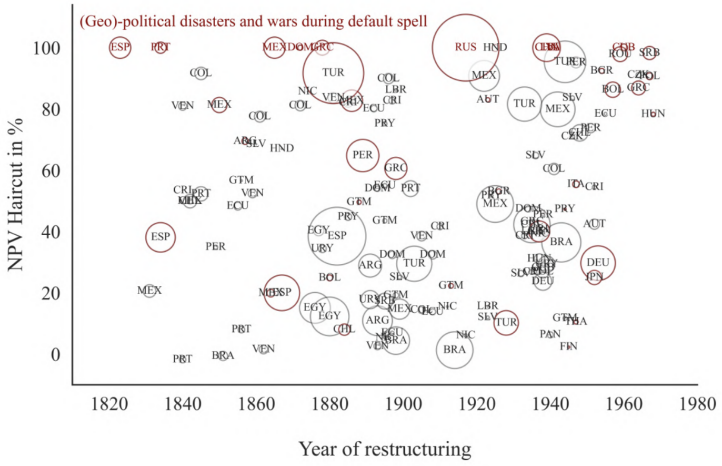
Types of Financial Assets

- Fixed Income Securities (*obligations*); treasury bonds, corporate bonds, mortgage-backed securities, Sovereign bonds, etc.
- Treasuries bonds are the ultimate risk-free instrument.
  - States are expected to be always able to pay back.
  - Not always true (defaults or 'haircuts') *e.g.* Stop of the Exchequer (UK, 1672), Russia in 1917, etc.
- Equity (*actions*): control rights over the firm.
  - Equity is a residual claim (paid after bondholders).
  - Dividends are uncertain and can happen far away (maturity is indefinite).

What is Finance?

Types of Financial Assets

Figure 13: 200 years of Sovereign haircuts (all restructurings with foreign private creditors)



Note: Country-Markers represent the time of the debt restructuring.

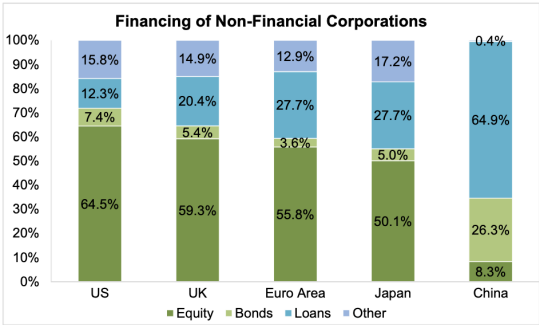
What is Finance?

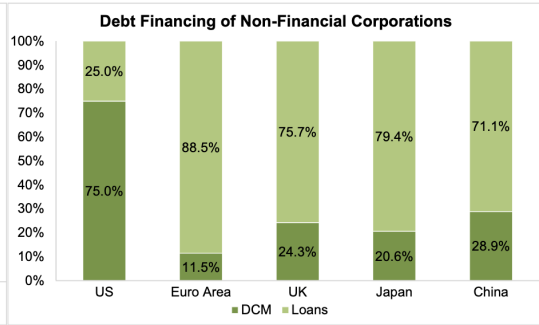
The Financial Industry

- Different types of markets.
  - **Money markets**: where debt securities with maturity < 1 year are issued and traded. High liquidity, low return and low risk.
  - **Capital markets**: where debt instruments or securities with maturities > 1 year and corporate stocks or equity securities are issued and traded.
  - The initial offering of debt and equity securities takes place on the primary market. The issuer (a firm for instance) receives directly the proceeds from the sale.
  - Secondary markets is the place where debt and equity securities are traded between investors. The original issuer does not receive anything here.

What is Finance?

Types of Financial Assets: Financing of corporations

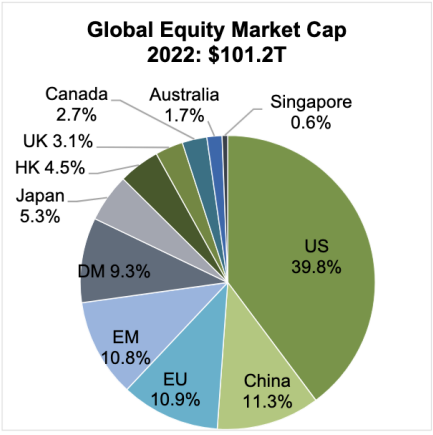




Source: OECD, Federal Reserve, ECB, Bank of Japan, National Bureau of Statistics of China, SIFMA estimates
Note: As of 2022, China 2020; Economic activity defined as financing of non-financial corporations. Euro Area = 19 EU-member states using the Euro. Other financing, ex-China = insurance reserves, trade credits and trade advances; other financing, China = bankers' acceptances, FDI, other foreign A/D, misc. and errors; DCM = debt capital markets, corporate bonds only

What is Finance?

Size of the equity market (≈ World GDP)

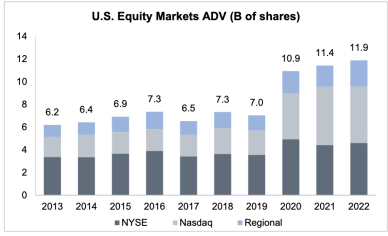


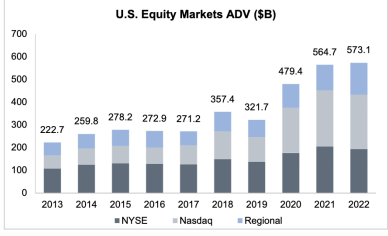
Source: World Federation of Exchanges, SIFMA estimates

What is Finance?

Types of Financial Assets

US Equity Markets Average Daily Trading Volume (ADV) – Charts





Source: Cboe Global Markets

What is Finance?

Types of Financial Assets

- Interest rates are central in financial markets.
- This is the price of loanable funds in financial markets.
- How are they determined?

What is Finance?

Types of Financial Assets

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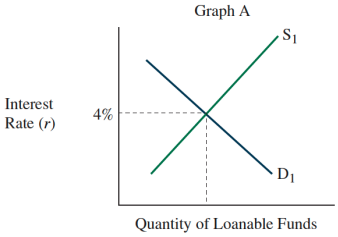
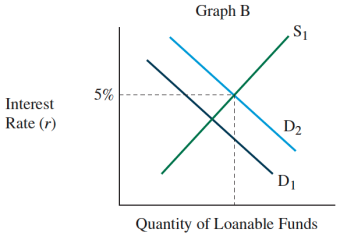
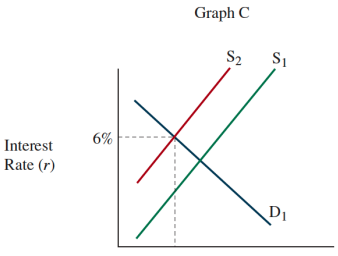
- This is the price of loanable funds in financial markets.
- How are they determined?
- At the price that equalizes supply and demand.

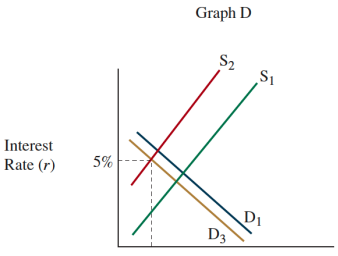
What is Finance?

Types of Financial Assets







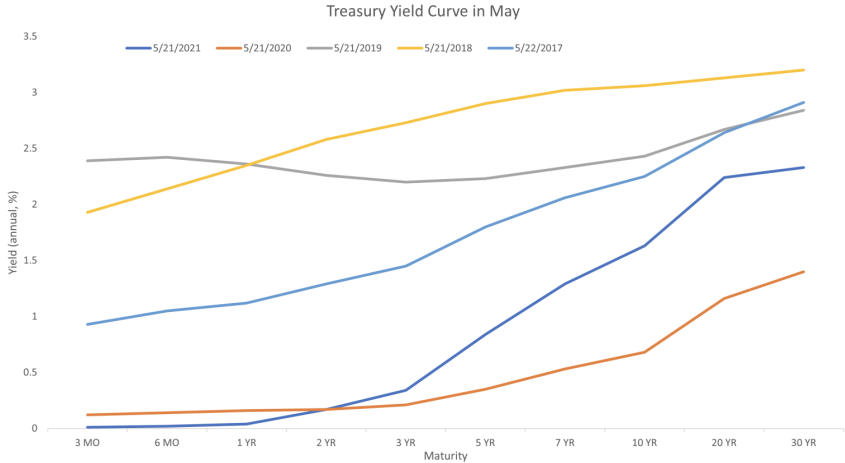


- Interest rates are also affected by different factors than exogenous movements in supply and demand.

- It depends on inflation (if I expect inflation in the future I'll ask a higher rate), the default risk (if the borrower is more risky I'll ask a higher rate to compensate potential losses), *etc.*

What is Finance?

Types of Financial Assets



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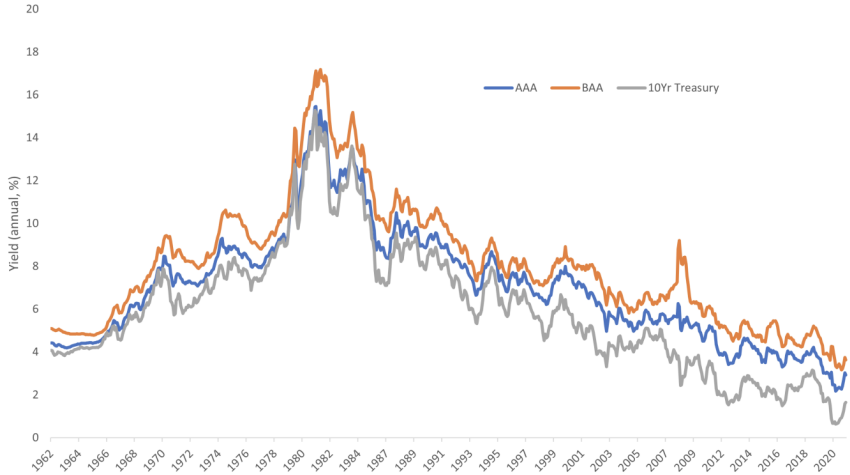


A brief history of Finance and financial crisis

Anatomy of a crisis

- Key idea of Minsky: changes in the supply of credit are pro-cyclical.
  - Increases when the economy booms and conversely.
  - (check ”Manias, Panics and Crashes: A History of Financial Crises”, by Kindleberger for deeper insights)

- When the economy booms, investors become more optimistic, revise upward their estimates of profitability, and become more eager to borrow.

- At the same time lenders’ risk assessment and risk awareness decline, making them more willing to make loans, loans they wouldn’t have made in the past.

- Investors that increase their indebtedness to buy real estate, stocks or commodities to make short-term profits (assuming that their financial gains will exceed the interests) become distress when the economy slows and are willing to massively sale.

Anatomy of a crisis

- Everything begins with a positive exogenous shock that will generate optimism.
  - U.S.A, 20': Boom of the automobile industry, massive electrification of the country, and the equipment of households in phones.
  - Japan, 80': Financial liberalization and the excess of money coming back to Japan.
  - U.S.A. 90': Revolution in information technology and the great decrease in communication costs
  - Early 00': Financial innovation of securitization (packaging of mortgages with similar attributes into bundles that provided the basis for issuing collateralized debt obligations.

Anatomy of a crisis

- The amount of money available for home mortgages increased sharply as a result of these innovations.
- When the shock is large enough, it increases the profitability of some sectors.
- The boom is also fueled by the expansion of the credit supply: positive feedback create investment and growth.

Anatomy of a crisis

- This creates euphoria which spurs speculation (investment for resale at higher price rather than for investment income). Other banks and investor follow the leader that they see making profits and do not want to lose market shares. It is a rationale for the creation of bubbles.

- Many channels of cross-border propagation (psychological effect, arbitrage, cross-border investment).

- This bubble grows as long as buyers are more eager to buy than sellers to sell. When this is not the case, for instance because prices are too high and it becomes clear that they do not reflect fundamentals, increase in prices are slower and some actors enter in financial distress : they cannot pay they debt anymore.

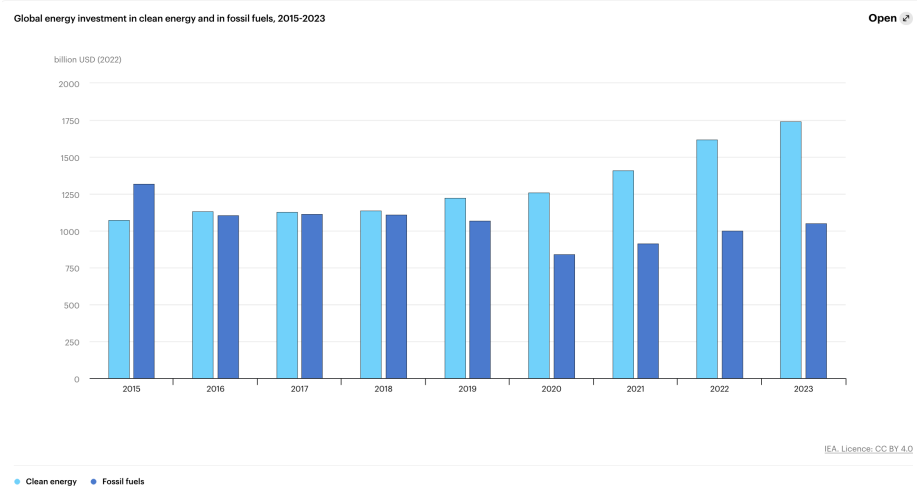
- More actors are then willing to become more liquid and decide to sell (stocks and real estate in particular).

- Their prices fall sharply and some actors and bankrupted, the value of their holding is too low to cover their debt.

The future of Finance

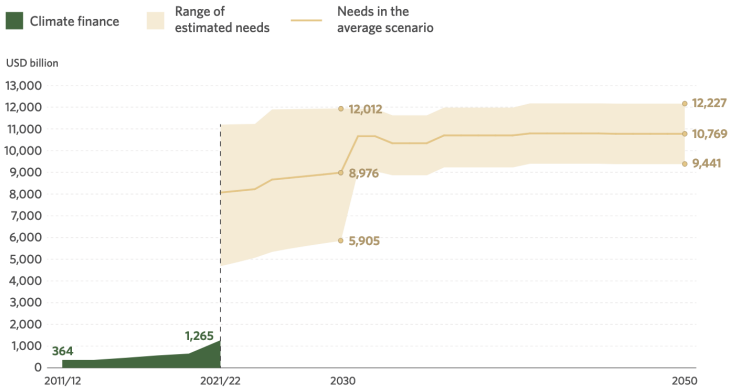
- The central role of finance in modern economic systems makes it an important tool for planning the future.
- The environmental transition is one of the key challenge for our societies in the following years.
- Many initiatives around to make finance go green (greenwashing?).
- The EU aims at net zero emissions in 2050.
  - How to achieve it?
  - Need to consume less!
  - But also to deploy new technologies. These technologies need investment: $\approx$ 28 trillons (McKinsey, European Commission).
- How to ensure that investment is flowing in the right direction?

The future of Finance



The future of Finance

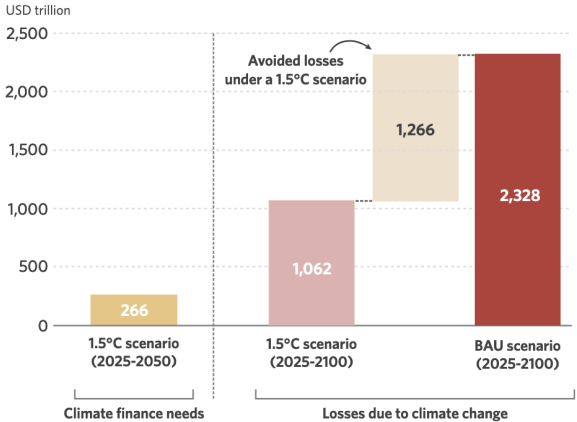
Figure ES3: Global tracked climate finance and average estimated annual needs through 2050[3]



Note: Climate finance needs estimates for 2023-2050 include direct investments in climate-specific physical assets and excludes transition-related unabated fossil fuel finance. Estimates are based on secondary data collected from over 15 sectoral scenarios (see Methodology document for detail). Climate finance needs for 2023-2050 are expressed in 2022 USD to ensure comparability of estimates from several different scenarios.

The future of Finance

Figure ES4: Cumulative climate finance needs vs. losses under 1.5°C and BAU scenarios



Source: *CPI analysis and NGFS (2022).*

The future of Finance

- Investment generally flows where the return are higher (for a given level of risk is better).
- McKinsey (2020): almost half of the necessary investment will not meet standard investment criteria.
- Introducing carbon pricing can be able to make green investment profitable.
- Public investment planning can also be part of the solution.

The Fundamental Function of Finance

The Fundamental Function of Finance

Functions of financial markets

- (Efficient) Allocation of scarce capital to projects.
- (Efficient) Pricing and sharing of risks in the economy.
- **Consumption smoothing via saving and borrowing.**

The Fundamental Function of Finance

- What's the fundamental function of finance?

$\longrightarrow$ Transforming today's euros in tomorrow's euros and vice-versa.

- Don't forget that even if we study finance in isolation, finance is part of a system
- The State defines, by its regulation, the rules of the game: how and under which conditions finance can operate.

The Fundamental Function of Finance

- Let's look at Julia's endowments.
- There are two periods: *now* ($t = 0$) and *later* ($t = 1$).
- She knows that, for sure, she will have 100 of wage in period 1.
- The interest rate is 10%.
- What is the maximum she is able to borrow today?

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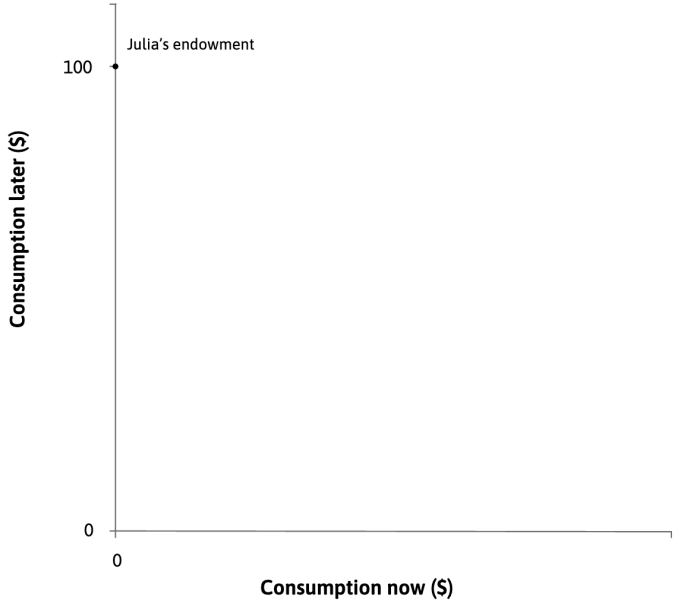
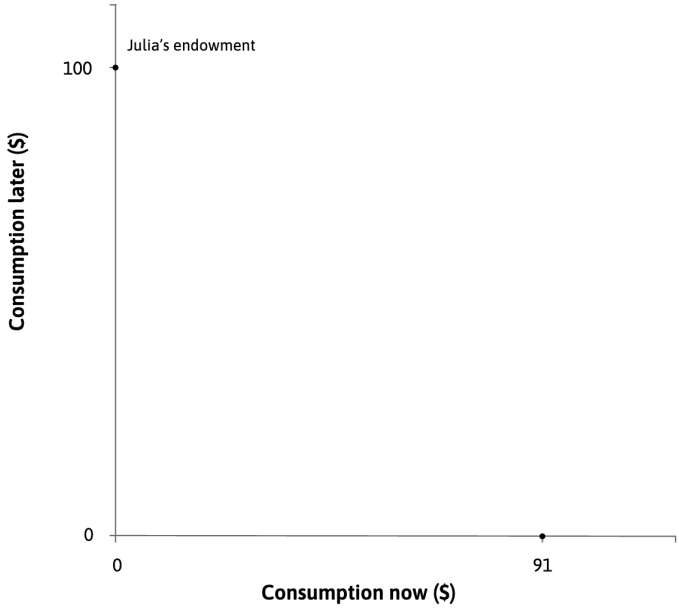
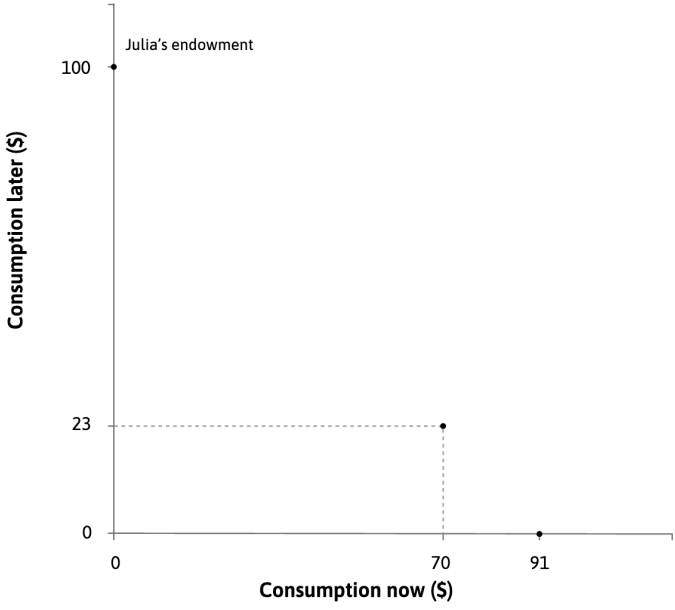
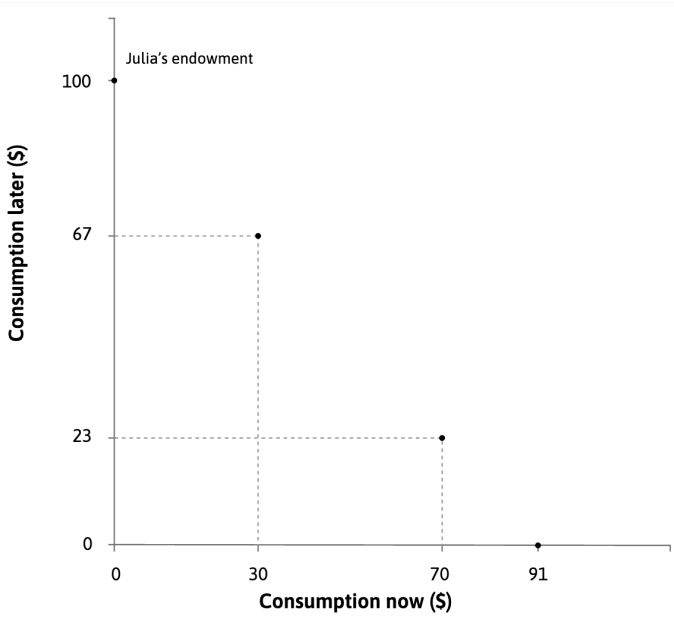
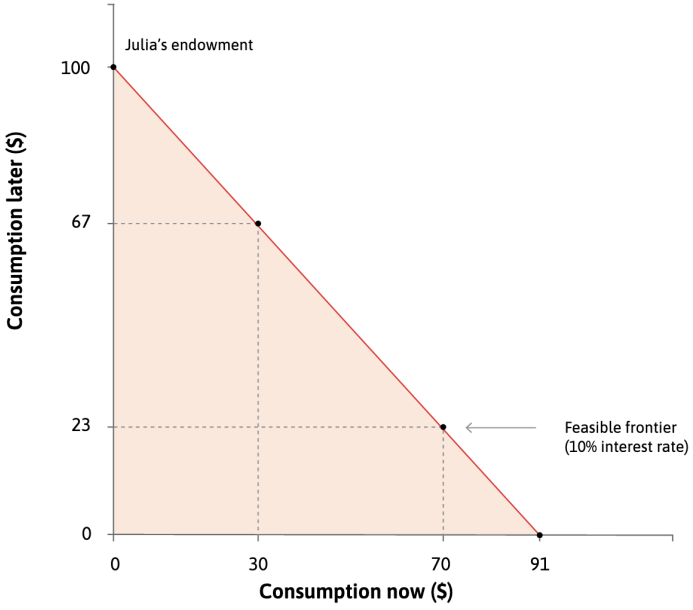
- $x_{t+1} = x_t \times (1 + r) \iff x_t = \frac{x_{t+1}}{1+r}$
- $x_t = \frac{1}{1+r} 100 \approx 91$

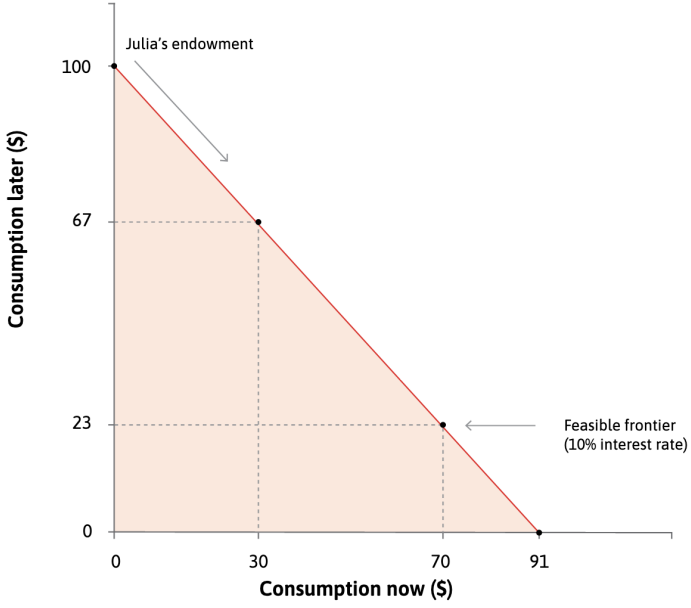

Julia's endowment
100
0
0
Consumption later ($)
Consumption now ($)

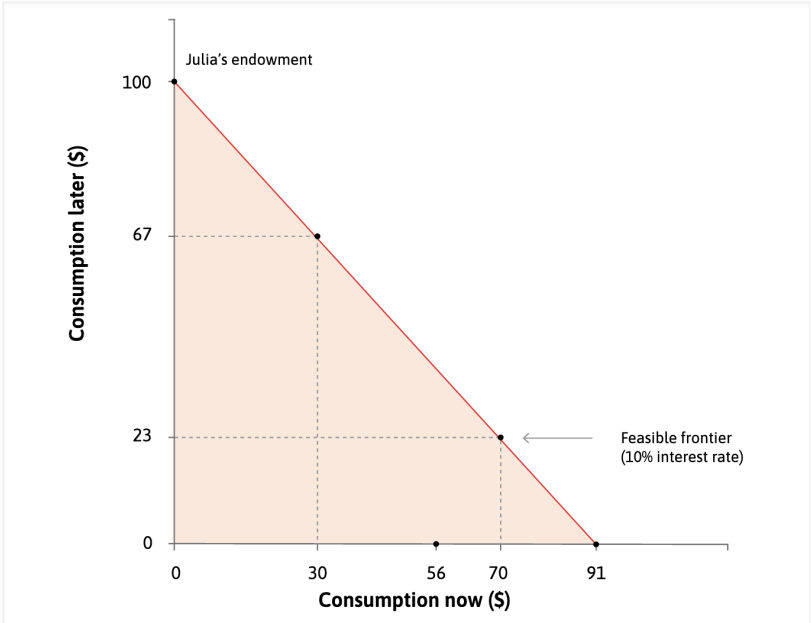

Julia's endowment
100
0
Consumption later ($)
0
91
Consumption now ($)


Julia's endowment
100
23
0
Consumption later ($)
0
70
91
Consumption now ($)


Julia's endowment
100
67
23
0
Consumption later ($)
0
30
70
91
Consumption now ($)


Julia's endowment
100
67
23
0
Consumption later ($)
Feasible frontier
(10% interest rate)
0
30
70
91
Consumption now ($)


Julia's endowment
100
67
23
0
Consumption later ($)
Feasible frontier
(10% interest rate)
0
30
70
91
Consumption now ($)


Julia's endowment
100
67
23
0
Consumption later ($)
0
30
56
70
91
Consumption now ($)
Feasible frontier
(10% interest rate)

The Fundamental Function of Finance

- How do you draw the feasible frontier?

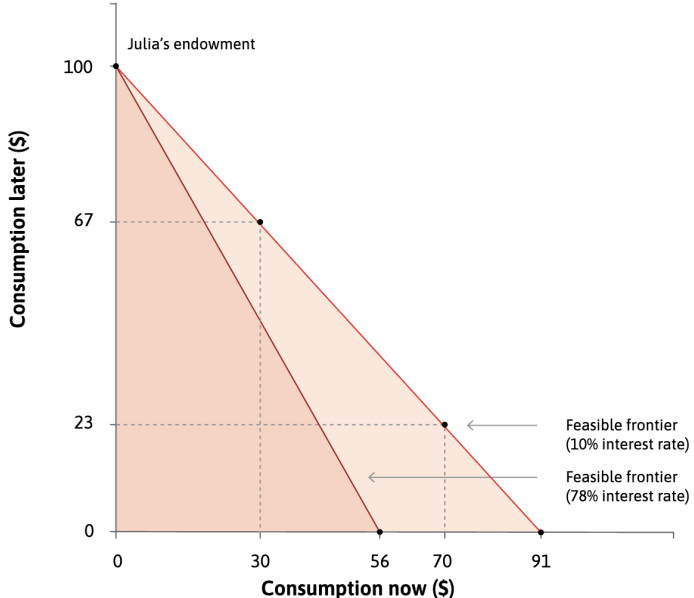
The Fundamental Function of Finance

- How do you draw the feasible frontier?
- It works like in micro when a consumer allocates consumption between two goods.
- The maximum Julia can consume is 100 later or 91 now.
- Think about period 1. She has to allocate 100 between today's consumption and tomorrow's consumption.

The Fundamental Function of Finance

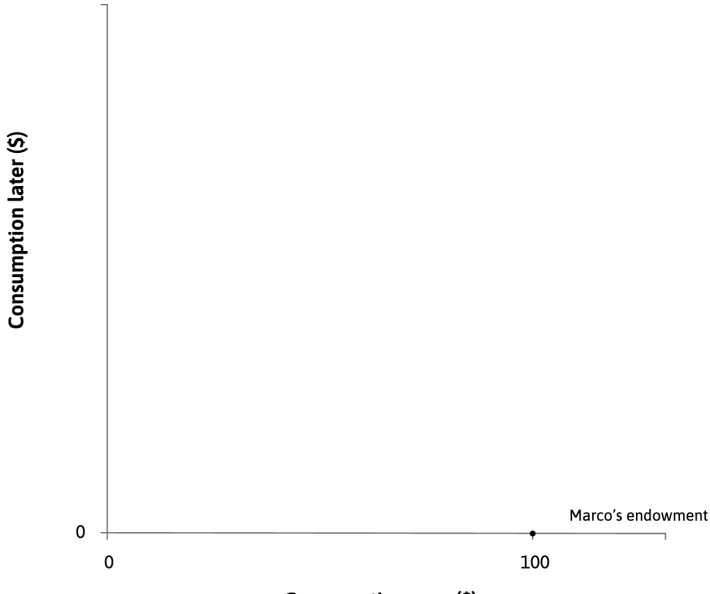
- How do you draw the feasible frontier?
- It works like in micro when a consumer allocates consumption between two goods.
- The maximum Julia can consume is 100 later or 91 now.
- Think about period 1. She has to allocate 100 between today's consumption and tomorrow's consumption.
- $R = x_{t+1} + (1 + r)x_t$.
- $x_{t+1} = R - (1 + r)x_t$
- $(1 + r)$ can be seen as the marginal rate of transformation of future consumption to present consumption.
  - I have to give up (1+r) in consumption in the future to consume 1 now.

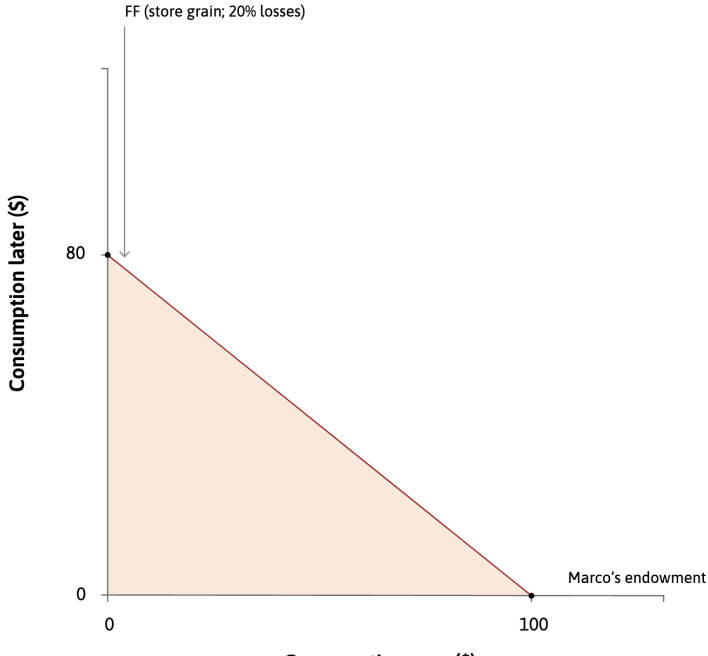
The Fundamental Function of Finance

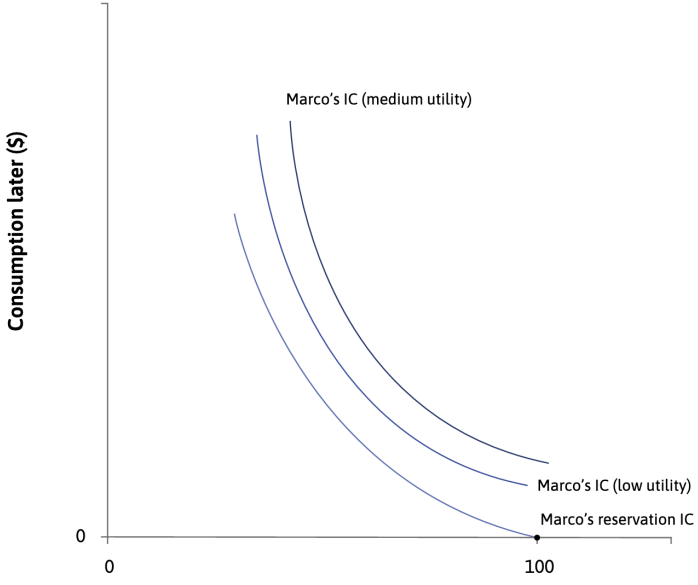


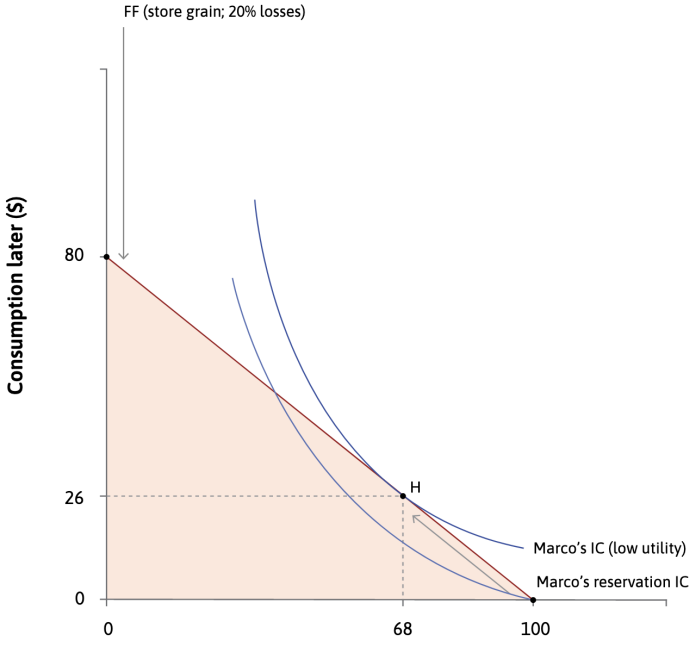
The Fundamental Function of Finance

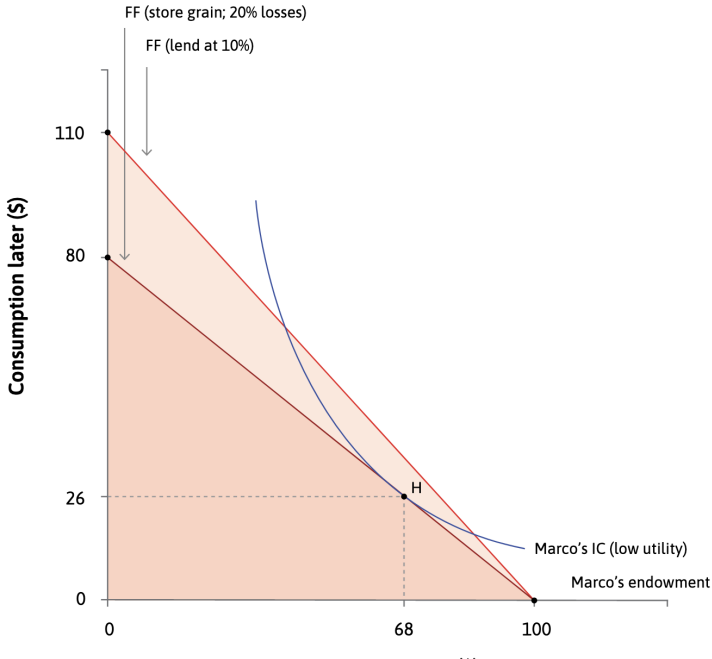
- Borrowing and lending allows someone to rearrange its capacity to buy goods now vs. in the future.
- Consuming more now will constrain my consumption in the future.
- How to chose the optimal bundle?
- Look at preferences! Assume that:
  - Agents prefer to smooth consumption $\longrightarrow$ diminishing marginal returns to consumption.
  - Agents are impatient (they trade-off consumption today against more consumption tomorrow).

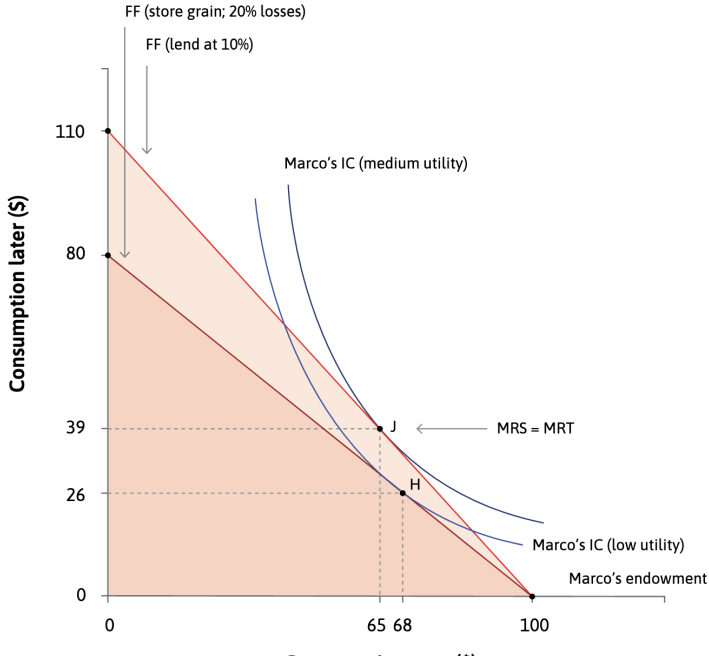

Consumption later ($)
Marco's endowment
0
0
100

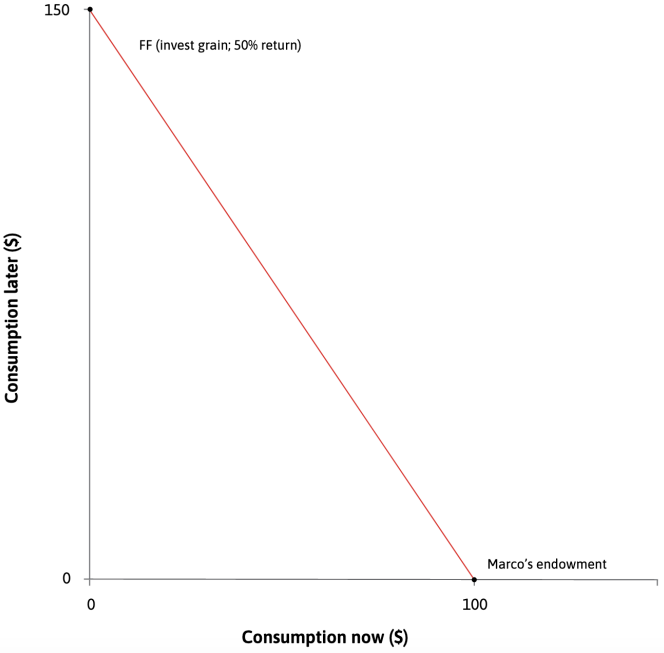

FF (store grain; 20% losses)
Consumption later ($)
80
0
Marco's endowment
0
100

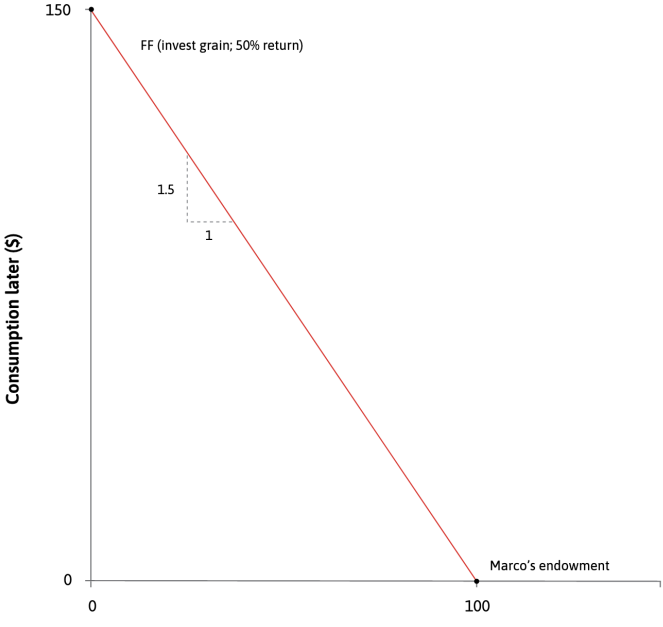

Consumption later ($)
Marco's IC (medium utility)
Marco's IC (low utility)
Marco's reservation IC
0
0
100

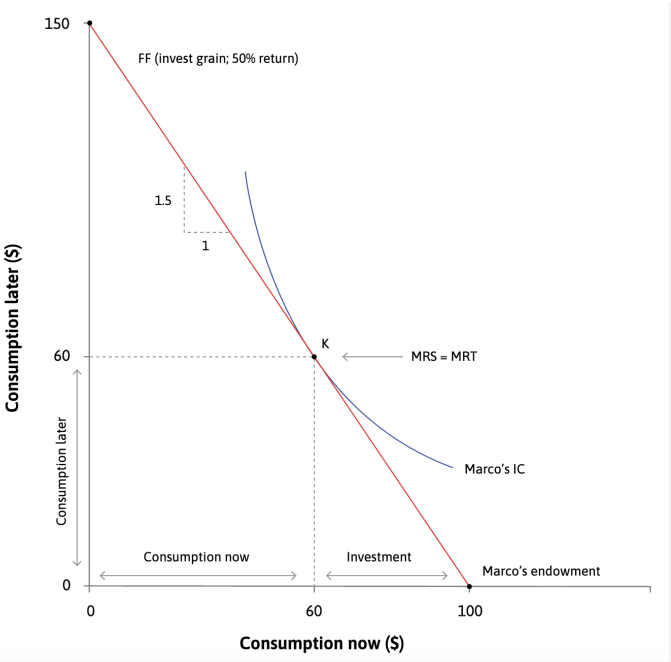

FF (store grain; 20% losses)
Consumption later ($)
80
26
0
H
Marco's IC (low utility)
Marco's reservation IC
0
68
100

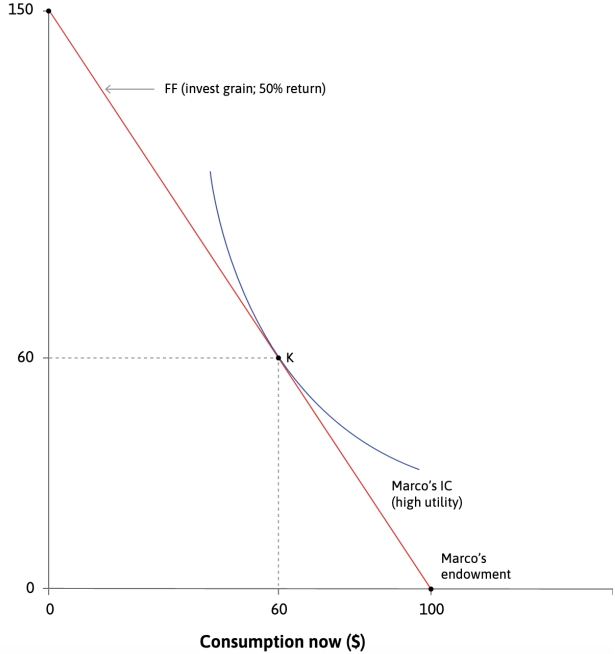

FF (store grain; 20% losses)
FF (lend at 10%)
110
80
26
0
Consumption later ($)
H
Marco's IC (low utility)
Marco's endowment
0
68
100

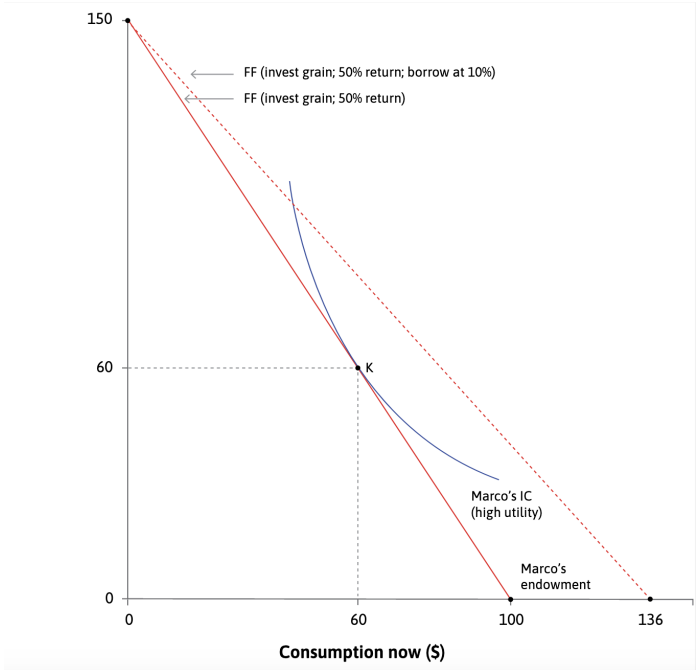

FF (store grain; 20% losses)
FF (lend at 10%)
110
80
39
26
0
Consumption later ($)
Marco's IC (medium utility)
J
MRS = MRT
H
Marco's IC (low utility)
Marco's endowment
0
65
68
100

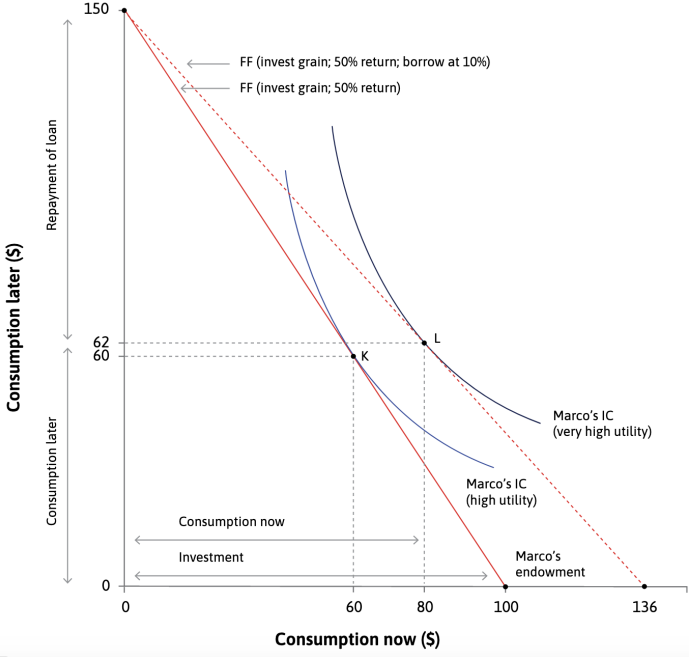

150
FF (invest grain; 50% return)
Consumption later ($)
0
Marco's endowment
0
100
Consumption now ($)

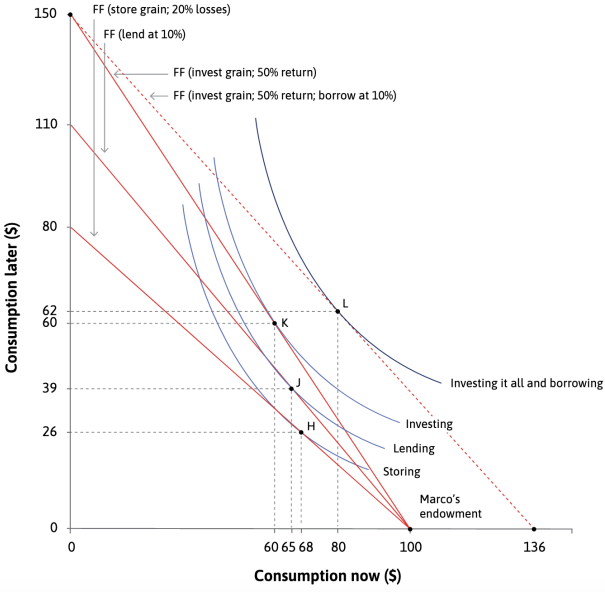

150
FF (invest grain; 50% return)
1.5
1
Consumption later ($)
0
Marco's endowment
0
100
Consumption now ($)


150
FF (invest grain; 50% return)
1.5
1
K
60
MRS = MRT
Consumption later ($)
Consumption later
Marco's IC
Consumption now
Investment
Marco's endowment
0
0
60
100
Consumption now ($)


150
FF (invest grain; 50% return)
60
K
Marco's IC
(high utility)
Marco's
endowment
0
0
60
100
Consumption now ($)


150
60
0
FF (invest grain; 50% return; borrow at 10%)
FF (invest grain; 50% return)
K
Marco's IC
(high utility)
Marco's
endowment
0
60
100
136
Consumption now ($)


150
FF (invest grain; 50% return; borrow at 10%)
FF (invest grain; 50% return)
Repayment of loan
Consumption later ($)
62
60
L
K
Marco's IC
(very high utility)
Marco's IC
(high utility)
Consumption Later
Consumption now
Investment
Marco's
endowment
0
0
60
80
100
136
Consumption now ($)


FF (store grain; 20% losses)
FF (lend at 10%)
FF (invest grain; 50% return)
FF (invest grain; 50% return; borrow at 10%)
150
110
80
62
60
39
26
0
Consumption later ($)
L
K
J
H
Investing it all and borrowing
Investing
Lending
Storing
Marco's endowment
0
60 65 68
80
100
136
Consumption now ($)

The Fundamental Function of Finance

- This conceptual exercise shows how finance can create growth, by reallocating resources in time.
- Much more complicated in real life.
- Risk is a fundamental concept in finance that we have not taken into account here.
- It creates uncertainty and instability.

Four Axioms of Finance

Four Axioms of Finance

1. Investors prefer more to less.
2. Investors are risk-averse.
3. Investors prefer money today to money tomorrow.
4. No arbitrage is possible.

Four Axioms of Finance

Investors prefer more to less.

- Self evident.
- Would you prefer to receive
  - 100 €
  - 200 €
  - Indifferent

Four Axioms of Finance

Investors are risk-averse.

- Would you prefer to receive
  - 100 €
  - 200 € with 50% chance, 0 otherwise
  - Indifferent

Four Axioms of Finance

Investors prefer money today to money tomorrow.

- Would you prefer to receive
  - 100 € nowadays
  - 100 € in a year
  - Indifferent

Four Axioms of Finance

Investors prefer money today to money tomorrow.

- Would you prefer to receive
  - 100 € nowadays
  - 100 € in a year
  - Indifferent

$\longrightarrow$ It's a matter of individual preferences but it also takes into account inflation and uncertainty in the future.

Four Axioms of Finance

No arbitrage is possible.

- Riskless profit opportunities are taken away because markets are highly competitive.

Stock	Rain	Shine
Parasol Co.	-10%	20%
Umbrella Co.	20%	-10%

- Each share costs 100, you have 0, but you can borrow and lend at a 4% rate.
- Is it possible to make profit for sure?

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- Will this situation last?
  - Demand for credit will increase until the rate stabilizes at 5%

Next sessions

- Time value of money.
- Corporate finance.
  - What is the objective of companies?
  - How to choose and finance investment?
- Portfolio theory: the trade-off between risk and return.