

Foundations of Finance

Spring 2022

Prof. Olivier Wang

For Today

- Practical Information about the class
- Overview of class:
 - What is finance?
 - The axioms underlying finance

Teaching Fellows

- Sections 1-2: Stefano Pastore sp5528@stern.nyu.edu
 - OH Fridays 4-6pm on Zoom
- Section 3: Nihar Patel nihar.patel@stern.nyu.edu
 - OH Thursdays 1-2pm on Zoom

You can go to any OH.

But questions about HW should be addressed to your section's TF.

Online

NYU Brightspace:

- Updates and announcements
- Class material, problems, and solutions
- **Quizzes** after most classes

Slack channel:

- Polls
- Can ask (and answer!) questions during class

Prerequisites

- The course is largely self-contained.
- But because of the nature of modern finance, the course is fairly quantitative:
 - Algebra and calculus in class and in problems.
 - Statistics: mean, variance, correlation, regression (read **Statistics Review** handout H0).
- Knowledge of how to use a calculator, Excel
- Stay up to date: FT, WSJ, Economist, Bloomberg

Grades

■ Midterm Exam	30%
■ Final Exam	40%
■ Homeworks	15%
■ Quizzes	15%
■ Participation bonus	

Stern's grading guidelines followed.

See syllabus

Exams

- Midterm exam on **Wednesday 3/9**
- Final exam during final week TBD

Problems

- Solving lots of problems is *crucial*!
- 4 homework assignments
 - You may discuss the assignments in groups.
 - Turn in your own solutions.
 - Show *how* you got your result.
- Will post more ungraded practice problems

Course Outline

1. What are the main financial instruments?
2. How do financial markets operate?
3. How to measure the performance of securities?
4. How to invest: the trade-off between risk and return
 - Portfolio selection
4. How to value financial assets
 - The Capital Asset Pricing Model
 - Equity valuation (stocks)
 - Fixed income securities (bonds)
 - Options

What is Finance?

Instead of an abstract definition, let's think of how economic agents use finance

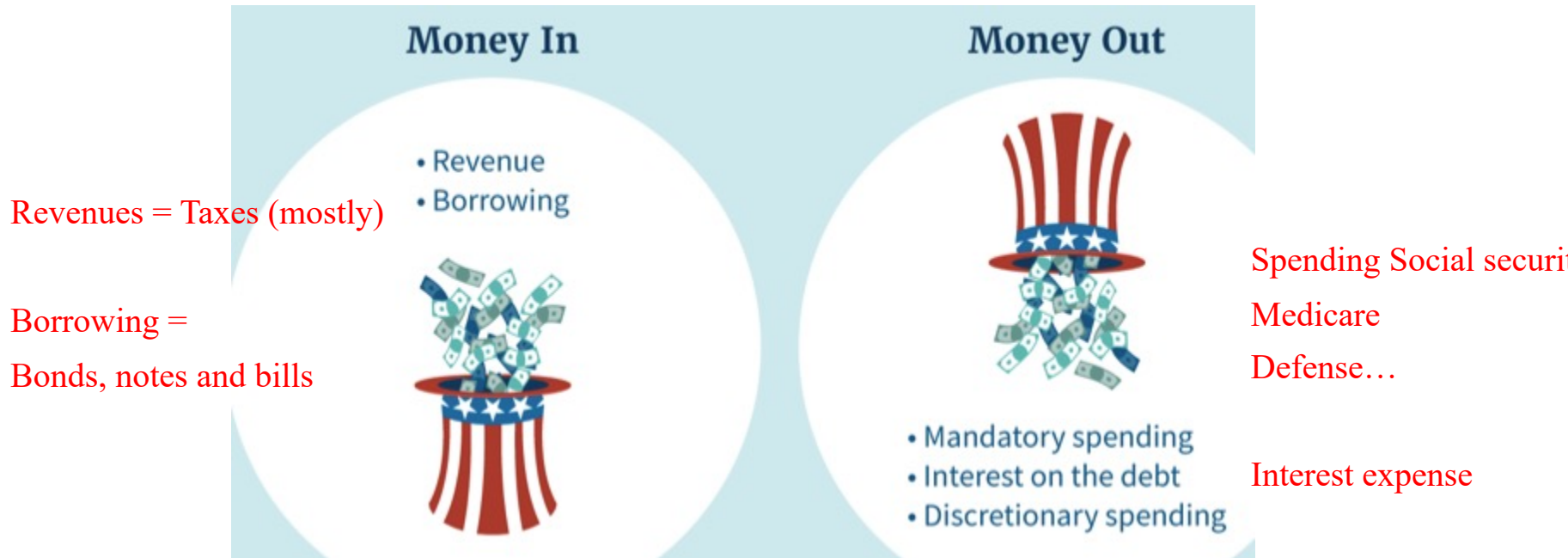
- Firms
 - Raise funds to invest
 - Return money by paying interests and dividends
- Households
 - Borrow and save
- Governments
 - Raise funds to invest and finance deficits

U.S. Households Balance Sheet

Billions of \$ outstanding at end of 2017

		Total Assets	\$ 112,126.20		Total Liabilities	\$14,642.30
		Non Financial Assets	\$ 29,827.60	27%	Loans	\$14,609.30
Real Assets	{	Real Estate <i>houses</i>	\$ 24,533.50	82%	Mortgages	\$10,070.40
		Durables Goods <i>cars...</i>	\$ 5,294.10	18%	Consumer Credit	\$ 3,826.40
		Financial Assets	\$ 82,298.60	73%	Net Worth	\$97,483.90
		Money, deposits, MMF <i>money</i>	\$ 11,660.80	14%		
Securities	{	Bonds	\$ 4,101.20	5%		
		Corporate equities and mutual funds	\$ 24,507.80	30%		
Retirement	{	Life insurance reserves	\$ 1,626.60	2%		
		Pension assets	\$ 25,819.70	31%		
		Proprietor equity <i>private businesses</i>	\$ 12,520.90	15%		

Government Finance

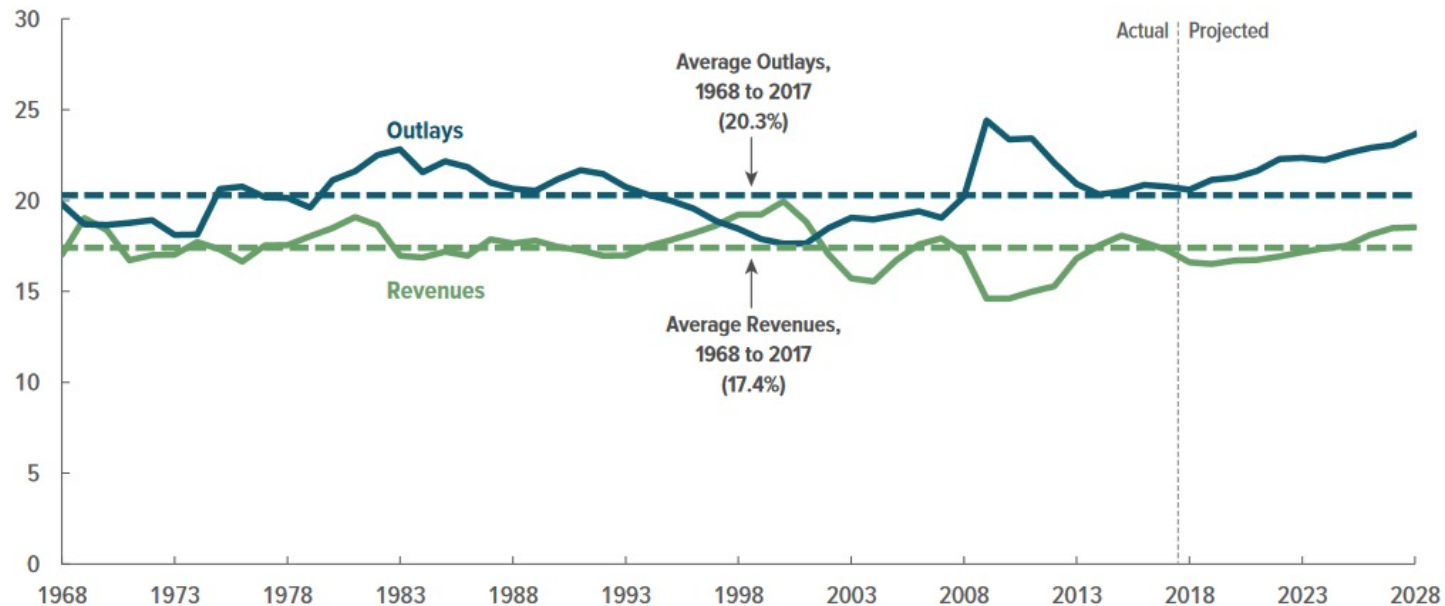


Open question: does the government ever pay the principal back?

Government Finance

Total Revenues and Outlays

Percentage of Gross Domestic Product



Source: Congressional Budget Office.

The CBO, established in 1974, is a nonpartisan office that produces independent analyses of budgetary and economic issues to support the Congressional budget process.

A Lot of Bonds (before COVID...)

Debt Held by the Public



The Axioms of Finance

What would you prefer?

A. \$1000

B. \$2000

C. Indifferent

What would you prefer?

- A. \$1000
- B. \$2000 with 50% chance,
\$0 otherwise
- C. Indifferent

What would you prefer?

- A. \$1000 now
- B. \$1000 in a year
- C. Indifferent

Arbitrage

- Return of Parasol Co: -10% if rain, $+20\%$ if sun
 - Return of Umbrella Co: $+20\%$ if rain, -10% if sun
 - You can borrow and lend at 4% interest rate
 - How can you make a *sure* profit with *zero initial cash outlay*?
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- A. Buy Parasol and sell Umbrella
 - B. Buy Parasol and buy Umbrella
 - C. Buy Parasol, buy Umbrella, and borrow at 4%

Finance is based on a few simple axioms:

1. Three axioms about investor behavior:

- Investors prefer more to less
- Investors are risk averse
- Money paid in the future is worth less than same amount paid today (“time value of money”)

2. Financial markets are highly competitive

- No arbitrage condition (“no free lunch”)

Risk and Return

Real returns on U.S. Stocks and Treasury Bonds 1870-2021

