

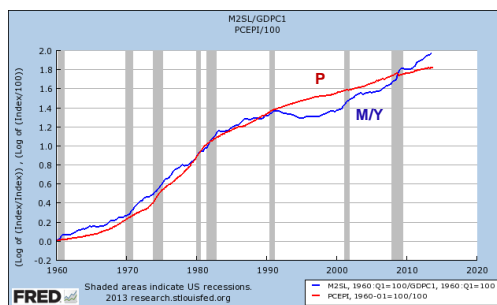
## The Global Economy

### Monetary Policy & Interest Rates

## Ride home revisited

- Should Fed continue aggressive expansion of money supply (“quantitative easing”)?
- Why or why not?

## Ride home revisited



## The idea

- Interest rates reflect many things, but the short-term focus of bond traders in most countries is on the central bank

## Keep it simple

- Lots of stories and institutional detail along the way
- Focus on **central bank balance sheet** and **Taylor rule**

## Big picture for bond investors

- Bond investors
  - Bond prices fall when interest rates rise (definition)
  - More so for long bonds
  - If you expect rates to rise, hold short bonds
  - Look to Fed for guidance [more coming]

## Big picture for policy analysts

- Are you worried about inflation or growth right now?
- What should the Fed do?
- Would we be better off with gold as our currency?

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## Big picture for philosophers

- What is money?
- Why does it matter?
- Is gold money? Paper? Bitcoins?

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## Big picture for economists

- Donald Knuth
  - Science is what we understand well enough to explain to a computer; art is everything else.”
- Evidently monetary policy is an art

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## Courses related to this topic

- Monetary policy, banks, and central banks (ECON-GB.2333)
  - Tobias Adrian, NY Fed, Head of Capital Markets Group
- Financial crisis and policy response (ECON-GB.2343)
  - Kim Schoenholtz, Professor of Management Practice, Ex-Salomon and Citi, former Chief US Economist at Citi, central bank expert
- Not offered next term, but probably next year

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## Roadmap

- Short history of money
- What should central banks do?
- **Money supply mechanics**
- Interest rate mechanics
- **Taylor’s interest rate rule**
- Unconventional monetary policy

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## *Short history of money*

## Stone money

- Milton Friedman, "Stone money," in *Money Mischief*
  - On the island of Yap in the Western Pacific ...
- What's the point?



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## Commodity money

- Gold standard
  - Money tied to gold (eg, 1 oz = \$35)
  - In principle, people can take their money to the central bank and exchange it for gold
  - This guarantees money has value
- Questions
  - Does it deliver stable prices?
  - Is it a waste of gold?
  - An improvement on our current system?

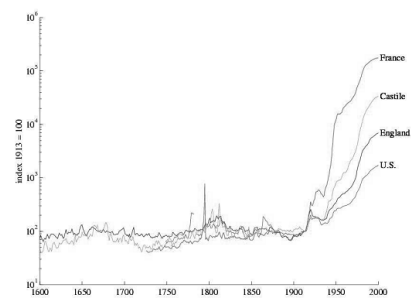
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## Commodity money

- David Ricardo, *Proposals for a Secure Currency*, 1816
  - The introduction of precious metals [as money] may with truth be considered one of the most important steps toward the improvement of commerce. But it is no less true that ... it would be another improvement to banish them altogether [in favor of paper money].
- What is he saying? Do you agree?

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## Prices with commodity & paper monies



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## Open question

- How do we deliver stable prices?
  - Commodity money?
  - Central bank policy?
  - Something else?

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*What should central banks do?*

## Federal Reserve System

- Founded by Federal Reserve Act of 1913
  - The Federal Reserve System and the Federal Open Market Committee should seek “to promote effectively the goals of **maximum employment, stable prices, and moderate long-term interest rates.**”
- So what’s the goal?
- And what about motherhood and apple pie?

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## ECB

- ECB = European Central Bank
- Treaty of Maastricht (1992)
  - The **primary objective of [monetary policy] shall be to maintain price stability.**
  - Without prejudice to the objective of price stability, the ECB shall support the general economic policies in the Community with a view to contributing to the achievement of ... a high level of employment and sustainable and non-inflationary growth.
- How does this differ from Fed? Good idea or bad?

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## Banco Central de Argentina

- BCRA Act of 2003
  - The Argentine Central Bank is a self-governed institution whose primary and fundamental mission is to preserve the value of the currency.
- Good idea? Did it work?

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## Federal Reserve revisited

- Fed policy statement, October 30, 2013:
  - Information received since the September meeting generally suggests that economic activity has continued to expand at a moderate pace. Consistent with its statutory mandate, the Committee seeks to foster maximum employment and price stability.
- What are they saying? Do you agree?

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## Federal Reserve revisited

- Janet Yellen, testimony, November 2013
  - The past six years have been challenging and difficult. We have made good progress, but unemployment is still too high. At the same time, inflation has been running below the Federal Reserve's goal of 2 percent. For these reasons, the Federal Reserve is using its monetary policy tools to promote a more robust recovery.
- What is she saying? Do you agree?

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## Federal Reserve revisited

- Charles Plosser, President, Philly Fed, speech, November 2013
  - The active pursuit of employment objectives continues to be problematic for the Fed. Most economists are dubious of the ability of monetary policy to predictably and precisely control employment in the short run, and there is a strong consensus that, in the long run, monetary policy cannot determine employment.
- What is he saying? Do you agree?

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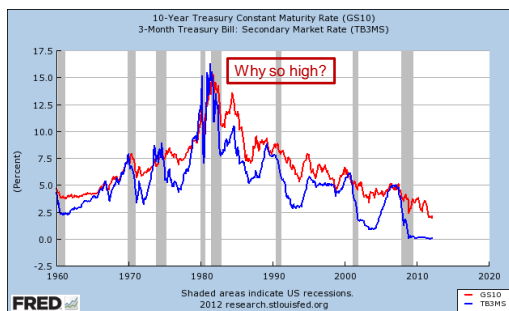
## Money & interest rates

### Where do interest rates come from?

- We generally think of monetary policy in terms of interest rates
- Where do these interest rates come from?
  - Short-term Treasuries?
  - Long-term Treasuries?
  - Fed funds rate?
  - Inflation-indexed Treasuries (TIPS)?

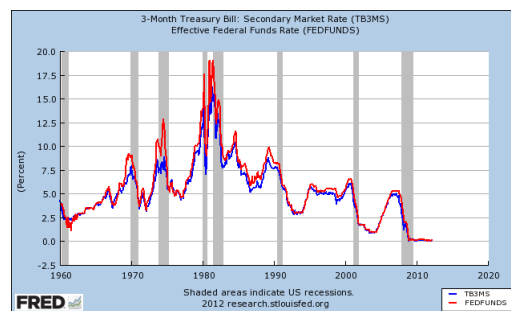
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### Where do interest rates come from?



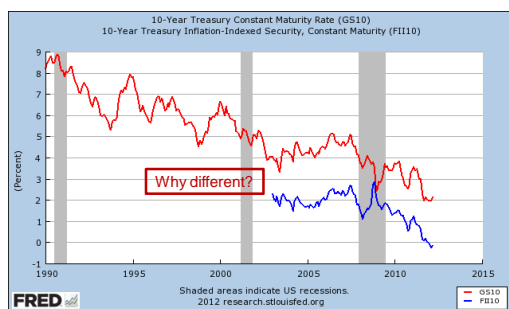
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### Where do interest rates come from?



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### Where do interest rates come from?



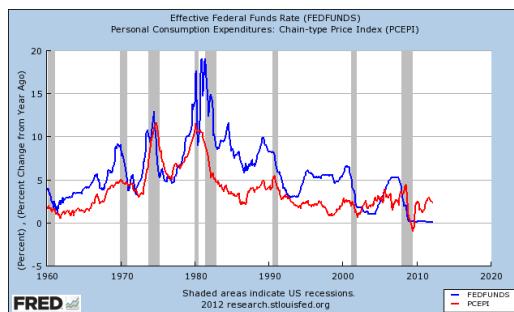
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### Where do interest rates come from?

- Interest and inflation ("Fisher equation")
 
$$i = r + \pi$$
  - $i$  = "nominal" interest rate (payment in dollars)
  - $r$  = "real" interest rate (payments in goods)
  - $\pi$  = inflation (expected?)

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## Where do interest rates come from?



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## Where do interest rates come from?

- Summary
  - Inflation is part of the story
  - But there's still a lot of variation left

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## Money supply mechanics

## Reminder: money supply mechanics

### Treasury

Assets	Liabilities
	Bonds 200

### Central bank

Assets	Liabilities
Bonds 20	Money 20

### Households and firms

Assets	Liabilities
Money 20	
Bonds 180	

- How does central bank increase money supply?
- [Think: asset swap]
- Why do households go along?

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## Fed policy statement

- Federal Open Market Committee ("Fed" or "FOMC")
  - Meets eight times a year
  - Makes public statement immediately following
  - Search: "FOMC"
- Statement includes
  - Interest rate target
  - And recently: asset purchases ("quantitative easing")

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## Fed policy statement

- Statement of October 30, 2013:
  - The Committee sees the improvement in economic activity since it began its **asset purchase program** as consistent with growing underlying strength in the economy. However, the Committee decided to continue purchasing agency mortgage-backed securities at a pace of \$40 billion per month and longer-term Treasury securities at a pace of \$45 billion per month.
  - The Committee decided to **keep the target range for the federal funds rate at 0 to 1/4 percent** and currently anticipates that this exceptionally low range will be appropriate for some time.
- What are they saying?

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## Asset market purchases

### Central bank usually

Assets		Liabilities	
Bonds	20	Money	20

### Central bank now

Assets		Liabilities	
Bonds	120	Money	20
Agency	100	Reserves	200

- What are these “asset market purchases”?
- How does the Fed finance them?
- Why is it helpful to pay interest on reserves?
- What kind of asset swap is this?

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## Interest rate mechanics

## Overview

- Central banks shift AD by changing money supply
- But: Fed policy statement focused on interest rate
- Translation
  - Increase in interest rate is same as reduction in money supply
  - Decrease in interest rate is same as expansion of money supply
- More soon, but that’s the point
- Focus on US, but [most] other countries are similar

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## Some institutional detail

- In practice, Fed operates in market for “reserves”
- Reserves are deposits of banks at Fed (“fed funds”)
  - The Fed is the bank for banks
  - Reserves held by banks for transactions or as investments
- Banks trade overnight positions in “fed funds”
  - If they have more than they want, they sell
  - If they have less than they want, they buy
- The rate on these positions is the “**fed funds rate**”

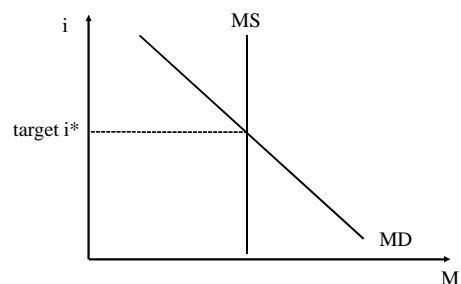
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## Hitting the target interest rate

- How does the Fed hit its target interest rate?
- Demand for money depends on interest rate
  - Why? Currency pays no interest, so hold less if rate is high
  - So... choose supply of money to hit target
- No different from markets for apples, copper, etc

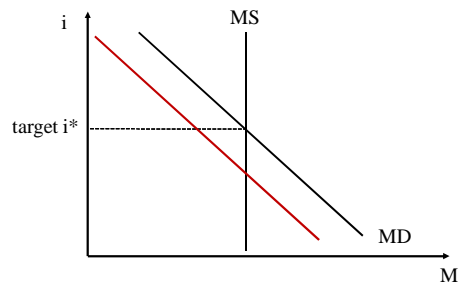
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## Hitting the target interest rate



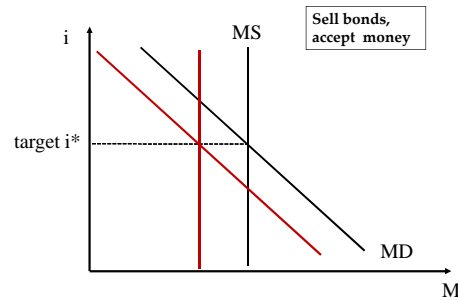
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### What if demand changes?



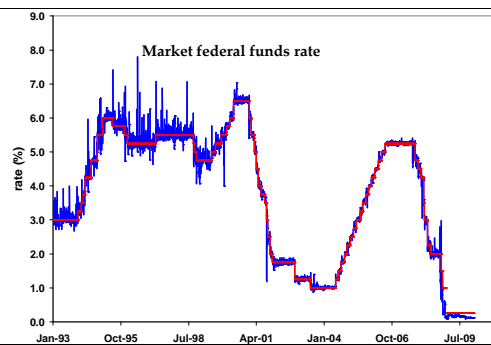
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### What if demand changes?



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### Hitting the target interest rate



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### Hitting the target interest rate

- Summary
  - Increasing money supply lowers interest rate
  - Decreasing money supply raises interest rate
  - We'll talk as if changing money supply and interest rate are equivalent

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### Up next

- What rate do we choose?
  - Could go back to AS/AD
  - But we'll use a popular rule of thumb instead

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### *The Taylor rule for the fed funds rate*



## The Taylor rule

- A formula for setting fed funds rate
- What's good about a formula? Bad?
- What should rate respond to?
  - Inflation?
  - GDP and GDP growth?
  - Condition of financial system?
  - Exchange rate?
  - Other things?

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## The Taylor rule

- John Taylor's rule for setting fed funds rate

$$i = r^* + \pi + a_1(\pi - \pi^*) + a_2(g - g^*)$$

- $i$  = target fed funds rate
- $r^*$  = average real interest rate [2%]
- $\pi$  = inflation rate
- $\pi^*$  = target inflation rate [2%]
- $g$  = GDP growth rate
- $g^*$  = average GDP growth rate [3%]
- $(a_1, a_2)$  = numbers/parameters [1/2, 1/2]

Variations?

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## The Taylor rule as bond trader's guide

- What happens to interest rate if
  - GDP growth rises?
  - Inflation rises?

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## The Taylor rule

- What does it suggest on average?

$$i = r^* + \pi + a_1(\pi - \pi^*) + a_2(g - g^*)$$

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## The Taylor rule

- What does it suggest now?

$$i = r^* + \pi + a_1(\pi - \pi^*) + a_2(g - g^*)$$

- Recent numbers
  - Inflation PCE chain index: YOY Sep = 0.9%
  - Inflation CPI urban consumers: YOY Sep = 1.2%
  - GDP growth: 2013Q3 = 2.8%. YOY = 1.6%

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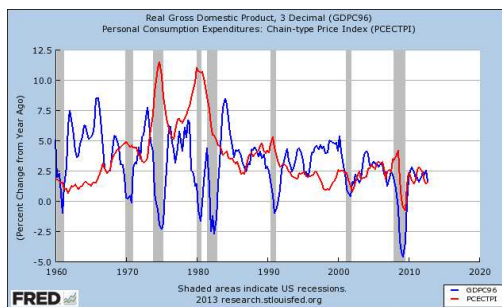
## The Taylor rule

- How much does it respond to inflation? Why?

$$i = r^* + \pi + a_1(\pi - \pi^*) + a_2(g - g^*)$$

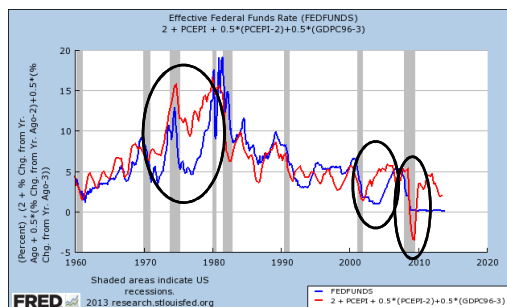
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## US history: inflation and growth



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## US history: Taylor rule



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## The Taylor rule

- What happened in 1970s?
  - Rate below Taylor rule, inflation shot up
  - Same as last week, where we called it too much money
- What happened in 2001?
  - Rate below Taylor rule, justified or mistake?
- What happened in 2008?
  - Taylor rule points to negative rate, can't be done [more soon]
- What should we do now?
  - Taylor rule above target, rate too low?

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## Unconventional policy

## Unconventional monetary policies

- Policy 1: quantitative easing
  - What do we do when the interest rate hits zero?
- Policy 2: credit easing
  - How can we mitigate impact of financial disruption?

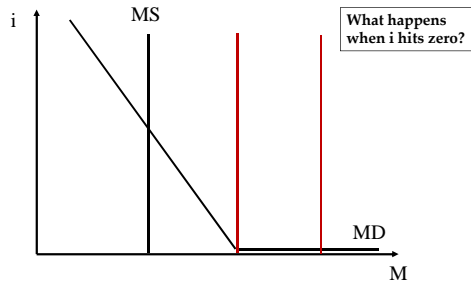
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## Unconventional policy 1

- What happens when interest rate hits zero?
  - Can't have negative interest rates, people would hold cash instead
  - ZLB: zero lower bound
- But: you can still increase money supply
  - QE: quantitative easing
  - New name for an old idea?

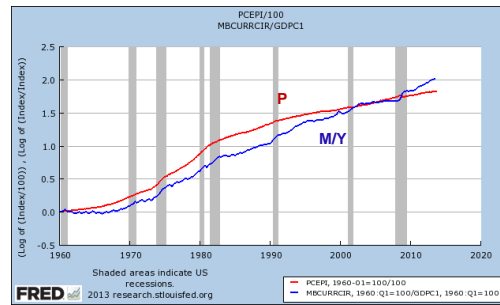
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## QE at the ZLB



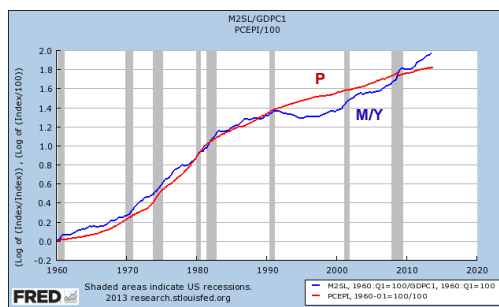
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## Quantitative easing (currency)



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## Quantitative easing (M2)



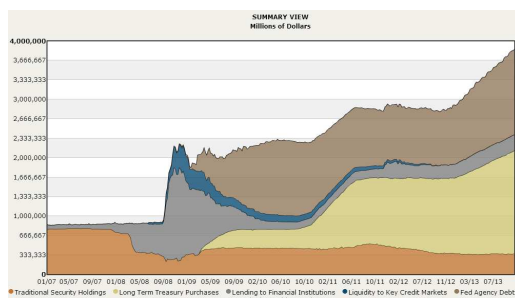
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## Unconventional policy 2

- Another unconventional policy: buy assets
  - CE: credit easing (buy private assets)
  - QE: quantitative easing (buy public assets in large quantities)
- See Cleveland Fed animation  
[http://www.clevelandfed.org/research/Data/Credit\\_Easing/index.cfm](http://www.clevelandfed.org/research/Data/Credit_Easing/index.cfm)
- Why?
  - Prop up financial system? Twist yield curve?

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## Quantitative and credit easing



Source: Cleveland Fed.

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## Unconventional policy revisited

- Which was it?
  - Brilliant strategy that mitigated impact of the financial crisis
  - Excessive expansion that will lead to inflation down the road

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## What have we learned?

- Central banks usually target an interest rate rather than the money supply
  - Two ways of thinking about the same thing
- Taylor rule ties interest rate to inflation and growth
  - Bond trader's guide
  - Raises questions when policy differs [like now?]
- When interest rate hits zero, you can still increase the quantity of money

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## The Global Economy

### *Principles of Tax Policy*

NYU  STERN

## Roadmap

- New module: crises
- The ideas
- Words and numbers
- Principles of spending policy
- Principles of tax policy
- **Low rates, broad base**

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## Starting new module

- New module organized roughly around economic crises
- First topic: “fiscal policy” = “government finance”
  - Government spending
  - Tax revenue
  - Debt = deferred taxes [next week]

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## The ideas

- Countries differ – a lot – in the magnitude and type of spending, the taxes they collect, and how they manage their debt
- Good tax systems
  - Pay for government spending [next week]
  - Are transparent and simple to execute
  - Apply low rates to a broad base

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## *Words and numbers*

## Words

- An old joke:
  - Opinion polls show that 100% of voters think other people should pay more tax.

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## Words

- *The Economist*, Survey France, Oct 26 06:
  - An employer who pays a worker twice the minimum wage, or €2,400 a month, has to shell out nearly half as much again to the state in social-security contributions; the employee, for his part, has to hand over 22% of his pay in social-security contributions, on top of income tax. A French pay slip typically runs to over 40 itemised lines.
- What's going on here?

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## Words

- Ivan Miklos, Deputy Prime Minister of Slovakia, *Financial Times*, on corporate taxes:
  - I am convinced that the reforms of new EU member states could serve as inspiration for the older member states as well. One such reform is the flat tax. ... We now have one of the simplest, most transparent tax systems in the world. ... And our tax revenues have not decreased at all, partly because the reform eliminated most of the incentives and opportunities for tax avoidance. The new system has been particularly popular with German companies.
- What's going on here?

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## Words

- EIU, *Country Commerce Report*, India:
  - Corporate tax rates have come down in recent years to fairly reasonable levels, in keeping with the government's aim to widen the tax base and ensure greater compliance. But the underground economy, with its untaxed transactions and incomes, remains large.
  - The system remains complicated, however, and is the subject of frequent litigation.
- What's going on here?

76

## Words

- Jesse Drucker, Bloomberg, May 2013
  - Even amid growing public outrage in Europe against austerity policies, the gulf between rhetoric and reality on taxation means individuals rather than businesses are often bearing the brunt of higher taxes.
- What's going on here?

77

## Words

- Tom Friedman, NYT, Mar 2 10:
  - Intel's CEO Paul Otellini: "The things that are not conducive to investments here are [corporate] taxes and capital equipment credits. A new semiconductor factory at world scale built from scratch is about \$4.5 billion — in the United States. If I build that factory in almost any other country in the world, where they have significant incentive programs, I could save \$1 billion. [We built our new plant in China] and it wasn't because the labor costs are lower. Yeah, the construction costs were a little bit lower, but the cost of operating after tax was substantially lower."
- What's going on here?

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## Words

- Eduardo Porter, "A tax code of politics," *NYT*, April 10, 2012:
  - Our byzantine tax code is built upon a longstanding political deal: Democrats wanted a tax scale with higher rates for richer Americans to finance social programs for the poor and middle class. Republicans countered by pushing for tax exceptions, exclusions and deductions that shielded the incomes of the rich from the taxman and reduced government revenue.
  - This compromise has left us with a loophole-riddled code.
- What's going on here?

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## Words

- Eduardo Porter, "A tax code of politics," *NYT*, April 10, 2012 (continued):
  - The richest 1 percent of Americans, who make \$1.5 million on average, pay 28 percent of their income in federal taxes. That's way below the top rate of 35 percent. The rest of us also pay little. The bottom 85 percent of taxpayers have an average federal tax rate of 12 percent. The poorest 25 percent pay less than 1 percent of their income
- What's going on here?

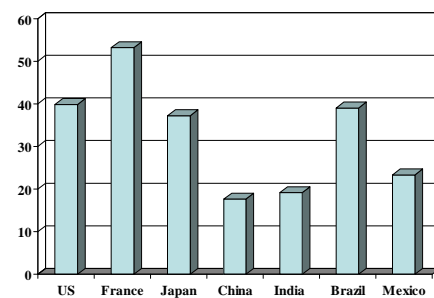
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## Words: summary

- What should we tax?
- Who should we tax?
- Why?

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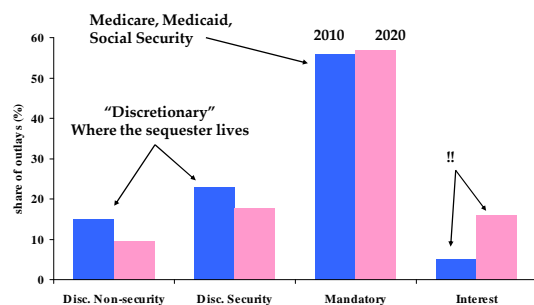
## Government spending (% of GDP)



Source: OECD fiscal database.

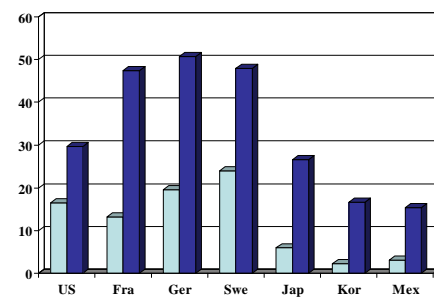
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## US federal government spending



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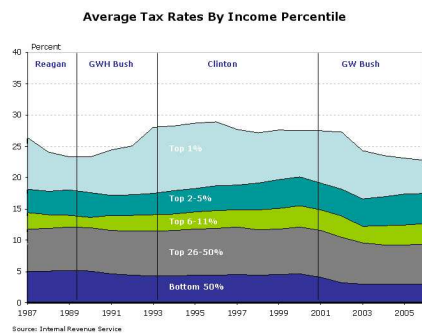
## Personal tax rates (% at average wage)



Source: OECD. Green=direct tax. Blue=total incl soc ins payments.

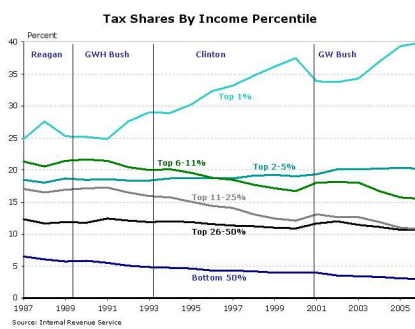
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## US average tax rates by income (all taxes)



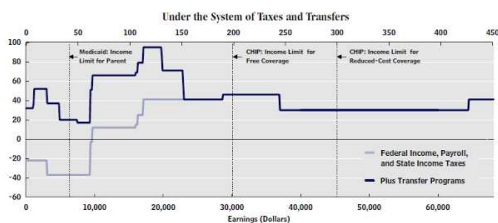
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## US tax shares by income (all taxes)



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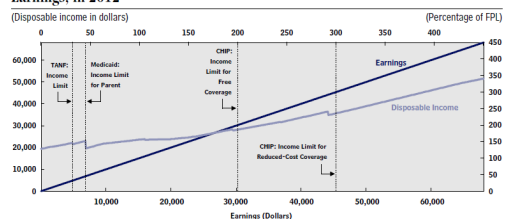
## US: marginal tax rates by income



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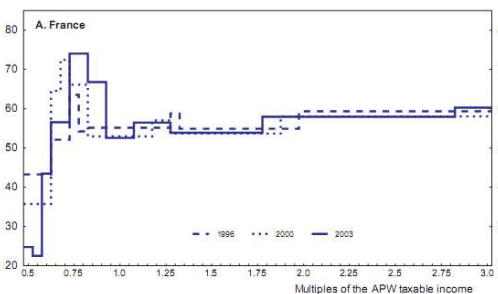
## US: post-tax and pre-tax income

### Disposable Income for a Hypothetical Single Parent with One Child, by Earnings, in 2012



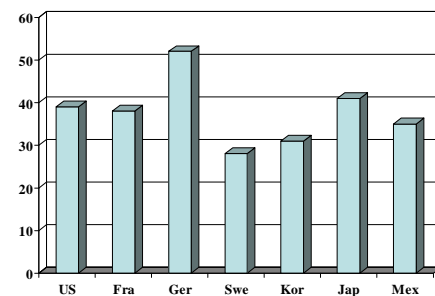
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## France: marginal tax rates by income



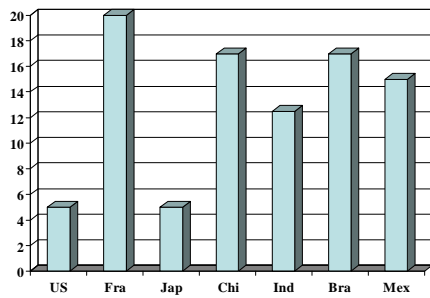
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## Corporate tax rates



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## Value-added tax rates



Source: Doing Business.

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## Principles of government spending

## Government spending

- Classic argument: provide *public goods*
- Public goods are
  - Non excludable: hard to keep non-payers from consuming
    - National security, legal system, fish in the ocean
  - Non rival: my consumption does not affect your consumption
    - Fresh air, NY skyline, public safety
- Hard for a private firm to capture all the benefits, so market would provide too little

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## Government spending

- Many goods partly private, partly public
- Individuals and countries differ on
  - Roads?
  - Security?
  - Education?
  - Mass transit?
  - Sport stadiums?
  - Opera?
  - Health care?
  - Others?

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## Government spending



**Libertarian Reluctantly Calls Fire Department**  
April 21, 2004 | [Issue 40 • 16](#)

CHEYENNE, WY— After attempting to contain a living-room blaze started by a cigarette, card-carrying Libertarian Trent Jacobs reluctantly called the Cheyenne Fire Department Monday. “Although the community would do better to rely on an efficient, free-market fire-fighting service, the fact is that expensive, unnecessary public fire departments do exist,” Jacobs said. “Also, my house was burning down.” Jacobs did not offer to pay firefighters for their service.

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## Government spending, continued

- Most government spending not goods, public or otherwise
- Transfer payments to cover
  - Pension funds
  - Disability
  - Healthcare
- Countries differ, but (esp) in rich countries transfers are greater than purchases of goods and services

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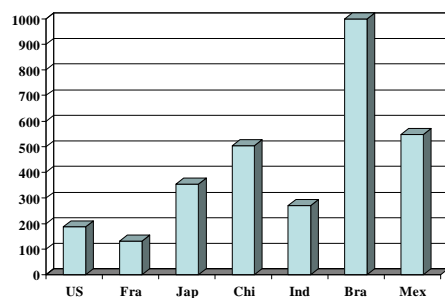
## Principles of tax policy

## Tax principles

- Societies choose different levels of spending
- They have to pay for it, primarily through taxes
- Which taxes?
- Principles of good tax policy
  1. Collect enough revenue to pay for government spending [next week]
  2. Transparent and easy to execute
  3. Apply low rates to a broad base

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## Complexity of business taxes (hours)



Source: Doing Business.

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## Tax complexity: Vodafone in India

- Civitas.in online case [my summary]
  - Vodafone BV, based in the Netherlands and controlled by Vodafone UK, obtained a controlling interest in CGP Investments Holdings, located in Cayman Island, from Hong Kong-based Hutchinson Telecommunications International Ltd (HTIL)
  - HTIL had a stake in CGP's mobile operations in India.
  - India sent Vodafone a \$2.3b tax bill based on capital gains in its India operations (gains taxed on transfer of control)
  - The Supreme Court rejected the government's argument in March, but the government threatened to pass legislation allowing retrospective taxation of business deals.
  - The saga continues ...

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## Low rate, broad base

## Tax "distortions"

- If we start with a good allocation of resources, taxes move us away from it
- We say taxes "distort" decisions to buy and sell
- Examples
  - Tax on cigarettes discourages smoking
  - Tax on labor income discourages work
  - Tax on saving and investment income discourages both
  - In each case: good or bad?

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## Tax “distortions”

- The idea is to raise enough revenue to pay for spending with smallest distortions possible
- Tax principle #3: Apply a low rate on a broad base

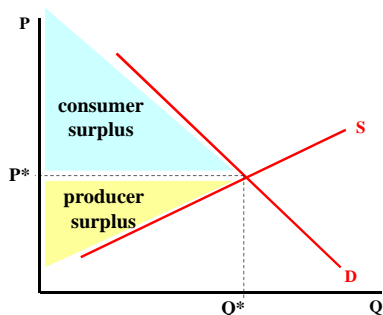
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## Tax “distortions”

- Apply low tax rate to broad tax base
- Why?
  - Taxes “distort” economic decisions
  - High tax rates distort more
- Our thought experiment
  - Tax two markets equally
  - Tax one market twice as much
  - Which is better?

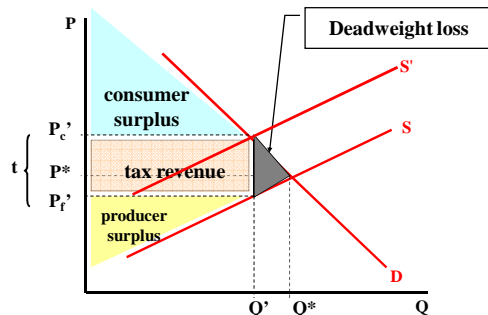
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## Welfare maximized where $S=D$



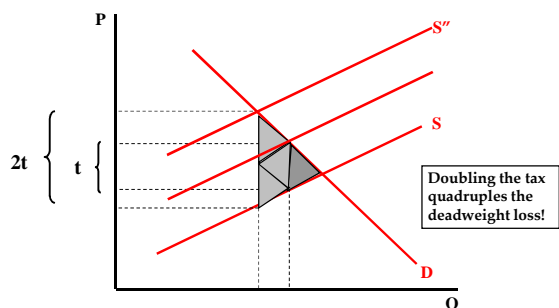
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## Tax destroys surplus



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## Large tax destroys more surplus



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## Tax distortion summary

- Summary
  - Tax at rate  $t$  generates loss of one triangle
  - Tax at rate  $t$  on two markets generates loss of two triangles
  - Tax at rate  $2t$  on one market generates loss of **four** triangles
- Therefore
  - Better off taxing two markets at rate  $t$
  - Principle #3: tax broad base (two markets) at low rate ( $t$ , not  $2t$ )

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## Low rate, broad base

- Should we
  - Make food and clothing exempt from tax?
  - Mortgage interest?
  - Health insurance?
  - Internet sales?
  - Legal services?
  - Education supplied by nonprofits?

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## Low rate, broad base

- “A dance is a dance,” New York Times, October 2012
  - The New York State Court of Appeals ruled last week that Nite Moves, a strip club near Albany, must pay sales tax on admissions fees it collects from customers. State law exempts from sales tax “dramatic or musical arts performances,” including “choreographic” performances. The question was whether a private lap dance or a pole dance qualifies as a “dance.”
- What’s going on here?

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## Low rate, broad base: VAT

- Why tax value added?
- Countries used to tax output at all stages
- Example: 5 stages in value chain, tax each stage on total value

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## Low rate, broad base: taxing interest

- Impact of taxing interest income
- Without taxes
  - Price now of one dollar of consumption now: 1
  - Price now of one dollar of consumption  $n$  periods from now:
$$1/(1+r)^n$$
- With taxes
  - Price now of one dollar of consumption now: 1
  - Price now of one dollar of consumption  $n$  periods from now:
$$1/[1+(1-t)r]^n$$

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## Low rate, broad base: taxing interest

- Numbers
  - $r = 0.05$  [5%]
  - $t = 0.25$  [25%]
  - $n = 20$  [20 years]
- Compare cost of future consumption
$$1/(1+r)^n = 0.38$$
$$1/[1+(1-t)r]^n = 0.48$$
- This makes future consumption more expensive
  - What does it distort? What are the consequences?

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## What have we learned?

- Countries differ a lot in government spending and taxes
- Taxes change incentives to work, save, etc
- Good tax systems
  - Generate enough revenue to cover spending [next week]
  - Simple and transparent
  - Broad base, low rate

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## Coming up

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- Problem Set #4: monetary & fiscal policy
- Due in two classes (three weeks)
- First question doable now

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## For the ride home

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- Has the US government issued too much debt?
- What's too much? What are the consequences?

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