
The Global Economy

Monetary Policy & Interest Rates



The idea

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

2

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]

3

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? Bitcoins?

4

Advertisement

- More on today's 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

5

Roadmap

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

6

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?



8

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?

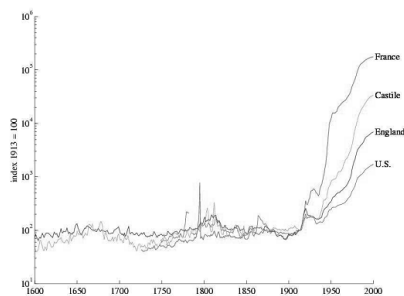
9

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?

10

Prices with commodity & paper monies



11

Open question

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

12

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?

14

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? Why? Good idea or bad?

15

Federal Reserve revisited

- Ben Bernanke, testimony before Congress, November 2005
 - Middle income living standards and poverty are best addressed through employment growth. By maintaining low inflation and low expectations of inflation, you can create new employment.
- Does this make sense to you? Or should we eliminate the “dual mandate”?

16

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?

17

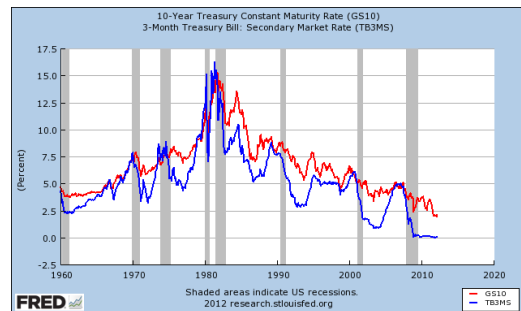
Money & interest rates

Where do interest rates come from?

- Short-term?
- Long-term?
- Nominal?
- Real?
- Other?

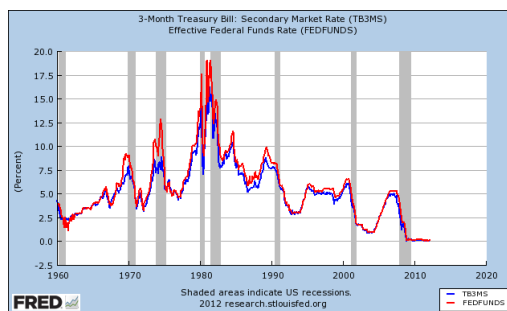
19

Where do interest rates come from?



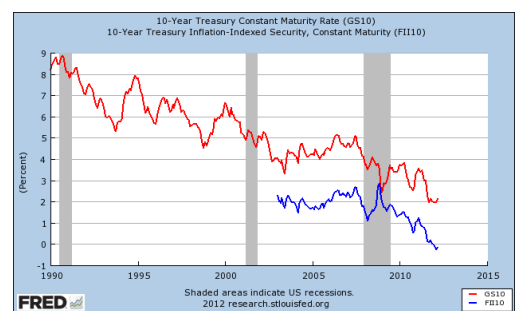
20

Where do interest rates come from?



21

Where do interest rates come from?



22

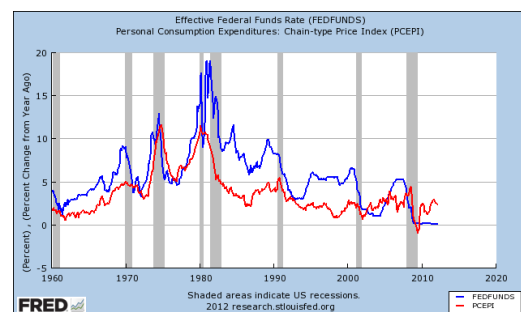
Where do interest rates come from?

- Interest and inflation ("Fisher equation")

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

23

Where do interest rates come from?



24

Money supply & interest rate mechanics

Overview

- Central banks shift AD by changing money supply
- Our approach
 - 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

26

The market for reserves

- Reserves are deposits of banks at Fed ("fed funds")
 - Reserves held by banks against deposits
 - The Fed is the bank for banks
- Banks trade overnight positions in "fed funds"
 - If they have too much, they sell
 - If they have too little, they buy
- The rate on these positions is the "fed funds rate"

27

Money supply mechanics

- More detail than previous version
- The Fed buys and sells government securities
 - If buy, they credit reserve positions of banks
 - If sell, they debit reserve positions of banks
 - Banks then trade among themselves in fed funds market
 - An overall increase in reserves supports expansion of bank deposits (a broader version of money than currency)
- More detail than we need, but
 - Central banks deal with financial institutions, not individuals

28

The Fed's interest rate target

- Federal Open Market Committee ("Fed" or "FOMC") meets 8 times a year
- Typically announce interest rate target (fed funds) right after the meeting
- Recent policy has included statements about asset purchases ("quantitative easing") – why?

29

The Fed's interest rate target

- Statement of March 20, 2013:
 - Information received since January suggests a return to moderate economic growth. Labor market conditions have shown signs of improvement. Household spending and business fixed investment advanced. Inflation has been running somewhat below the Committee's longer-run objective [and] longer-term inflation expectations have remained stable.
 - Committee decided to continue purchasing additional agency mortgage-backed securities and longer-term Treasury securities and to **keep the target range for the federal funds rate at 0 to 1/4 percent.**
- What are they saying?

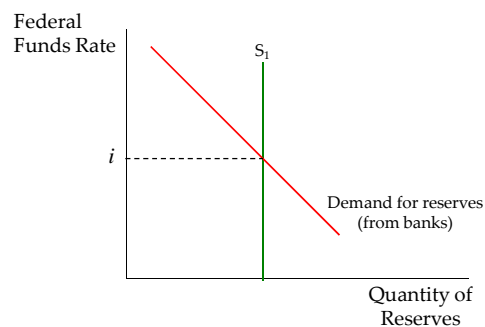
30

Hitting the target rate

- Banks typically hold more reserves if the rate is low
 - Higher rate, better return on selling
- Fed sets “fed funds rate” by changing supply of reserves
 - They vary supply to hit the rate they want

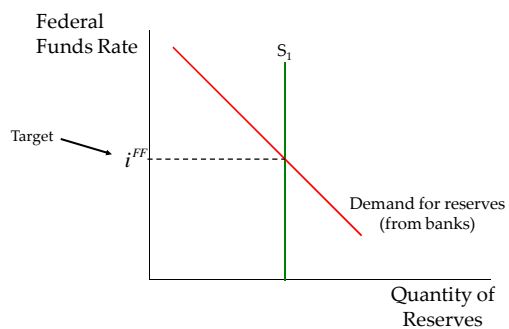
31

The market for reserves



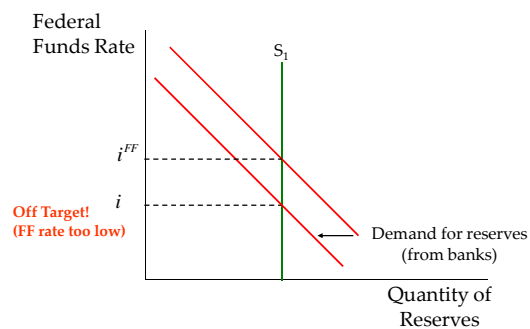
32

Hitting the target rate



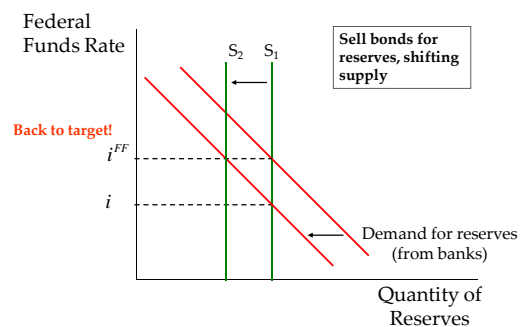
33

Hitting the target rate



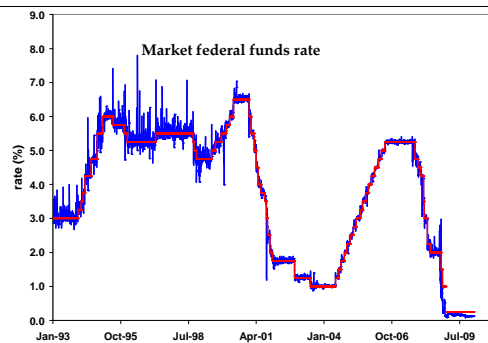
34

Hitting the target rate



35

Hitting the target rate



36

Hitting the target 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

37

Up next

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

38

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?

40

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%]
 - π = inflation rate
 - π^* = target inflation rate [2%]
 - g = GDP growth rate
 - g^* = average GDP growth rate [3%]
 - (a_1, a_2) = numbers/parameters [1/2, 1/2]

41

The Taylor rule as bond traders guide

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

42

The Taylor rule

- What does it suggest on average?

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

43

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 Feb = 1.3%
 - Inflation CPI: Mar YOY = 1.5%
 - GDP growth: YOY 2012Q4 = 1.7%

44

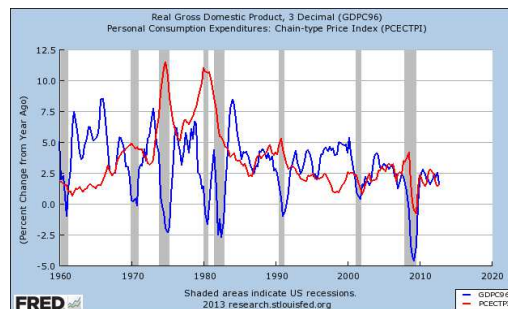
The Taylor rule

- How much does it respond to inflation? Why?

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

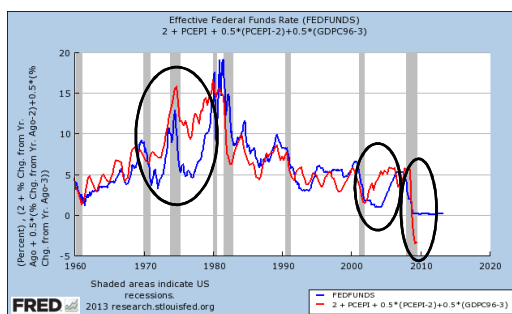
45

US history: inflation and growth



46

US history: Taylor rule



47

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?
 - Something for you in Problem Set #4

48

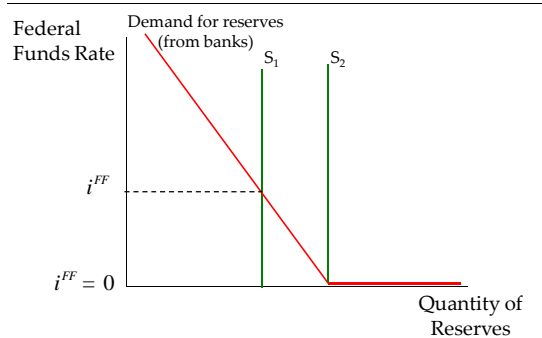
Unconventional policy

Unconventional policy 1

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

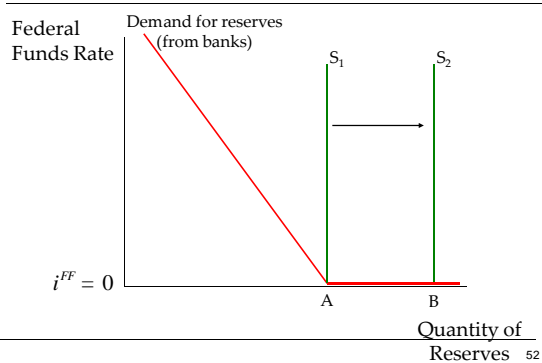
50

Zero lower bound



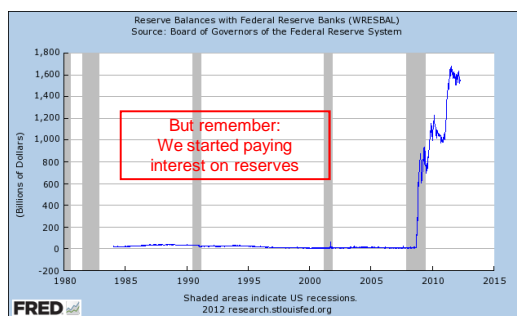
51

Quantitative easing



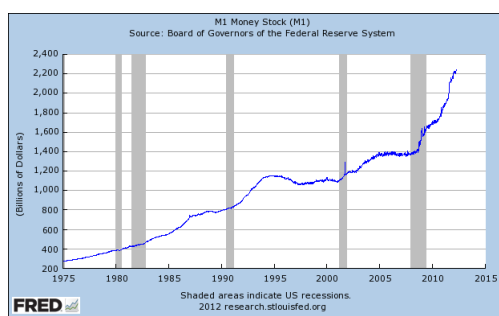
52

Quantitative easing



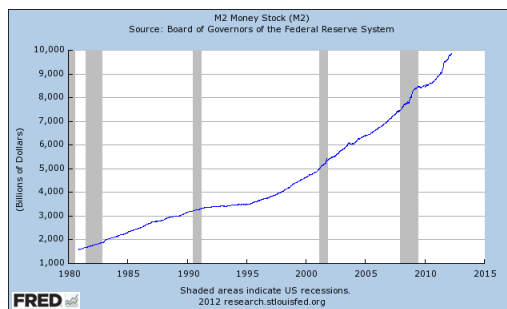
53

Quantitative easing



54

Quantitative easing



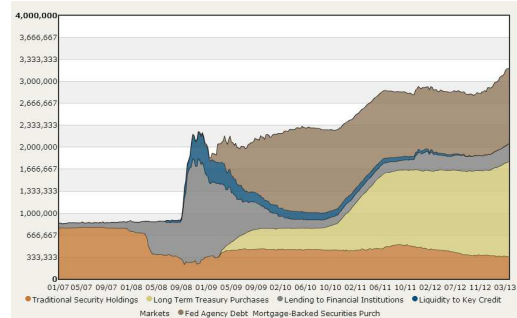
55

Unconventional policy 2

- Another unconventional policy: buy private assets
 - CE: credit easing
- See Cleveland Fed animation
 - http://www.clevelandfed.org/research/Data/Credit_Easing/index.cfm
- Find
 - Aid to financial system?
 - Quantitative easing?
 - Credit easing?

56

Credit easing



Source: Cleveland Fed.

57

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
- When interest rate hits zero, you can still increase the quantity of money

58

The Global Economy

Principles of Tax Policy

Reminder

- Problem Set #4 due in two weeks (start of class, class 11)

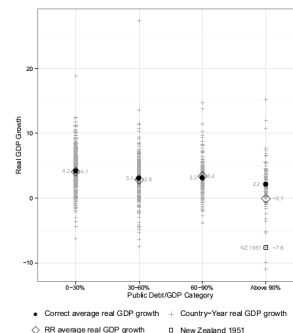
60

What's happening?

- Matt Yglesias on the Reinhart-Rogoff Excel error, via Jonathan Rossman:
 - This is huge. Or, rather, it won't matter but it ought to be a big deal. You've probably heard that countries with a high debt-to-GDP ratio suffer from slow economic growth. The specific number 90 percent has been invoked frequently ... thanks to a study by Carmen Reinhart and Kenneth Rogoff. Now three scholars at Umass find that the Reinhart/Rogoff result is based on ... an Excel coding error.
- What do we learn from this? Is debt a problem? Austerity?

61

What's happening?



Source: Herndon, Ash, and Pollin.

62

Roadmap

- New module: crises
- The ideas
- Quotations and numbers
- Principles of spending policy
- Principles of tax policy

63

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]

64

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
 - Are transparent and simple to execute
 - Apply low rates to a broad base

65

Quotations and numbers

Quotations

- *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?

67

Quotations

- 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?

68

Quotations

- 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?

69

Quotations

- 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?

70

Quotations

- 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?

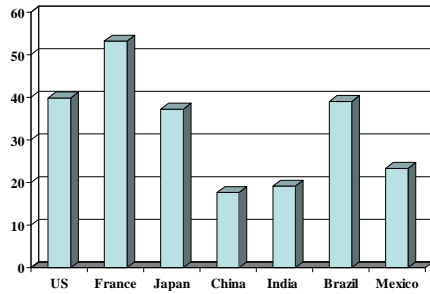
71

Quotations

- 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?

72

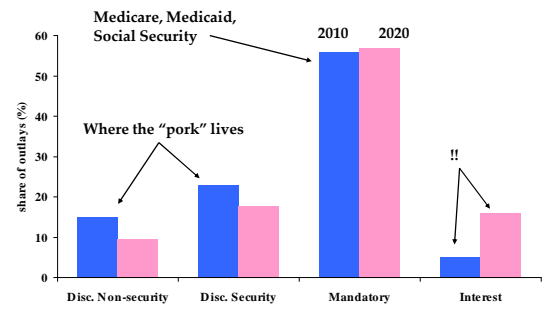
Government spending (% of GDP)



Source: OECD fiscal database.

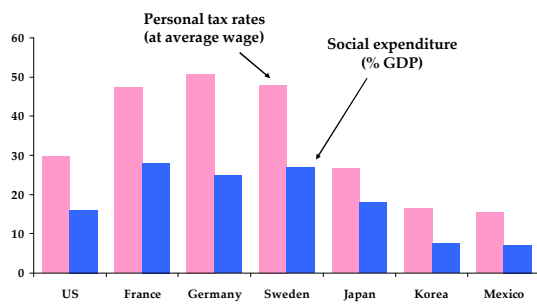
73

US federal government spending



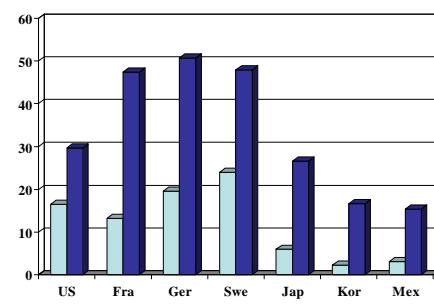
74

Social insurance and taxes



75

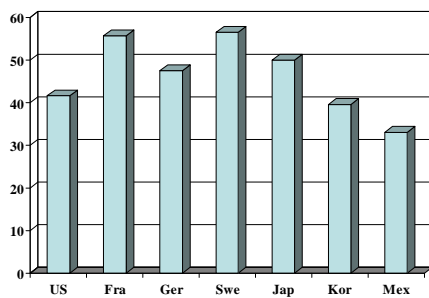
Personal tax rates (% at average wage)



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

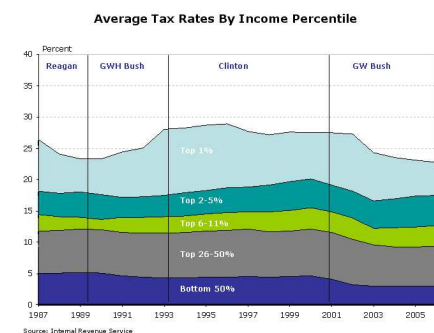
76

Top personal tax rates



77

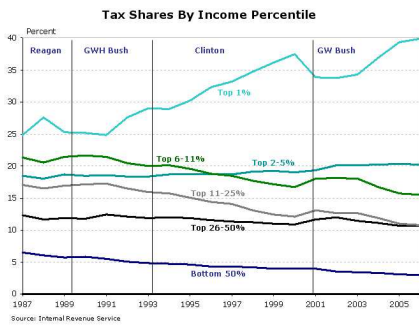
US average tax rates by income (all taxes)



Source: Internal Revenue Service

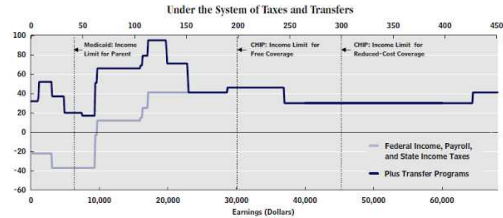
78

US tax shares by income (all taxes)



79

US: marginal tax rates by income

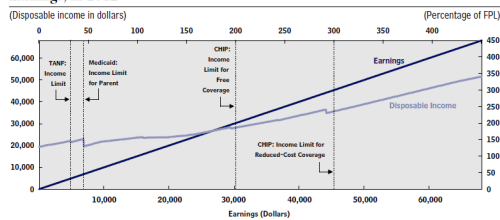


Source: CBO via Cochrane.

80

US: post-tax and pre-tax income

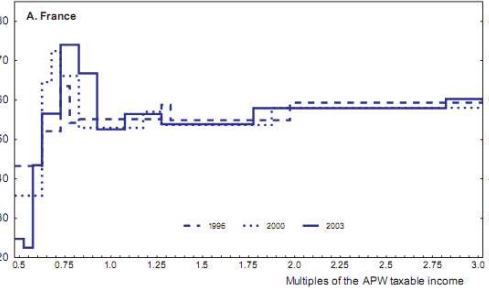
Disposable Income for a Hypothetical Single Parent with One Child, by Earnings, in 2012



Source: CBO via Cochrane.

81

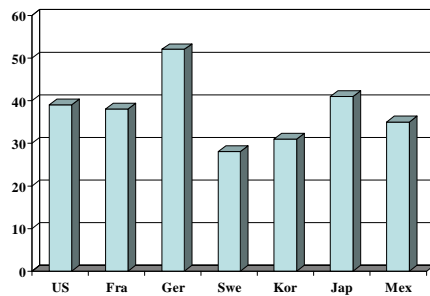
France: marginal tax rates by income



Source: OECD working paper 439, "The French tax system."

82

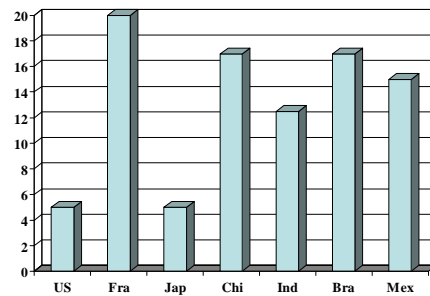
Corporate tax rates



Source: KPMG.

83

Value-added tax rates



Source: Doing Business.

84

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

86

Government spending

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

87

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.

© Copyright 2006, Onion, Inc. All rights reserved.
The Onion is not intended for readers under 18 years of age.

88

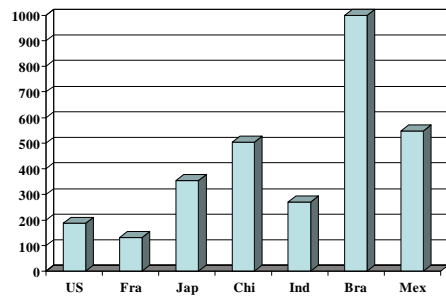
Principles of tax policy

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. Are transparent and simple to execute
 3. Apply low rates to a broad base

90

Complexity of business taxes (hours)



Source: Doing Business.

91

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 ...

92

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?

93

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

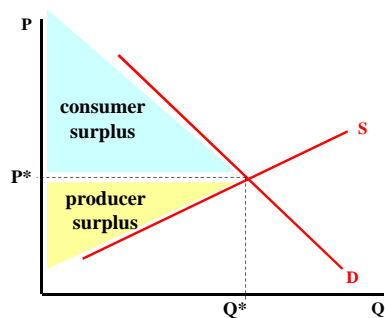
94

Tax "distortions"

- Apply low tax rate to broad tax base
- Why?
 - Taxes "distort" economic decisions
 - High tax rates distort more
- Our logic
 - Tax two markets equally
 - Tax one market twice as much
 - Which is better? [the first one]

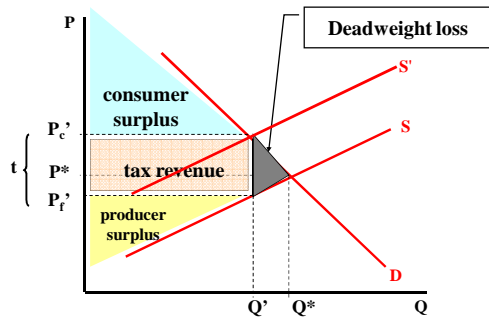
95

Welfare maximized where $S=D$



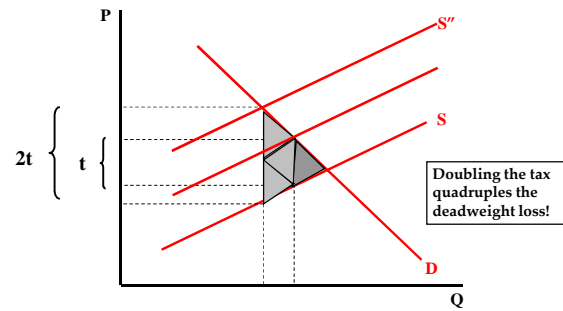
96

Taxes destroy surplus



97

Larger taxes destroy more surplus



98

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 $2t$)

99

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?

100

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? Do you agree?

101

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

102

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:
$$1/[1+(1-t)r]^n$$

103

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?

104

What have we learned?

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

105

For the ride home

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

106