Econ 341: First day 2014

- Web site and basic outline
- Status of reserve books: ???
    - Basic reading for first week is from my Econ 314 coursebook, which is available online
    - I will send pdf of Blanchard chapter for second week if not on reserve by this weekend
- Course is reading intensive
    - Level of mathematical analysis varies a lot among readings
        - The math is not important for this class: read between the equations when necessary.
    - Some days there will be a lot of readings; others not so much
        - Look ahead (and I'll try to warn you) and read ahead when there is a big day coming up.
    - Strongly encourage: Come to class with a list of important (or confusing, or controversial) points from the readings. Make sure that these points are covered in class. Ask questions about them if they are not.
- Project: Don't know what it will be yet
    - Fed is phasing out the symposia that I have used in the past
    - In 2012 we did our own symposium on Euro Crisis. (At the time, Greece was near default with Portugal, Ireland, and Spain not far behind. The ECB, IMF, and EU were all debating policy alternatives.)
    - There is no compelling crisis right now that commands this kind of attention.
    - Fed policy as it unwinds quantitative easing is fascinating, though not a crisis, and will be the focus of our project, either with Fed sponsorship or not.
    - Project will involve teams of students playing roles in policy making: Mock FOMC meeting seems likely.
- Essays: About three dealing with aspects of policies that we cover in class. Often based on an article from the press.

Days 2, 3, & 4: AS/AD and IS/LM

Basic Principles of AS/AD

- Long-run AS is vertical
    - Define ***natural output*** in terms of resource capacity, normal utilization of capacity
    - LRAS at any moment is vertical at natural output
    - Growth: LRAS moves to the right
        - Could be due to increased resources, improved technology, or elimination of inefficiencies in resource allocation
- Short-run AS slopes upward
    - Several theories (price stickiness, wage stickiness)
    - Increase in AD causes increase in output as well as prices in short run
- Aggregate demand
    - Downward-sloping because (traditional explanation)
        - Increase in P causes need for more money
        - Everyone tries to sell bonds or other assets to get additional money
        - Interest rate must rise to make people willing to buy/hold bonds
        - Rise in interest rate causes households to shift from spending to saving and businesses to reduce borrowing to "invest"
        - These effects unfold over several quarters or even years
    - Connection to our course:
        - Expansionary monetary policy shifts AD curve upward
            - Long-run effect: increase prices
            - Short-run effect: stimulate output and raise prices
        - Expansionary fiscal policy shifts AD outward
            - Increase in G raises spending directly
            - Reduction in T gives people more disposable income, which probably makes them spend more

Income-expenditure model

- Assumptions
  - Output is demand-determined (AS is perfectly elastic)
  - All components of spending except consumption are exogenous
- Assessing the assumptions
  - Perhaps reasonable in severe depression with much unused capacity
  - Investment in severe depression is probably more sensitive to prospects for future output than to interest cost
    - If higher current output signals higher expected future output, then this would argue for $I(Y)$ alongside $C(Y)$, which would make the multiplier larger.
  - Lacks strong microfoundations: Keynes's "fundamental psychological law"
- Key insights
  - Exogenous increases in spending (from whatever category) raise income, which cause further increases in spending
  - Has provided argument for "fiscal stimulus" from the New Deal to the 2009 American Reconstruction and Recovery Act

IS/LM model

- Assumptions
  - Embeds the income-expenditure model in a framework that endogenizes the interest rate and investment
  - Incorporates equilibrium in money-holding (asset markets) alongside income-expenditure equilibrium
  - Money supply is assumed exogenous
  - Retains the assumption of perfectly elastic AS, if we think of *IS*/*LM* as determining Y with fixed/given P
- Assessing the assumptions
  - Makes investment assumption more relevant for non-depression economy, but the perfectly elastic AS is problematic
  - Modern central banks operate using rules that endogenize *M*
    - This can be incorporated quite easily: replace the *LM* curve with monetary-policy reaction function (*MP* or *TR*)
  - Still lacks strong microfoundations
  - If combined with realistic AS curve, can be more appropriate for non-depression economy
  - Assumptions were convincing enough to attract most macroeconomists from the 1930s through the 1960s

- Key insights
    - Multiplier is limited by crowding out through interest rate and price increases
    - Models stimulative role of monetary policy
    - Can be combined as theory of AD with other AS models

Quantity theory

- Assumptions
    - Output is totally supply-determined; AS is perfectly inelastic at "natural output"
        - Efficient output is what perfectly efficient economy would produce with current endowments of resources and current preferences about work, saving, etc.
        - Natural output is the (smaller) amount that an economy would produce when the microeconomic imperfections such as monopolies, taxes, etc. are taken into account.
        - Actual output may be above or below natural output depending on macroeconomic conditions—but not in the quantity theory where $Y = Y_n$ by assumption.
    - Money demand is assumed exogenous (and not clear how to change model to endogenize)
    - Simplistic theory of money demand (constant velocity)
        - Endogenizing velocity (by relating to interest rate) delivers a model not unlike *IS*/*LM*
- Assessing the assumptions
    - Perfectly inelastic AS is probably reasonable in long run
    - Can be combined as theory of AD with other AS models
    - Theory of AD is simplistic in the extreme
- Key insights
    - Money is neutral
    - Relationship (which seems reasonably accurate in long run) among money growth, real growth, and inflation: $\pi = \mu - g_Y$

Aggregate supply/Aggregate demand model

- Assumptions
    - Aggregate demand curve based on *IS*/*LM* or quantity theory
    - Short-run aggregate supply curve that slopes upward due to one of several variant models:
        - Wage stickiness
        - Price stickiness

        - Imperfect information
    - Long-run aggregate supply curve is vertical at natural output
- Assessing the assumptions
    - Weak microfoundations for AD, but somewhat better for AS
    - Framework is flexible enough to allow lots of variations in specific models for both AD and AS
- Key insights
    - Aggregate demand can affect output in the short run but should not be a major factor in the long run
    - Long-run inflation is determined similarly to quantity theory
    - We can reconcile simple Keynesian ideas (income-expenditure, *IS*/*LM*) with long-run inflation behavior and long-run neutrality of money

Day 5: Monetary/fiscal policy issues

- Long-run link between money growth and inflation
- Short-run effect of money on AD and output
- How do changes in monetary policy affect the economy? Is it through the "interest-rate channel" modeled by *IS*/*LM* or something else?
- Zero lower bound/liquidity trap
    - Nominal interest rate cannot go below zero
    - Real rate is bounded below at $-\pi$, which is > 0 if deflation is expected
- How should the central bank make day-to-day and month-to-month decisions about monetary policy in the absence of immediate information about the economy?
    - Interest-rate targets vs. money growth targets in immediate run
    - Inflation targets vs. real variables in longer run
- How effective is fiscal policy? What are the multipliers?
- Do tax changes affect spending?
    - Ricardian equivalence
    - Temporary vs. permanent
- Automatic stabilizers
- Lags in fiscal and monetary policy
- To what extent can governments borrow forever and accumulate ever-rising debt?

Day 1: Introductory background (old, but useful?)

No readings

Money

- Money is means of payment
    - Needed to avoid double-coincidence of wants
- Monetary asset can be anything
- Society determines which assets are used as money

Credit

- Credit is needed because people who own wealth are not always the people who have the best uses for it.
- Direct provision of credit is simplest, but has problems
    - Lack of diversification
    - Lack of information about borrowers
    - Mismatch between desired term to maturity
- Direct provision most likely (outside of small, family transactions) for large wealth-holders who can diversify and well-known borrowers: corporate bonds and commercial paper
- Intermediated credit
    - Banks and other financial intermediaries deal with both sides, borrowing from wealth-holders and lending to ultimate borrowers
    - Intermediation is costly, so why do it? What do banks do to earn their income?
        - Collection of information about borrowers
        - Risk pooling for diversification
        - Transformation of term to maturity
        - Administration of loans, accounts
- Can monetary and credit systems be separated?
    - Yes, in principle, with 100% reserve requirement
    - This would be inefficient, but safe: credit conveys risk

Risk

- The value of *all* assets varies under alternative states of the world
    - State of the world: specification of everything that can happen at a given date
        - Are all possible states known? Can we attach reliable probabilities to each?
            - Knight's distinction: "risk vs. uncertainty"
        - If yes, then markets in "contingent contracts" can allocate "risk" efficiently
        - "Finance" is the field of economics/business that studies how this is done

- Examples of risk
    - An umbrella is worth more if it rains
    - A bet on a football game is an asset that is worth more if the team you've bet on wins
    - Insurance contracts are worth more if you have an accident
    - A dollar bill is worth more (in real terms) if the price level is low
- Common kinds of risk in financial markets affect the value of financial assets
    - Default on loan or bond (failure to repay as promised)
    - Changes in market value of stock/bond
        - Stock value responds to willingness of others to buy, based on expected future profits of corporation
        - Bond value responds not only to expected probability of default, but also to market interest rates: negative effect of r on price of bond
    - Inflation
        - Inflation lowers value of financial assets that are denominated in nominal terms
            - Buyers of such assets will demand compensation (through lower price, higher interest rate, etc.) for expected inflation
            - Unexpected inflation causes transfer of wealth from owner to issuer
    - Exchange-rate fluctuation affects dollar value of assets denominated in foreign currencies

Financial markets

- Goal of financial markets is allocation of credit and diversification and allocation of risk through issuance and exchange of financial assets
- Financial asset is a promise (which may or may not ultimately be fulfilled) of certain rights:
    - Stock is share of ownership in corporation
    - Bond is promise of repayment with interest
    - Many variations on these
- Derivative assets are ones based on other financial assets:
    - Futures contract is promise to deliver something (possibly a financial asset) in the future at a price and date that are specified at the time the contract is made
    - Option is the choice of whether to buy (call option) or sell (put option) something in the future at (or before) a date and at a price specified at the time the contract is made
- By using financial assets and derivatives, one can create assets with specific risk profiles
    - This is useful to hedge one's own risky positions or to acquire specific kinds of risk
    - For example, if I am traveling to Europe next summer, I may want to fix my costs in dollar terms now

        - A futures (or forward) contract allows me to set the dollar price of a euro now for a transaction next summer
        - A call option on euros allows me (at the cost of the option) to either exercise the option to buy euros in the summer or to buy euros on the spot market in the summer if the dollar goes up rather than down. It is one-way insurance, but is costly.

Monetary policy and financial markets

- Open-market operations—traditional locus of monetary policy
    - Operates through financial market (federal-funds market)
    - Operates through banking system (affecting availability of reserves)
- Regulation
    - Fed regulates depository intermediaries
    - Attempts to promote the safety of the monetary system
    - Because monetary institutions are centrally involved in financial system, Fed is very concerned with conditions in financial markets and may intervene to maintain safety of monetary payments system

Day 6: Money

Reading: White, Ch. 1, Goodhart, Ch. II, Radford

Nature and institutions of money and US monetary history.

Defining functions of money

- White: "commonly accepted medium of exchange;" Goodhart: "means of payment"
    - What is the difference?
    - Is the difference important?
    - Is it important to agree on the details of what money is?
- Other functions of money
    - Must be store of value (not unique to money)
    - Unit of account is usually most convenient in units of money (money as scorecard vs. token)
    - Standard of deferred payment

Menger's theory of money

- Money as "social convention" evolving endogenously without government intervention
- Unlikelihood of mutual coincidence of wants → need for "indirect exchange"
    - Radform's experience?
    - Nonsmokers demanding cigarettes
    - Cigarettes becoming the unit of account
- Varying "degrees of marketability"
    - (What does he mean that marketability is a "non-Walrasian concept"?)
    - Why cigarettes in Radford's world?
- Transaction costs: search, transportation, contracting, spoilage
- Good intermediary good would be:
    - Widely demanded
    - Low transportation, spoilage costs
- May be beneficial to hold inventories of intermediary goods
- Widespread use of indirect exchange leads to "social convergence to common medium of exchange."
    - Self-reinforcing nature of social acceptance of medium of exchange
    - Does this mean that competing moneys are impossible?
    - What if the prevailing money becomes less desirable/effective?
- Emphasis on spontaneity of evolution and absence of government role

Goodhart's theory of money

- Uncertainty about creditworthiness of partner requires money
    - Goodhart (p. 28): "In a sense trust—or lack of trust—in personal honesty lies close to the heart of the rationale for the use of money. If it was possible to believe that IOUs, personal acceptances of indebtedness, would always be strictly honored, then it would be feasible to envisage a credit economy, even in the face of uncertainty and transactions costs."
- Counterexample is Walrasian GE model where everyone is (by assumption) on budget constraint. (Talk about how this would work: everyone simply keeps track of income and spending and makes sure that they balance; this leads to balance even if no money changes hands.)
- Temporal separation of desired transaction timing makes inventory of medium of exchange useful
- Money not used in many communal settings where honor assures rough balance of exchange over time

Characteristics of good money

- Uniformity of quality (ease of verification)
- Durability
- Divisibility and fusibility
- Portability
- Coinage, milling, seigniorage
- Goodhart: seigniorage limited by power of issuer.

Moneychangers, goldsmiths, and the emergence of banking

- Deposits for safekeeping
- Transfer of deposits by written instruction
- Banknotes as generalized transfer notices
- Analogy to checks vs. travelers' checks
- Advantages of mutual par acceptance, clearinghouses
- Fractional reserves
- Scottish banking system (19^{th} century) as laissez-faire banking system that worked

Emergence of fiat money

- White argues that this only happens with government declaration of monopoly on note issue
- Dowd argues that next steps would be movement to indirect commodity standard where redemption would not occur in specie but in other assets. Banks would move there to avoid costly reserves.

Which financial assets should be called money?

- Something that makes final payment?
- Something that has high cross-elasticities of demand and supply with means of final payment?
- Note that NO commodity is universally acceptable in exchange
- Credit relationships among payer, payee, and back that are implicit in checks
    - Should checking deposits be part of M?
    - Should savings? Only if accessed through overdrafts? What about overdraft lines of credit? Credit-card limits?
- Definitions of monetary base, M1, M2, M3.

"In no other country in the history of the world has the subject of money and banking given rise to such long-sustained, deep-rooted, widespread, acrimonious, publicly debated, and eagerly reported controversy as in America." Davies, p. 473.

Colonial period

- Shortage of money in colonial period
    - Little specie
    - No indigenous sources
    - Trade deficit drained supplies
    - Replaced specie with commodities (agricultural, wampum, furs, etc.) and foreign coins circulated with official British.
    - Colonies eventually began issuing paper "notes of credit" that promised eventual convertibility and circulated as currency.

Basic concepts

- Gresham's Law
- Legal tender
- Seigniorage
- Commodity money and suspension of convertibility
- Velocity of circulation, quantity equation
- Bank capital, deposits, notes, loans, securities, etc.

Constitutional system

- Money issue used to finance revolutionary war (taxes unpopular) → inflation
- States as well as federal government issued money
- Under Constitution, money issue reserved to federal government
- Coinage Act of 1792 (Robert Morris) set dollar as unit

- Bimetallic at 15:1 (overvalued silver, shortage of gold coins, France at 15.5 in 1803, Britain 16 in 1816)
- Mint founded at Philadelphia with no seigniorage charge

First and Second Bank episodes

- Why were banks inherently unpopular?
  - Concentration of wealth and power
  - Perceived to favor urban and industrial interests over agriculture
  - Federal bank would compete with state-chartered banks
  - No authorization for federal bank in Constitution (strict constructionists)
  - Would limit states' rights to prohibit banking altogether
- First Bank of US: 1791–1811
  - Established on the model of Hamilton over objections of Jefferson
  - Well run, successful, 8 branches plus headquarters in Philadelphia
    - (Only 5 other banks operating in US at that founding, 90 by 1811)
    - Charters were political documents, voted on by legislatures
    - Kept ~20% specie reserves against notes
  - Served as federal government's agent
    - Conducting commercial business
    - Collecting taxes
    - Making loans to Treasury
  - Failure of Farmers' Exchange Bank of Gloucester, RI in 1809
    - Negligence and stupidity
    - Contributed to suspicion of banks
  - Andrew Dexter's scheme of phony notes, sent far from site, limited redeemability
    - $800,000 in notes, only $45 in specie
  - FBUS was agent of redemption for state bank notes, so it enforced convertibility
  - Tie vote in Senate was broken by VP Clinton (over objections of Pres Madison) dissolving FBUS in 1811
  - Ended up earning profit for shareholders; branches usually chartered as state banks
- No national banks: 1811–1816
  - Large increase in private note circulation (not accompanied by specie)
    - Due to lack of BUS discipline through redemption
  - Suspension was almost universal in 1814 after raid on Washington
  - Major logistical problems for Treasury during War of 1812
    - Loss of tariff revenue when trade declined during war
    - No ready source of credit
    - No convenient way to move money around the country
- Second Bank of US: 1816–1836

- Speculators and politicians dominated Board
  - Lending to shareholders for their investments → lack of true capital
  - Only $2m rather than prescribed $7m in specie
- Poorly run
  - Did not enforce redemption of state bank notes
  - Kept only 10% specie reserves
  - Overcommitted in lending
  - Many branches (25 eventually)
  - Weak or nonexistent legislation on embezzlement
- 1818 House investigation
  - President Wm. Jones resigned
  - Langdon Cheves appointed
  - Replaced by Nicholas Biddle in 1923
- Biddle's era
  - From 1823–30, operated as a central bank
  - Restrained credit and enforced convertibility
  - Expanded circulation to encourage single currency (drive out state notes)
  - Evolved into financial regulator
  - Worked effectively with Treasury
- Destruction of SBUS
  - Andrew Jackson and populism wanted to destroy *all* banks
  - Hammond sees five elements in movement against SBUS
    - Wall Street vs. Chestnut Street (finance vs. business)
    - Businessmen's dislike for credit restraint
    - Politicians' resentment of abrogation of states' rights
    - Popular identification of SBUS with business aristocracy
    - Agrarian antipathy to all banks
  - Not rechartered in 1836.

Free-banking era

- Very heavily studied episode in recent years
  - White and others argue for possibility of monetary system without government control
- "Free banking" means established rules for obtaining a charter, no need for legislative action
  - Came first in Michigan and New York, then in most other states
  - Bank notes were prepared by the states, then released to the banks upon surrender of (state) bonds of equal value
  - Serious problems in Michigan and other Western states

        - "The monetized the state debts by purchasing bonds with their own circulating notes and then disappeared in order to avoid having to redeem the notes. They had to be hunted for in the woods, among the retreats of wildcats. [Hence, wildcat banks] Their cash reserves were sometimes kegs of nails and broken glass with a layer of coin on top. Specie exhibited to the examiners at one bank was whisked away through the trees to be exhibited at another the next day."
    - Later evidence (Dwyer and others) that failing free banks were either badly run and poorly regulated by states and customers, or that they held state bonds in Confederate states, which plummeted in value as the Civil War approached. They argue that free banking itself is not necessarily unstable.

Civil War, greenbacks, and the National Bank Act

- Civil War created great need for government funds
    - Once again, no national bank to lend to Treasury
- Greenbacks were unconvertible currency issued to finance the war
    - Promised to redeem after war
    - Promise fulfilled through massive monetary contraction ending with full convertibility in 1879
    - Volume peaked at $449m in January 1864
    - Circulated alongside gold certificates, but not at par
    - Most prices quoted in greenbacks; gold accepted at premium based on market balue of gold in terms of greenbacks
        - Government payments could be made in either, so greenbacks dominated
- National Bank Act (1864)
    - Patterned on New York's free-banking law
    - Established uniform federal currency backed by war bonds
        - Created demand for these bonds
        - Notes were issued by banks (limited to 90% of capital and backed by federal bonds)
        - 10% tax imposed on state-bank notes—intended to drive them out
            - Did eliminate state-bank notes, but deposits kept state banks in business
    - Charters required:
        - Minimum capital standards
        - 15–25% minimum reserves on notes and deposits
        - Limits on real-estate ownership and loans to single borrowers
        - No real-estate loans
        - Personal liability of shareholders for par value of shares

- Resumption in 1879
    - Followed fifteen years of political controversy and repeated policy switches
    - Rapid deflation (~3% per year) but rapid growth (railroads and opening of West)

Day 7: Gold Standard

Gold standard vs. bimetallism (1873)

- White's Ch 2 presents model of working of gold standard
    - In long run, production cost of gold sets its value
    - In short run, demand and supply for existing gold stock
    - Price of gold currency = $1/P$ where P is the aggregate price of goods
- Gold standard kept prices pretty stable over long periods
- International specie-flow mechanism helped maintain balanced trade
    - Balance of payments surplus → gold inflow → inflation → substitution away from domestic goods
- If gold standard functions well and depositors and note-holders enforce convertibility, then no government intervention is required
- Bimetallism
    - Dollar defined both in terms of gold and silver
    - Why?
        - Shortage of specie: expands potential reserves
        - Silver producers wanted to maintain status (demand)
    - Problems
        - If equilibrium gold/silver price is not aligned with dollar definitions then arbitrage is profitable
        - If mint buys Au at $30 and Ag at $2, but market price of gold rises to 16 times silver, then gold coins are worth more as metal than as coins. People will bring silver jewelry to the mint to make coins and melt down gold coins to make jewelry. (Suppose transformation is free: sell 15 silver bracelets to mint for $30, get one gold coin, make into gold bracelet, trade for 16 silver bracelets, repeat as necessary.)
    - Demonetization of silver in 1873 after large US discoveries
        - Strong "free-silver" movement in late 19th century
            - William Jennings Bryan: Cross of gold speech at Demo convention in 1896 (He lost to McKinley)
            - *Wizard of Oz*: yellow brick road, etc.
        - Friedman and others called this the "Crime of '73" and argued that deflation could have been prevented by the additional money in the system due to monetary silver.

Crises and founding of Federal Reserve System

- Panics in 1893 and 1907

    - Shortage of gold
    - Runs on banks
        - No lender of last resort, though other private banks sometimes helped out
        - No deposit insurance to prevent runs: everyone needs to be first
- Aldrich-Vreeland (National Monetary) Commission to consider new monetary arrangements
    - Federal Reserve Act of 1913
        - Established Fed as central bank under the gold standard
        - Great independence of political control because gold standard did not allow "monetary policy" per se and founders wanted to keep politicians' hands off the money supply
    - World War I happened immediately and upset the international gold standard
        - Fed not sure how to behave in non-gold-standard world
        - Britain (center of financial world) off gold, used up reserves to fight war
    - After World War I
        - Huge gold reparations for Germany were supposed to replenish Britain's supply
        - Germany couldn't pay, ended up in hyperinflation and with Nazis coming to power
        - Britain struggled with deflation and depression through most of 1920s trying to re-establish gold convertibility
        - U.S. had enough gold to support convertibility through 1920s
    - This sets monetary stage for Great Depression

Days 8 & 9: Banking

Readings: Croushore, Ch 8, White, Ch 3–5, Goodhart, Ch V.

Major players of the banking system

- Commercial banks
  - Defined by accepting checkable deposits and making loans
  - Lots of quasi-banks: savings and loan associations, credit unions, mutual savings banks
  - Investment banks vs. commercial banks
    - Separated by Glass-Steagall Act in 1933
    - View that investment bank activities had destabilized banking system in Great Depression
    - Modern analysis questions this and notes that investment banking returns may diversify those from commercial banking
    - Repealed in 1999
- Regulatory authorities
  - Federal Reserve System
    - Requires reserves on deposits
    - General regulation (capital requirements, etc.)
    - Serves as bank for banks
    - "Lender of last resort" for banks
    - Offers payment-clearing services
    - FHLBB → (1989) Federal Housing Finance Board & Office of Federal Housing Enterprise Oversight → (2009) Federal Housing Finance Agency for savings and loans
    - NCUA for credit unions
    - Could Fed's regulatory and clearing role be played by private sector?
      - White thinks so.
      - Private credit-rating agencies work a lot like regulators.
      - Private clearinghouses can and do function effectively, and impose appropriate conditions of liquidity and solvency on their members.
  - Federal Deposit Insurance Corporation
    - Provides deposit insurance for banks
    - FSLIC (now defunct) and NCUA for other intermediaries
  - Controller of the Currency (Treasury)
    - Charters and supervises national banks
    - Examines banks to monitor compliance with regulations
  - State banking commissions

        - Regulation and examine state-chartered banks
- Bank customers
    - Households take loans and make deposits
    - Firms do likewise, though larger firms have access to direct capital markets

Why do we need banks?

- Banks (and other depository intermediaries) serve several needs
- Information specialists
    - Lenders do not need to gather detailed information about individual borrowers
    - Banks are in a natural position to collect and maintain credit information
- Enforcement and payments processing
    - Economies of scale in collecting and processing payments, going after non-payers
- Pooling and diversification of risks
    - Individual depositors are insulated against large losses from default of individual borrowers.
    - This may be less helpful in a general downturn when, for example, all real-estate values in an area decline so that all loans go bad at the same time.
- Transformation of maturities
    - Borrowers want fixed and sometimes distant repayment dates
    - Depositors want ready access to their money

What do banks do? Bank balance sheets

- Assets
    - Loans to public
    - Securities
        - Can only hold debt securities in top four rating categories: AAA, AA, A, BAA
        - Mostly hold Treasury securities and other government securities
        - FDIC insured banks cannot hold equity except in Fed and banking subsidiaries, though after Gramm-Leach-Bliley (1999) they can have subsidiaries that hold equities
    - Reserves (R)
        - Definition
            - Vault cash
            - Deposits at Fed
        - Transaction accounts (checkable deposits):
            - 0 on first $10.3m
            - 3% on $10.3m – $44.4m
            - 10% on amounts over $44.4m

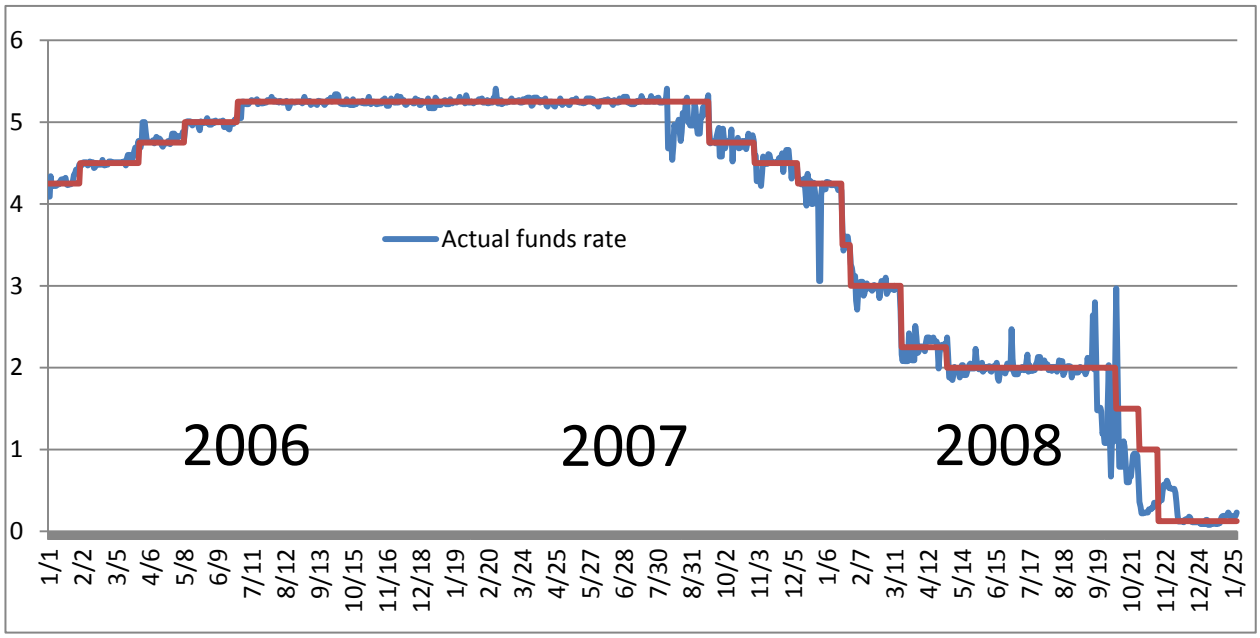
        - No reserve requirements on non-transaction accounts
        - Banks sometimes hold excess reserves, but usually try to minimize because reserves have not (until the current crisis) paid interest
        - If a bank is short of reserves, it can:
            - Borrow from Fed
                - Not popular because of regulatory role
                - Like borrowing from your mother
                - Interest rate on Fed lending = "discount rate"
            - Borrow from another bank
                - Federal-funds market/rate
                - Overnight inter-bank loans
            - In current crisis:
                - Fed has auctioned reserves through the Term Auction Facility to provide reserves for 28 or 84 days without stigma of bank borrowing
                - Reserves in Dec 2007 and Dec 2008:
                    - Dec 2007: Total = $42.7b, Non-borrowed = $27.3b, Required = $40.9b, Excess = $1.8b
                    - Non-borrowed reserves were negative through most of 2008! Turned positive in December, but Fed claims that this is just a statistical anomaly relating to how various credit provision schemes are accounted.
                    - Dec 2008: Total = $821.2b, Non-borrowed = $167.6b, Required = $53.8b, Excess = $767.4b
    - Other assets
        - Buildings, computers, etc.
- Liabilities
    - Deposits
        - Demand, savings, money-market deposit accounts, time deposits
        - Insured up to limits by FDIC (Why?)
    - Borrowing from Fed, if any
    - (We will ignore both assets and liabilities pertaining to cash items in process of collection)
- Capital
    - Difference between assets and liabilities
    - Bank's net worth
    - This is the amount of the owners' money that is at risk in banking activity
        - (Under limited liability, can't dip into owners' pockets)

- Capital regulation is one way that regulators assure that owners' have something to lose. They are betting *mostly* with depositors' money, but sufficient capital assures that the owners have their own money at stake, too.
- Basel accords generally require 8% of assets in capital. However, some assets are excluded or have lower capital requirements. We will study this later under bank regulation.

Monetary control by Fed

- Fed balance sheet
  - Assets
    - Gold
    - Foreign currencies
    - Treasury securities (mostly bills)
    - Other financial assets???
    - Loans to banks
    - Physical assets
  - Liabilities
    - Currency held by the public (*C*)
    - Vault cash of banks
    - Banks' deposits at Fed
    - Financial liabilities of Fed = **monetary base** (*B*)
      - *B* is under control of the Fed
      - No one else can affect it without the Fed knowing and agreeing
      - *B* increases (decreases) when Fed buys (sells) something
      - Open-market operations are intentional changes in *B* through purchases of government bonds
      - Base expanded from $836.4b to $1,663.9b from Dec 2007 to Dec 2008.
  - Net worth
- Public's balance sheet
  - Assets
    - Houses and other stuff
    - Money (*M*)
      - Deposits at banks
      - Currency held by public
  - Liabilities
    - Loans from banks
  - Net worth
- Monetary policy and money supply

- M is what affects aggregate demand
- B is controlled by Fed
- Changes in B affect M
- Money multiplier (μ) $\equiv M/B$
    - $$\mu = \frac{M}{B} = \frac{C+D}{C+R} = \frac{\frac{C}{D}+1}{\frac{C}{D}+\frac{R}{D}} = \frac{\chi+1}{\chi+\rho} > 1$$
    - χ is households' behavioral parameter
    - ρ is banks' behavioral parameter
- $M = \mu B$
    - If μ is constant, Fed can control M growth by controlling B growth through open-market operations.
    - If μ varies predictably, Fed can stabilize growth in M through "defensive" open-market operations.
    - What if μ varies unpredictably???
        - If ρ or χ increases then banks' reserves will be tight
        - Net excess demand for reserves on federal-funds market will raise federal-funds rate
        - If Fed seems funds rate rising, may step in and supply reserves
        - Most central banks have followed interest-rate-targeting policy in recent decades
            - Set target funds rate
            - If funds rate goes above (below) target, add (subtract) reserves
        - FOMC meeting (in normal times) has been mostly about setting funds-rate target
            - Target is now 0–0.25%, so there is no room for further expansion.
            - Even before dramatic increase, funds rate fluctuated wildly away from target during late 2008.
        - *M1* expanded Dec 2007 to Dec 2008 by $1,364.5t to $1.595.8t (up 17%) while B doubled. μ fell by roughly half. (Compare to Great Depression data cited by Friedman and Schwartz.)
        - Lately, funds rate has varied from target.



- Because funds target is essentially at a minimum (can't go below zero), monetary policy can no longer be conducted by funds-rate targeting.
- Can, however, use quantitative measures such as expansion of reserves, base, or money supply.

Payments system

- Check and payment clearing
  - Banks clear checks and other payments through the Fed (or through private clearinghouses).
  - Gross flows of payments far exceed net flows.
  - Banks may have "daylight overdrafts" on their Fed accounts
  - What happens if Washington Mutual goes bankrupt in the middle of the day?
    - Billions of dollars of WaMu customers' checks outstanding at other banks
    - Billions of dollars of other banks' checks at WaMu
    - Should they be netted against each other before dealing with liquidation or should other banks stand in line with depositors and other creditors?
    - What if net negative position exceeds balance in Fed account?
    - Payments-system risk is possibility that one failure could domino into general system failure.
    - Can also happen with stock brokers or other financial institutions that have large gross flows of payments.

        - Fed intervened to provide liquidity to brokers and other non-depository financial institutions in late 2008.
        - Very similar to payments-system risk, but not the traditional bank constituency of the Fed.
- Correspondent banks
    - Home Valley Bank of Grants Pass, Oregon, is one of the smaller banks in the state with $180m of deposits.
    - Doesn't make sense for HVB to have full-service foreign-exchange operations or other specialized services that local consumers and businesses might need occasionally.
        - Small banks typically have "correspondent" relationships with large city banks.
        - HVB might hold a large deposit at US Bank in Portland with which it handles large commercial transactions.
            - US Bank gains because it earns money on the deposit (by lending)
            - HVB gains because it can offer "big-city" services to its customers
        - US Bank serves some of the same roles for HVB that the Fed serves for larger banks.
    - What happens if correspondent bank fails?
        - Small-bank deposits are large, so uninsured
        - If small bank doesn't have access to funds, it may fail
        - Possibility of cascading failures → "too big to fail"
        - Best alternative is usually for someone else to buy up failing bank and keep it operating. (Purchase and assumption, perhaps subsidized.)

Day 10: Securitization and Derivatives

Readings: FRB Boston on derivatives, Mengle on credit derivatives, Rosen on securitization, Quigley on incentives in mortgage banking

Securitization

- Why would banks want to issue asset-backed securities
    - Unbundling of information and risk
    - Think about marriage: can't unbundle desirable and undesirable aspects of spouse
        - Wouldn't it be neat (efficient) if you could sell off the parts you don't like to someone who liked them?
    - Mortgage (or other loan) is a bundle of characteristics: term, information relationship with borrower, risk characteristics, interest rate, liquidity, etc. Some may be desirable; others may not.
    - Combination of asset-backed securities and derivatives may allow the bank to sell off the characteristics it doesn't like while keeping the ones it does.
    - Common situation: bank is well situated to issue and service loan, but doesn't really want the loan on its books as an asset.
- Bank as mortgage originator
    - Handles application, transaction costs, information costs, payment flow
    - These are things that banks are very good at
- Bank may not want to keep as many long-term mortgages on its books as it makes
    - Mortgage itself is not very liquid
    - May be excessive exposure to local housing market
- Bank may sell a package of mortgages to someone else
    - FNMA, GNMA, FHLMC will buy "conforming loans"
        - Limits on size, % of collateral value, credit rating of borrower
        - These GSEs are backed by a capital fund set up by the federal government (now defunct)
        - GSEs then package these loans into government-guaranteed mortgage-backed bonds that are sold on a liquid market to anyone wanting long-term assets backed by real estate, including mutual funds, insurance companies, etc.
    - More than half are privately packaged rather than GSE-backed
        - May be backed by prime, sub-prime, or Alt-A quality loans
        - Prime jumbo loans
        - Sub-prime or Alt-A loans (high % of collateral or weak credit background)
- Risks of MBSs
    - Interest-rate risk, like all bonds

    - Prepayment risk
    - Default risk
    - Risk may be allocated finely through subordination
        - Many separate securities with different order of repayment of underlying mortgages
        - May also have tranches ordered by timing of repayments
- Resecuritization
    - Collateralized debt obligations (CDOs) are long-term bonds backed by assets such as MBS-backed securities
    - Structured investment vehicles (SIVs) are shorter in term, but otherwise similar

Securitization and incentives

- Mortgage originators and the packagers of MBSs are all paid fees up front that don't depend on the performance of the asset down the road.
- Moral-hazard problems arise when originator approves loans it would not keep, then passes them along to MBS owners as good. Impossible to quantify all aspects of default risk, so there will always be cases that will slip through any formal set of rules.

What are derivative securities?

- Mengle's definition: "A derivative is a bilateral agreement that shifts risk from one party to another; its value is derived from the value of an underlying price, rate, index, or financial instrument."
- Neely's definition (cited in FRB Boston): "[Derivatives] allow users to pass on an unwanted risk to another party and assume a different risk, or pay cash in exchange."
- **Forward agreements**
    - Agreements to exchange "a given quantity of an asset for a fixed price on a specified future date" with payment occurring at the time of the exchange
    - Often/usually occur through large money-center bank, which is counterparty to both transactions and earns a transaction fee (OTC derivative)
- **Futures contracts**
    - Similar to forward agreements, except quantities, dates, and commodities are standardized so that they can be sold on exchanges (Chicago Mercantile Exchange)
- **Options**
    - Call options: Right to purchase a security at a given strike price on or before a given date
    - Put options: Right to sell a security at a given strike price on or before a given date
- **Interest-rate swaps**
    - Two banks agree to exchange the interest payments on two different assets for a period of time without actually exchanging the assets

    - Total-return swaps are variant
- Derivatives can also reduce or increase risk
    - Farmer hedges (insures) risk by selling forward
    - Food processor hedges (insures) risk by buying forward
    - Mutual interest in exchanging futures contract
        - What risks still exist?
            - Crop failure (crop insurance)
            - Bankruptcy of processor
            - Inflation risk
    - Speculators can take short or long positions to increase risk (take bet)
        - If I think that euro is going up vs. dollar
            - If everyone else thinks that too, then futures price of euros will be higher than spot price
            - If others don't think that, I can bet on my beliefs by buying future euros cheaply, then selling at the (higher, if I'm right) spot price
    - "Any derivative that can be used to hedge can also be used to speculate." Neely, quoted on p. 6 of FRB Bos
- Derivatives can be so complex that some might not fully understand all the contingencies and risks.
    - Market risk
    - Liquidity risk
    - Counterparty credit risk (especially with OTC derivatives, which are not always marked to market)
    - Systemic risk: failure of money-center bank could bring down payments system

Credit-default swaps

- Insurance contracts for defaults or other credit events
    - Protection buyer
    - Protection seller
    - Reference entity (who may default or not)
    - Notional amount (amount of insurance)
- Market has exploded from nearly nothing to >$40t in 2000s.
- How is risk transferred?
    - Protection buyer is insulated against (and protection seller assumes) default risk by reference entity (assuming that protection exactly matches up with loan to reference entity)
        - Banks (both kinds) and hedge funds are the principal buyers
        - Banks, hedge funds, and insurance companies are principal sellers

    - Buyer still has counterparty risk with respect to seller (and to reference entity if seller defaults)
    - Seller has counterparty risk if buyer defaults rather than paying agreed "premiums"
- Complex credit-default swaps
    - Can issue CDS on a basket or portfolio of entities, or an index of firms
        - CDX is an index of 125 North American investment grade firms
        - Can get protection on a tranche of CDX
            - Mengle's example: 3–7% tranche on CDX index
            - No insurance on first 3% of notional amount losses on CDX assets
            - Full coverage on 3–7% bracket
            - No coverage about 7%
    - Can also be on asset-backed securities (mortgage-backed, home-equity-loan-backed, etc.)
- Benefits
    - Facilitates hedging of risk
    - Allows diversification of bank portfolio without sacrificing information relationships to own customers
    - Allows one to "go short" in individual borrowers if one is pessimistic
    - Add transparency in the sense that market price is placed on otherwise bilateral credit risks
- Costs
    - Potentially destabilizing if buyers of risk don't understand it
    - May reduce incentive to screen borrowers if risks can easily be shed
        - Sellers of protection should resist this, but may have less information
    - CDSs are not sold on exchanges
        - Novation (transfer) requires consent of counterparty

Day 11: Intro to Bank Regulation

Readings: Spong book, White, Ch 6

Why regulate banks?

- Trust is essential part of banking
    - People entrust banks with their money
- This is true in many other industries
    - People trust food companies not to poison them, car companies to produce safe vehicles, chemical companies not to blow up their plants, etc.
    - In many (most?) cases, companies have strong incentives to be safe in order to stay in business and keep their customers
    - Are there incentive incompatibilities between banks and their customers that require regulation???
- It is difficult for private sector to monitor banks
    - Like the wildcat banks, a bank has strong incentive to abscond with its customers' money if it can do so without the customers realizing it
    - Banks, unlike most companies, can operate successfully while insolvent as long as no one knows that they are insolvent. (Why?)
- Illiquidity can lead to bank runs
    - Essence of Diamond-Dybvig model
        - Bank makes long-term commitment with risk, costly to liquidate early
        - Depositor withdrawal patterns are not perfectly predictable.
        - If uninsured depositors start to think that there will be excess early withdrawals, each has incentive to withdraw first, triggering a bank run.
        - Without lender of last resort, bank must liquidate its assets early, taking losses, which may turn illiquidity into insolvency.
        - Rumors that lead to a bank run may be self-fulfilling.
    - Deposit insurance has strong benefits to public. Effective lender of last resort may be alternative. (Bank of England worked this effectively in some crises.)
    - But insured banks and their depositors have no incentive to avoid risk
    - FDIC and other regulators must step into this role
- Externalities from individual bank failures
    - Could compromise payments system
    - Could cause failures of other financial institutions to which bank is liable
    - Undermines confidence in other banks: runs or panics
- Important section of Spong's Ch 1: What bank regulation should *not* do:
    - Prevent all failures
    - Substitute government decisions for private ones

- Favor one group over another

Regulation for depositor safety

- Limiting risk
  - Banks have interest in limiting risk
  - Banks have better information than regulator about their risks
    - Bankers Trust pioneered new methods of centralized, computer-monitored risk management
    - Relied on risk of overall portfolio rather than individual assets
    - Each loan officer could assess (in theory) not only how likely it was that any borrower might default, but how that risk interacted with the rest of the loan (and other asset) portfolio to determine overall portfolio risk.
  - Regulators have less information about the individual borrowers.
    - Regulators may also have less sophisticated systems for analyzing portfolio risk.
  - Does it make sense for regulators to assess a bank's in-house risk- analysis system, then allow the bank to use that system to control its own risk rather than making an independent assessment with a less sophisticated approach?
    - Some tendency to do that starting in the 1990s
    - Regulators often trusted the banks' risk-assessment models
- Regulations on asset holdings to limit risk
  - Restrictions on permissible assets
  - Margin requirements on securities loans
  - Limits on loan-to-value ratios on commercial and construction real estate
  - Limits on types and grades of securities banks can hold
- Limiting possibility for insider exploitation/fraud
  - Limits on loans to insiders
  - Limits on loans to single borrowers
- Assuring that bank owners have incentive to reduce risk
  - Capital requirements
  - Several layers of capital (Tier 1, Tier 2)
  - Assets weighted by risk (Table 4, p. 89)
  - Ratio of Tier 1 and total capital to weighted assets must exceed limits
  - Based on capital ratios, bank is categorized as well capitalized, adequately capitalized, undercapitalized, significantly undercapitalized, or critically undercapitalized. (Table 5, p. 91)
  - As banks move down the capitalization rankings, they are subject to more strict oversight and control by the regulator. (Table 6 and 7, pp. 93 and 94)
- Enforcement by regular examination

- More frequent if bank appears near margins of acceptable standards of safety

Examination and compliance: CAMELS ratings

- Examined bank gets a 1–5 rating on each of six categories
- Capital adequacy
  - As discussed above
- Asset quality
  - Assessment of default risk on bank's loans and other assets
  - Are loan standards appropriate?
  - How many nonperforming or problem assets?
  - Is loan portfolio appropriately diversified?
  - Are loan-loss reserves adequate?
- Management and administrative ability
  - Do the board and top managers know what they are doing?
- Earnings level and quality
  - Is the bank making (enough) money?
  - Is it using its earnings appropriately?
    - For example, setting aside loan-loss reserves rather than paying dividends
- Liquidity level
- Sensitivity to market risk
  - Newest criterion
  - What would happen to the bank if interest rates went up or down?

Holding company examination: BOPEC ratings

- Why would holding company need separate examination?
  - How do nonbank affiliates contribute to risk?
  - Are there issues at the holding-company level that might compromise individual banks in the system?
- Bank subsidiaries
- Other subsidiaries
- Parent company
- Earnings consolidated
- Capital adequacy consolidated

Resolving failed banks

- If FDIC closes down a bank, there are three possibilities
- Liquidation
  - FDIC seizes all bank assets, liquidates them, and pays off insured depositors.

    - Anything left is distributed to other creditors, though they will usually take a haircut.
    - Insured depositors and other creditors must usually wait to get their money, which may be disruptive.
    - Liquidation may lower price received for assets. (Fire sale)
- Purchase and assumption
    - Another institution purchases the assets of the failed bank and assumes liability for its deposits.
    - This is usually the easiest for all concerned
        - Bank continues operation, perhaps with a new name
        - No interruption in services to depositors or borrowers
    - FDIC may subsidize P&A if doing so would be less costly than liquidation
        - Acquiring bank may be willing to assume some loss in order to enter new market or otherwise gain market share.
- "Bridge bank"
    - FDIC sets up temporary bank under new management to operate in anticipation of a future P&A.

Regulations aimed at competition, structure, consumer protection

- Maintaining competitive banking markets
    - Similar to FTC role in other markets (DOJ also reviews)
    - Note that US banking market is frightfully fragmented
    - Merger movement in 1990s, 2000s is probably good for efficiency
    - Most mergers are geographic diversification.
        - Fed usually requires divestiture in individual markets if concentration would be too high.
    - Special regulations on interstate and international mergers
- Chartering restrictions to prevent criminals or incompetents from owning banks
- Truth-in-lending regulations
- Fraud prohibitions

Day 12: Issues in Bank Regulation

Readings: Flannery, Akerlof & Romer, Stern & Feldman, Jaffee & Perlow, Shy & Stenbacka.

Quote of the day

- Flannery, p. 83: "Obviously, the U.S. financial sector's condition today is excellent." (August 2006)
- Was he right?
    - If so, how did things change so fast?
    - If not, how did the experts not know?
- Unresolved issues in bank regulation *before current crisis*
    - Role and reliability of ratings agencies
        - Not good at predicting failures
        - Conflicts of interest and lack of competition
    - Risks of banks' expansion into commerce (and vice versa)
        - WalMart's bank charter application
    - Depositor preference for risk and deposit insurance
        - Risk-based deposit-insurance premiums
            - Can they ever be large enough to overcome problem?
            - Can risks ever be measured sufficiently well to create pricing formula?
    - Systemic risk
        - Traditionally occurs through depositor runs and interbank credit exposure
        - Expanded in recent years to include OTC counterparties
            - This creates systemic risk from nonbanks such as hedge funds, insurance companies, investment banks, etc. as well as banks
    - Capital adequacy
    - Feasibility of market discipline
        - How to monitor?
        - Bank examination?
        - Share value?
        - Subordinated debt price?
    - How to resolve large failures credibly (TBTF)

Akerlof and Romer's "looting" model

- Simplest form of model:
    - V is true value of corporation
    - Government offers to lend money to corporation but owners can only take M

    - $V > M$: owners behave as normal, maximize V
    - $V < M$: owners take out large loans, pay selves M, go broke and default on government
    - Critically important condition is that the value of the firm exceeds the short-term extractive capacity of the owners
        - Bank capital is operational version of V
        - Capital regulation attempts to keep V above plausible short-term gains
        - "Capital forbearance" as strategy of trying to weather the crisis
- Distinction between A&R model and model of excessive risk-taking
    - Risk-taking model asserts that institutions may hope for high profits with risky strategy knowing that their losses are limited.
    - A&R model suggests that owners of firms may intentionally choose bankruptcy because it is more profitable for them than operating the firm.
- Applications
    - Inflated net worth
        - Could happen through "goodwill"
        - May allow capital requirements to be fulfilled despite actual long-term value of the firm that is much smaller
    - Riding the upward-sloping yield curve
        - Borrow short, buy long-term bonds with $r_L > r_1$
        - Pay out earnings difference in dividends
        - Period 2 deposit rate will exceed long-rate, so bank makes loss, but profits from first period are already extracted: default
        - Could prevent this by forcing long bonds to be "marked to market" after period one, so that capital losses on long bonds would reduce feasible extraction.
            - Note advantages and disadvantages of marking to market…
    - Acquisition, development, and construction loans
        - Create loan that has high (and safe) payout to lender in early periods, but ends up with negative net worth
        - Origination fee and early-period interest payments (made from principal)
        - Eventual worth of the project need not be positive
        - Developer defaults on loan, bank is insolvent, but early fees and interest have already been extracted by owners
- Applications to S&L crisis will be covered next week

Too big to fail

- Why would big bank failure be problematic for the entire economy?
    - Payments system problems

    - Correspondent problems
    - Counterparty problems
- Why should we bail out the big banks?
    - Prevent financial meltdown
    - Decision must be made quickly before true underlying situation is known
- Why not?
    - Moral hazard
    - Eliminates any market discipline on owners and managers
    - Even if owners' equity is wiped out, they may have extracted benefit through looting
- Stern and Feldman's three groups
    - 1. Costs of TBTF are exaggerated; some uninsured creditors take losses
    - 2. Legal structure works against implementation of TBTF
    - 3. No realistic solution: government cannot credibly commit to imposing losses on uninsured creditors
- Stern and Feldman's recommendations
    - Institutions
        - Reinforce rule of law and integrity of public institutions
        - Appoint leaders who resist bailouts
        - Account publicly for costs of any bailouts
        - Reduce costs of large failures by reducing concentration of payments system, reduce spillover effects in other ways

Bear Stearns case

- Why did they bail out BS?
    - Investment banks are market-makers and counterparties in derivatives markets.
    - "Too interconnected to fail"
    - JPMorgan was willing buyer with cash to invest
- Will all investment banks be bailed out?
    - Bad idea because of moral hazard
    - Lehman Bros was *not* bailed out at the same time this was written
- Suggested reforms
    - Clearinghouse for derivative settlements
    - Netting options
    - Both require restriction of flexibility to standardize contracts
- Market regulation vs. moral hazard of bailouts
- Jaffee & Perlow argue for separating investment activities from derivative counterparty activities
    - Most of the risk comes from the investment activities

    - Isolate that risk in a different company that doesn't threaten the counterparty activities that have systemic implications
    - Market regulation would discipline the investment side
- Why not bail out Lehman Brothers?
    - No willing buyer
    - Second time syndrome

Narrow banking?

- Shy and Stenbacka argue for separating payments system from banks' loan activities
- Give depositors a choice between a "perfectly liquid," 100% reserved account (paying no interest and charging a fee) and a traditional bank account subsidized by the bank's interest earnings
- S&S argue that the traditional accounts would not need to be insured because depositors would have access to perfectly safe accounts for the part of their wealth that they weren't willing to put at risk.
    - Would everyone just put money in the traditional deposits?
        - If so, wouldn't the system be a return to the 1930s?
    - Wouldn't this disintermediation be very inefficient since people's perfectly liquid deposits would not be used productively?

Day 13: Basics of Financial Crises

Readings: Kindleberger & Aliber 1-2, Reinhart & Rogoff, selected chapters.

Kindleberger & Aliber: Minsky's theory of crisis

- Profitable shock for at least one sector
    - Leads to heavy investment in that sector
    - Reinforcement by other investors following trend
    - Bubble can result if investors start buying assets for appreciation rather than return
- Destined to be disappointed if investment is overdone
    - Bubble bursts and momentum shifts the other direction
    - May require time for depreciation to lower actual stock of capital to desired level

Reinhart & Rogoff

Kinds of financial crises

- Inflation crises
- Currency crashes (foreign exchange market)
- Currency debasement (metallic vs. fiat currency reforms)
- Asset bubbles bursting
- Banking crises
- Sovereign debt crises (domestic vs. external)

"This time is different"

- There is a consistent failure to recognize the symptoms of asset bubbles by the participants in the market
    - This makes sense, because as soon as participants recognize that it is a bubble, they burst it.
- R&R give 5 examples of why agents thought their experience was different from recent crises

Predicting default by countries?

- There is no clear threshold for what Debt/GDP ratio is OK and what is a problem
- For advanced, rich countries, much higher debt ratios are deemed OK by investors in financial markets (e.g., Japan)
- Most modern analysis suggests that the factors underlying successful economic growth are hard to quantify

Sovereign default

- Is country unable to repay or unwilling?
    - What mechanisms are available to compel repayment?
    - What recourse does a creditor have, not and in the future?
        - Collateral?
        - Threats?
        - Future lending?
- Workout lending to postpone default
    - Or rescheduling or partial default
- What enters a country's cost/benefit calculation to decide whether to default or repay?
    - Access to future capital
    - Similar in some ways to looting situation: does short-run benefit of default outweigh long-run cost of ostracism from capital markets?
    - New regime after default: Should capital markets give the new regime a chance or continue to punish the old default???

Chapter 6: Default is very common

Even serial default is common and many countries spend decades in default.

Chapter 10: Banking crises

- In repressed financial systems:
    - Government restricts financial markets so that people effectively must deposit in banks
    - Government restricts or directs bank lending (especially to the government itself)
    - Eventually the government may default and the banking system fails
    - We won't be studying these kinds of crises in detail
- In advanced systems:
    - Bank runs: "fragility of highly leveraged borrowers"
- "Capital-flow bonanzas, credit cycles, and asset prices"
- Growth and government budgets tend to recover very slowly after banking crises

Chapter 12: Inflation crises

- If government debt is in domestic currency, then inflation is a means of repaying
- Inflation tax (we will study later)
- Disinflation (we will study later)

Day 14: Early 20th Century Crises

FRB Boston on 1907, Noyes, New Yorker on 1907, Friedman & Schwartz, Bernanke, Calomiris & Mason, Temin 1-2

Panic of 1907: Background conditions

- Rapid expansion of credit in world markets
- Rapid increases in world commodity prices
- Stock markets were very unstable in early part of year
    - Repeated crashes and recoveries

Panic of 1907: Basic facts of October

- Augustus Heinze attempted to corner the market in United Copper shares and failed, with price of shares collapsing from $62 to $15 in two days (10/16).
    - Heinze also ran Mercantile National Bank (with no expertise), resigned at collapse (10/17)
    - Charles W. Morse was director of MNB and other banks, was forced out by clearinghouse after links with United Copper scheme were discovered
        - Ice trust was his doing as well
- Clearinghouse decided to bail out Mercantile's depositors
- Next day: run on Knickerbocker Trust because president (Charles Barney) was associate of Heinze and Morse and had funded some of their adventures (Fri. 10/18)
    - Knickerbocker not eligible for clearinghouse membership (not a bank)
    - National Bank of Commerce was Knickerbocker's clearinghouse correspondent and initially provided liquidity, but eventually (10/21) quit that role to avoid being stuck with Knickerbocker checks they couldn't clear
    - Barney forced out, but run continued (Mon 10/21)
    - JPMorgan appointed committee of bankers (Strong and Davison) to audit books, but decided next day not to aid Knickerbocker because "capital and surplus were impaired." (10/22)
    - Knickerbocker closed hours later
- Banks around the country began withdrawing correspondent balances from New York banks, spreading the panic
- Morgan decided to aid Trust Company of America and other healthy trusts to keep problem from spreading within New York banks/trusts (10/22)
    - Initial announcement of support for TCA caused run
    - Strong and Davison audited quickly and found assets to be solid, but illiquid
    - Widespread runs and near-complete suspension
    - Call money rate rose to 90%, then 100%, then 150%

    - At Morgan's urging, US Treasury, Rockefeller, others deposited money in NY banks to support loans (10/24)
    - Stock market was crashing because of lack of credit
    - Morgan coordinated bank lending to the securities firms
    - Issuance of vast amounts of clearinghouse scrip to keep liquidity
    - Succeeded in keeping TCA open, stabilized expectations somewhat
- New York bonds can't be sold on world markets
    - Morgan lead syndicate to underwrite them (10/30)
    - Avoided default
- Impending failure of largest brokerage firm (Moore & Schley) and Tennessee Coal and Iron after improper financial dealings and speculation
    - Morgan convinced US Steel (of which he was a board member) to exchange US Steel bonds for TC&I stock, bailing out Moore & Schley.
    - Got permission from Roosevelt to merge to prevent crisis from worsening

What made the Panic of 1907 a major crisis?

- Noyes argues that there are five characteristics
    - Sufficient credit crisis to force suspension of convertibility by banks
    - Hoarding of currency by individuals
    - Need for emergency inflow of gold from abroad to provide liquidity
    - Shutting down of manufacturers due to loss of credit access
    - Abrupt reduction of aggregate demand
- Three popular causes in contemporary circulation
    - Roosevelt's trust busting reducing return to businesses
        - Noyes discounts this
    - Reckless banking in New York
        - Evidence from early period of dangers from too small reserves, excess speculation
        - Nothing new in 1907
    - Defects in currency system
        - Perhaps not resilient, but Noyes argues that this was not the true cause
- Noyes's causes
    - World-wide speculative increase in asset prices
    - Enormous demand for capital through new securities (high MPK?), but supply was not as great
    - Rising interest rates and tightness of "floating capital"
    - Several other countries experienced crises earlier in year from same pressures
        - Chile, Egypt, Germany, Netherlands,

        - Abuses of credit and inflation of prices greater in New York, hence steeper collapse
    - Bottom line: speculative excess in securities, credit, and commodity markets

Great Depression: F&S's six key events

- October 1929: Stock-market crash
    - What determines stock values?
        - Present value of expected future profits
        - Depends inversely on interest rate
        - Tight money → high rates → low stock values
    - In 1929, stock values were inflated by heavy "margin purchases"
    - Reduced paper wealth, lowering consumption
    - Firms could not issue new shares to finance investment
    - Reduction in confidence in macroeconomy
        - Lower perceived MPK (Keynes)
        - Lower perceived permanent income
- October 1930: Onset of first banking crisis
    - Bank of United States failed
        - Some may have mistaken this for Fed, given name
        - Temin argues that this crisis was confined largely to BUS and New York
    - M didn't fall much at this time
    - Bank failures had two effects
        - Losses to owners and creditors
        - Reduction in M through destroyed deposits
        - F&S argue that latter was crucial
            - Canada had no failures (10 banks) and much smaller ΔM
    - Why did banks fail?
        - F&S seem to suggest contagion
        - Fear of failure forced liquidation, which lowered asset prices causing failure
        - Calomiris & Mason do not support this
    - Temin argues that forecasters (and policymakers) mistook the crash and recession of 1929–30 for that of 1921–22.
        - Early recession was reallocation from war to peace.
        - Great Depression was global shortfall of AD.
    - F&S argue that bank suspension would have been appropriate
        - Fed could have lent to solvent banks, but did not.
        - No general suspension or private intervention because all were waiting for Fed.
- March 1931: Onset of second banking crisis

    - Lasted longer than the first crisis
    - Failure of Kreditanstalt in Austria in May 1931
    - Large increases in χ, ρ led to large decreases in μ
    - Gold inflows propped up *B* to some extent, but not nearly enough
    - Large decline in *M*
    - Government interest rates were very low; corporate very high
- September 1931: British end gold convertibility
    - Led to expectation that US would follow
    - Large gold outflows added to internal drain to excess reserves and currency
    - Fed raised discount rate to try to stem gold outflow
        - Gold outflow stopped
        - Many more banks failed: sensitive to interest rate fluctuations
    - No open-market purchases to provide replacement for drained gold and currency
- April 1932: Beginning of Fed open-market purchases
    - June 1932: Chicago bank panic that Calomiris & Mason analyze
    - Base increased with large open-market purchase early, followed by gold inflow
- January 1933: Bank panic of 1933
    - Waves of panics in individual banking markets in late 1932.
    - Drained reserves from New York banks through conversion of correspondent balances to currency
    - Early March: bank holidays, first at state, then at federal level
        - Roosevelt inaugurated on March 4, declared bank holiday on March 6
        - Banks closed through March 9
    - Early panics led to suspension of currency conversion
    - This panic led to suspension of all banking activities

Great Depression: F&S's analytical dimensions

- Movements of major variables over these six dates/periods (graphs)
- Underlying sources of changes in money stock
- Bank failures
- International effects
- Monetary policies actually followed
- Alternative policies
    - Why was policy so inept?
    - Why no more lending?
        - High standards for discountable paper
        - Strict interpretation of gold standard rules
        - Differences between New York and other Fed presidents/boards
        - Absence of Benjamin Strong or equivalent

Temin: Role of gold standard

- Gold standard was suspended, but did not die in 1914
    - All countries anticipated resumption sooner or later
    - Presumption was that resumption would be at pre-war parity
    - England and US were especially adamant to restore pre-war system
        - US had gold, so was pretty much OK once initial shock subsided
        - England had little gold, so needed huge deflation to restore parity
        - England has unstable financial system in 1920s and high unemployment
    - France restored at realistic, devalued franc
        - Imported gold through 1920s
    - Germany was constrained by Treaty of Versailles
        - High reparations (unrealistic)
        - Forced to not undervalue currency
        - Combination of forces leads to hyperinflation in 1923.
- Rules of gold standard forced asymmetric adjustment
    - Deficit countries had to deflate.
    - Surplus countries could "sterilize" gold inflows to prevent inflation.
    - This led to deflationary bias in monetary policy world-wide.
- Rules of gold standard called for high interest rates (and high domestic central-bank lending) to attract gold to deficit countries.
    - US followed this prescription in early 1930s.
    - F&S focus on decline in money multiplier and money supply, lack of rapid expansion of base.
- Structure of interest rates shifted in early 1930s
    - Risk premium increased dramatically
        - Corporate rates rose relative to government rates
    - Expected deflation began to set in
        - Mundell effect (negative) of $\pi^e < 0$ began to outweigh Keynes effect (positive) of P falling
        - Consumers waited for further price declines rather than spending now out of higher money balances
        - Real rates were high even when nominal rates were near zero

Calomiris & Mason: Failures in asymmetric-information panic

- Late-June 1932 panic in Chicago was isolated in time and space from other panics
- They provide strong evidence that it was induced by lack of depositor confidence in solvency of individual banks
- Did strong, solvent banks go down due to panic and runs?
    - They looks at four variables for panic failures, non-panic failures, and survivors

        - Market value of equity/book value of equity (share value/par)
            - Survivors already distinctly better in 1/31
        - Estimated probability of failure
            - Panic failures were less risky than non-panic failures, but much more risky than survivors.
            - This suggests that the panic drove down asset values and failed some banks that would have survived.
        - Rate of decline of bank deposits
            - Non-survivors had much higher withdrawals before panic
        - Interest paid on bank debts
            - Interest cost (before panic) of panic failures was 50% higher than survivors (small sample)
- "Failures of banks during the panic reflected the continuation of the same process that produced failures before the panic."
- "We conclude that failures during the panic reflected the relative weakness of failing banks in the face of a common asset value shock rather than contagion."

Bernanke: Bank credit, not money, was key decline

- F&S focus on decline in money supply, but interest rates did not rise in the way that the traditional money → AD mechanism suggests they should have.
- "Credit channel" of money policy (we study later) argues that the drying up of bank credit could depress AD without interest rates going up.
    - Banks stop lending to most customers
        - No rise in interest rate because only best customers are getting loans
        - Rationing of credit by banks
        - Adverse-selection (Stiglitz-Weiss) problem with raising interest rates
    - Small and riskier customers are hardest hit.
    - AD contracts without large rise in rates.

Day 15: Crises and Near-Crises of the 1980s

Readings: Economist on 3rd world debt, Schwartz, Jaffee, Kane, Curry & Shibut.

Third-world debt crisis of 1982–

- Mexico, Brazil, and Argentina announced that they could not service their debt.
    - Many other developing countries followed suit
- Origins of the debt
    - Recycled petrodollars created vast supply of loanable funds in US banks during late 1970s.
    - High inflation pushed nominal interest rates into double digits.
    - Bank lending to developing countries was very popular.
        - Lots of evidence that past defaults did not lead to reduced credit flows or higher interest rates
    - Lending was denominated in dollars, so it depended on export earnings to generate funds for repayment. (Could not be monetized by LDCs)
- Origins of the crisis
    - World-wide recession in 1982 dramatically reduced LDC exports and prices of raw materials.
    - High inflation and tight money → very high nominal interest rates. (Most loans had variable interest rates.)
    - Oil prices began to fall from their 1980 peaks: Mexico loses export revenue.
    - Much of the money lent to LDCs was wasted on subsidizing loss-making government enterprises, given away to consumer subsidies, or appropriated for consumption by leaders.
- Bank problems. Most major banks had exposures to impaired LDC debt that exceeded their capital: They were insolvent if their debt was marked to market.
    - Alternative courses of action
        - Workout lending: Lend the LDCs more money (and at lower rates) so that they can stay current on old loans. Pretend/hope that they will be able to repay the new loans some day.
            - Could be justified if there were a half-complete project that would be economically productive if completed
                - If not, it's just a bank-subsidized Ponzi scheme
            - Lower rates, world recovery, and lending by international agencies might eventually allow countries to repay.
            - Assumption of this plan was that LDCs had a liquidity problem, not a solvency problem.

        - Schwartz argues that this was incorrect based on decline in market prices of LDC loans in secondary markets and declines in bank stock prices.
        - East Asian countries did not have this problem, so couldn't be due to world conditions. (They exported more manufactured goods rather than raw materials. Does this matter?)
        - Many Latin American and African countries wasted the borrowed money and didn't have earnings from productive resources with which to repay.
    - Mark to market and shut down banks. Formally the right thing to do, but impossible politically and economically. Would have shut down the entire financial system.
    - Some kind of buyout/bailout, with IMF or someone else assuming the bad debts at a price that would keep the banks solvent.
- Why was an agreement so difficult?
    - Needed unanimous agreement of all creditors
    - Each creditor had individual incentive to hold out for full repayment, concessions by others.
        - How does bankruptcy court deal with this problem?
        - Chapter 7: All assets are liquidated with shared compensation according to priority (wages and secured debt first, regular primary debt next, subordinated debt last).
        - Chapter 11: Creditors' committee consisting of largest creditors signs off on business plan for reorganization and restructuring of debt.
- What happened?
    - From 1982–87, banks continued to pretend that the loans would be repaid.
        - Extended additional workout loans
    - Late 1975: Baker Plan
        - IMF would oversee structural reforms (this never works)
        - Banks would increase workout lending
        - Didn't really work; just made problem worse
    - May 1987, Citibank increased loan-loss reserves, effectively writing down loans to Latin America
        - Other banks quickly followed.
        - By 1988, GAO estimated LLR at $21b but loan losses at $49b.
    - Brady Plan, 1989 (US Treasury Secretary Nicholas Brady)
        - Securitized bank loans at discount

        - Offered conditional IMF/WB money for countries to help buy zero-coupon US bonds as collateral on principal
        - Banks lost part of loan amount, but got tradable security with good collateral.
        - Basically worked
    - US banks made enough money (in other ways) to recover from insolvency and financial system didn't implode.

Savings-and-loan crisis of 1986–

- Savings and loans and banks in Texas and other Southwestern states all went broke in late 1980s.
    - Long-standing difficulties that had started reducing S&L profitability in the 1970s
        - Large commitments of long-term mortgages at very low nominal rates
        - Dramatic rise in nominal market rates due to high inflation
        - Regulation Q restricted interest rate on S&L savings accounts to 5.25% (banks to 5%).
            - Disintermediation when MMMFs, Eurodollars, and other unregulated investments could pay 12–15%
            - Deregulation in Depository Institution Deregulation and Monetary Control Act (DIDMCA) of 1980 relaxed Regulation Q ceilings, but this put S&Ls in loss-making situation: paying high rates and receiving low ones.
    - Deregulation placed S&Ls in lending sectors in which they had no expertise, such as commercial real estate development.
    - Rapidly falling oil prices deflated property values in Southwest in mid-1980s.
- Real-estate loans became impaired; many institutions were insolvent if loans were priced appropriately.
    - Negative capital → severe incentives for looting
        - Curry & Shibut: End of 1986, 441 S&Ls with $113b of assets were insolvent and another 533 with $453b had capital < 2% of assets.
    - "Texas premium" of 50–100 basis points on CDs at Southwest S&Ls
        - Raised cost of funds but gave them a source of money for either "bet the bank" risk-taking or looting
    - Spread the problem by drawing deposits away from healthy institutions, increasing competition
- Policy alternatives:
    - Prompt closure by FSLIC/FDIC
        - Problematic because amount of insured deposits greatly exceeded reserve funds of FSLIC and FDIC

        - Needed act of Congress to enable the implicit federal guarantee of these funds
        - Politically unpopular, especially because of the regional nature of the problem
    - Regulatory capital forbearance
        - This worked in LDC debt crisis at about the same time, why not here?
        - Kane's Table 1 shows the number of "zombie" S&Ls
        - Looting was severe and many closed institutions turned out to have seriously negative capital
- Ultimate resolution
    - Financial Institutions Reform, Recovery, and Enforcement Act (1989) established Resolution Trust Corporation.
    - FSLIC and RTC closed 1043 S&Ls with $519 billion of assets.
    - Curry & Shibut estimate total resolution cost at $153b, of which $124b was borne by taxpayers.

Lessons from these crises?

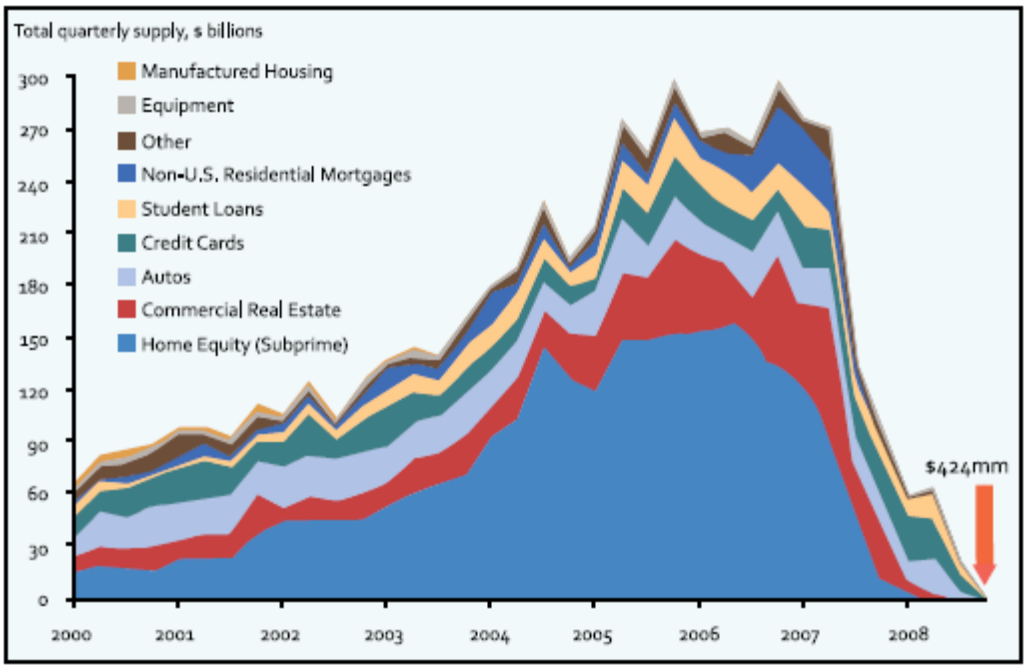
- Dangers of capital forbearance
- Banks may take on excessive risk, especially in new situations
- High cost to taxpayers of bailing out banks

Days 16 & 17: Recent Financial Crisis

Background of the crisis

- "Originate and distribute" model of lending: decline in lending standards
- Asset-backed securities
    - More efficient allocation of risk
    - Increased incentives for banks to reduce lending standards and pass on dodgy loans
    - Obfuscated location of risk

Figure 1. Asset-Backed Security Issuance, 2000–2008



Source: J. P. Morgan Securities Inc. Data as of 10/31/2008.

- Liquidity spirals: Asset price decline leads to fire sales to preserve capital, reduced lending
- Runs can happen due to uninsured counterparties → quick erosion of bank capital
- Gridlock due to network effects of counterparties
    - Effects of over-the-counter trading vs. exchanges

Events

- Subprime defaults first rose in February 2007
- Rating downgrades in June and July 2007

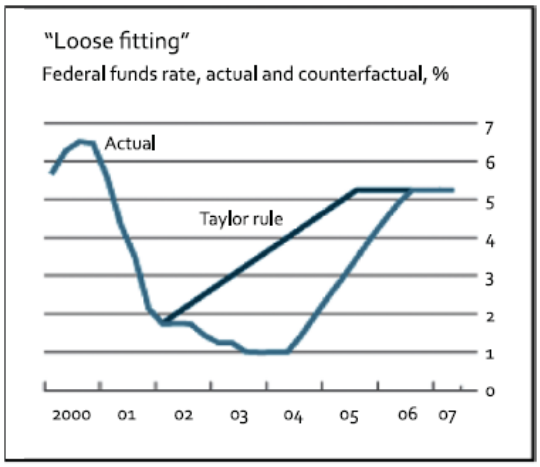
- July 2007: Market for short-term asset-backed commercial paper (banks and other firms borrowing short-term backed by ABSs) becomes less liquid
- August 2007: Hedge funds make losses → margin calls and more fire sales
- Fed starts lowering FFR and broadens discountable security categories
    - In March 2008, Term Securities Lending Facility
        - Secret lending to banks to avoid public stigma of borrowing from Fed
- October 2007: More write-downs of MBSs
- Bear Stearns
    - March 2008: pressure on BS because of decline in FNMA bond values
    - Misunderstanding about signals from Goldman led to run on BS
    - Fed negotiated a takeover by JPMorgan Chase
- Fed set up Primary Dealer Lending Facility to provide liquidity to investment banks when necessary
- Lehman Brothers
    - September 2008: LB was bankrupt (or thought to be) and no one wanted to take it over
    - Merrill Lynch and AIG are taken over, then Washington Mutual and Wachovia
- Fed drops FFR to zero in December
- "TED spread" = measure of risk premium on 3-month interbank lending (LIBOR – Treasury bills) rose dramatically beginning in summer of 2007 and again in late 2008
- September 2008: TARP is proposed: $700b to buy bad assets of financial institutions, passed on October 3

Financial crisis → recession

- Recession starts in December 2007, with sharp declines in late 2008 and early 2009
- Usual mechanisms: deleveraging, bank credit, impaired balance sheets, etc.
- Economic stimulus act: fiscal policy of $100b in tax cuts passed in February 2008

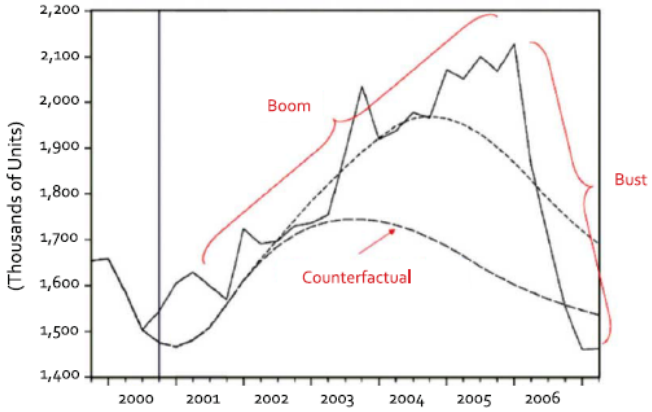
Taylor: Fed inflated housing bubble

Figure 1. Loose-Fitting Monetary Policy



Source: The Economist, 18 October 2007.[2]

Figure 2. The Boom and Bust in Housing Starts Compared with the Counterfactual



The line with shorter dashes shows model simulations using the actual interest rate.

Source: Author's calculations, based on research [1] in Appendix.

Why was "this time different" and the Fed didn't respond to rising housing prices? Aggregate nominal housing prices had never declined in the US.

Fed intervention was aimed at liquidity, not counterparty risk.

This time is different because …

- Reinhart & Rogoff emphasize role of rapid growth in US debt (trade deficits)

- Different because (pp. 214–215):
  - US financial system was most efficient in world at allocating risk
  - Developing countries needed a safe place for funds
  - Greater financial integration meant that higher debt levels were safe
  - Monetary policy in US was reliable
  - New financial instruments were expanding access to housing markets
  - Just a further deepening of international financial integration

Recovery from financial crises

- Reinhart & Rogoff (Ch 14)
  - Asset-market collapses are "deep and prolonged"
  - "Profound declines in output and employment"
  - Large increases in government debt (usual deficits induced by recession, plus costs of bailouts)
- Claessens, Kose, & Terrones
  - Look at recessions and crises (interpreted loosely) over 1960–2007 in 21 OECD countries
  - "Specifically, we find evidence that recessions associated with credit crunches and house price busts tend to be deeper and longer than other recessions." (from abstract)

Table 6. Recessions associated with credit crunches (percentage change unless otherwise indicated)

	Median values			Mean values		
	Without crunches	With crunches	With severe crunches	Without crunches	With crunches	With severe crunches
A. Output						
Duration[a]	3.00	3.00	3.00	3.61	3.90	4.00
Amplitude	−1.76	−2.7**	−2.20	−2.33	−4.17**	−4.13
Cumulative loss	−2.66	−6.15**	−6.15*	−5.84	−9.46	−11.79
B. Components of output						
Consumption	−0.04	−0.58	−0.58	−0.15	−0.36	0.38
Total investment	−3.65	−5.57	−5.57	−5.67	−6.75	−6.28
Residential investment	−3.72	−7.52	−7.47	−6.19	−9.60	−9.13
Non-residential investment	−3.58	−4.25	−4.34	−5.18	−3.81	−4.65
Exports	−0.46	−2.44	−1.28	−0.46	−2.88	−2.26
Imports	−3.15	−6.47**	−6.47*	−3.34	−7.94	−8.64
Net export (% of GDP)[b]	0.43	1.51**	1.64**	0.51	1.81**	1.89**
Current account (% of GDP)[b]	0.42	1.24	1.39	0.49	0.97	1.23
C. Other macroeconomic variables						
Industrial production	−4.02	−5.55	−6.76*	−3.89	−4.78	−6.41*
Unemployment rate[b]	0.57	0.89	0.99	1.21	0.99	1.10
Inflation rate[b]	−0.32	0.14	0.53	−0.56	0.97	1.08
D. Financial variables						
House prices	−1.83	−3.91**	−5.95*	−3.09	−6.55	−7.64
Equity prices	−6.18	−3.09	0.60	−4.57	−1.83	2.68
Credit	1.13	−4.41***	-4.91***	2.30	−4.72***	−6.11**

Notes: Severe credit crunches are those that are in the top half of all crunch episodes. Each cell reports the mean (median) change in the respective variable from peak to trough of recessions associated with credit crunches, unless otherwise indicated. The symbols *, **, and *** indicate that the difference between means (medians) of recessions with and without credit crunches is significant at the 10%, 5%, and 1% levels, respectively.
[a]Number of quarters.
[b]Change in levels.

Table 7. Recessions associated with house price busts (percentage change unless otherwise indicated)

	Median values			Mean values		
	Without busts	With busts	With severe busts	Without busts	With busts	With severe busts
A. Output						
Duration[a]	3.00	3.00	3.00	3.18	4.55**	4.6**
Amplitude	−1.51	−2.2*	−2.64**	−1.96	−3.24*	−4.05**
Cumulative loss	−2.24	−3.84***	−5.23***	−3.48	−10.68**	−13.90*
B. Components of output						
Consumption	0.05	−0.76***	−1.16***	0.13	−1.71***	−2.25***
Total investment	−3.82	−7.77*	−6.92	−4.59	−9.48**	−9.59
Residential investment	−2.46	−6.79**	−7.47**	−4.63	−11.31**	−13.65**
Non-residential investment	−3.67	−7.7*	−6.82	−4.06	−8.84*	−7.83
Exports	−1.07	0.68*	0.67	−1.02	1.03*	1.20
Imports	−2.65	−5.23	−5.3*	−2.24	−5.26*	−6.13**
Net export (% of GDP)[b]	0.41	1.24***	1.29**	0.09	1.5***	1.48**
Current account (% of GDP)[b]	0.07	0.78**	0.6*	0.02	1.27**	1.23*
C. Other macroeconomic variables						
Industrial production	−4.43	−4.26	−4.99	−4.13	−4.35	−4.73
Unemployment rate[b]	0.47	1.36***	1.2***	0.83	2.02**	1.93
Inflation rate[b]	−0.26	−0.80	−0.59	−0.35	−0.88	−0.14
D. Financial variables						
House prices	−0.84	−6.3***	−7.05***	−0.34	−9.63***	−11.17***
Equity prices	−8.85	0.61*	−7.22	−6.87	0.06	−1.59
Credit	1.42	−0.52***	−1.24***	3.01	−2.37**	−2.99***

Notes: Severe house price busts are those in the top half of all bust episodes. Each cell reports the mean (median) change in the respective variable from peak to trough of recessions associated with house price busts, unless otherwise indicated. The symbols *, **, and *** indicate that the difference between means (medians) of recessions with and without house price busts is significant at the 10%, 5%, and 1% levels, respectively.
[a]Number of quarters.
[b]Change in levels.

Table 8. Recessions associated with crunches and busts: summary statistics

Events	Duration[a] (mean)	Amplitude (median)[b]	Cumulative loss[b] (median)
A. Recessions without credit crunches	3.61	−1.76	−2.66
Recessions with credit crunches	3.90	−2.7**	−6.15**
Recessions with severe credit crunches	4.00	−2.20	−6.15*
B. Recessions without house price busts	3.18	−1.51	−2.24
Recessions with house price busts	4.55**	−2.2*	−3.84***
Recessions with severe house price busts	4.6**	−2.64**	−5.23***
C. Recessions without equity price busts	3.49	−1.72	−2.87
Recessions with equity price busts	3.79	−1.73	−2.66
Recessions with severe equity price busts	3.68	−1.98	−3.16
D. Recessions without financial crises	3.36	−1.80	−2.65
Recessions with financial crises	5.67**	−2.52	−4.92***
Recessions with severe financial crises	6.80	−2.76	−4.92***

Notes: Severe credit crunches and equity/house price busts are in the top half of all crunch and bust episodes. Severe financial crises correspond to the big five crisis episodes listed in the text. Each cell reports the mean (median) change in the respective variable from peak to trough of recessions associated with equity price busts, unless otherwise indicated. The symbols *, **, and *** indicate that the difference between means (medians) of recessions with and without equity price busts is significant at the 10%, 5%, and 1% levels, respectively.
[a]Number of quarters.
[b]Percent change.

Day 18: Midterm Exam

Days 19 & 20: Money Demand

Readings: McCallum, Ch 3; Teles & Zhou.

Modern approaches to modeling money demand

- Money in the Walrasian model (or not)
- How could we introduce money into Walrasian model?
    - Utility function
        - Artificial because money does not really yield utility
        - Easy, though
    - Constraint
        - Does holding money save money or time?
        - McCallum models money as saving transaction time
    - Money in production function
        - Firms hold money, too.
- Cash-in-advance models
    - In discrete time, assume that household cannot spend more than the amount of money it has at the beginning of period.
- Shopping-time models
    - Like McCallum's model
    - Assume that the amount of shopping time required to make purchases is negatively related to the amount of money held
    - Tradeoff between money balances and leisure

Older approaches

- Keynes's three motives for money holding ("liquidity preference")
    - Transactions demand: Baumol/Tobin
    - Precautionary demand: Miller/Orr
    - Speculative demand: Tobin
- This approach is problematic because money held for one motive is also available for the others.

The "standard" model

- $M/P = L(Y, i)$

McCallum's exposition of Baumol/Tobin model

- Assumptions
  - Spending is perfectly smooth at cP per period
  - Income is perfectly lumpy
  - Money bears no interest
  - Bonds bear nominal interest at R per period
  - Nominal transaction cost of δP for each money/bond transaction
  - Make n such transactions per period
- Two costs associated with money balances (M)
  - Forgone interest cost = RM
  - Transaction cost = $n\delta P$
- Saw-tooth pattern of money balances between transactions
  - Take out cP/N each transaction
  - Average money balance = $M = cP/2n$
- Total cost of money holding (in terms of M) = $C = RM + (cP/2M)(\delta P) = RM + c\delta P^2/2M$.
- To minimize cost, take derivative wrt M and set to zero:

$$\frac{\partial C}{\partial M} = R - \frac{c\delta P^2}{2M^2} = 0$$
$$R = \left(\frac{c\delta}{2}\right)\left(\frac{P}{M}\right)^2$$
$$\frac{M}{P} = \sqrt{\frac{c\delta}{2R}}.$$

- Implications
  - Real money demand: nominal is proportional to price level
  - Increase in transaction cost → increase in money demand
  - Increase in interest rate → decrease in money demand
  - Increase in flow of consumption spending → increase in money demand
  - All elasticities are predicted to be ½

McCallum's shopping-time model

- Utility (why does this need to be a dynamic problem?)

$$U = \sum_{t=0}^{\infty} \beta^t u(c_t, l_t)$$

- Monetary budget constraint

$$P_t y_t + M_{t-1} + (1+R_{t-1}) B_{t-1} = P_t c_t + M_t + B_t$$
$$B_{t-1} = \sum_{s=0}^{\infty} \frac{P_{t+s}(c_{t+s} - y_{t+s}) + (M_{t+s} - M_{t+s-1})}{\prod_{k=0}^{s}(1+R_{t+k-1})}$$

- Time budget constraint (note that shopping is *dis*utility!)

$$l_t = \psi(c_t, m_t), \quad \frac{\partial l}{\partial c} < 0, \frac{\partial l}{\partial m} > 0, m \equiv \frac{M}{P}.$$

- Maximizing constrained utility leads to

$$u_l\left[c_t, \psi(c_t, m_t)\right] \psi_m(c_t, m_t) = \left[\frac{R_t}{1+R_t}\right]\left[u_c(c_t, \psi(c_t, m_t)) + u_l(c_t, \psi(c_t, m_t))\psi_c(c_t, m_t)\right]$$

- In principle, this equation has three variables: *c*, *m*, and *R*, and can be solved for *m* as a function of *c* and *R*. (Note that *c* replaces *y* in the standard equation.)
- LHS: Marginal benefit of holding additional money through increased leisure
- RHS: Marginal value of forgone consumption through lower interest earnings
    - First term is direct loss in consumption
    - Second (smaller and negative) term is saved leisure through less shopping time
- Can apply Cobb-Douglas utility and leisure functions to get closed form (p. 39)

Precautionary demand for money

- Uncertainty about spending in cash-in-advance framework: random variable *S* with mean zero and standard deviation σ
- Pay brokerage cost *b* if caught short of cash
- Hold *s* in cash with nominal interest rate *i*

$$E(TC) = \left[1 - \Pr(S \le s)\right] b + is$$
$$\frac{dTC}{ds} = -b\frac{d\Pr(S \le s)}{ds} + i = 0$$
$$f(s) = i / b.$$

- Effects of *b*, *i*, and σ on precautionary demand *s*.

Speculative demand for money

- When will money earn a higher rate of return than bond?
    - Only when *i* is expected to rise quickly before maturity of bond.

    - Never for variable-rate bond or very short bond
- Can everyone expect i to rise quickly?
    - No, all would flood out of bonds and i would go up.
- Speculative demand could exist for individuals on tail of expectations distribution if expectations are not homogeneous.

Empirical evidence

- Prior to 1970s, $\ln(M/P) = \alpha + \beta \ln Y - \gamma \ln i$ was good and stable fit.
    - Estimates of β were about 1 and γ about 0.15.
    - Good econometric results with M1 or M2 and short or long rates
- In 1970s, money demand began falling below predictions
    - High inflation led to money-saving technological innovations
        - Sweep accounts
        - MMMFs
        - Telephone-transfer accounts
        - Eventually ATMs and online banking
    - These innovations didn't go away when inflation and interest rates went back down.
    - Innovation has continued.
- What is the appropriate measure of money to use in empirical money demand functions
    - M1 and M2 don't seem to be stably related to Y and i.
    - Teles & Zhou propose MZM and find supporting evidence for stability.
    - Others have suggested a Divisia index of monetary assets.
- Still an open question for research.

Day 21: Credit channel

Problems with traditional interest-rate channel of monetary effect:

- Weak empirical evidence for cost-of-capital effect on I
- Strong evidence for accelerator effect
- Monetary policy affects short rate; spending should respond to long rates
- The definition of what money is and does has changed over time

Four basic facts about monetary effects

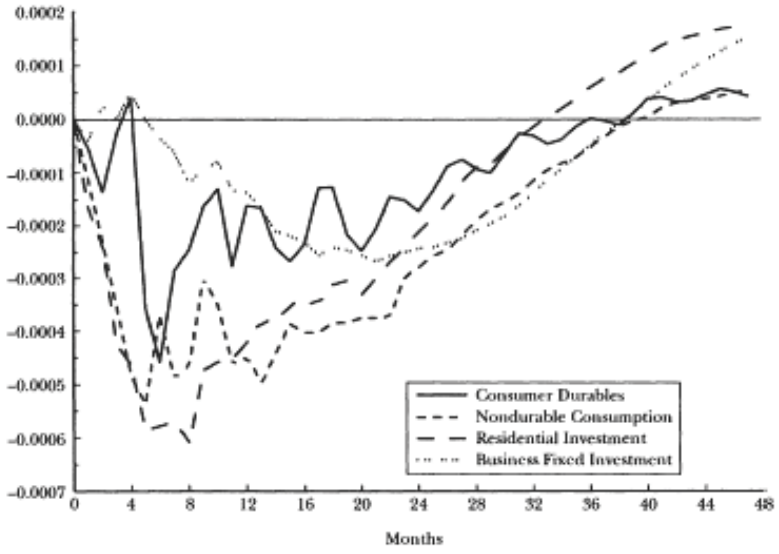
Fact 1: Although an unanticipated tightening in monetary policy typically has only *transitory* effects on interest rates, a monetary tightening is followed by *sustained* declines in real GDP and the price level.

Fact 2: Final demand absorbs the initial impact of a monetary tightening, falling relatively quickly after a change in policy. Production follows final demand downward, but only with a lag, implying that inventory stocks rise in the short run. Ultimately, however, inventories decline, and inventory disinvestment accounts for a large portion of the decline in GDP.

Fact 3: The earliest and sharpest declines in final demand occur in residential investment, with spending on consumer goods (including both durables and non-durables) close behind.

Fact 4: Fixed business investment eventually declines in response to a monetary tightening, but its fall lags behind those of housing and consumer durables and, indeed, behind much of the decline in production and interest rates.

Figure 3
Responses of Spending Components to a Monetary Policy Shock



Credit channel

- External finance premium: imperfection associated with principal/agent problem between borrowers and lenders
    - What is this?
    - Why would it lead to a higher cost of external vs. internal finance?
- We know that small firms are more bank-dependent (from FHP). Banks are strongly affected by monetary policy. They may manifest tight monetary policy through higher interest rates, or through tightening credit standards. (Stiglitz and Weiss adverse-selection model)
- Balance-sheet channel: M↓ ⇒ worsened borrower balance sheets ⇒ less lending to firms.
    - Why?
    - Higher coverage ratios (interest payments/(interest payments + profits)) after monetary tightening.
    - Reduces value of collateral assets.
    - Lower cash flow for internal investment as interest rates and revenues decline.
- Bank-lending channel: M↓ ⇒ D↓, L↓ ⇒ I↓, C↓.
    - Can banks easily replace lost deposits with other sources of funds?

        - Perhaps, but not perfectly.
    - Will banks ration credit by increasing r or by making the terms of lending more restrictive?
        - Maybe both, but emphasis on latter.

Evidence from Gambacorta and Marques-Ibanez

- Key finding: "Banks with weaker core capital positions, greater dependence on market funding, and on non-interest sources of income restricted the loan supply more strongly during the crisis period." (from abstract)
    - Why would banks with weak core capital reduce lending?
    - What does greater dependence on market funding mean?
    - What does greater dependence on non-interest sources of income mean?
- The "risk-taking channel": "low interest rates could … induce financial imbalances as a result of a reduction in risk aversion and a more intensive search for yield by banks and other investors." p. 138
- They have detailed quarterly data on 1000+ individual banks in Europe and U.S.
- They find that Euro Area non-financial corporations were able to issue bonds during the crisis, which would mitigate the importance of a scarcity of bank lending.
    - This suggests the need for a new model of a bank-credit channel.
- Banks have moved to an "originate to distribute" model of lending through securitization
    - Their income derives from processing and origination fees rather than from interest
    - Also provides access to non-deposit sources of funds for lending
    - Increased sensitivity to financial-market conditions in ways other than just reserve availability
- New model of bank-lending channel:
    - Capital shortage affects supply to bank of non-insured funds through financial markets, though it would not affect insured deposits
    - Conditions in corporate-bond market are now more important as banks increase use of non-deposit funds; correspondingly, reserve tightness is less important
    - More laxity in credit standards may (and probably did) result from increased securitization
    - Financial stress may lead to losses on non-traditional activities (such as trading), which may lead banks for reduce lending
- Empirical work: dependent variable is loan growth at individual banks (1000+ from 15 countries over 44 quarters ending in 2009:4)

Table 2. Expected signs in the regressions and summary of main results[a]

Variable name	Variable description	Expected sign	Basic argument	(A2.I) Baseline regression MTN model (Ehrmann *et al.*, 2003)	(A2.II) Securitization and the risk-taking channel	(A2.III) Impact of bank funding: deposits strength	(A2.IV) Impact of short-term funding	(A3.I) Tier 1 capital ratio	(A3.II) Bank risk and monetary policy	(A3.III) Non-interest income	(A3.IV) Supervisory strength
SIZE	Log of total assets	+/–	Large banks might isolate better adverse shocks (+). In case of internal capital markets or strong lending relationship between small firms and small banks (–)								
*SIZE*C*		+/–	Too big to fail (+)/ Too large to be saved (–)	+++	+++	++	+++	+++			
LIQ	Liquidity ratio	+	Highly liquid banks more likely to expand supply of loans								
*LIQ*C*		+	Particularly in crisis period	–		–					
CAP	Capital-to-asset ratio	+	Well-capitalized banks more likely to expand supply of loans	– – –	– –		– –	+++	+++	++	++
*CAP*C*		+	Particularly in crisis period	+++	+++	+	+++	+++	++	+++	+++
SEC	Securitization dummy	+	Securitization as capital relief and funding source		+	+		+	+	+	+
*SEC*C*		+/–	Could reverse in crisis periods		++	+			++		
DEP	Deposit ratio	+	Banks with more deposit funding could expand supply of loans			++		+++	+++	+++	+++
*DEP*C*		+	Particularly in crisis period			++					
STF	Short-term funding	+/–	Banks with more short-term funding more subject to market conditions								
*STF*C*		–	In crisis periods short-term funding could hinder loan supply				– – –				
NII	Non-interest income	+	More profitable but also more volatile non-interest income can lead to more lending								

Table 2. (Continued)

Variable name	Variable description	Expected sign	Basic argument	(A2.I) Baseline regression MTN model (Ehrmann *et al.*, 2003)	(A2.II) Securitization and the risk-taking channel	(A2.III) Impact of bank funding: deposits strength	(A2.IV) Impact of short-term funding	(A3.I) Tier 1 capital ratio	(A3.II) Bank risk and monetary policy	(A3.III) Non-interest income	(A3.IV) Supervisory strength
*NII*C*		–	In crisis periods can lead to less lending							– –	– –
RISK	Risk dummy	+/–	Riskier banks might expand lending by more, especially versus risky segments (+). Alternatively if forced by regulation to contain their credit portfolio (–)								
*RISK*C*		–	In periods of crisis riskier banks might be forced to restrict lending supply to a greater exient						– –	– –	– –
Δi_M	Quarterly changes in the monetary policy rate	–	Higher monetary policy rates (tightening) lead to a decline in lending	– –	– – –	– – –	– – –	– – –	– – –	– –	– –
Δi_M**C*		+/–	In period of crisis the effect could be amplified (–) or there could be a 'pushing on a string effect' (+)		–		–				
NSMP	Non-standard monetary policy indicator	+		++	++	++	++	+		++	++
Δi_M**SIZE*		+	Large banks expected to buffer monetary policy shocks.								
Δi_M**SIZE*C*		+	Particularly in crisis period	+++	++		+	++			
Δi_M**LIQ*		+	Banks holding more liquid assets more likely to buffer monetary policy shocks					– –			
Δi_M**LIQ*C*		+	Particularly in crisis period			–					
Δi_M**CAP*		+	Well-capitalized banks more likely to buffer monetary policy shocks	+	+						
Δi_M**CAP*C*		+	Particularly in crisis period			+		++	+	++	++
Δi_M**SEC*		+	Securitization likely to buffer monetary policy shocks		+++	+++	++	+++	+++	+++	+++
Δi_M**SEC*C*		+/–	In crisis, securitization could reinforce monetary policy shocks							– – –	– – –

Table 2. (Continued)

Variable name	Variable description	Expected sign	Basic argument	(A2.I) Baseline regression MTN model (Ehrmann *et al.*, 2003)	(A2.II) Securitization and the risk-taking channel	(A2.III) Impact of bank funding deposits strength	(A2.IV) Impact of short-term funding	(A3.I) Tier 1 capital ratio	(A3.II) Bank risk and monetary policy	(A3.III) Non-interest income	(A3.IV) Supervisory strength
$\Delta i_{M} \cdot DEP$		+	More market funding (fewer deposits) could reinforce monetary policy shocks								
$\Delta i_{M} \cdot DEP \cdot C$		+	Particularly in crisis period			+++					
$\Delta i_{M} \cdot STF$		+/–	Uncertain impact of short-term funding								
$\Delta i_{M} \cdot STF \cdot C$		–	More short-term funding could reinforce monetary policy shocks in periods of crisis				– –				
$\Delta i_{M} \cdot RISK$		–	More bank-risk funding could reinforce monetary policy shocks								
$\Delta i_{M} \cdot RISK \cdot C$		–	Particularly in crisis period						– – –	– – –	– – –
$\Delta i_{M} \cdot NII$		+/–	Uncertain impact of more non-interest rate income								
$\Delta i_{M} \cdot NII \cdot C$		–	Could reinforce monetary policy shocks in periods of crisis							– – –	– –

[a] The sample period runs from 1999 Q1 to 2009 Q4. Shaded areas in grey indicate the variables that are included in each regression. The symbols + (–), ++ (– –), and +++ (– – –) represent significance levels of 10%, 5%, and 1% respectively. When the sign is not reported it means that the coefficient is not statistically different from zero.

- Key results:
  - NSMP: non-standard monetary policy has been effective in stimulating lending (other things equal)
  - Standard capital ratio often has negative effect, but using only Tier 1 capital and augmenting with "expected default frequency" leads to expected result: weaker banks lend less
  - Banks that securitize more lend more (not unexpected)
  - Long spell of very low interest rates seems to lead to more lending (is it riskier?)
  - Banks lent less in countries where they could do non-standard banking activities such as trading

Day 22: Unconventional Monetary Policy

Bernanke on crisis

- Vulnerabilities
    - Excessive debt from Great Moderation
    - Bank's inabilities to monitor own risks (despite thinking they could)
    - Excessive reliance on short-term funding (often through commercial paper rather than through deposits as formerly)
    - Increased concentration of risks through exotic instruments
    - Inadequate oversight and regulation
    - Inadequate capitalization of GSEs
- Lessons from Great Depression
    - Fed did not lend freely to stabilize solvent institutions
    - Fed did not prevent monetary contraction and deflation
- Bernanke was determined not to repeat these errors
    - TALF: Term Auction Lending Facility
        - Like the discount window except Fed determined amount to lend and auctioned to those bank willing to pay highest interest rate
        - Borrowing not publicized to avoid stigma of borrowing from Fed
    - Other lending facilities for non-banks
        - MMMFs had classic run because they were uninsured, promised (traditionally, not legally) full repayment first-come-first-served, and were did not have enough asset value (after decline in price of commercial paper) to repay all shareholder in full
        - Lending to AIG based on collateral from solvent parts of the company
            - Fully repaid
            - Treasury later bought up shares, which were eventually liquidated
        - Fed essentially followed Bagehot's recommendation: lend freely but at high interest rates and with collateral
            - Rates were high relative to "normal" rates, but lower than the crisis rates that prevailed in panicked capital markets
            - This allowed them to be phased out naturally, as firms chose not to renew loans when market rates returned to normal levels
            - In practice, all loans were fully repaid: the Fed ended up making money on this lending
- Stress tests
    - Assessment of solvency of financial institutions under all foreseeable shocks to interest rates, exchange rates, asset prices, etc.

    - An extension of normal examination criteria
    - Positive result creates greater confidence
- Large-scale asset purchases (LSAP) = quantitative easing (QE)
    - Purchases of long-term Treasury bonds and GSE bonds to lower rates on them
    - How to unwind this?

Taylor on crisis and policy response

- "Broadly speaking, monetary policy, regulatory policy, and fiscal policy each became more discretionary, more interventionist, and less predictable in the years leading up to the crisis…"
- We have already studied Taylor's argument that too-lax monetary policy inflated the housing bubble
    - Interest rates were lower than past practice would have suggested they should be given the economic conditions of the early 2000s.
    - He argues that policy since the crash has also deviated from expected traditions
- Why is it bad to have an unpredictable policy?
- Taylor: TALF in 2007 was ineffective because the problem was insolvency/risk, not illiquidity for which LOLR policies were appropriate
- Taylor's alternative explanations:
    - Summers: Equilibrium real interest rate has fallen, perhaps below zero, due to excess supply of saving (baby boom)
        - This makes the ZLB more of a problem, even without deflation
    - Reinhart/Rogoff: Financial crises always lead to weak recoveries
- Taylor's bottom line: The problem has been unpredictability of policies.

B. Friedman on how crisis has changed monetary policy

- Has the Fed's use of large-scale asset purchases (especially targeted on specific kinds of longer-term assets) identified a new instrument for monetary policy?
    - These have been quite successful in stabilizing markets for MBSs and in lowering long-term rates relative to short-term rates
    - Empirical evidence suggests that the Fed's $400b QE2 lowered long rates 10 to 100 basis points
- "Forward guidance" as a way of changing inflation and interest-rate expectations?
    - This is a recent innovation by Bernanke's Fed: including in the FOMC post-meeting statement "guidance" about the likely future course of the funds rate target
    - Friedman argues that this has been a muddy tool and probably not very effective
- Friedman: Monetary theory will need to be re-written if the central bank now has two or three (or more) policy instruments rather than just one

- "The familiar idea, from generations of textbooks, is that doubling the quantity of central bank liabilities (or "monetary base") would lead to a doubling of the price level – not just a few percentage points' increase in the temporary rate of inflation. In some of the major economies, the quantity of central bank liabilities has not just doubled but quadrupled.

  "There is an empirical side to this theoretical challenge as well. Corresponding to the generations of textbooks based on the quantity theory, several generations of empirical research in monetary economics – article after article, in one scholarly journal after another – documented empirically the relationship between one or another economy's price level and the quantity of liabilities issued by its central bank. Now, however, given the huge magnitude of the expansion in central bank balance sheets during and following the 2007-9 financial crisis, and especially in light of the weight that least-squares statistical methods attach to outlier observations, for at least the next generation no one will again be able to find economically sensible estimates, for any of the large high-income economies, from what were once standard regressions relating the price level (or its rate of change) to the quantity (or change) of central bank liabilities." pp. 18-19

Day 23: Empirical Effects of Monetary Policy

Readings: Nagel & Parker; Christiano, Eichenbaum, & Evans; Romer & Romer

Raw correlations

- Money growth/FF rate and output/unemployment are correlated
  - Why?
  - Does monetary policy cause output changes?
  - Do output changes cause changes in *M* or *i*?
  - Either is plausible.
- Interpreting the correlation
  - Suppose that high π → FF rate ↑ → π ↓.
    - Does this mean raising FF rate lowers π?
    - Not necessarily, π could be falling as a natural result of higher π without monetary policy having any effect.
  - How can we identify effects of monetary policy separately from those of correlates of monetary policy?
    - Must identify monetary-policy shocks
    - Those instances when monetary policy was changed consciously by authorities rather than automatically as a natural response to conditions.
  - Two approaches
    - VAR identification
    - Narrative approach

VAR models

- Structural form
  - Suppose that the structure of the economy can be represented by this simple two-equation model:

$$m_t = \alpha_{m,0} + \alpha_{my} y_t + \delta_{mm} m_{t-1} + \delta_{my} y_{t-1} + \varepsilon_{m,t}$$
$$y_t = \alpha_{y,0} + \alpha_{ym} m_t + \delta_{ym} m_{t-1} + \delta_{yy} y_{t-1} + \varepsilon_{y,t}.$$

  - Could have longer lags and nothing fundamental would change.
  - The coefficients are the structural coefficients: α coefficients measure contemporaneous effects of *y* and *m* on each other.
  - ε terms are the "structural shocks" that we want to identify: the shocks to monetary policy relative to what it would ordinarily be.
  - Can't estimate structural forms because *y* and *m* are correlated, which means that are correlated with the error terms and estimates are inconsistent.

- Reduced form
  - Can solve these equations to get rid of the endogenous variables on the right-hand sides

$$m_t = \frac{1}{1-\alpha_{my}\alpha_{ym}}\left[\left(\alpha_{0,m}+\alpha_{my}\alpha_{y,0}\right)+\left(\delta_{mm}+\alpha_{my}\delta_{ym}\right)m_{t-1}+\left(\delta_{my}+\alpha_{my}\delta_{yy}\right)y_{t-1}+\left(\varepsilon_{m,t}+\alpha_{my}\varepsilon_{y,t}\right)\right]$$

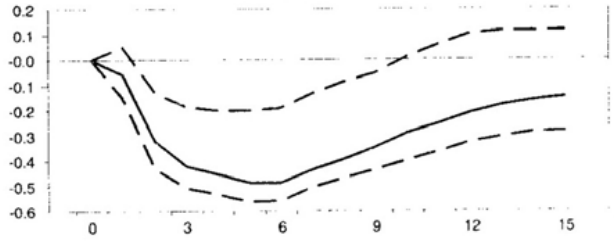
$$y_t = \frac{1}{1-\alpha_{my}\alpha_{ym}}\left[\left(\alpha_{0,y}+\alpha_{ym}\alpha_{m,0}\right)+\left(\delta_{ym}+\alpha_{ym}\delta_{mm}\right)m_{t-1}+\left(\delta_{yy}+\alpha_{ym}\delta_{my}\right)y_{t-1}+\left(\varepsilon_{y,t}+\alpha_{ym}\varepsilon_{m,t}\right)\right]$$

  - Now we can rewrite these reduced-form equations as

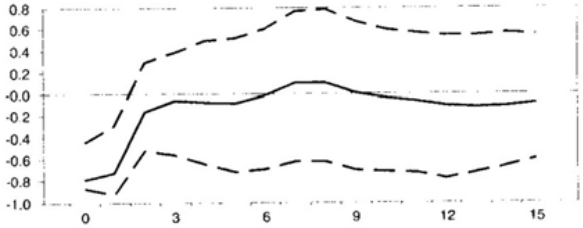
$$m_t = \beta_{m,0}+\beta_{mm}m_{t-1}+\beta_{my}y_{t-1}+\eta_{m,t}$$
$$y_t = \beta_{y,0}+\beta_{ym}m_{t-1}+\beta_{yy}y_{t-1}+\eta_{y,t}$$

  - We can estimate these reduced-form equations and calculate the residuals to get estimates of the η terms.
- Identification of shocks
  - What is the nature of the η terms? Is η_m a purely monetary shock of the kind whose effect we want to examine?
    - No. $\eta_{m,t} = \varepsilon_{m,t} + \alpha_{my}\varepsilon_{y,t}$, which is a function of *both* shocks.
    - The current money supply is affected by both the current structural money shock and the current structural output shock *if* current output affects current money.
  - If $\alpha_{my} = 0$, then η_m is a pure money shock.
  - If $\alpha_{ym} = 0$, then η_y is a pure output shock and we can disentangle ε_m from the model by computing the part of η_m that is uncorrelated with η_y.
  - We must make one of these "orthogonalization" assumptions in order to identify the monetary shocks.
  - Table 5 of empirical chapter (p. 15).
- Christiano, Eichenbaum, and Evans results
  - Impulse-response functions
  - CEE: Figure 1 (p. 20) of empirical chapter shows estimated dynamic effects of upward FF rate shock

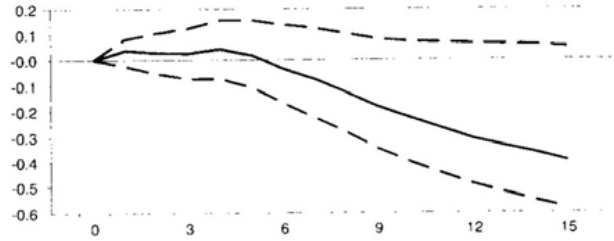
MP Shock => Y



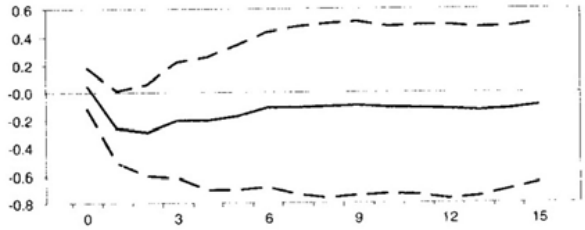
MP Shock => NBR



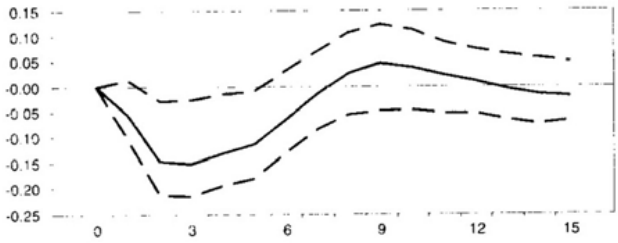
MP Shock => Price



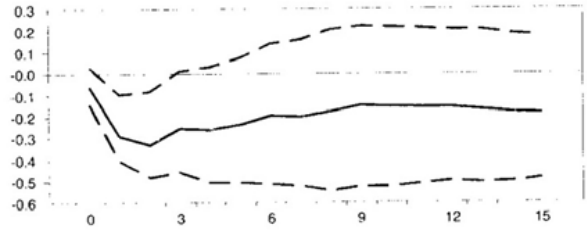
MP Shock => TR



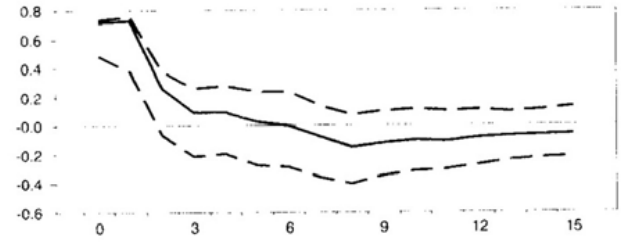
MP Shock => Pcom



MP Shock => M1

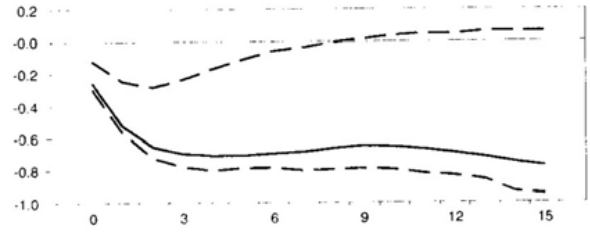


MP Shock => FF



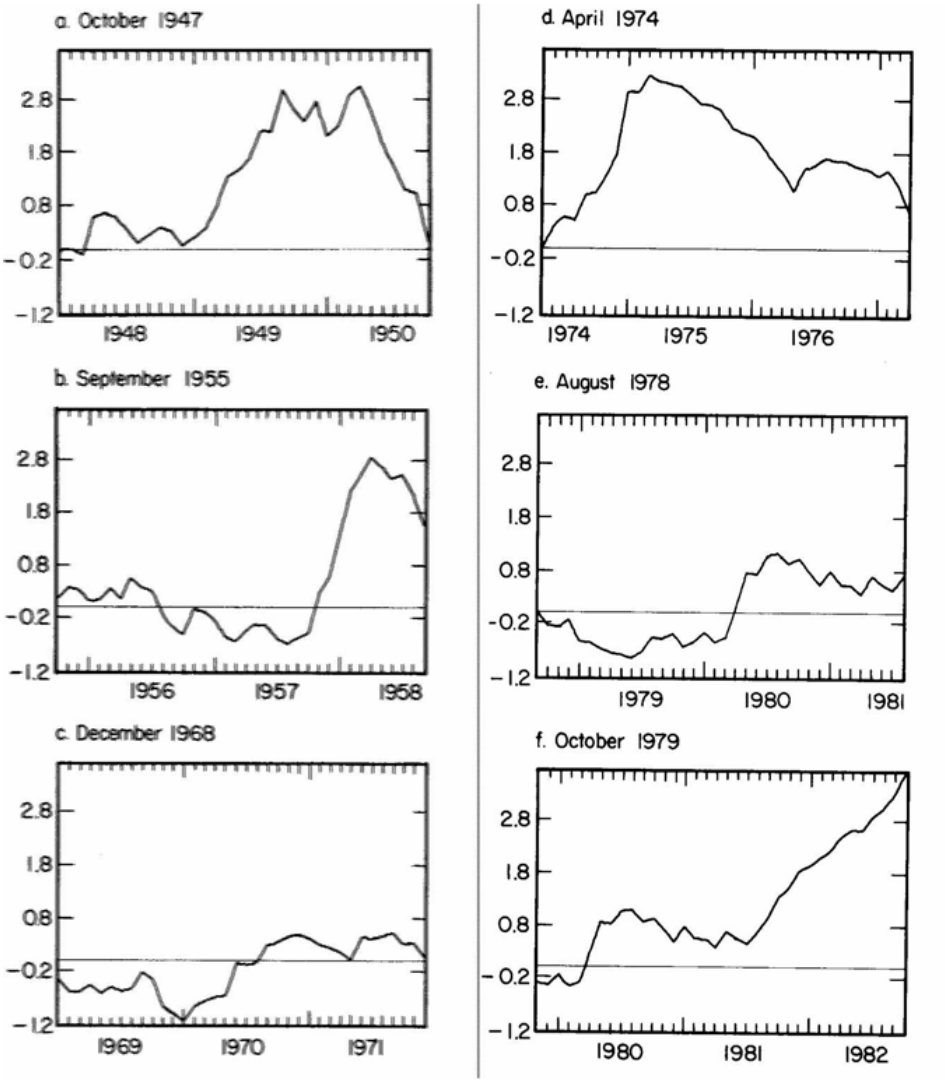
Fed Funds Model with M2

MP Shock => M2



Romer & Romer's narrative approach

- Another way of attempting to identify monetary-policy shocks is to look at documentary record.
    - When did the Fed say that it was breaking with its normal policy routine and raising the FF rate to reduce inflation?
- Romer & Romer identify six "Romer dates" on which such contractions occurred
- What happened to the economy after these dates?
    - Relative to what would have happened anyway
    - Need to look at differences between actual path and the predicted path based on VAR forecast up to that date.



- Empirical chapter Figure 3 (p. 25) shows unemployment effects of Romer-date shocks.

Evidence on credit channel

- How would we identify credit channel?
    - Do reductions in reserves after contractionary policy lower lending?
        - Bernanke and Blinder find immediate reduction in banks' securities and deposits; lending falls after six months.
    - Does contraction affect mix of credit (toward commercial paper vs. bank lending) or spread on these loans?
        - Kashyap, Stein, & Wilcox find that mix swings strongly toward nonbank credit after Romer dates.
        - Spread between bank loan rates and commercial paper rates also increases.
        - Investment (especially producer durables) responds strongly to mix and spread.
    - Does monetary contraction affect small firms more strongly?
        - Gertler and Gilchrist find large effects of Romer dates on small firms compared to large firms.

Day 24: Seigniorage

Readings: White, Buiter, Click

Seigniorage under commodity money

- Sovereign usually pockets a small fee for minting
  - Face value of coin > intrinsic value of embodied metal
  - Too much would debase the money and cause people to lose faith in it.
  - Very limited seigniorage opportunities under gold standard

Seigniorage in modern monetary systems

- Under fiat money, intrinsic value is near zero, so all proceeds from monetary issue can be considered seigniorage.
- Seigniorage accrues to central bank, which may turn over to the Treasury.
- Buiter's three sides of seigniorage:
  - $S_{1,t} = \Delta M_t = M_t - M_{t-1},$ where M is end-of-period monetary base
    - This is the proceeds from printing and issuing new base.
  - $S_{2,t} = i_t M_{t-1}$
    - This is interest earned from investing the accumulated proceeds from all outstanding monetary base.
  - $S_{3,t} = \pi_t M_{t-1},$ where π is the inflation rate
    - This is inflation tax on public's money balances.
  - All three can be expressed either in dollar terms or as a percentage of GDP by dividing by $P_t Y_t$.
- Steady-state growth → $1 + \bar{\mu} = (1 + \bar{\pi})(1 + \bar{\gamma})$, where μ is money growth rate and γ is real output growth rate, assuming elasticity of money demand wrt output = 1.
  - This implies constant steady-state $m_t = \dfrac{M_{t-1}}{P_t Y_t}$
- Thus, three seigniorage concepts can be written as
  - $\bar{s}_1 = \bar{\mu}\bar{m} = \left[(1 + \bar{\pi})(1 + \bar{\gamma}) - 1\right]\bar{m}$
  - $\bar{s}_2 = \bar{i}\bar{m} = \left[(1 + \bar{\pi})(1 + \bar{r}) - 1\right]\bar{m}$
  - $\bar{s}_3 = \bar{\pi}\bar{m}$
- Money-demand function: $\bar{m} = \ell(\bar{\pi}),\ \ell' < 0.$
  - $\eta(\bar{\pi}) = -\dfrac{\ell'(\bar{\pi})}{\ell(\bar{\pi})}$ is semi-elasticity of money demand, $\eta' \geq 0.$
- Seigniorage Laffer curve: s as function of π.

- $s_3 = 0$ and s_1 and s_2 are small if $\pi = 0$.
- $s_1 = s_3$ if $\gamma = 0$.
- s_1 and s_3 are 0 if $\pi = \gamma = 0$.
- $s \to 0$ as $\pi \to \infty$.
- There is a peak someplace in the middle
  - Not at same π for all s concepts
  - If $m = \alpha - \beta(1+\pi)$, then $\hat{\tilde{\pi}}_1 = \frac{1}{2}\left(\frac{\alpha}{\beta} + \frac{1}{1+\bar{\gamma}}\right) - 1$ and $\hat{\tilde{\pi}}_3 = \frac{1}{2}\left(\frac{\alpha}{\beta} + 1\right) - 1$
  - Note the effects of α and β:
    - Increase in α increases revenue-maximizing inflation
    - Increase in β lowers revenue-maximizing inflation
    - Increase in γ lowers revenue-maximizing inflation without changing inflation-tax maximizing inflation

Empirical evidence

- Click's table of s values is below (Table 1)

Optimal seigniorage

- Seigniorage is one taxation alternative among many
- What determines the optimal share of taxation through seigniorage?
  - How high are the costs of seigniorage?
  - How high are the costs of other taxes?
  - Equate marginal costs of each kind of tax.
- Click's model: Welfare cost = $E_0 \sum_{t=0}^{\infty} \beta^t \tfrac{1}{2}\left(a\tau_t^2 + bs_t^2\right)$
- Budget constraint: $g_t = \tau_t + s_t + d_t - (1+\delta)d_{t-1}$ with δ = interest rate net of growth rate
- Optimal seigniorage = $\bar{s} = \frac{a}{a+b}\bar{g}$
  - Higher with low deadweight losses from seigniorage (b)
    - Low interest-elasticity of money $\rightarrow$ low b
  - Higher with higher deadweight losses from conventional taxes (a)
    - High per-capita income might $\rightarrow$ low a
  - Higher with higher government spending
- Empirical support for determinants of seigniorage in Table 2

TABLE 1

AVERAGE ANNUAL RATES OF SEIGNIORAGE (1971–1990)

Country	Seigniorage as Percent of GDP	Seigniorage as Percent of Gov't Spending	Country	Seigniorage as Percent of GDP	Seigniorage as Percent of Gov't Spending
New Zealand*	0.3810	1.0436	India*	1.7192	11.8175
Denmark*	0.3943	1.0512	Venezuela	1.7948	7.6515
United States*	0.4295	1.9552	Dominican Republic	1.8561	11.6631
Canada*	0.4371	2.0144	Morocco*	1.8887	5.9533
Kuwait*	0.4610	1.2196	Ethiopia	1.9988	8.5599
United Kingdom*	0.4737	1.2800	Singapore*	2.0098	9.1736
Belgium*	0.4910	1.0187	Spain*	2.0267	7.5584
Rwanda	0.5262	n.a.	Lesotho	2.1606	5.1142
Netherlands*	0.5352	1.0184	Tanzania	2.1641	8.2810
France*	0.5520	1.3863	Pakistan*	2.1722	11.4778
Norway*	0.5630	1.4598	Ecuador	2.1725	15.8076
Gabon	0.5756	1.5615	Mauritius	2.1757	8.7001
Finland*	0.5966	2.1217	Paraguay	2.2438	21.6222
Switzerland*	0.6189	6.7397	Colombia*	2.3178	17.5651
Australia*	0.6271	2.5722	Iceland*	2.3250	8.3515
Cameroon	0.6376	3.3825	Jamaica	2.3427	n.a.
South Africa*	0.6535	2.5281	Italy*	2.3572	7.4229
Qatar	0.6536	n.a.	Uganda	2.3754	21.6516
Germany*	0.6869	2.3539	Romania	2.4491	6.5803
Austria*	0.6940	1.8944	Togo	2.7308	7.7544
Sweden*	0.7234	1.9301	Brazil	3.0394	13.7132
Burundi	0.8524	6.1174	Greece*	3.1291	10.5149
Honduras	0.8994	5.2043	Zaire	3.2641	10.6499
Congo	0.9026	n.a.	Ghana	3.3136	22.0139
Niger	0.9037	n.a.	Costa Rica	3.3337	15.0873
Zimbabwe*	0.9442	2.7438	Zambia*	3.5082	10.4253
Japan*	0.9585	5.6200	Sierra Leone	3.5618	16.5434
Kenya	0.9837	3.9985	Turkey	3.5821	15.2030
Thailand	1.0872	6.3018	Uruguay	3.7044	15.1053
Trinidad & Tobago	1.1148	3.0989	Mexico*	3.7207	18.9687
Mauritania	1.1524	n.a.	Burma	3.7268	24.9233
Barbados	1.1924	3.7201	Bolivia	3.8067	19.7555
Central African Rep.	1.1961	n.a.	Portugal*	4.0034	10.0712
Philippines*	1.2251	8.9611	Sudan	4.4325	n.a.
Tunisia	1.3418	4.0607	Iran	4.6616	15.0880
Indonesia*	1.3908	6.8590	Jordan	4.9885	12.1835
Cote d'Ivoire	1.4156	n.a.	Peru*	4.9935	28.2328
Ireland*	1.5178	3.4922	Egypt	5.4170	12.1084
Sri Lanka	1.5179	4.9710	Poland	6.9379	n.a.
El Salvador	1.5259	10.8938	Malta	7.5743	18.3596
Nepal	1.5343	10.0539	Nicaragua	7.8601	23.7008
Botswana	1.5484	4.4003	Argentina*	9.7299	62.0003
Korea*	1.5690	9.6979	Chile*	10.3001	32.5765
Nigeria*	1.5728	11.1197	Yugoslavia	11.8731	148.9518
Malaysia*	1.5749	5.2696	Israel*	14.8424	22.2781

NOTES: * denotes countries for which money demand is estimated; n.a. denotes "not available."

TABLE 2

DETERMINANTS OF SEIGNIORAGE: OPTIMUM TAX MODELS
Dependent Variable is Log of Average Seigniorage/GDP Ratio

	1	2	3	4	5	6	7
Constant	−3.426**	−2.985**	−3.349**	−3.113**	−3.407**	−3.457**	−3.730**
	(.598)	(.677)	(.553)	(.674)	(.617)	(.405)	(.096)
Short-run	45.040*						
Semi-elasticity	(26.959)						
Long-run		6.213**					
Semi-elasticity		(1.876)					
Short-run			8.799**				
Elasticity			(3.697)				
Long-run				0.493*			
Elasticity				(.298)			
Per Capita GNP	−0.111**	−0.117**	−0.105**	−0.123**	−0.127**	−0.119**	−0.102**
	(.022)	(.022)	(.020)	(.022)	(.022)	(.015)	(.014)
Gov't. Spending/	0.072	0.328	0.119	0.247	0.121	0.129	
GDP (log)	(.360)	(.389)	(.331)	(.385)	(.370)	(.265)	
Observations	41	36	40	37	41	79	89
Adjusted R^2	.38	.44	.42	.39	.36	.30	.26
Standard Error	.752	.743	.719	.769	.763	.730	.746

NOTES: White-corrected standard errors in parentheses. * denotes significant at 10 percent level. ** denotes significant at 5 percent level.

- Higher interest elasticity seems to be associated with less seigniorage (remember that elasticities are < 0, so increase in elasticity value means less elastic).
- Higher GNP → less seigniorage.
- Seems to be independent of *g*
    - All of the effect is on the tax side, not the spending side.
- In short run, less creditworthy countries are more likely to use inflation tax.

Days 25 & 26: Hyperinflation and Disinflation

Costs of inflation

- Is inflation bad?
- Why?
- Costs of unanticipated inflation
    - Redistribution
        - Borrowers/lenders
        - Wage contracts
        - Government vs. public
- Costs of anticipated inflation
    - Shoe-leather costs
    - Government taxes nominal interest
    - Inconvenience
- Costs of inflation uncertainty
    - Shorter contracts
    - Lowered confidence both domestically and internationally

Episodes of hyperinflation

- Cagan's classic study of seven European hyperinflations between 1921 and 1946.
    - Examine numbers in table.

TABLE 1

MONETARY CHARACTERISTICS OF SEVEN HYPERINFLATIONS*

	Country						
	Austria	Germany	Greece	Hungary		Poland	Russia
1. Approximate beginning month of hyperinflation	Oct., 1921	Aug., 1922	Nov., 1943	Mar., 1923	Aug., 1945	Jan., 1923	Dec., 1921
2. Approximate final month of hyperinflation	Aug., 1922	Nov., 1923	Nov., 1944	Feb., 1924	July, 1946	Jan., 1924	Jan., 1924
3. Approximate number of months of hyperinflation	11	16	13	10	12	11	26
4. Ratio of prices at end of final month to prices at first of beginning month	69.9	1.02×10^{10}	4.70×10^{8}	44.0	3.81×10^{27}	699.0	1.24×10^{5}
5. Ratio of quantity of hand-to-hand currency at end of final month to quantity at first of beginning month	19.3	7.32×10^{9}	3.62×10^{6}	17.0	1.19×10^{25}†	395.0	3.38×10^{4}
6. Ratio of (4) to (5)	3.62	1.40	130.0	2.59	320.0	1.77	3.67
7. Average rate of rise in prices (percentage per month)‡	47.1	322.0	365.0	46.0	19,800	81.4	57.0
8. Average rate of rise in quantity of hand-to-hand currency (percentage per month)§	30.9	314.0	220.0	32.7	12,200†	72.2	49.3
9. Ratio of (7) to (8)	1.52	1.03	1.66	1.41	1.62	1.13	1.16
10. Month of maximum rise in prices	Aug., 1922	Oct., 1923	Nov., 1944	July, 1923	July, 1946	Oct., 1923	Jan., 1924
11. Maximum monthly rise in prices (percentage per month)	134.0	32.4×10^{3}‖	85.5×10^{6}#	98.0	41.9×10^{15}	275.0	213.0
12. Change in quantity of hand-to-hand currency in month of maximum change in prices (percentage per month)	72.0	1.30×10^{3}**	73.9×10^{3}#	46.0	1.03×10^{18}	106.0	87.0
13. Ratio of (11) to (12)	1.86	24.9	1,160	2.13	40.7	2.59	2.45
14. Month in which real value of hand-to-hand currency was at a minimum	Aug., 1922	Oct., 1923	Nov., 1944	Feb., 1924	July, 1946	Nov., 1923	Jan., 1924
15. Minimum end-of-month ratio of real value of hand-to-hand currency to value at first of beginning month	0.35	0.030††	0.0069‡‡	0.39	0.0031†	0.34	0.27

* All rates and ratios have three significant figures except those in row 15, which have two. For sources see Appendix B (pp. 96–117).

† Includes bank deposits.

‡ The value of x that sets $(1 + [x/100])^t$ equal to the rise in the index of prices (row 4), where t is the number of months of hyperinflation (row 3).

§ The value of x that sets $(1 + [x/100])^t$ equal to the rise in the quantity of hand-to-hand currency (row 5), where t is the number of months of hyperinflation (row 3).

‖ October 2 to October 30, 1923, at a percentage rate per 30 days.

October 31 to November 10, 1944, at a percentage rate per 30 days.

** September 29 to October 31, 1923, at a percentage rate per 30 days.

†† October 23, 1923.

‡‡ November 10, 1944.

- Other historical hyperinflations cited by Fischer et al. (table)
    - Black Death (<50 percent decline in prices)
        - Why?
    - Spanish inflation after New World gold discoveries

TABLE 1
HISTORICAL EPISODES OF HIGH INFLATION

Country/Episode	Dates of Episodes	Duration	Cumulative Inflation[1]	Geometric Annual Rate of Inflation	Max. Annual Inflation	Source(s)
Ancient Rome Diocletian	151–301	151 years	19,900.0	3.6	n.a.	Paarlberg (1993)
China/Sung Dynasty	1191–1240	50 years	2,092.6	6.4	18.0	Lui (1983)
Europe/Black Death[2]	1349–1351	3 years	138.5	33.6	56.3	Paarlberg (1993)
Spain	1502–1600	99 years	315.2	1.4	14.6	Hamilton (1965), Paarlberg (1993)
France/John Law[6]	Feb. 1717–Dec. 1720	47 months	55.2	11.9	1,431.3	Hamilton (1936), Paarlberg (1993)
American Revolution[3,6]	Feb. 1777–Jan. 1780	36 months	2,701.7	203.7	16,098.7	Fisher (1913), Paarlberg (1993)
French Revolution[4,6]	Feb. 1790–Feb. 1796	73 months	26,566.7	150.5	92,067.6	Capie (1991)
U.S. Civil War/ North Confederacy[6]	1862–1864 Feb. 1861–Apr. 1865	3 years 51 months	116.9 9,019.8	29.4 189.2	45.1 5,605.7	Paarlberg (1993), Lerner (1955)
Mexican Revolution[5,6]	Feb. 1913–Dec. 1916	47 months	10,715.4	230.6	7,716,100.0	Cardenas and Manns (1989), Kemmerer (1940)
China	1938–1947	10 years	2,617,681.0	176.6	612.5	Huang (1948)

[1] Inflation expressed in percentage terms.
[2] Price of wheat in England.
[3] Depreciation of the continental currency (in units per Spanish Dollar), based on prices of beef, Indian corn, wool, and sole leather.
[4] Value of assignat.
[5] Pesos per U.S. dollar.
[6] Maximum annual inflation based on annualized maximum monthly inflation rate.

        - Averaged 2% and never exceeded 15%
    - Revolutionary France
- No hyperinflations 1947–84.
    - US dollar provided "nominal anchor" similar to gold standard
- Recent hyperinflations (not including current Zimbabwe) (table)
    - All in developing countries
        - Many in former Communist countries: Monetary overhang

TABLE 2
HYPERINFLATIONS, 1956–96 (CAGAN DEFINITION)[1,2]

Countries	Dates of Episode	During Hyperinflation: Duration (in months)	During Hyperinflation: Cumulative Inflation	During Hyperinflation: Monthly Inflation Rate: Geometric Average	Median	Highest
Angola[3]	Dec. 94–Jun. 96	19	62,445.9	40.3	36.0	84.1
Argentina	May 89–Mar. 90	11	15,167.0	58.0	61.6	196.6
Bolivia	Apr. 84–Sep. 85	18	97,282.4	46.6	51.8	182.8
Brazil	Dec. 89–Mar. 90	4	692.7	67.8	70.2	80.8
Nicaragua	Jun. 86–Mar. 91	58	11,895,866,143	37.8	31.4	261.2
Congo, Dem. Rep.	Oct. 91–Sep. 92	12	7,689.2	43.8	35.2	114.2
Congo, Dem. Rep.	Nov. 93–Sep. 94	11	69,502.4	81.3	65.0	250.0
Armenia	Oct. 93–Dec. 94	15	34,158.2	47.6	44.5	437.8
Azerbaijan	Dec. 92–Dec. 94	25	41,742.1	27.3	23.1	64.4
Georgia	Sep. 93–Sep. 94	13	76,218.7	66.6	66.3	211.2
Tajikistan	Apr. 93–Dec. 93	9	3,635.7	49.5	36.4	176.9
Tajikistan	Aug. 95–Dec. 95	5	839.2	56.5	63.0	78.1
Turkmenistan	Nov. 95–Jan. 96	3	291.4	57.6	55.7	62.5
Ukraine	Apr. 91–Nov. 94	44	1,864,714.5	25.0	14.9	285.3
Serbia	Feb. 93–Jan. 94	12	156,312,790.0	228.2	54.2	175,092.8

Sources: IMF, *International Financial Statistics;* national authorities, and IMF staff estimates.
[1] Cagan defines hyperinflation "as beginning in the month the rise in prices exceeds 50 percent and as ending in the month before the monthly rise in prices drops below that amount and stays below for at least a year. The definition does not rule out a rise in prices at a rate below 50 percent per month for the intervening months, and many of these months have rates below that figure."
[2] Excludes the following one- and two-month episodes. In the market economies, Chile (Oct. 1973) and Peru (Sep. 1988, July–Aug. 1990). In the transition economies, Estonia (Jan.–Feb. 1992), Latvia (Jan. 1992), Lithuania (Jan. 1992), Krygyz Republic (Jan. 1992), and Moldova (Jan.– (April 1991, Jan.–Feb. 1992), Kazakstan (April 1991, Jan. 19 (April 1991, Jan.–Feb. 1992) even though by Cagan's definiti they appear related to two price jumps (April 1991, and Jan.–
[3] Period after hyperinflation is from July–Dec. 1996.

TABLE 2 (

Causes of hyperinflation

- Monetary expansion: "Inflation is always and everywhere a monetary phenomenon."
- Self-fulfilling expectations?
    - Econometric estimates say no: money demand not sensitive enough to π
- Is there a hyperinflation equilibrium?
    - High inflation forces even faster money growth?

TABLE 4
MARKET ECONOMIES: TRANSITION MATRIX[1]

Range of Inflation	Year T + 1: < 25	25–50	50–100	100–200	200–400	> 400	Probability: Will Rise	Will Fall	Number of Observations
Year T									
< 25	95.4	4.1	0.4	0.1	0.0	0.0	4.6	0.0	3343
25–50	46.5	38.4	13.3	1.4	0.4	0.0	15.1	46.5	279
50–100	10.6	23.0	47.5	14.8	1.6	2.5	18.9	33.6	122
100–200	10.1	11.9	18.6	42.4	15.3	1.7	17.0	40.6	59
200–400	11.7	5.9	5.9	11.8	17.6	47.1	47.1	35.3	17
> 400	2.7	0.0	8.1	13.5	8.1	67.6	0.0	32.4	37
Total									3857

Source: IMF, *International Financial Statistics.*
[1] Calculated as number of observations in year T + 1 in the corresponding column range as a percentage of numbers of observations in the corresponding row range in year T. (Rows add up to 100.) Based on pooled, cross-section annual data 1960–96, from 133 countries.

- Effect of fiscal deficits
    - Fischer results suggest positive connection between seigniorage and fiscal deficits
- Inflation persistence?
    - Contracts might provide mechanism for persistence
    - Lagged indexation might encourage persistence, though contemporaneous indexation would not.

Effects of high inflation

- Output growth is lower during high inflation
    - Contrast to Phillips curve result
- Investment is especially hurt
- High inflation always equals highly variable inflation and highly uncertain inflation
    - Difficult for credit markets

Disinflation

- Modern theory of Phillips curve: $u \sim \pi - \pi^e$
    - Decrease in π relative to π^e would raise u.
- What is the best way to lower the unemployment cost of disinflation?
    - "Conventional wisdom" is gradualism
        - Okun looks at 6 econometric studies to estimate that each that keeping unemployment higher by one point for one year lowers inflation by 1/6 to ½ point: average 0.3.
        - Each point of inflation reduction costs about 3 point-years of unemployment or (using Okun's Law) 9 percent of GNP. (Sacrifice ratio)
        - Is this disinflation worth it?
            - Key policy question in 1976: Is it better to retain slack in economy to bring inflation down or to stimulate a quick recovery?
            - Okun suggests subsidizing costs to lower inflation and reverse cost-price spiral.
- Is there a way to avoid the cost of disinflation?
    - Modern Phillips curve theory says that if expected inflation declines with actual, there will be no effect on unemployment or output.
    - Is this feasible?
        - WIN buttons?
        - Credible Federal Reserve policy?
- Sargent's evidence on four European hyperinflations
    - In all cases, output went up as hyperinflation ended
    - He argues that fiscal changes made decline in inflation credible in each case.
    - Is hyperinflation the same as regular inflation?

- Ball's "sacrifice ratio"
  - Denominator = reduction in average inflation rate
  - Numerator = %-years of reduced output relative to trend
  - Data for quarterly disinflations:

Table 5.1 Disinflations: Quarterly Data

Episode	Length in Quarters	Initial Inflation	Change in Inflation	Sacrifice Ratio
Australia				
74:2–78:1	15	14.60	6.57	0.7234
82:1–84:1	8	10.50	4.98	1.2782
Canada				
74:2–76:4	10	10.60	3.14	0.6273
81:2–85:2	16	11.60	7.83	2.3729
France				
74:2–76:4	10	11.90	2.98	0.9070
81:1–86:4	23	13.00	10.42	0.5997
Germany				
65:4–67:3	7	3.67	2.43	2.5590
73:1–77:3	18	6.92	4.23	2.6358
80:1–86:3	26	5.86	5.95	3.5565
Italy				
63:3–67:4	17	6.79	5.74	2.6539
77:1–78:2	5	16.50	4.30	0.9776
80:1–87:2	29	19.10	14.56	1.5992
Japan				
62:3–63:1	2	8.11	3.00	0.5309
65:1–67:2	9	5.99	2.20	1.6577
70:3–71:2	3	7.53	2.09	1.2689
74:1–78:3	18	17.10	13.21	0.6068
80:2–83:4	14	6.68	5.07	0.0174
84:2–87:1	11	2.29	2.11	1.4801
Switzerland				
73:4–77:4	16	9.42	8.28	1.8509
81:3–83:4	9	6.15	3.86	1.2871
United Kingdom				
61:2–63:3	9	4.24	2.10	1.9105
65:2–66:3	5	4.91	2.69	−0.0063
75:1–78:2	13	19.70	9.71	0.8679
80:2–83:3	13	15.40	11.12	0.2935
84:2–86:3	9	6.19	3.03	0.8680
United States				
69:4–71:4	8	5.67	2.14	2.9364
74:1–76:4	11	9.70	4.00	2.3914
80:1–83:4	15	12.10	8.83	1.8320

With annual data:

Table 5.2 **Disinflations: Annual Data**

Episode	Length in Years	Initial Inflation	Change in Inflation	Sacrifice Ratio
Australia				
61–62	1	1.27	1.52	−0.0399
74–78	4	13.10	6.38	0.4665
82–84	2	9.48	5.46	0.7571
86–88	2	7.80	1.88	0.0824
Austria				
65–66	1	2.18	2.21	−0.5019
74–78	4	8.05	5.16	1.0824
80–83	3	5.93	1.90	1.5339
84–86	2	4.55	3.56	−0.2219
Belgium				
65–67	2	3.60	1.69	0.7376
74–78	4	10.80	7.23	0.4945
82–87	5	7.57	6.54	1.7156
Canada				
69–70	1	3.74	1.54	0.9863
74–76	2	9.08	2.57	0.3822
81–85	4	10.00	6.56	2.2261
Denmark				
68–69	1	6.13	2.94	−0.6939
74–76	2	11.40	3.95	0.5746
77–78	1	9.52	1.74	0.5776
80–85	5	10.60	7.89	1.7621
Finland				
64–65	1	7.27	3.92	−0.3582
67–69	2	7.03	5.22	0.9459
74–78	4	14.70	8.33	1.6569
80–86	6	9.92	6.95	0.6477
France				
62–66	4	5.31	3.63	−0.6765
74–76	2	11.00	3.19	1.0807
81–86	5	11.30	9.05	0.2517
Germany				
65–67	2	3.28	1.78	1.5614
73–78	5	6.31	3.91	3.9174
80–86	6	4.96	5.11	2.0739
Ireland				
64–66	2	5.41	3.37	0.9134
74–78	4	15.90	8.52	0.8147
80–87	7	15.60	13.52	0.4292
Italy				
63–67	4	5.95	4.76	2.2857
76–78	2	14.90	4.30	0.5107
80–87	7	17.60	13.40	1.6448
Japan				
62–64	2	7.55	3.78	−0.6262
74–78	4	15.20	12.51	0.4615
80–82	2	5.44	3.72	−0.1567
83–86	3	1.84	1.99	−0.6117

Table 5.2 (continued)

Episode	Length in Years	Initial Inflation	Change in Inflation	Sacrifice Ratio
Luxemburg				
75–78	3	8.79	6.03	0.5302
Netherlands				
65–67	2	5.44	2.55	1.2767
75–78	3	8.33	4.89	−0.8558
81–83	2	5.92	3.11	1.3973
84–86	2	2.85	3.35	−0.5739
New Zealand				
71–72	1	8.39	2.42	0.5396
75–78	3	13.20	3.73	1.2897
80–83	3	13.50	8.19	0.1752
86–88	2	12.30	7.62	0.1018
Spain				
62–63	1	7.37	2.13	−0.5630
64–69	5	9.95	7.28	−0.2142
77–87	10	18.40	13.86	3.4847
Sweden				
65–68	3	5.59	3.74	1.1134
77–78	1	9.53	2.85	0.3564
80–82	2	11.80	4.35	0.8707
83–86	3	7.61	4.21	−0.5350
Switzerland				
66–68	2	3.58	1.55	1.6060
74–76	2	7.90	6.87	1.3447
81–83	2	4.75	2.12	1.2618
84–86	2	3.22	2.12	−0.7917
United Kingdom				
61–63	2	3.32	2.27	1.7717
75–78	3	16.70	9.71	−0.0682
80–83	3	13.10	9.78	0.5379
84–86	2	4.51	1.84	0.4823
United States				
69–71	2	4.76	1.53	3.3666
74–76	2	8.91	3.63	1.6057
79–83	4	10.40	7.63	1.9362

- Determinants of sacrifice ratio:
  - Smaller disinflations are relatively more costly
  - Slower disinflations are relatively more costly (Sargent)
  - Less wage flexibility makes disinflation more costly
  - Initial inflation, openness, and incomes policies have no consistent effect.

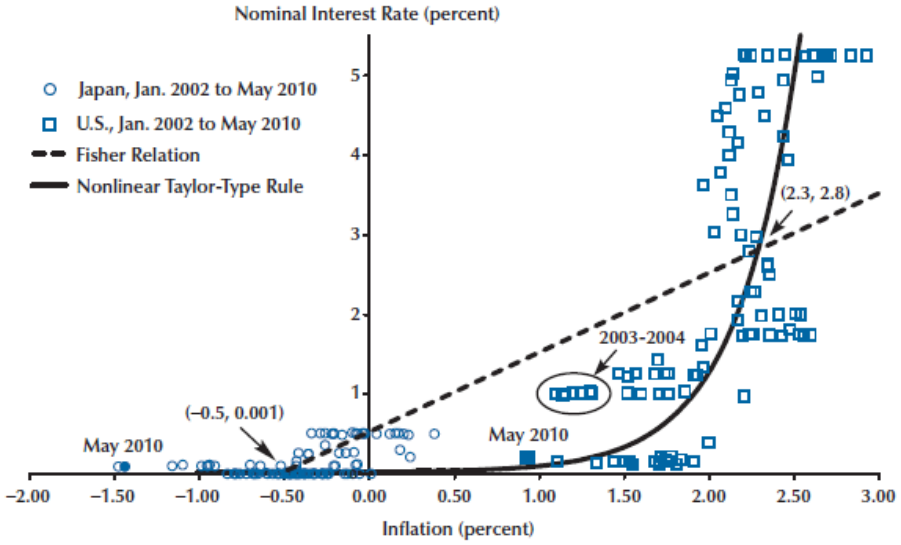
Deflation

- If inflation is bad, shouldn't deflation be good?
- Friedman's "optimum quantity of money"
- Problems with deflation
    - Difficulty of real wage adjustment
    - Debt-deflation hypothesis
    - ZLB restriction on monetary policy
    - Lower bound on real interest rates
        - Money bears positive real rate, which may discourage consumption and encourage saving
- Bullard's argument that we can hit a deflationary equilibrium
    - Japan, Great Depression, current situation?

Bullard

Figure 1

Interest Rates and Inflation in Japan and the U.S.



NOTE: Short-term nominal interest rates and core inflation rates in Japan and the United States, 2002-10.

SOURCE: Data from the Organisation for Economic Co-operation and Development.

Day 27: Practice for Symposium

Day 28: Dynamic Inconsistency

Reading: White 10.

Reasons for inflation

- Government revenue, but few countries use inflation as a major revenue source.
- Stimulation of output?
    - Only works in short run
    - Keynes: In the long run we're all dead.
    - Long run is just a sequence of short runs.
    - Or is it…

Dynamic inconsistency

- Big idea: Optimal long-run policy is not same as the sequence of optimal short-run policies
- Intuitive examples:
    - Final exam
    - Capital levy
- Barro-Gordon version of Kydland-Prescott model
    - Can be done in output-inflation or unemployment-inflation space
    - We'll do with unemployment and Phillips curve
    - Key assumptions
        - Phillips curve is vertical in long-run, downward-sloping in short run
        - Optimal inflation rate = 0
        - Optimal unemployment rate < natural unemployment rate
            - Rigidities in economy?
            - Unemployment insurance?
            - Taxes?
            - Imperfect competition?
            - Politics?
            - Whose optimal unemployment rate?
        - Policymaker chooses inflation rate (directly)
        - Expectations
            - Myopic
            - Rational
    - Indifference map and bliss point
    - Short-run PC as constraint (given π^e)

        - Can we achieve the bliss point?
    - Long-run PC as constraint (when $\pi^e = \pi$)
        - Can we achieve the bliss point?
    - Sequence of short-run equilibrium
- Barro/Gordon's "positive theory of inflation"
    - Inflation rate will be higher if
        - Target *u* is further below natural *u*
        - Short-run PC is flatter
        - Objective function worries more about *u* vs. π
            - Indifference ellipses are flatter
        - Policymaker takes short-run vs. long-run perspective
- Can we constrain policymaker to choose long-run optimal equilibrium?
    - If not, we will have $\pi >$ optimal
    - How?
        - Institutional constraints?
            - Independent central bank
            - Long terms for governors
            - Bonus for low inflation
            - Formal inflation target
        - Reputation?
            - Picking conservative central banker?
            - Maintaining reputation by keeping inflation low?

Days 29 & 30: Instruments and Operating Targets

Readings: White 11, Blinder 1-2, Bernanke & Mishkin; Clarida, Gali, & Gertler.

Rules vs. discretion

- Dynamic inconsistency is often used as an argument for "monetary rules" rather than discretion.
    - Need for "commitment" to avoid short-run exploitation of Phillips curve
    - Friedman's recommendation: Price/inflation is the only thing that the central bank can control in the long run, so don't mess it up trying to fine-tune short-run goals.
- What kind of rule would be best?
    - Friedman rule?
        - Constant rate of money growth
            - μ = real growth rate (3%?) would keep prices stable
            - Optimum quantity of money argument: set $i = 0$ by having $\pi = -g$
            - Deflation can be problematic, though
    - Taylor rule?
        - Interest-rate pegging policy
        - $i = \bar{i} + a(\pi - \bar{\pi}) + b\left(\frac{Y - \bar{Y}}{\bar{Y}}\right)$
        - Seems consistent with actual policy behavior in numerous countries
    - Inflation target or price-level target?
        - Would be consistent with Friedman's rule but allow for changes in g and in money demand
        - Which would be better?
    - Exchange-rate peg
        - Ties domestic inflation to foreign inflation
        - Currency crises can arise if peg overvalues currency

Choice of short-term instrument

- How many things can the Fed control?
    - Money supply/monetary base
    - Fed-funds rate
    - Exchange rate
- Fed can only have one instrument at a time
    - Increasing B will lower funds rate and depreciate dollar
    - Lowering funds rate requires raising B and depreciates dollar
    - Etc.

- Or can it have more?
    - Benjamin Friedman's argument that Fed can use asset side of the balance sheet to affect multiple interest rates
    - QE: There are many levels of bank reserves that are consistent with zero nominal funds rate
    - Forward guidance may allow some latitude to affect expectations
- Why does choosing an instrument matter?
    - In a world with perfect information and no policy lags, Fed just shifts LM to intersect IS at desired Y.
    - The problem is that each variable of interest has short or long observation lags and that policy affects each with long lags
    - Have to try to predict where the economy will be 9–18 months from now based on what you know about where it was 3–6 months ago.
        - Use signals from quickly observed variables to try to discern whether we're on the right path for the slowly observed ones.
        - Interest rates and exchange rates (along with some bank variables such as borrowing) are instantaneously observed
        - Money supply and reserves are observed with short lags (week or so)
        - Some data on prices and unemployment come in monthly
        - GDP and better price data take several quarters and then are revised substantially for a year or more.
- Goals, targets, and instruments
    - Goals are ultimate economic goals: growth and inflation
        - Typically not observable without error for a year or two
        - Could not be the basis for day-to-day policymaking if lags are important
    - Targets are short-term clues about goals
        - Money supply can be target
        - Unemployment and CPI are observed monthly, but are imperfect and/or lagging
    - Instrument is the day-to-day operating rule of the bank
        - Funds rate
        - Reserves/base
        - Exchange rate
    - Fed must assume a stable relationship between its instrument, targets, and goal variables, while watching for evidence that the relationship may change.
- Choice of instrument is one of choosing which mechanism most effectively controls economy in ways Fed desires
- Considerations:
    - Control

- Observability/lags
- Coherence of relationship to ultimate targets

Poole's IS/LM analysis of money-supply vs. interest-rate targets

- If no lags and perfect knowledge, no difference: set LM to bring output to full employment
- Effects of IS shock: better to keep *M* constant than *r*
- Effects of LM shock: better to keep *r* constant then *M*
- Which kinds of shocks have been most prevalent?
  - Money demand has been very unstable
  - Relationship between *B* and *M* has be unstable at times (like now)
  - Most central banks with floating exchange rates have chosen *r* rules

Blinder/Brainard recommendation for policymaking

- Estimate appropriate policy change, then do less.
- Watch what happens
- Adjust if necessary
  - Increase to appropriate level if working out as expected
  - Change policy if not as expected

Clarida, Galí, and Gertler's estimated U.S. Taylor rules

- $i^*_t = i^* + \beta\left[E\left(\pi_{t,k} \mid \Omega_t\right) - \pi^*\right] + \gamma E\left(x_{t,q} \mid \Omega_t\right)$
  - k period horizon for inflation
  - q period horizon for output gap (x)
  - i is nominal rate
- Similar to Taylor rule except based on expected future rather than past
- $r^*_t = r^* + (\beta - 1)\left[E\left(\pi_{t,k} \mid \Omega_t\right) - \pi^*\right] + \gamma E\left(x_{t,q} \mid \Omega_t\right)$
  - r^* must be long-run equilibrium real rate (not a policy choice)
  - β must be bigger than one for anti-inflation policy to be effective.
- Refinements:
  - Fed actually smooths changes in interest rates
  - No random error term to absorb differences in response
  - Assumes perfect control over *i*
  - $i_t = (1-\rho)\left[r^* - (\beta - 1)\pi^* + \beta\pi_{t,k} + \gamma x_{t,q}\right] + \rho(L) i_{t-1} + \varepsilon_t$
    - ε absorbs unpredicted changes in π and x.
    - ρ captures Fed interest-rate smoothing
    - Assume that sample average *r* is *r**.
- Results:

- Results of Table II ($k = q = 1$ quarter) suggest that the pre-Volcker reaction function was unstable
- Inflation led to decline in target real interest rate
- Possibility of policy-loop feedback that could accelerate inflation

TABLE II
BASELINE ESTIMATES

	π^*	β	γ	ρ	p
Pre-Volcker	4.24	0.83	0.27	0.68	0.834
	(1.09)	(0.07)	(0.08)	(0.05)	
Volcker-Greenspan	3.58	2.15	0.93	0.79	0.316
	(0.50)	(0.40)	(0.42)	(0.04)	

Standard errors are reported in parentheses. The set of instruments includes four lags of inflation: output gap, the federal funds rate, the short-long spread, and commodity price inflation.

- Volcker-Greenspan era had lower target π and stable reaction
  - Also more output responsiveness

Inflation targeting as policy rule

- Inflation vs. price-level targeting
  - Gold standard was price-level target
  - Is it more important to have fixed value of dollar or fixed rate of change?
- Operational issues
  - Usually specify target range rather than single number
  - Often have specific horizon
  - "Constrained discretion" rather than a true rule
  - Establishes primacy of inflation as goal of monetary policy
  - Dealing with supply shocks?
    - Bundesbank's policy of setting target according to its view of "how much inflation was unavoidable"
    - One-time changes such as implementation of indirect tax in Canada
  - Is inflation a targetable variable given the lags in observability and long lags in policy effect?

Empirical evidence on inflation targeting

- Australia, Canada, New Zealand, Sweden, and UK have explicit inflation targets

- Other central banks often behave as though inflation was their primary target, but don't set numerical targets

- Ball and Sheridan find that advanced countries with inflation targets do not have lower or less volatile inflation, so the evidence for inflation targeting is not conclusively strong
  - Only a few countries and a few years
- Levin et al. (St. Louis Fed)
  - Are forecasts of inflation correlated with recent historical inflation?
    - If no explicit inflation target, then recent inflation is likely to persist and/or reflect current policy goals
    - If credible explicit inflation target, then expectations (especially longer-term) should be at target and independent of recent inflation.
    - Results suggest that this is true:

Table 2

Estimated Response of Change in Inflation Expectations to Change in Realized Inflation

	Horizon (years ahead)			
	1	3	5	6-10
IT	0.00	0.20	0.09	0.01
	(0.10)	(0.06)	(0.05)	(0.05)
Non-IT	–0.03	0.25	0.29	0.24
	(0.17)	(0.11)	(0.11)	(0.08)
Euro area and United States	–0.06	0.30	0.34	0.24
	(0.19)	(0.12)	(0.11)	(0.08)

NOTE: This table holds estimates of β from equations (1) and (2) applied to both IT and non-IT economies over the period 1994-2003. Standard errors are in parentheses. Estimation was performed via generalized least squares assuming cross-sectional heteroskedasticity. Similar results are obtained when estimation is performed via a seemingly unrelated regression.

- Inflation is also less persistent in the countries that target inflation:

Table 3

Persistence Estimates for Inflation

	Core CPI	
Country	Median unbiased	Upper 95th percentile
IT countries		
Australia	0.70	1.02
Canada	0.27	0.63
New Zealand	0.24	0.60
Sweden	0.16	0.54
United Kingdom	0.33	0.68
Non-IT countries		
Denmark	0.66	1.00
Euro area	0.84	1.06
France	0.75	1.04
Germany	0.77	1.04
Italy	0.88	1.07
Netherlands	0.39	0.74
Japan	0.82	1.05
United States	1.04	1.10

NOTE: For each country in the sample, this table records the median unbiased estimat percent confidence interval for the largest autoregressive root of core and total CPI in Estimates were computed based on Stock (1991), using equation (2).

- Gonçalves and Salles examine evidence for developing countries
    - Inflation has been falling in most countries of the world since 1980
    - Has inflation decline been stronger in targeting countries than non-targeting ones?

Table 1
Inflation data[a]

Country	Adoption year	Initial inflation	Final inflation	Fall
Brazil	1999	8,7	7,9	−0,8
Chile	1991	21,8	7,2	−14,6
Colombia	2000	22,8	6,9	−15,9
Czech Republic	1998	3,8	3,5	−0,3
Hungary	2001	15,3	5,9	−9,4
Israel	1992	17,2	6,1	−11,1
Mexico	1999	21,8	7,2	−14,6
Peru	1994	48,6	6,6	−42,0
Philippines	2002	11,3	5,0	−6,3
Poland	1999	22,8	4,5	−18,3
South Africa	2000	12,3	5,2	−7,1
Thailand	2000	5,4	2,2	−3,3
South Korea	1998	7,4	3,4	−4,0
Targeters mean	1998	**17**	5,5	**−11,4**
Argentina	–	7.3	6.4	−0.9
Bulgaria	–	4.5	7.3	2.8
China	–	8.6	0.6	−8.0
Costa Rica	–	19.3	11.0	−8.3
Côte d'Ivoire	–	6.3	3.0	−3.3
Dominican Republic	–	17.9	9.2	−8.7
Ecuador	–	30.2	16.6	−13.7
Egypt	–	15.3	5.1	−10.2
El Salvador	–	16.0	2.7	−13.3
India	–	9.4	5.2	−4.2
Indonesia	–	9.0	10.2	−1.2
Lebanon	–	14.6	1.3	−13.4
Malaysia	–	3.6	2.3	−1.4
Morocco	–	6.5	1.6	−4.9
Nigeria	–	18.5	12.8	−5.8
Pakistan	–	8.9	5.1	−3.8
Panama	–	2.3	1.1	−1.2
Tunisia	–	7.2	2.7	−4.5
Turkey	–	37.9	21.7	−16.2
Uruguay	–	33.9	9.4	−24.5
Venezuela	–	24.3	22.4	−1.9
Singapore	–	2.6	0.5	−2.1
Taiwan	–	4.1	0.8	−3.2
Non-targeters' mean	–	**13,4**	**6,9**	**−6,5**

[a] Here we report only one "initial period", i.e., that beginning in 1980.

- Regression analysis supports interpretation of table:

Table 2
Inflation regressions

Dependent variable: Fall in inflation	
Controls	Model 1 (beginning of initial period: 1980)
C	2.56 (0.0681)
IT dummy	−2.53 (0.0607)
Initial inflation	−0.67 (0.0000)
R^2	0,79

White heteroskedasticity-consistent standard errors.
p-values in parentheses.

- Likewise, there is a greater fall in volatility

Day 31: Introduction to Fiscal Policy

Readings: Blanchard 26; Blinder; Barro; Bernheim

Overview issues

- Countercyclical fiscal policy
    - Shifts IS
    - Subject to crowding out (complete in LR)
- Deficits and debt
    - Flow vs. stock
    - Structural vs. cyclical deficit

Three views of fiscal policy

- Keynesian view
    - Deficit spending expands aggregate demand, increasing output
    - Moderate effects on interest rates and prices
- Neoclassical view
    - Deficit spending expands aggregate demand, raising real interest rates and prices but not affecting output
    - Complete crowding out of increases in government spending or declines in taxes
- Ricardian view
    - Deficit spending does not raise aggregate demand
    - Future expected taxes offset spending effects of lower current taxes
    - Government spending matters (crowds out) but not tax timing

Why Keynesian fiscal policy went out of favor

- Policy lags
    - Inside lags
        - Recognition lag
        - Decision lag
        - Implementation lag
        - Automatic stabilizers have no inside lag!
            - Important, but often overlooked aspect of fiscal policy
            - High tax rates increase automatic stabilization, but decrease incentives for work…
    - Oustide lags
        - Effectiveness lag
    - Compare fiscal-policy lags to monetary policy
- Temporary vs. permanent changes in taxes

    - Temporary changes should have small MPCs
    - Permanent changes are larger, but have to be rescinded
    - Difficult to increase then decrease expenditures
        - People get hired, programs and organizations established
        - Once people get inside government, inertia is on their side
- Not only what fiscal policy, but how
    - Every member of Congress wants spending in his or her state
    - No one wants to raise taxes
- Interconnection of fiscal policy with large-government/small-government political debate
    - Meltzer & Richard model of government size
        - Political economy model based on redistribution
        - High-productivity people have interest in low taxes and small government
        - Low-productivity people are less likely to work, earn less when they do, and are less affected by taxes and gain more from transfers.
        - Why is the optimal tax rate < 1 even if the median voter does not work?
        - What happens if we include public goods in the model?

Historical points

- Role of Vietnam War spending in fueling 1970s inflation
- Failed Johnson tax surcharge of 1968
- Emergence of large deficits under Reagan
    - Little possibility for further stimulative policy
    - Proposals to require balanced budget
- Can budget-balancing be stimulative?
    - Possible reduction in long-term interest rates through decrease in expected deficits

Ricardian equivalence

- Pure neoclassical model with no imperfections → government spending matters but method of financing does not.
- Government budget constraint implies that (for given path of *G*) lowering current taxes means raising future taxes.
    - Increase in future taxes has same present value (at government interest rate) as decrease in current taxes
    - No net wealth effect for public
        - No effect on PV of lifetime income
    - No effect on consumption
        - Must save tax cut to accumulate interest to pay off future taxes
        - Conveniently, the government provides a useful saving vehicle to do this
        - Send check to Treasury bond desk rather than IRS

        - At maturity, cash bond proceeds and send to IRS
- What can go wrong? Almost anything!

The strict irrelevance of fiscal policy ("Ricardian equivalence") depends upon a variety of strong assumptions. These include: 1) successive generations are linked by altruistically motivated transfers; 2) capital markets are either perfect, or fail in specific ways; 3) consumers are rational and farsighted; 4) the postponement of taxes does not redistribute resources across families with systematically different marginal propensities to consume; 5) taxes are non-distortionary; 6) the use of deficits cannot create value (not even through bubbles); and 7) the availability of deficit financing as a fiscal instrument does not alter the political process. One can certainly make a

    - Finite lifetimes
        - Parents get tax cut; children pay off debt
            - Do we care about children's welfare?
    - Liquidity constraints due to imperfect capital markets
        - Deficit substitutes for borrowing against future: let government do it
    - Tax smoothing effects
    - Different tax rates: government borrows at lower rate than individuals
    - Myopia
    - Uncertainty and precautionary saving
    - Consumption spending vs. consumption
        - Suppose that everyone reacts to a temporary tax cut by buying a car
        - This would cause increase in spending, but not in consumption
        - This may also cause significant spending effects from temporary changes in taxes

Days 32 & 33: Empirical Effects of Fiscal Policy

Readings: Plosser; Barro; Wachtel & Young; Mountford & Uhlig; Shapiro & Slemrod; Ilzetski et al.; IMF; Christiano, Eichenbaum, & Rebelo

What determines the effect of fiscal policy on output, interest rates?

- Initial effect on total spending: How much does the IS curve shift?
    - Ricardian equivalence → tax decreases (temporary) should not affect consumption; permanent spending increases should cause offsetting reduction in consumption
    - Direct crowding out and micro effects of different kinds of spending changes? (Are they complements or substitutes for private spending?)
    - Who gets tax cut/transfer increase or income from new government spending and what is their MPC? (Liquidity constraints)
    - What is the MPC and the crude Keynesian multiplier
- What is the slope of the LM curve: How much does the AD curve shift?
    - At zero lower bound?
    - Accommodating monetary policy to keep interest rates from rising?
    - International effects: Do capital inflows (to lower interest rate) cause appreciating currency and deteriorating net exports? (Twin deficits hypothesis)
- What is the slope of the AS curve: Do firms have excess capacity to raise output without raising prices?
    - SRAS is often thought to be relatively flat when output is low, steep when output is near full employment.

What are we looking for?

- Keynesian effects
    - Either $G\uparrow$ or $T\downarrow$ should increase output, real interest rates, and/or prices
- Neoclassical effects
    - Either $G\uparrow$ or $T\downarrow$ should increase real interest rates
- Ricardian effects
    - $G\uparrow$ should increase interest rates
    - $T\uparrow$ should have no effect except on saving

Problems with direct tests

- Temporary vs. permanent deficits might have different effects
- Expected future deficits also have effects
- Interest rates respond instantly to information, don't wait for actual change in deficit
- Reverse causality between output and deficits

Possible solutions to these problems

- Use only new information about fiscal variables rather than actual changes
    - Mountford and Uhlig use VAR procedure to identify fiscal shocks
    - Romer & Romer use narrative approach to identify "exogenous" shocks
- Shapiro and Slemrod ask households about spending tax rebates

Barro's test: Not included in reading for 2014

- British interest rate data from 1700s through WWI
    - Temporary changes in military spending were most of variation in deficits, so we have a good proxy for temporary deficits
    - Note that Britain suspended convertibility only twice: Napoleonic Wars and WWI. In other wars they maintained the gold standard.

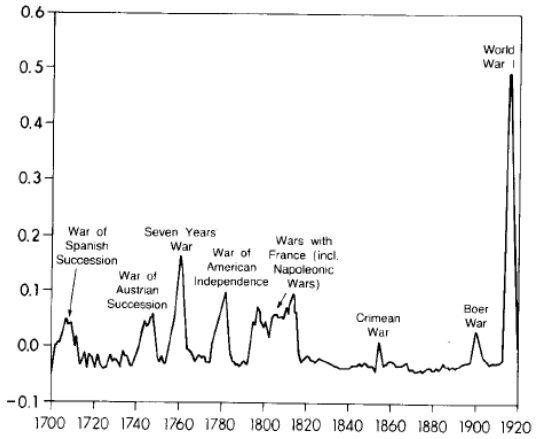


Fig. 3. The ratio of real military spending to trend real GNP, 1701–1920; the figure shows the spending ratio, g_t, less the mean value of g_t, 0.067.

- Prediction of Ramsey growth model:

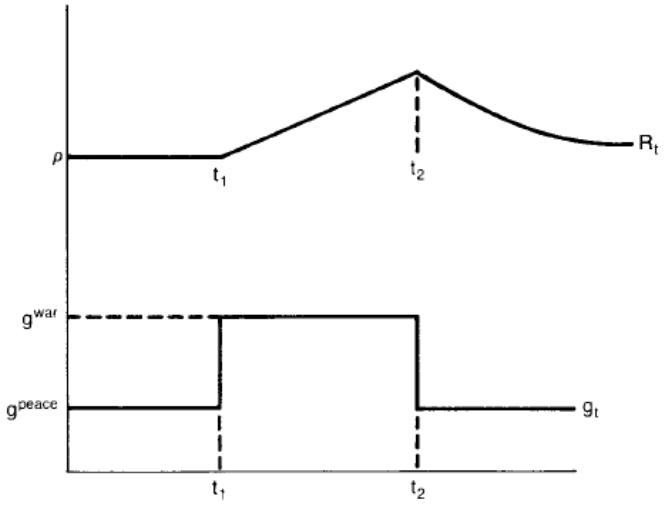


Fig. 2. Path of government spending and the real interest rate in war and peace, allowing for investment goods.

- Visual assessment of correlation:

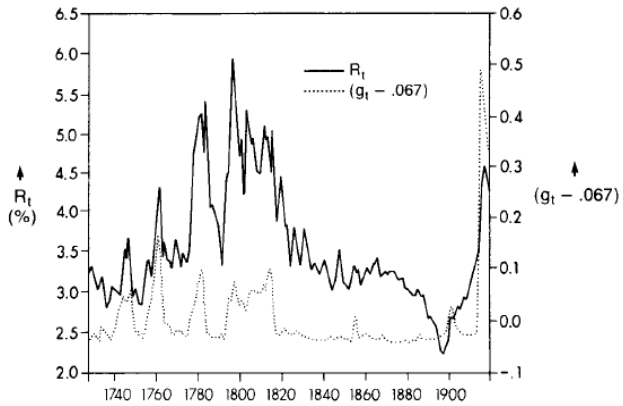


Fig. 4. Military spending and the interest rate, 1729–1918.

- Regression evidence:

1730–1913

$$R_t = \underset{(0.20)}{3.54} + \underset{(1.3)}{6.1} \cdot \tilde{g}_t, \qquad \hat{\lambda} = \underset{(0.029)}{0.909},$$

$$\hat{\sigma} = 0.243, \quad R^2 = 0.89, \quad R^2 \text{ (for } R_t - R_{t-1}) = 0.14, \quad DW = 2.2, \tag{6}$$

1730–1918

$$R_t = \underset{(0.27)}{3.54} + \underset{(0.7)}{2.6} \cdot \tilde{g}_t, \qquad \hat{\lambda} = \underset{(0.027)}{0.931},$$

$$\hat{\sigma} = 0.248, \quad R^2 = 0.89, \quad R^2 \text{ (for } R_t - R_{t-1}) = 0.11, \quad DW = 2.1. \tag{7}$$

  - $\tilde{g}$ is military spending/GDP relative to "permanent" military spending/GDP
  - R is long-term interest rate
- Introducing lags does not fundamentally change results
- Is it deficits, debt, or spending?
  - Both are marginally nearly significant
  - Spending variables are significant at 2% level
  - Deficit and debt variables barely at 10% level

$$R_t = \underset{(0.28)}{3.16} + \underset{(4.0)}{4.3}\tilde{g}_t - \underset{(3.3)}{3.9}\tilde{g}_{t-1} + \underset{(3.5)}{5.4}\tilde{g}_{t-2} + \underset{(3.4)}{2.2}\tilde{g}_{t-3} - \underset{(2.9)}{5.0}\tilde{g}_{t-4} + \underset{(2.1)}{3.9}\tilde{g}_{t-5}$$

$$+ \underset{(2.2)}{4.3}\left[\frac{B_t - B_{t-1}}{P_t \hat{y}_t}\right] + \underset{(0.23)}{0.34}\left[\frac{B_{t-1}}{P_t \hat{y}_t}\right], \qquad \hat{\lambda} = \underset{(0.033)}{0.906},$$

$$\hat{\sigma} = 0.232, \quad R^2 = 0.91, \quad R^2 \text{ (for } R_t - R_{t-1}) = 0.24, \quad DW = 2.2. \tag{18}$$

Plosser's test

- US data for 1970s and 1980s
- Extracts unexpected part of interest rate by looking at difference between interest rate on one-quarter bills and holding-period yield over coming quarter on longer-period bills/bonds.
  - These must be expected to be equal
  - New information about policy variables could cause changes

Table 3

Results of joint estimation.[a]

$$X_{t+1} = A(L)X_t$$

$$H_{t+1}R_{1t} = \phi + B(X_{t+1} - A(L)X_t)$$

Excess return	Constant	Unexpected movements in the: Log of monetized debt $(m-m^e)$	Log of privately held debt $(d-d^e)$	Log of gov't. purchases $(g-g^e)$
$H_{2,t+1}-R_{1t}$	0.00131[b]	−0.0067	0.0111	−0.0181[c]
	(0.00023)	(0.0120)	(0.0129)	(0.0072)
$H_{3,t+1}-R_{1t}$	0.00167[b]	0.0050	0.0457	−0.0391[c]
	(0.00061)	(0.0294)	(0.0313)	(0.0189)
$H_{4,t+1}-R_{1t}$	0.00125	0.0466	0.0890[d]	−0.0768[b]
	(0.00096)	(0.0444)	(0.0472)	(0.0285)
$H_{L,t+1}-R_{1t}$	−0.00400	0.3072[d]	0.1509	−0.1482
	(0.00353)	(0.1662)	(0.2100)	(0.1007)

[a] $A(L)$ is a third-order matrix polynomial. X is the vector of poly variables m, d, and g. The estimates of the matrix B are reported in the table with asymptotic standard errors in parentheses. The time periods differ across assets as indicated in table 1.

[b] Significant at the 1% level.

[c] Significant at the 5% level.

[d] Significant at the 10% level.

- Note that an increase in interest rate ***lowers*** the holding period yield on existing bills, so neoclassical theory predicts a negative sign for deficits.
- Results suggest that shocks to government spending, given debt and deficit, increase interest rates. Shocks to debt, whether monetized or not, do not.

Wachtel and Young: Deficit announcement effects

- Direct approach to measuring new information about deficits: changes in official forecasts by OMB and CBO
- New information = difference between current projection of deficit and last projection
  - Projections are published for current, next, and following fiscal years
- Estimating equation:

$$(1) \qquad \Delta R_t = \gamma_0 + \gamma_1 (M_t - M_t^e) + \gamma_2 (X_t^T - X_{t'}^T),$$

- Results

TABLE 2—CBO DEFICIT AND MONEY SUPPLY ANNOUNCEMENT EFFECTS[a]

Maturity of ΔR	Money Supply Effect	Deficit Effect	F[b]
3-month bill	0.98	0.39	4.8
	(2.20)[c]	(2.19)	
6-month bill	1.03	0.36	2.4
	(1.67)	(1.46)	
12-month bill	0.74	0.33	4.6
	(2.00)	(2.25)	
2-year	0.96	0.27	4.6
	(2.50)	(1.73)	
3-year	1.11	0.32	5.8
	(2.75)	(2.00)	
5-year	0.80	0.30	3.8
	(2.02)	(1.88)	
7-year	0.70	0.31	4.1
	(1.91)	(2.14)	
10-year	0.70	0.29	4.1
	(2.00)	(2.03)	
20-year	0.63	0.35	5.0
	(1.84)	(2.56)	
30-year	0.55	0.36	5.5
	(1.74)	(2.83)	

Notes: [a]Sample period is 2/8/82 to 8/7/86; and sample size is 1,121.
[b]F statistic for regression.
[c]Coefficient t-statistics are in parentheses.

TABLE 3—OMB DEFICIT AND MONEY SUPPLY ANNOUNCEMENT EFFECTS[a]

Maturity of ΔR	Money Supply Effect	Deficit Effect	F[b]
3-month bill	2.69	0.19	10.11
	(4.29)[c]	(1.35)	
6-month bill	2.25	0.19	9.27
	(4.04)	(1.52)	
12-month bill	2.12	0.15	10.95
	(4.48)	(1.37)	
2-year	2.15	0.20	11.29
	(4.38)	(1.85)	
3-year	2.05	0.20	11.36
	(4.39)	(1.88)	
5-year	1.85	0.17	10.29
	(4.21)	(1.71)	
7-year	1.58	0.14	9.06
	(3.91)	(1.68)	
10-year	1.58	0.14	9.92
	(4.14)	(1.65)	
20-year	1.55	0.18	11.27
	(4.21)	(2.21)	
30-year	1.22	0.18	8.77
	(3.49)	(2.32)	

Notes: [a]Sample period is 1/28/80 to 2/5/86; and sample size is 1,367.
[b]F statistic for regression.
[c]Coefficient t-statistics are in parentheses.

  - More significant for long-term interest rates than short
  - CBO projections have larger estimated coefficients than OMB

VAR approach: Mountford and Uhlig

- Shocks:
  - Business cycle
  - Monetary policy
  - Government revenue
  - Government spending
- Somewhat obscure method of identifying fiscal shocks (not crucial for us)
- Deficit spending IRFs are on page 978 (19th) of paper (anticipated and unanticipated)
- Deficit-financed tax cuts on 980 (21st) page
- Page 982 and 983 have multipliers

Romer & Romer (AER 2010)

- As in early work on monetary policy:
  - Use narrative record to identify underlying reasons for tax changes
  - Find tax changes "that are not systematically correlated with other developments affecting output." (Exogenous)
  - Sources: Presidential speeches, EROP, reports of Congressional committees.
  - Most tax changes have clearly identifiable motivation:
    - Offsetting ΔG (endogenous)
    - Offsetting something else that is likely to affect output (endogenous)
    - Dealing with inherited deficit (exogenous)
    - Achieving a long-run goal (fairness, growth, size of government) (exogenous)

$$\Delta Y_t = \alpha + \beta \Delta T_t + \varepsilon_t, \tag{1}$$

$$\varepsilon_t = \sum_{i=1}^{K} \varepsilon_t^i. \tag{2}$$

ε are various things that affect *Y*.

$$\Delta T_t = \sum_{i=1}^{K} b_t^i \varepsilon_t^i + \sum_{j=1}^{L} \omega_t^j, \tag{3}$$

ε also affects *T*.

$$\Delta Y_t = \alpha + \beta \left[\sum_{i=1}^{K} b_t^i \varepsilon_t^i + \sum_{j=1}^{L} \omega_t^j \right] + \varepsilon_t. \tag{4}$$

T variable is correlated with error, so standard estimate of β is biased.

$$\Delta Y_t = \alpha + \beta \sum_{j=1}^{L} \omega_t^j + v_t, \tag{5}$$

where $v_t = \sum_{i=1}^{K} (1 + \beta b_t^i) \varepsilon_t^i$. Provided that we have identified the ω_t^j's accurately from the

If we can identify ω by non-statistical means, then can estimate β by (5).

- Using narrative sources, they identify 54 quarterly tax changes that they think are exogenous.
    - These are "fiscal shocks:"

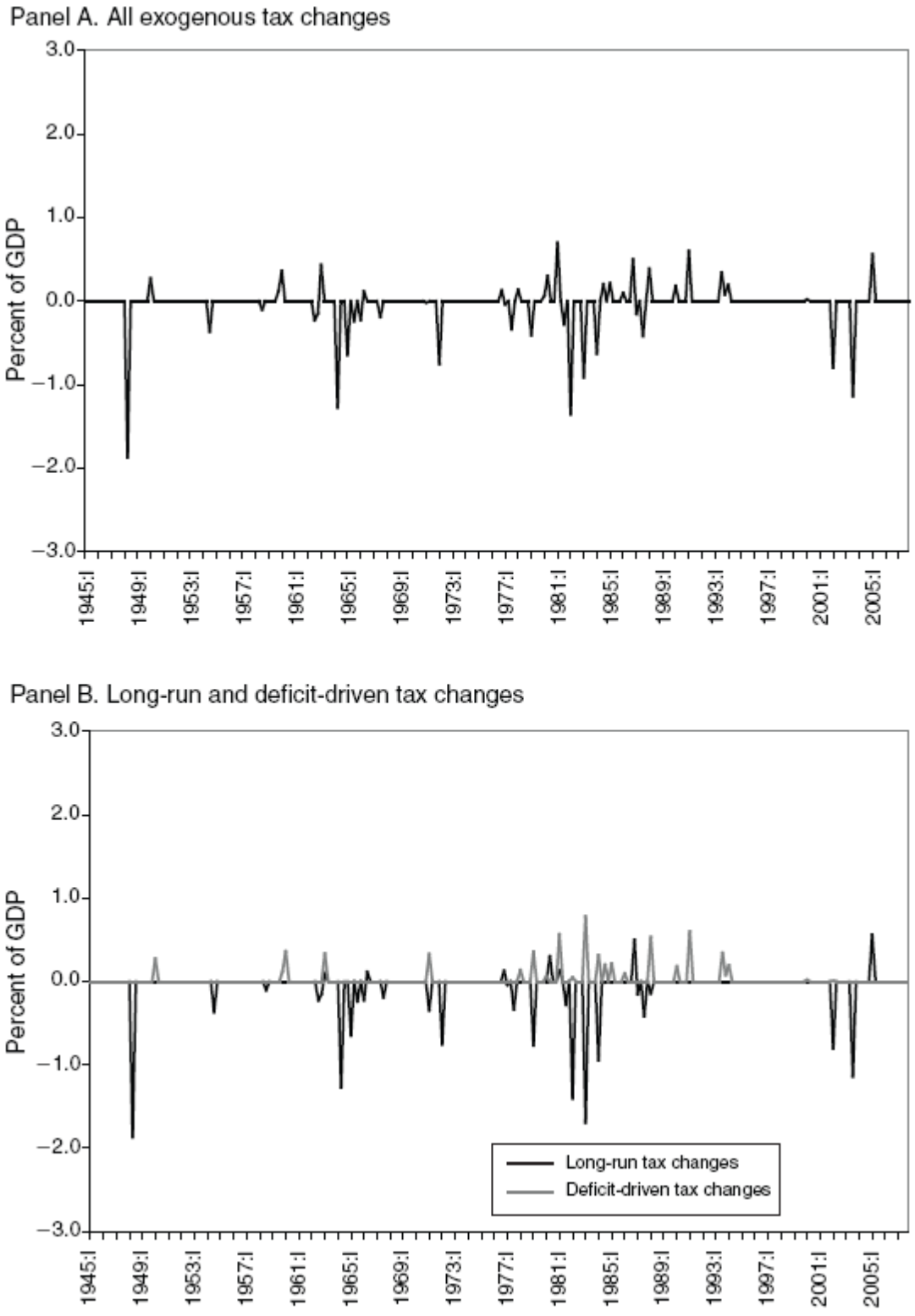


FIGURE 1. NEW MEASURE OF FISCAL SHOCKS

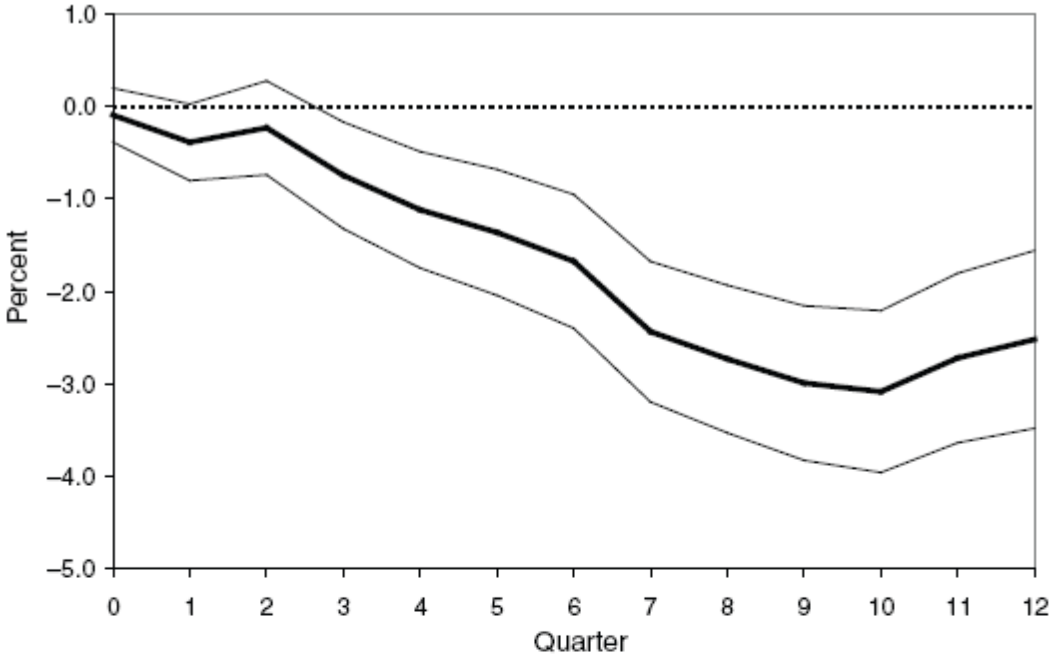


FIGURE 4. ESTIMATED IMPACT OF AN EXOGENOUS TAX INCREASE OF 1 PERCENT OF GDP ON GDP
(*Single equation, no controls*)

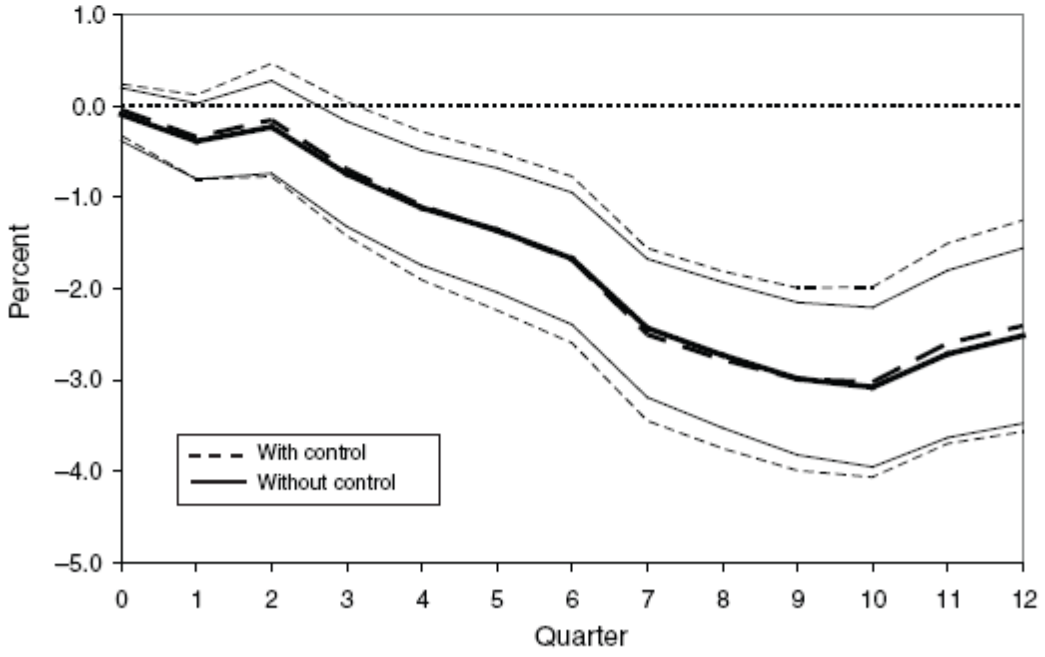


FIGURE 5. ESTIMATED IMPACT OF AN EXOGENOUS TAX INCREASE OF 1 PERCENT OF GDP ON GDP
(*Single equation, controlling for lagged GDP growth*)

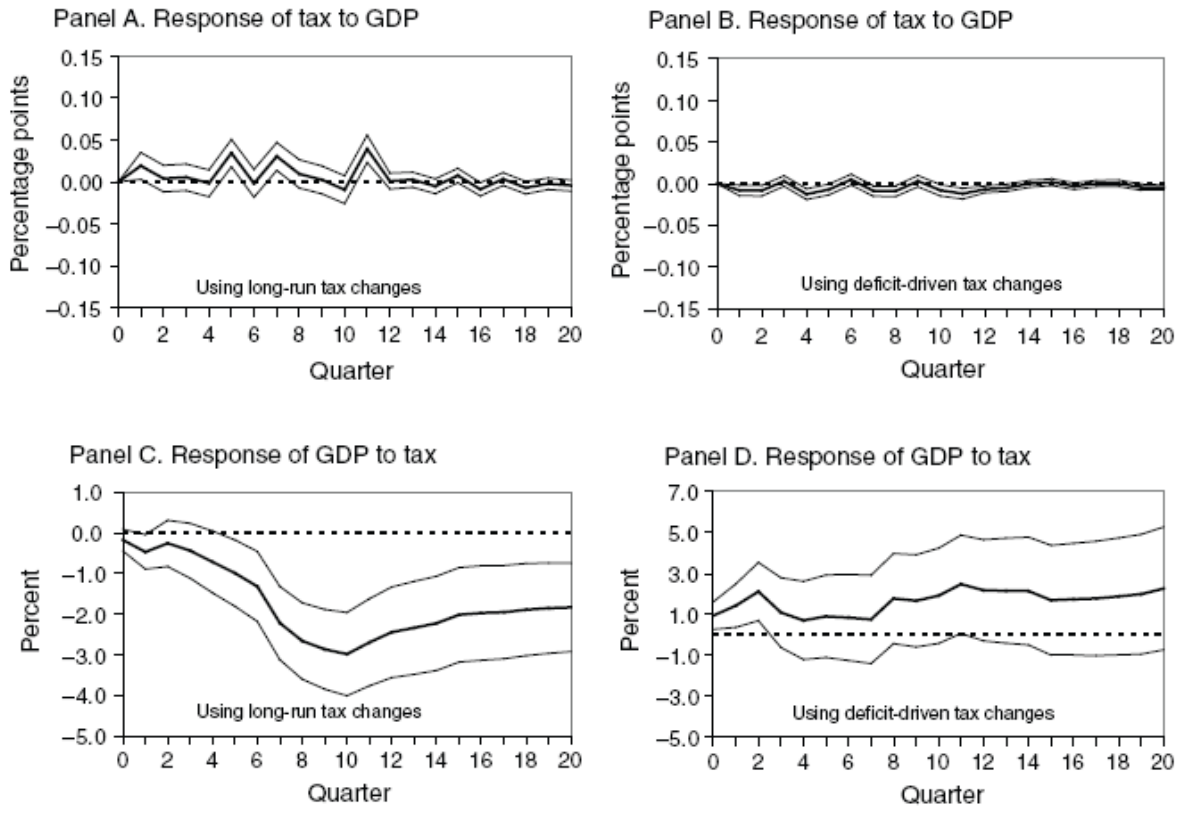


FIGURE 9. RESULTS OF TWO-VARIABLE VARS FOR THE TWO TYPES OF EXOGENOUS TAX CHANGES AND GDP

Tax changes to achieve long-run goals have different effects than those intended to balance an inherited deficit.

Shapiro and Slemrod survey results

- Added question to consumer expenditure survey from U of Mich:
- "Under this year's economic stimulus program tax rebates will be mailed or directly deposited into a taxpayer's bank account. In most cases, the tax rebate will be six hundred dollars for individuals and twelve hundred dollars for married couples. Those with dependent children will receive an additional three hundred dollars per child. Individuals earning more than seventy-five thousand dollars and married couples earning more than one hundred fifty thousand dollars will get smaller tax rebates or no rebate at all. Thinking about your (family's) financial situation this year, will the tax rebate lead you mostly to increase spending, mostly to increase saving, or mostly to pay off debt?"

Table 1. Responses to 2008 Rebate Survey

	Number of Responses	Percent
Mostly Spend	447	19.9%
Mostly Save	715	31.8%
Mostly Pay Off Debt	1,083	48.2%
Will Not Get Rebate	212	
Don't Know, Refused	61	
Total	2,518	100%

Source: Survey of Consumers, February 2008 through June 2008.

Table 2. Spending the 2008 Rebate, By Age

Age Group	Percent Mostly Spending
29 or less	11.7%
30-39	14.2%
40-49	16.9%
50-64	19.9%
Age 64 or less	17.0%
Age 65 or over	28.4%

Table 3. Spending the 2008 Rebate, By Income

Income Group	Percent Mostly Spending
$20,000 and under	17.8%
$20,001-$35,000	21.0%
$35,001-$50,000	16.6%
$50,001-$75,000	18.7%
$75,001 and over	21.4%
Refused to state income	23.9%
Total	19.9%

- Evidence from similar surveys and also from other sources suggest that the MPC out of the 2001 tax rebate was ~30-40%, which is broadly consistent with this one.

Ilzetzki, Mendoza, and Végh (NBER 2010)

- Quarterly dataset with 44 countries through 2007:4.
- Structural VAR assuming that Y does not affect G within one quarter.
- Also use military buildups to identify exogenous ΔG

Figure 6: Cumulative multiplier—high income and developing countries

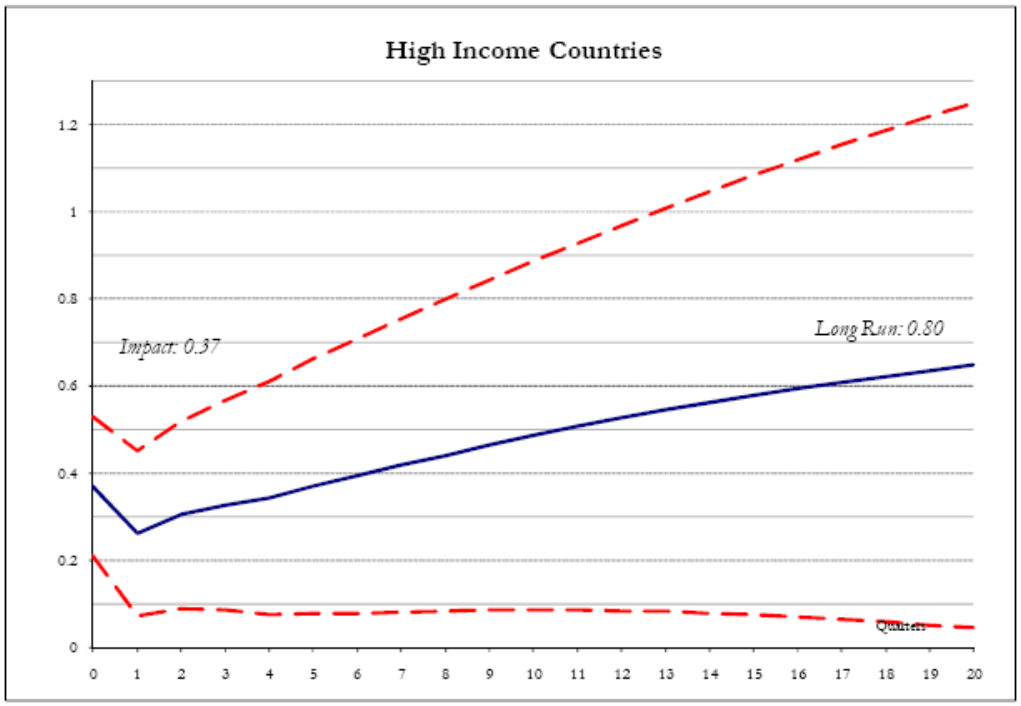


Figure 7: Cumulative multiplier—predetermined (fixed) and flexible (flex) exchange arrangements

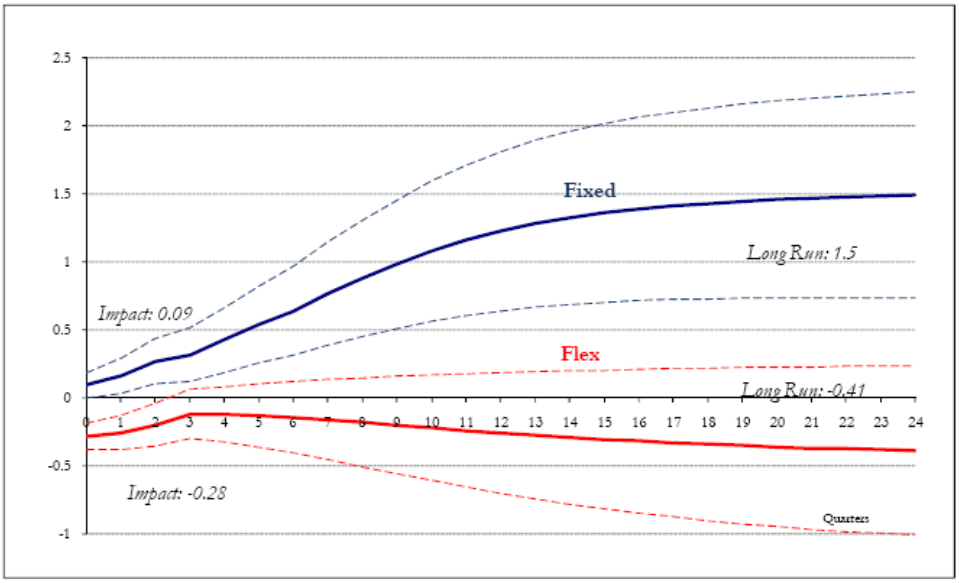
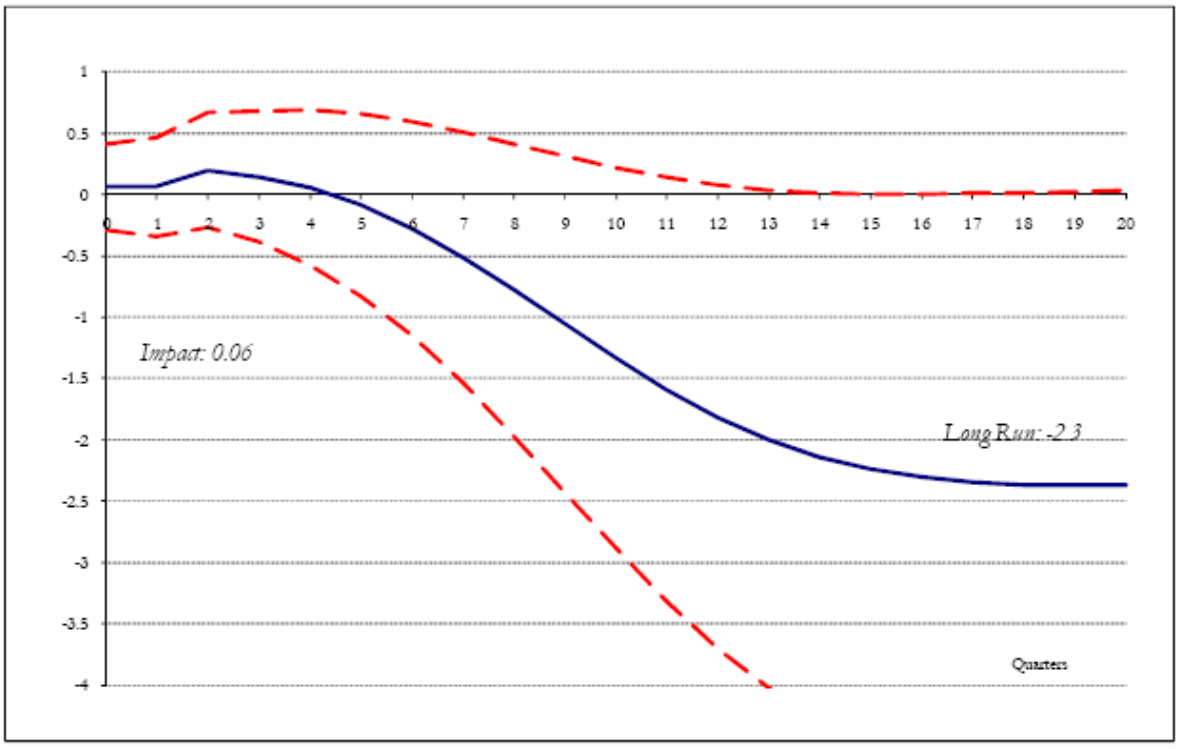
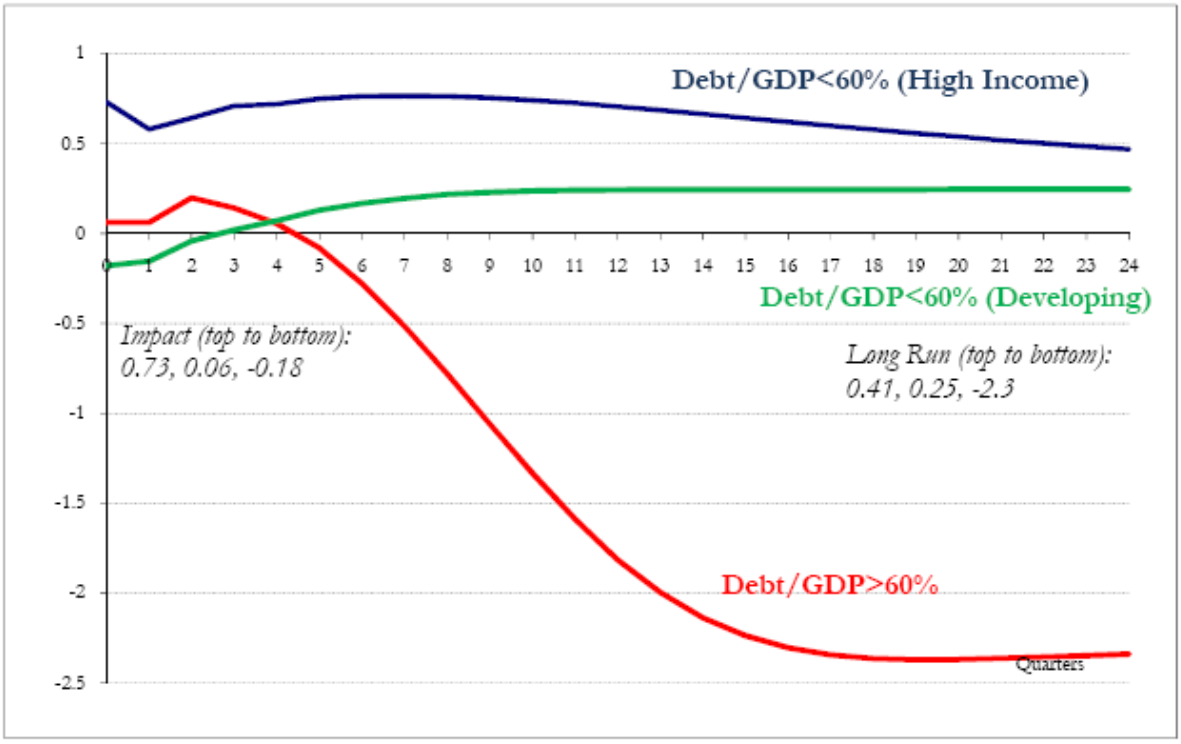


Figure 11: Cumulative multiplier: Highly indebted countries



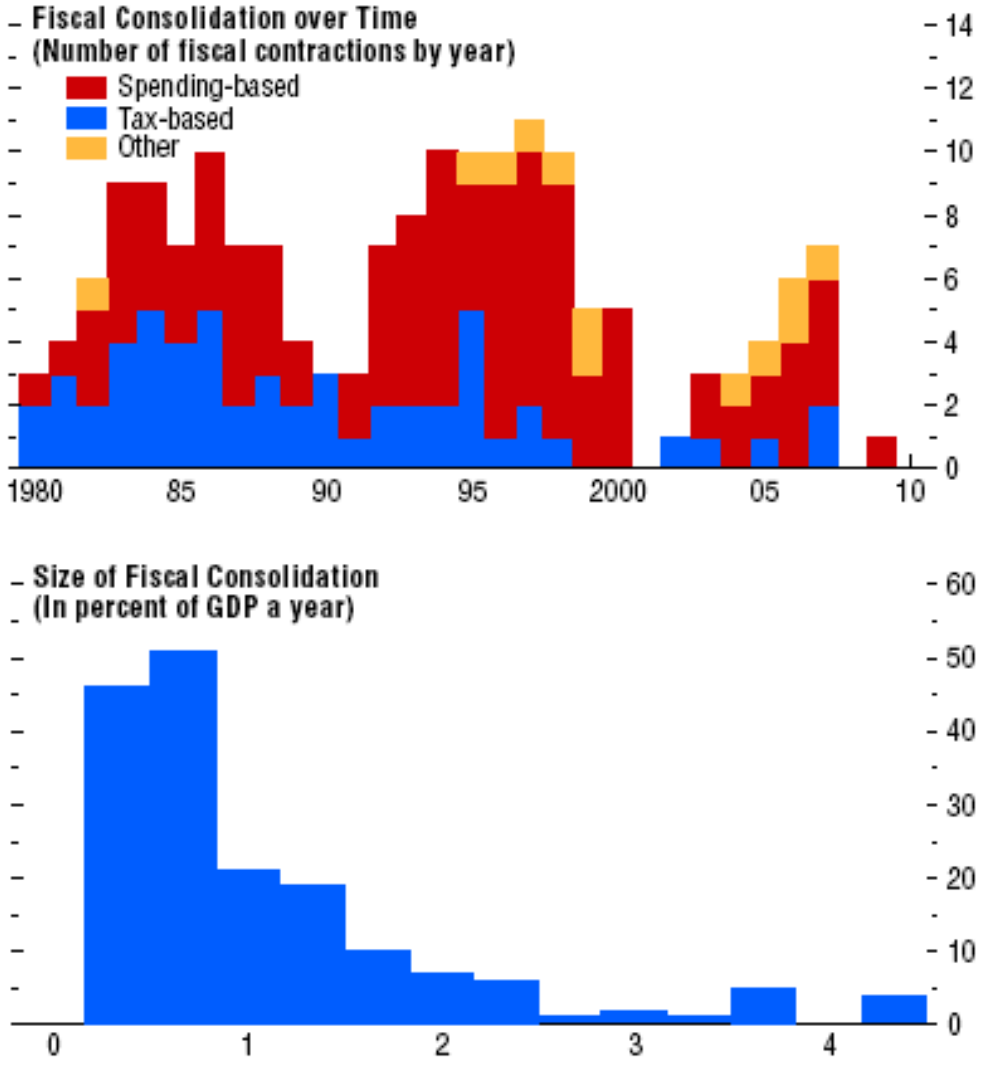


IMF 2010

- Use IMF's Global Integrated Monetary and Fiscal Model to simulate the effects of "fiscal consolidation" on economy.
- Questions they propose to answer (p. 94):
    - What are the short-term effects of fiscal retrenchment on economic activity? Does output typically contract or expand in response to tax hikes and spending cuts? What happens to unemployment?
    - What factors dampen or exacerbate the short-term effects? In particular, what are the roles of monetary policy, the composition of the package (taxes versus spending), and the perceived risk of sovereign default in shaping the outcome? What are the consequences of many countries cutting deficits at the same time?
    - Does fiscal consolidation have different effects when interest rates are near zero? Interest rates have rarely been near zero in the past—with the exception of Japan since the 1990s—but they are near zero in many advanced economies today. Would fiscal consolidation in this environment be more or less painful than in the past?
    - What are the long-term effects on output of reducing government debt? Do the long-term effects depend on whether the savings from lower interest payments are used to provide tax cuts or to finance new spending?
- Follow Romer & Romer in focusing only on tax policy actions intended to reduce budget deficits (using narrative evidence)
- 15 countries, 173 years in which budgetary measures aimed at fiscal consolidation, average size = 1% of GDP
- 1% of GDP fiscal consolidation lowers output by 0.5% within two years, raising unemployment rate by 0.3 points.
- Monetary authority often offsets part of effects of fiscal consolidation through expansion
    - Cannot if at ZLB
    - Cannot in monetary union
-

Figure 3.1. Action-Based Fiscal Consolidation

There were about 170 cases of action-based fiscal consolidation over the past 30 years in advanced economies. Consolidation has often relied primarily on spending cuts. On average, action-based fiscal consolidation amounted to 1 percent of GDP a year, but the range was wide.



Source: IMF staff calculations.

Note: The 15 advanced economies in the sample are Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Portugal, Spain, Sweden, United Kingdom, and United States. "Spending-based" consolidation relied primarily on spending cuts. "Tax-based" consolidation relied primarily on tax hikes. The "other" category denotes contractions for which composition details were either not available or for which no category accounted for the majority of the adjustment.

- Estimating equation:

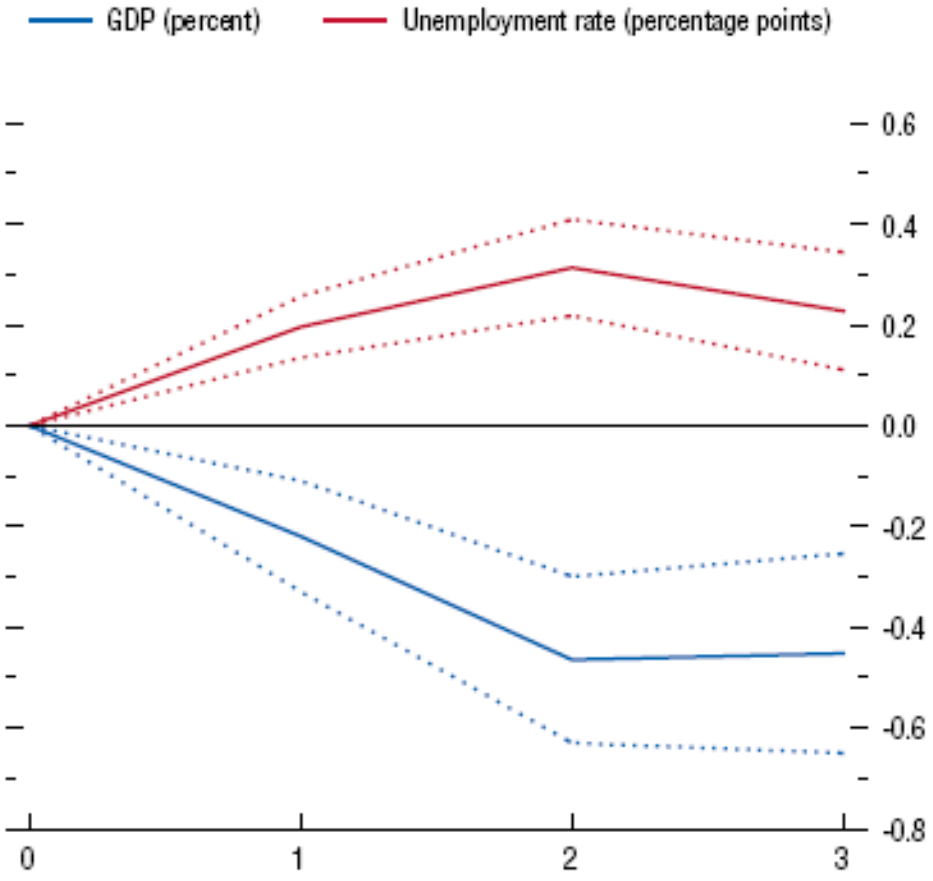
[16] In particular, the estimated equation has the growth rate of real GDP as the dependent variable on the left-hand side. On the right-hand side, the explanatory variables are the current and lagged values of the fiscal consolidation measures identified as discussed above. Including lags allows for a delayed impact of fiscal consolidation on growth. In addition, the approach controls for lags of real GDP growth, to distinguish the effect of fiscal consolidation from that of normal output dynamics. Thus, the equation estimated is

$$g_{it} = \alpha + \sum_{j=1}^{2} \beta_j g_{i,t-j} + \sum_{s=0}^{2} \beta_s ABFC_{i,t-s} + \mu_i + \lambda_t + \nu_{it},$$

where the subscript i denotes the ith country, and the subscript t denotes the tth year; g is the percent change in real GDP; and *ABFC* is the estimated size of the action-based fiscal consolidation measures as a percent of GDP. The approach includes a full set of country dummies (μ_i) to take account of differences among countries' normal growth rates. The estimated equation also includes a full set of time dummies (λ_t) to take account of global shocks such as shifts in oil prices or the global business cycle.

Figure 3.2. Impact of a 1 Percent of GDP Fiscal Consolidation on GDP and Unemployment

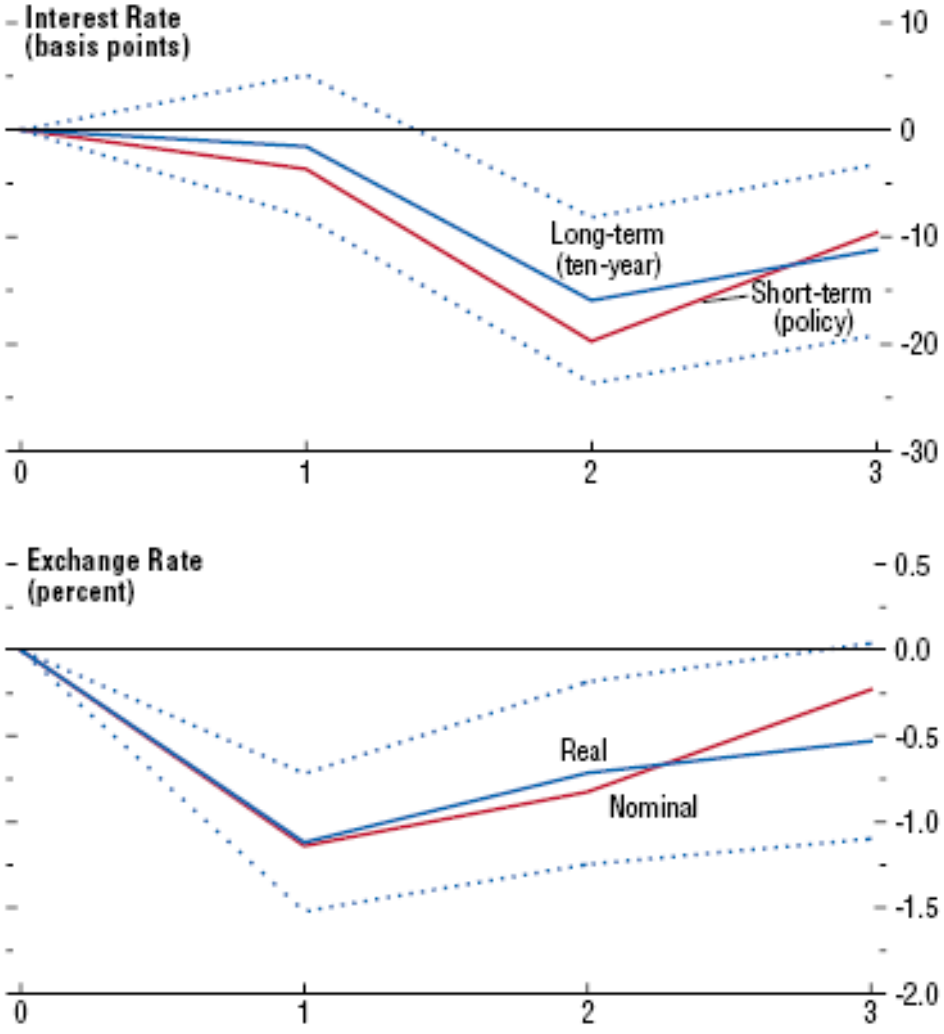
Fiscal consolidation is normally contractionary. A fiscal consolidation equal to 1 percent of GDP typically reduces real GDP by about 0.5 percent and raises the unemployment rate by about 0.3 percentage point.



Source: IMF staff calculations.
Note: $t = 1$ denotes the year of consolidation. Dotted lines equal one standard error bands.

Figure 3.3. Response of Monetary Conditions to a 1 Percent of GDP Fiscal Consolidation

Interest rate cuts and a decline in the value of the domestic currency usually play a key supportive role during episodes of fiscal consolidation.

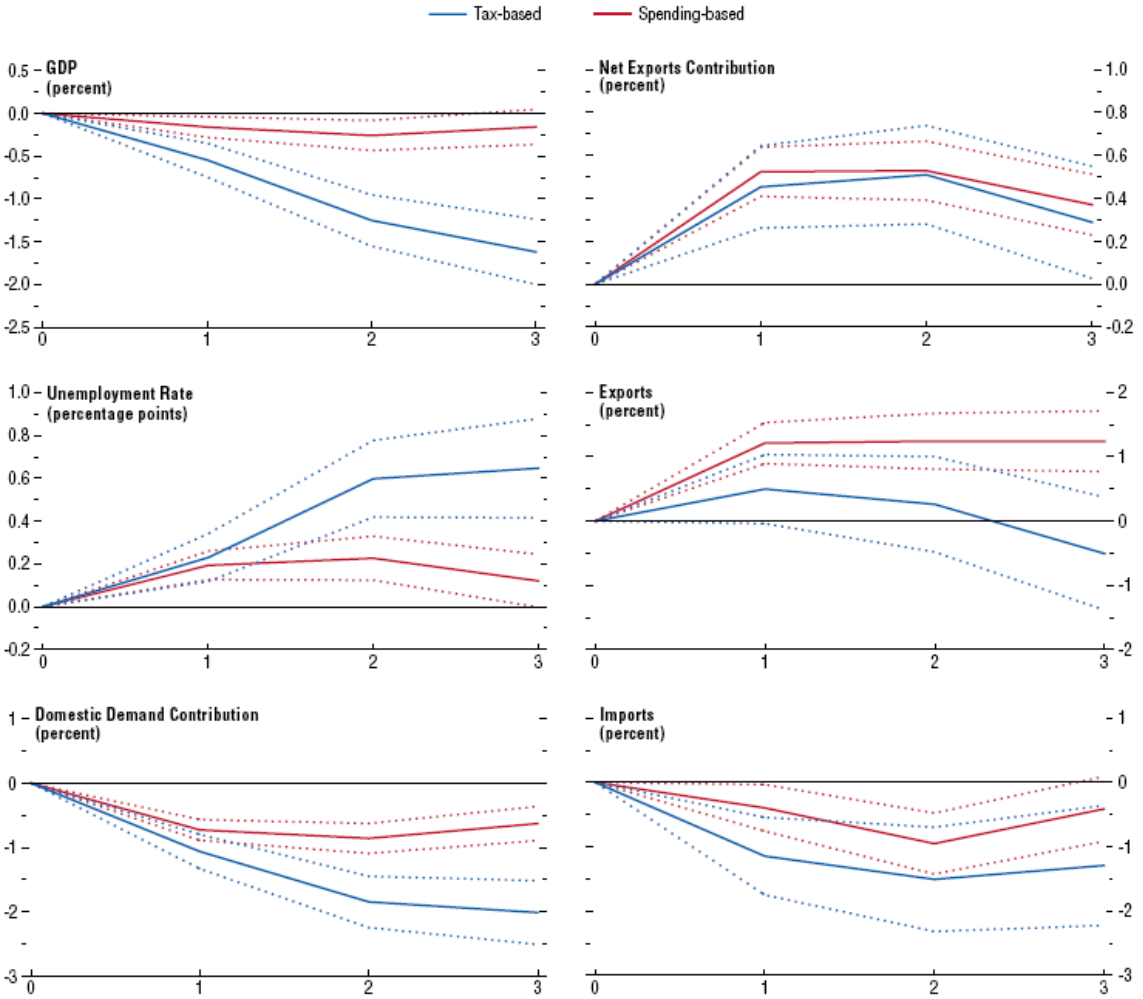


Source: IMF staff calculations.

Note: $t = 1$ denotes the year of consolidation. Dotted lines equal one standard error bands.

Figure 3.5. Impact of a 1 Percent of GDP Fiscal Consolidation: Taxes versus Spending

Spending-based consolidation is less contractionary than tax-based consolidation. GDP falls by less and unemployment increases less. Domestic demand contracts significantly as a result of both spending-based and tax-based consolidation, but the contraction is sharper after tax-based adjustments. A boom in net exports mitigates the contraction in both cases. A surge in exports drives the net export boom associated with spending-based consolidation. After tax-based consolidation, net exports rise mainly because imports fall.



Source: IMF staff calculations.
Note: $t = 1$ denotes the year of consolidation. Dotted lines equal one standard error bands.

- Monetary response is greater (interest rates fall more) after spending-based consolidation than after tax-based consolidation
- This accounts for much of the difference in outputs.
- "Central banks view spending-based deficit cuts more favorably, possibly because they interpret then as a signal of a stronger commitment to fiscal discipline, and are therefore more willing to provide monetary stimulus following spending-based adjustments." p. 102.

Christiano, Eichenbaum, & Rebelo JPE 2011

- "When is the government spending multiplier large?"
- They argue that spending multiplier is small if monetary policy follows a Taylor Rule because MP/TR curve is steep.
- Multiplier can be large (up to 2.3) if at ZLB:
    - Increase in expected inflation lowers real rate at zero nominal rate, which reinforces usual stimulative effect

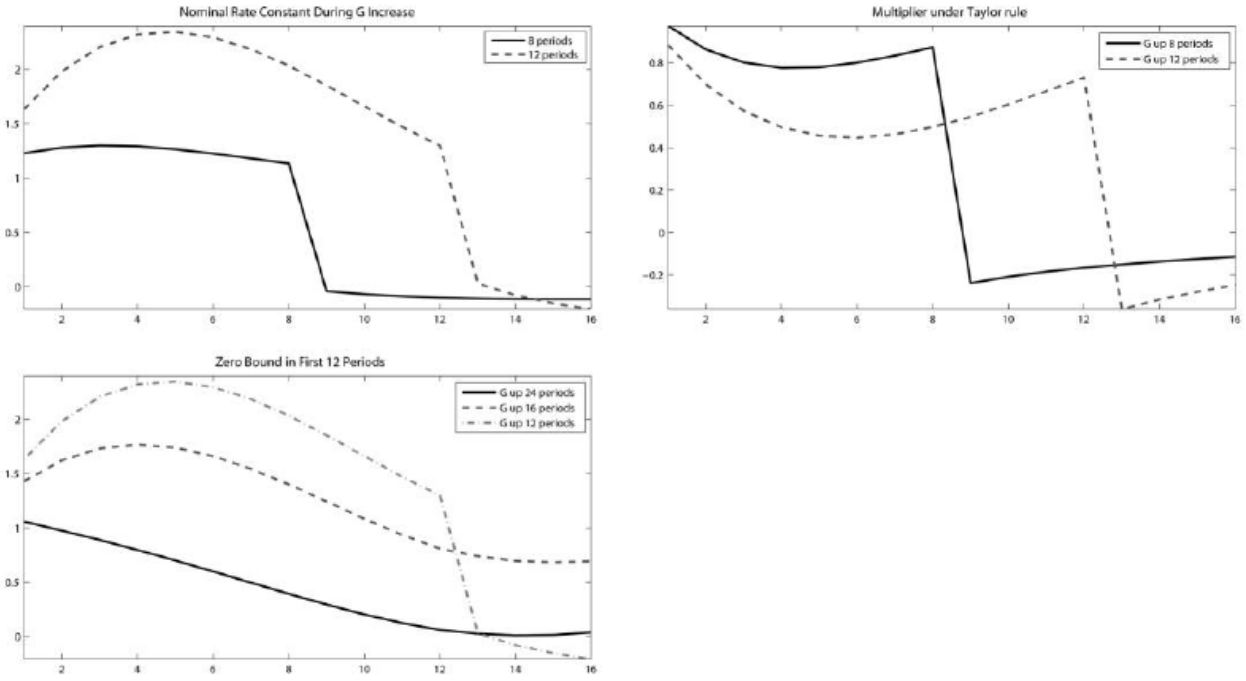


FIG. 5.—Government-spending multiplier in the Altig et al. model

Auerbach and Gorodnichenko (2013)

Many methodological differences between this paper and others:

- **Regime-switching** to allow effects of fiscal policies to be different during recessions and expansions
- **Disaggregation** of spending variables: do all components of *G* and *T* have the same effect on AD and output?
- Many OECD countries in sample

- Identification through **direct data on expected government spending**: difference between actual and expected is the shock

Results are in Figure 4 of the working paper

- Strong stimulative effect of ΔG in recessions, but not in expansions

Romer & Romer (2014)

- Interwar US to look at supply-side effects of income-tax rates
- Marginal tax rates do have effect on before-tax income, but elasticity of income with respect to $(1 - \tau)$ is only about 0.2.
- They argue this is a good sample to examine because
    - Most tax changes were balanced by expenditure changes, reducing AD effect
    - AD effect was probably small anyway because revenue didn't change much

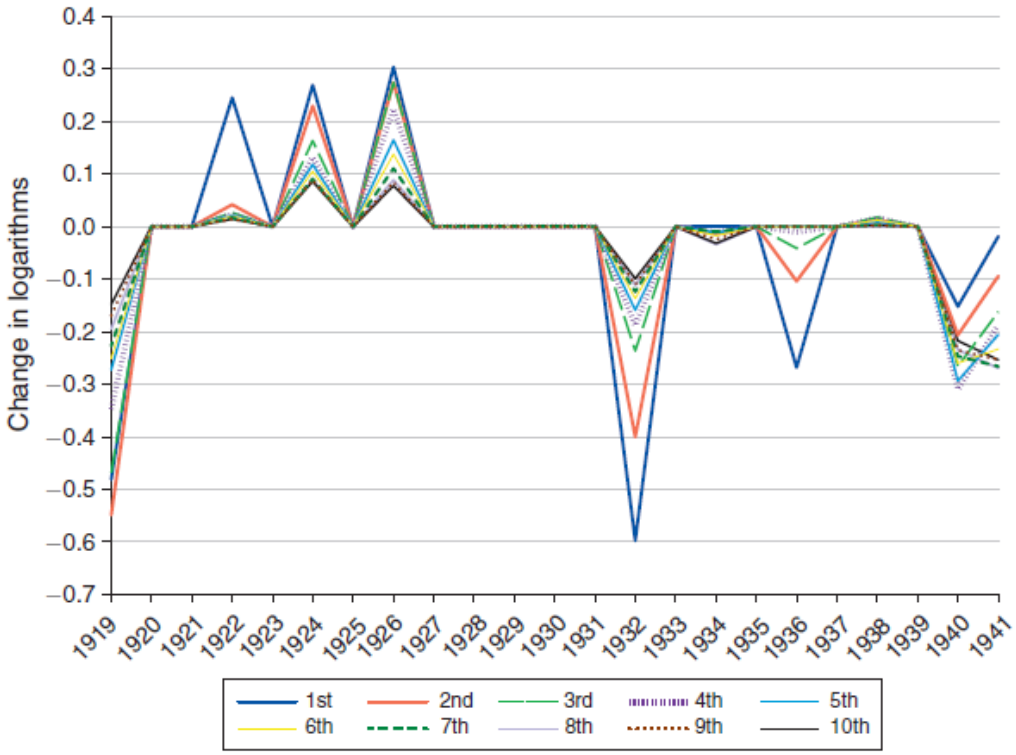


FIGURE 3. POLICY-INDUCED CHANGE IN THE LOG AFTER-TAX SHARE FOR DIFFERENT PERCENTILE GROUPS

Note: Each line represents the change for a given tenth of the top one-twentieth of 1 percent of the income distribution.

Our basic specification is

$$(1) \qquad \Delta \ln Y_{it} = \alpha_i + \beta_t + \sum_{j=A}^{B} \gamma_j \Delta \ln(1-\tau)_{i,t-j}^{PI} + \varepsilon_{it},$$

TABLE 2—BASIC TIME-SERIES/CROSS-SECTION RESULTS

	Estimation method	Lags included	Control variables	Elasticity of taxable income with respect to after-tax share	Observations
(1)	OLS	None	Year, group dummies	0.207 (0.031)	230
(2)	IV	None	Year, group dummies	0.208 (0.034)	230
(3)	OLS	1	Year, group dummies	0.316[a] (0.048)	220
(4)	OLS	2	Year, group dummies	0.270[a] (0.056)	210
(5)	OLS	None	Year dummies	0.209 (0.031)	230
(6)	OLS	None	Group dummies	0.093 (0.067)	230

Notes: The dependent variable is the change in the log of real taxable income. The table reports the estimated coefficient on the policy-induced change in the log after-tax share. As described in the text, the equations are estimated using the top 0.05 percent of the income distribution, subdivided into ten groups of equal size. In lines 1–2 and 5–6, the sample period is 1919 (that is, the changes in income from 1918 to 1919) to 1941. In lines 3 and 4, which include lags, the sample periods begin in 1920 and 1921, respectively. Standard errors are in parentheses.

[a]The coefficient estimate and standard error are for the sum of the coefficients.

Question: How would you expect the incentive effects of marginal income taxes to be different in the Great Depression than during "normal" times?

Day 34: Deficits and Debt

Government budget constraint

- Government measurement $\tilde{D}_t = i_t B_{t-1} + G_t - T_t$
    - Ignores lost real value of government debt, which is πB and is transfer to government
    - Ignores inflation tax
- In real terms: $D_t = r_t B_{t-1} + G_t - T_t$ and $B_t = B_{t-1} + D_t$
    - Should πM be there as measure of inflation/growth tax?
        - Could include in T for formality's sake
    - Appropriate definition of deficit is change in real value of debt from one year to next
    - $G - T$ as the primary deficit
    - $B_t = (1+r)B_{t-1} + G_t - T_t$

Sustainability of deficits

- Can the government run a deficit forever?
- Can the government run a primary deficit forever?
- Does the government debt ever have to be repaid?
    - Who owns US federal debt (table)
- Example
    - Initially balanced government budget with zero debt
    - T↓ by 1 unit in year one
    - Primary deficit = 1 in year one, 0 thereafter
    - In year two, bonds must be repaid in amount $1 + r$
        - Raise taxes by $1 + r$ over baseline ($2 + r$ over year one) in year two
        - Issue $1 + r$ bonds in year 2
            - $(1 + r)^2$ due in period three…
            - Sustainable?
    - What if primary deficit persists?
        - Need to borrow $1 + 1 + r = 2 + r$ in period 2
        - $1 + (1 + r) + (1 + r)^2$ in period 3…
        - Sustainable?
- Unless we allow the government to conduct a Ponzi scheme, the present value of G must equal the present value of T.
    - Current deficits → future surpluses
    - All G must be paid for with current taxes, future taxes, or inflation taxes
- What is the appropriate terminal limiting condition for debt?
    - $B \to 0$?

- $B \to$ constant?
- $B/Y \to 0$?
- $B/Y \to$ constant?

- What happens if people start to worry about long-term sustainability of deficit/debt?
  - Charge higher risk premium
  - Stop lending to government
  - Sell existing debt
  - Could be crisis or gradual
- Sustainability probably depends on confidence in ability to repay ~ GDP
  - B/Y is key measure of debt sustainability (table)
  - How does B/Y evolve?

$$\frac{B_t}{Y_t} = (1+r)\frac{B_{t-1}}{Y_t} + \frac{G_t - T_t}{Y_t}$$

$$= (1+r)\frac{Y_{t-1}}{Y_t}\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

$$= \frac{1+r}{1+g}\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

$$\frac{B_t}{Y_t} - \frac{B_{t-1}}{Y_{t-1}} \approx (r-g)\frac{B_{t-1}}{Y_{t-1}} + \frac{G_t - T_t}{Y_t}$$

  - Assuming that primary deficit goes back to zero, the debt/GDP ratio will grow if $r > g$.
    - Can do comparison in nominal terms more easily
    - From 2000–07:
      - Average 3-month T-bill rate = 3.20%
      - Average 10-year bond rate = 4.71%
      - Average nominal GDP growth rate = 4.99%
      - Looks like we are not in an explosive situation over that period if primary deficit is zero
    - Show graph of Debt/GDP ratio over time.

Is all the attention to the debt misplaced?

- If evaluating a private firm or individuals balance sheet
  - Debt is important
  - Assets are equally important
- Why don't we evaluate the asset side of the government's balance sheet?
  - Data problems: difficult to measure the value of government assets
- In what circumstances make sense for private entity to borrow?
  - Purchase durable asset that will yield services over many years

        - Spread out payments over many years as well
        - Government sewers, highways, etc.
    - Smooth consumption during period when income is low
        - Avoid large spending reductions in recession
    - Periods of extraordinary expenditures
        - Medical bills
        - Wars

Generational accounting

- Who pays the taxes and who gets the benefits?
- Must make (heroic) assumptions about future tax and benefit policies
- Some policies benefit one generation at expense of others
    - Hard to evaluate without knowing the distribution of benefits from durable government capital
    - Environmental degradation should count here, too.
    - What about policies that shift taxes to the future but encourage private investment in highly durable capital?

Hilscher et al.: Can the U.S. inflate away the debt?

- Not likely to be very effective
    - Most of the debt held by public is short-term
    - Moderate increase in inflation won't do much damage to real value of short-term debt
    - TIPS will not depreciate at all
- They conclude that the kinds of increases in inflation that are likely will not depreciate the real value of the current debt more than 3–5%

Eichengreen and Panizza: Can European countries sustain primary surpluses?

- Current European policies (EU, ECB) and IMF policies elsewhere require highly indebted countries to run substantial primary surpluses of 3–5% of GDP for 5–10 years.
- Such runs of primary surpluses have been rare, and often have occurred in special cases
    - Belgium in run-up to currency union
    - Norway with oil revenue fund
    - Fiscal reforms in New Zealand and Singapore
- Sustained surpluses usually happen with strong GDP growth in rich countries, not in disturbed countries that have high unemployment (Greece)

Panizza and Presbitero: Do debts affect growth?

- Negative correlation between debt and growth, but which way does the causality run?
- They use novel set of instrumental variables:
    - Changes in exchange rates affect the value of debt denominated in other currencies in ways that do not directly affect growth
    - But some countries have little or no debt in other currencies, so their variable is essentially zero
- They find that using their instrumental variable, debt changes have no effect on growth
- If you believe this result, then the correlation between debt and growth is entirely growth → debt, not the other way around.

Days 35 & 36: Political Business Cycles

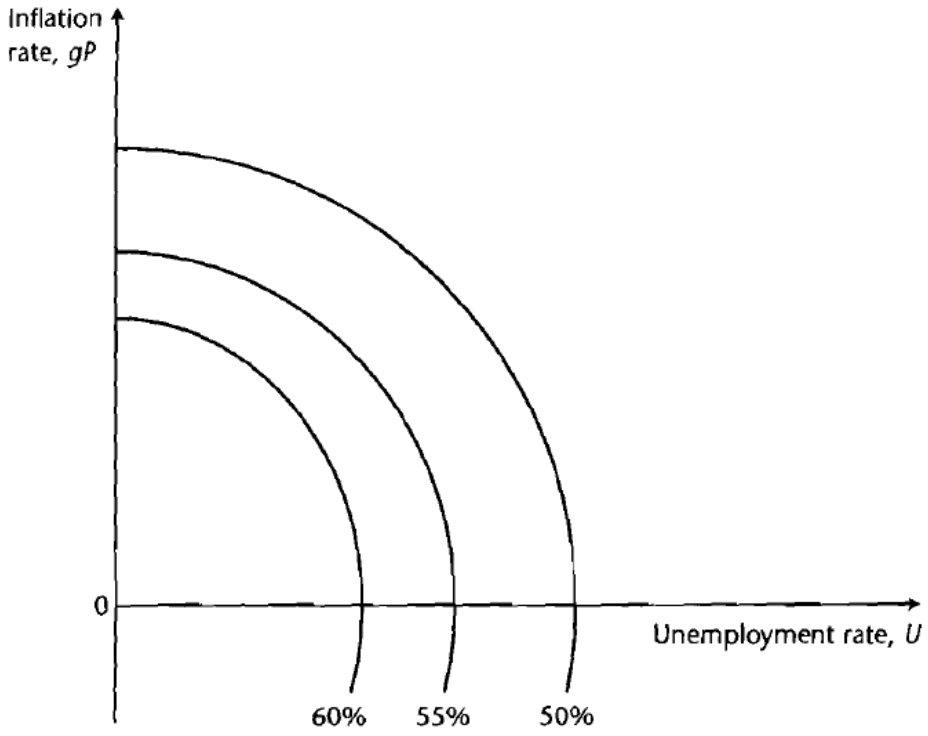
Readings: White 8, 9; Alesina & Roubini 1-4.

Motives for politicians / central bankers

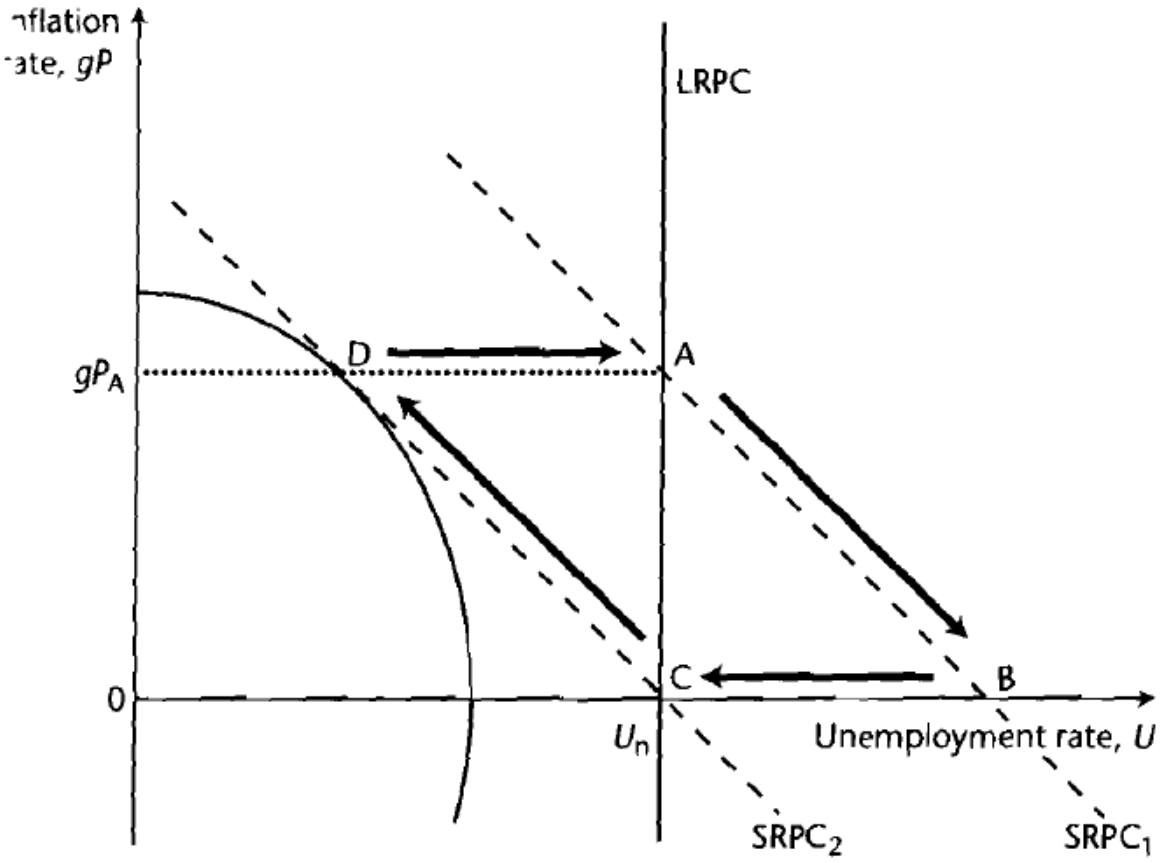
- Utopian
  - Stabilization, low inflation
  - Reflects public's preferences
- Cynical
  - Self-important central banker follows own goals
- Political
  - Tries to re-elect politicians in power
- Seigniorage
  - Inflation to get more revenue
- Partisan
  - Motivated by goals of political party

White's presentation of traditional Nordhaus-MacRae model

- Electorate has indifference curves in unemployment-inflation space
- Politically motivated central banker has to achieve a high enough indifference curve to elect



- Structure of economy
  - $u = u_n - c\left(\pi - \pi^e\right)$
  - $\pi^e = \pi_{-1}$
  - Election depends only on u and π on election day

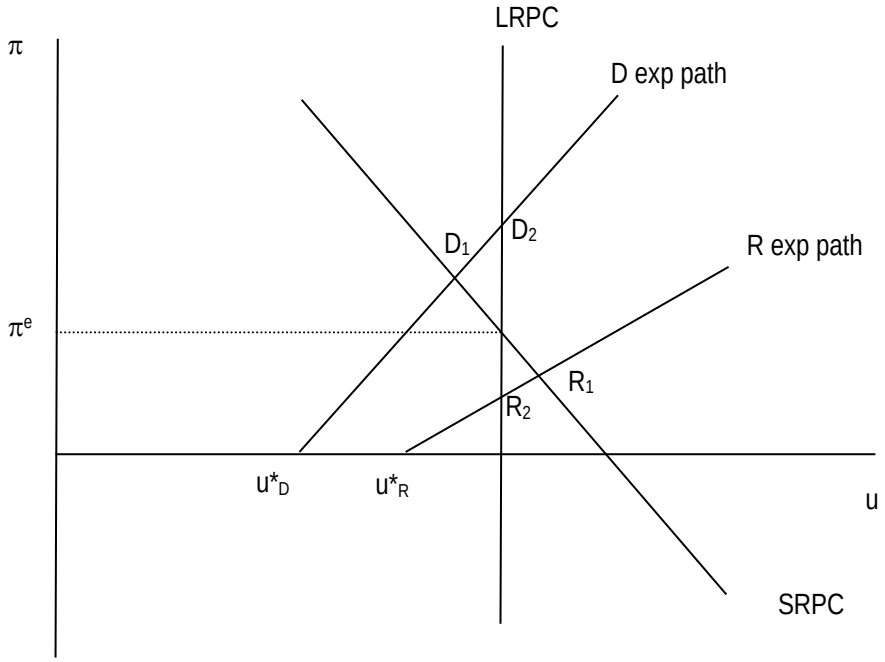


- Starting at C, moves to D in election year
  - Then economy goes to A as inflation expectations adjust
  - Move to B to lower inflation
  - Economy returns to C
- Predictions
  - Boom in election year
  - High inflation in and after election year
  - Recession in off years
  - Accelerating inflation if unwilling to endure recession in off years
- Empirical evidence
  - Inconsistent

- Some presidents (Eisenhower, Carter, Bush I) didn't do it, or didn't do it competently
- Small samples<!

Basic partisan model (White)

- Assumptions:
  - Rs dislike π
  - Ds dislike u
  - $\pi^e = \nu\pi_D + (1 - \nu)\pi_R$ (where ν is probability that D is elected)



- Predictions
  - Inflation higher under Ds
  - Recession after R is elected; boom after D is elected
  - Broadly consistent with evidence

Alesina & Roubini's presentation of Persson & Tabellini's rational opportunistic models

- Why wouldn't political business cycles be anticipated by rational agents?
- They would, if they knew the politicians' goals:
  - Expect higher inflation during election years, neutralize effect on unemployment
- What if policymakers vary in competence and use policy to signal their competence?
- Assumptions

- $y_t = \overline{y} + \pi_t - \pi_t^e + \varepsilon_t$
  - ε is competence term
  - $\varepsilon_t = \mu_t + \mu_{t-1}$
  - $\mu_t = \begin{cases} \overline{\mu} \text{ with probability } \rho, \\ \underline{\mu} \text{ with probability } 1-\rho. \end{cases}$
  - $E(\mu) = 0$
- Voters observe y_t but not π_t
- Voters choose politician to maximize $U = E\left[\sum_{t=0}^{\infty} \beta^t \left(-\frac{1}{2}\pi_t^2 + by_t\right)\right]$
- $\pi^* = b$ if no electoral issues
- $y = \overline{y} + \varepsilon$ in non-election year
- Voter's decision: $E(U_{t+1}) = -\frac{1}{2}b^2 + b\overline{y} + bE(\varepsilon_{t+1})$

- Politician may try to convince voters that he is competent
  - Politician's objective: $W(\mu_t^i) = U_{t+1}^i - U_{t+1}^0 + H = b\mu_t^i + H$, with H a dummy that is one if he wins.
  - Competent politician has more to gain from winning because he cares about economy.
  - Assume that incompetent wants to win enough that he doesn't give up.
- Can competent politician ($\mu_t = \overline{\mu}$) signal that fact to voters?
  - Must do something that incompetent couldn't or wouldn't do
  - Competent can drive output higher without as much inflation
  - Perhaps driving output up enough would signal to voters
    - Only if incompetent wouldn't dare increase inflation that much
    - Separating equilibrium vs. pooling equilibrium
    - If separating equilibrium exists, then rational signaling can happen
- Predictions:
  - Political business cycle may occur
    - Booms in election years, inflation afterward
  - Rational retrospective voting
    - People are rational in voting based on politician's recent behavior

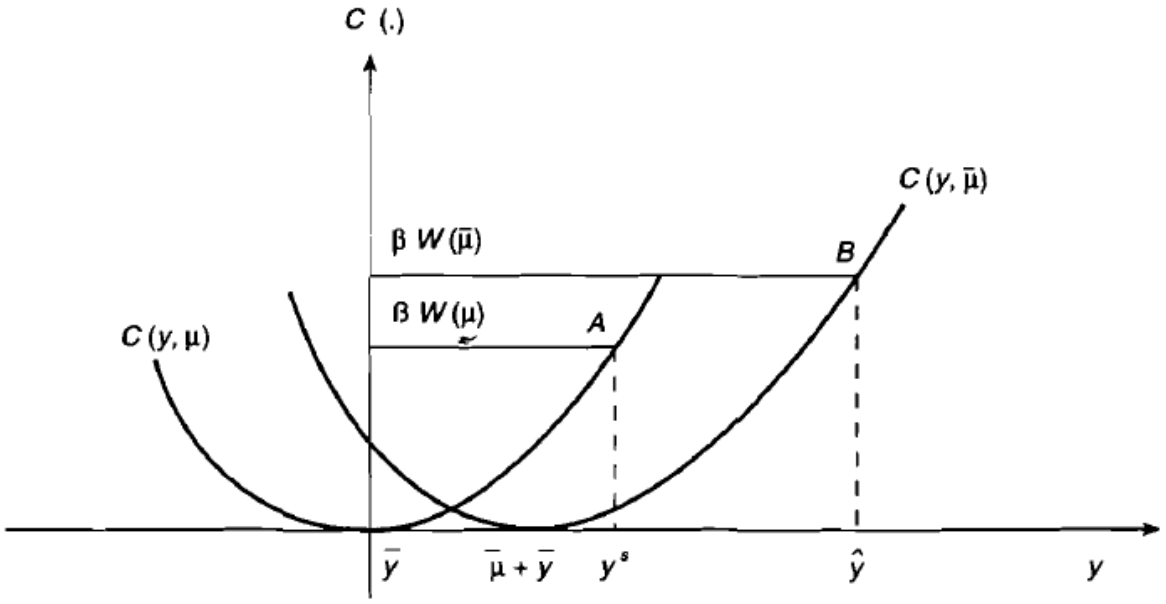


Figure 2.A.1

- C is the cost of signaling
- This is zero at equilibrium output, which depends on μ
- The βW lines are the maximum willingness to signal, where the benefit of reelection matches the cost of conveying the signal
- In diagram shown, there is a separating equilibrium because only competent policymaker is willing to move above y^s to signal
- Competent policymaker chooses y^s, signals competence and gets reelected
- Incompetent policymaker stays at y-bar and takes his chances

Rational partisan models (Ch 3)

- Each candidate has a preference for π, *b*
- Each voter has a preference for π, *b*
- Each voter calculates the expected utility if L wins and if R wins, votes for the candidate with higher expected utility.
  - This would be a purely partisan model
  - Can introduce rational retrospective voting by adding a competence term
  - This means that each voter balances ideology against competence and competent policymaker will try to signal competence to attract votes.
- Implications of models:

- Election outcome should depend on economic conditions (signaling)
- There will be policy surprise after election that depends on degree of uncertainty in election
  - L/D elected will cause rise in output
  - R elected will cause fall
- Inflation will be higher under L/D than under R

Empirical evidence (Ch 4)

- General issues:
  - President vs. Congress
  - Are all Rs and Ds homogeneous?
  - Are conditions different now than in 1950s?
  - Sample period
  - Other countries?

Table 4.1
Real GDP growth, 1949–1994

				Challenging		Incumbent	
	All	Republican	Democrat	Republican	Democrat	Republican	Democrat
Average	3.17%	2.41%	4.24%	2.59%	3.61%	2.27%	5.19%
Years 1 & 2	2.76	1.52	4.49	0.90	4.06	1.98	5.13
Years 3 & 4	3.59	3.30	4.09	4.28	2.94	2.56	5.25
Year 1	3.11	3.01	3.25	2.75	3.43	3.21	2.98
Year 2	2.40	0.03	5.73	−0.93	4.68	0.75	7.29
Year 3	3.52	2.79	4.80	4.13	3.32	1.78	6.27
Year 4	3.66	3.81	3.39	4.44	2.55	3.34	4.22

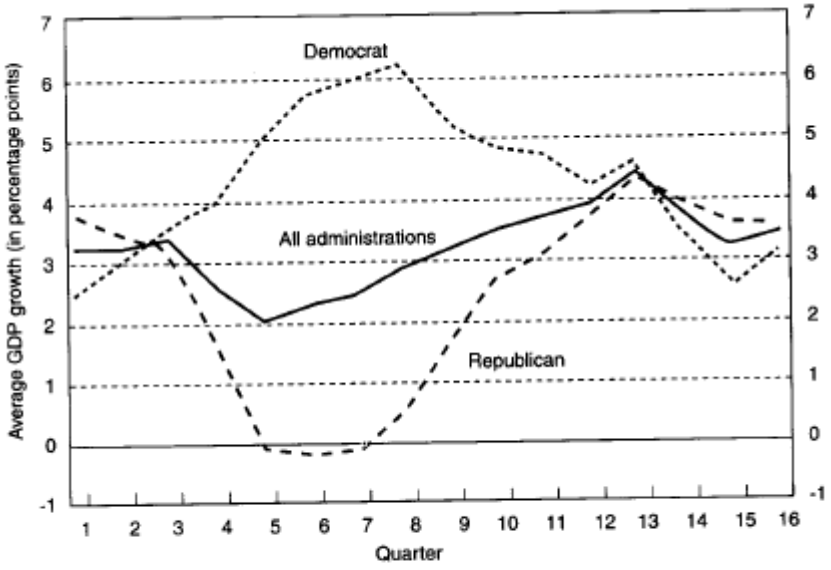


Figure 4.1
Real GDP growth

- GDP growth higher in 2nd and 3rd years of D

Table 4.2
Unemployment rate, 1949–1994

				Challenging		Incumbent	
	All	Republican	Democrat	Republican	Democrat	Republican	Democrat
Average	5.81%	6.10%	5.41%	5.95%	6.24%	6.22%	4.15%
Years 1 & 2	5.78	5.78	5.78	5.71	6.37	5.82	4.89
Years 3 & 4	5.80	6.43	4.69	6.19	5.95	6.62	3.42
Year 1	5.56	5.09	6.22	4.67	6.84	5.40	5.28
Year 2	6.00	6.47	5.34	6.76	5.90	6.25	4.50
Year 3	5.94	6.67	4.65	6.63	5.74	6.71	3.58
Year 4	5.66	6.19	4.73	5.74	6.16	6.53	3.29

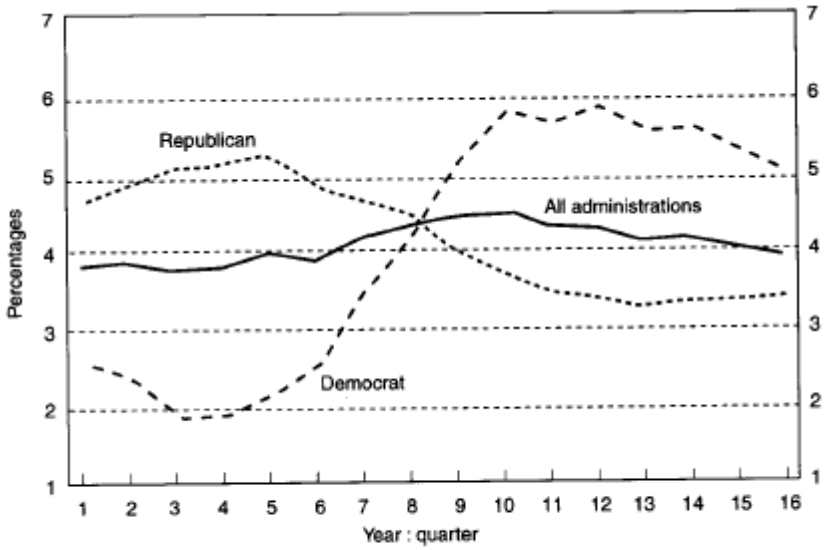


Figure 4.3
CPI growth

- Unemployment lower and inflation higher in second half of D administrations

Table 4.3
Inflation rate, 1949–1994

	All	Republican	Democrat	Challenging		Incumbent	
				Republican	Democrat	Republican	Democrat
Average	4.03%	4.16%	3.83%	3.76%	4.56%	4.46%	2.75%
Years 1 & 2	3.94	4.85	2.66	4.83	3.64	4.87	1.20
Years 3 & 4	4.23	3.47	5.56	2.70	6.82	4.05	4.30
Year 1	3.80	4.94	2.21	5.52	3.46	4.50	0.32
Year 2	4.08	4.77	3.12	4.14	3.81	5.25	2.08
Year 3	4.40	3.60	5.78	2.39	6.24	4.51	6.32
Year 4	4.07	3.34	5.34	3.01	3.91	3.60	3.27

Regressions: 1947–94

Table 4.4
Political dummy variables used in the text

DRPTXN =	+1	in the N quarters starting with a Republican (right-wing) administration
	−1	in the N quarters starting with a Democratic (left-wing) administration
	0	otherwise
DRPTN =	+1	in the N quarters starting with that of a change to a Republican (right-wing) administration
	−1	in the N quarters starting with that of a change to a Democratic (left-wing) administration
	0	otherwise
RADM =	1	if a Republican (right-wing) administration is in office, including the quarter of the change in administration
	−1	if a Democratic (left-wing) administration is in office, including the quarter of the change in administration
NRDN =	1	in the (N−1) quarters preceding an election and in the election quarter
	0	otherwise
NPOSTN =	1	in the N−1 quarters following an election and in the election quarter
	0	otherwise
ADM =	1	if a right-wing government is in office, including the quarter of the change in government
	1/2	if a center-right government is in office, including the quarter of the change in government
	1/2	if a center-left government is in office, including the quarter of the change in government
	−1	if a left-wing government is in office, including the quarter of the change in government

Table 4.5
Partisan theory
Dependent variable: inflation rate (π)

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)	(3) Coefficient (t-statistics)
Constant	0.46 (4.87)	0.46 (4.89)	0.62 (6.51)
$\pi(-1)$	1.13 (14.8)	1.13 (14.8)	1.14 (14.7)
$\pi(-2)$	−0.21 (1.89)	−0.21 (1.91)	−0.21 (1.88)
$\pi(-3)$	−0.13 (1.93)	−0.13 (1.93)	−0.13 (1.89)
POIL	0.02 (5.16)	0.02 (5.17)	0.02 (5.32)
D73	0.75 (5.03)	0.75 (5.05)	0.62 (4.38)
INTADM(−3)	−0.29 (2.67)	−0.31 (3.18)	—
RADM(−3)	−0.01 (0.19)	—	−0.11 (1.97)
R^2	0.95	0.95	0.95

INTADM = D73*RADM

Republican administrations have had lower inflation since 1973, but not before.

A&R claim that difference between D and R is 1.8% points of inflation. = 0.31/(1–1.13+0.21+0.13)

Table 4.6
Traditional partisan theory
Dependent variable: rate of growth of output (y) (columns (1), (3)), unemployment rate (U) (columns (2), (4)).

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)	(3) Coefficient (t-statistics)	(4) Coefficient (t-statistics)
Constant	1.03 (6.23)	0.32 (3.58)	0.97 (5.93)	0.27 (2.85)
$y(-1)$	1.13 (15.6)	—	1.10 (15.3)	—
$y(-2)$	−0.21 (1.94)	—	−0.21 (1.95)	—
$y(-3)$	−0.22 (3.03)	—	−0.18 (2.50)	—
$U(-1)$	—	1.68 (22.8)	—	1.66 (22.6)
$U(-2)$	—	−0.91 (7.06)	—	−0.89 (7.06)
$U(-3)$	—	0.16 (2.33)	—	0.19 (2.64)
RADM(−1)	−0.34 (3.33)	0.05 (2.20)	—	—
DRPTX6(−1)	—	—	−0.64 (4.30)	0.13 (3.37)
SEC6(−1)	—	—	−0.11 (0.86)	0.01 (0.36)
R^2	0.80	0.96	0.81	0.96

Note sign error in in-line unemployment equation as presented in text (4.3)

SECn is after first n quarters of administration (1 = R, –1 = D)

SECn should not have effect if only unanticipated policy changes matter

Table 4.7
Political business cycle theory
Dependent variable: rate of growth and output (y) (column (1)), unemployment rate (U) (column (2))

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)
Constant	0.81 (5.15)	0.30 (3.33)
$y(-1)$	1.17 (16.0)	—
$y(-2)$	−0.25 (2.25)	—
$y(-3)$	−0.17 (2.30)	—
$U(-1)$	—	1.71 (23.4)
$U(-2)$	—	−0.95 (7.32)
$U(-3)$	—	0.18 (2.53)
NRD4(−1)	−0.13 (0.58)	−0.06 (1.15)
R^2	0.79	0.96

No traditional PBC effect: NRDn is last n quarters before election. Should see high output and low unemployment to signal.

Table 4.8
Partisan theory
Dependent variable: rate of growth of money (m)

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)	(3) Coefficient (t-statistics)	(4) Coefficient (t-statistics)
	1949–94 sample		1949–82 sample	
Constant	−0.18	−0.58	−0.21	−0.63
	(0.95)	(1.84)	(1.04)	(2.0)
$U(-1)$	0.10	0.22	0.10	0.22
	(2.87)	(3.88)	(2.53)	(4.09)
M0(−1)	1.25	—	1.07	—
	(17.2)		(11.9)	
M0(−2)	−0.32	—	−0.13	—
	(4.52)		(1.49)	
M1(−1)	—	1.23	—	1.03
		(17.9)		(12.7)
M1(−2)	—	−0.36	—	−0.15
		(5.50)		(1.84)
RADM(−2)	−0.07	−0.09	−0.11	−0.20
	(1.20)	(1.12)	(1.83)	(2.41)
R^2	0.94	0.90	0.94	0.87

No consistent partisan effect on money growth: is this the right variable?

Table 4.9
Partisan theory
Dependent variable: interest rate (i)

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)	(3) Coefficient (t-statistics)	(4) Coefficient (t-statistics)
	Federal funds rate	Discount rate	3-month T-bill	10-year Treasury note
Constant	0.25	0.10	0.17	0.12
	(1.25)	(1.07)	(1.02)	(0.86)
$i(-1)$	1.17	1.40	1.15	1.21
	(14.5)	(16.5)	(14.2)	(14.1)
$i(-2)$	−0.44	−0.55	−0.50	−0.30
	(3.60)	(3.95)	(4.16)	(2.24)
$i(-3)$	0.24	0.13	0.32	0.07
	(2.94)	(1.56)	(4.00)	(0.85)
RADM(−2)	−0.29	−0.13	−0.24	−0.11
	(2.96)	(2.96)	(3.25)	(2.17)
R^2	0.90	0.97	0.91	0.96

Looks like inflation expectations effect of R outweighs real interest effect of contractionary policy.

Table 4.10
Political business cycle theory
Dependent variables: rate of growth of money (m), interest rates (i)

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)	(3) Coefficient (t-statistics)	(4) Coefficient (t-statistics)	(5) Coefficient (t-statistics)	(6) Coefficient (t-statistics)
	$m0$	$m1$	Federal funds rate	Discount rate	3-month T-bill	10-year Treasury note
Constant	−0.14 (0.76)	−0.53 (1.71)	0.33 (1.54)	0.17 (1.58)	0.25 (1.36)	0.22 (1.64)
$U(-1)$	0.09 (2.60)	0.20 (3.72)	—	—	—	—
$m(-1)$	1.26 (17.4)	1.25 (18.0)	—	—	—	—
$m(-2)$	−0.32 (4.60)	−0.38 (5.67)	—	—	—	—
$i(-1)$	—	—	1.21 (14.2)	1.45 (16.7)	1.19 (14.3)	1.24 (14.3)
$i(-2)$	—	—	−0.45 (3.54)	−0.55 (3.83)	−0.51 (4.07)	−0.30 (2.25)
$i(-3)$	—	—	0.19 (2.27)	0.08 (0.92)	0.26 (3.27)	0.04 (0.45)
NRD4	0.02 (0.17)	0.16 (0.85)	0.07 (0.36)	−0.04 (0.46)	0.05 (0.36)	−0.01 (0.10)
R^2	0.94	0.90	0.90	0.96	0.91	0.96

No monetary policy changes before elections

Table 4.11
Political effects on budget deficits
Dependent variable: Budget deficit (% of GDP) (*db*)

Independent variables	(1) Coefficient (t-statistics)	(2) Coefficient (t-statistics)	(3) Coefficient (t-statistics)	(4) Coefficient (t-statistics)	(5) Coefficient (t-statistics)
Constant	0.009 (1.94)	0.006 (1.03)	0.004 (0.83)	0.004 (0.79)	0.007 (1.39)
$db(-1)$	0.003 (0.16)	−0.002 (0.11)	−0.007 (0.32)	−0.007 (0.32)	−0.023 (0.93)
$b(-1)\pi^e$	0.01 (3.27)	0.01 (3.06)	0.01 (3.33)	0.01 (3.30)	0.01 (2.82)
YVAR	0.03 (4.90)	0.03 (5.07)	0.02 (3.67)	0.02 (3.69)	0.02 (3.23)
GVAR	−0.38 (2.89)	−0.12 (1.28)	−0.12 (1.35)	−0.12 (1.35)	−0.07 (0.83)
NRD4	—	0.001 (0.35)	—	0.001 (0.27)	—
RADM(−1)	—	—	0.004 (2.12)	0.003 (2.10)	0.000 (0.04)
R^2	0.34	0.31	0.29	0.29	0.22

Rs run higher deficits but no PBC effects before elections (entirely driven by Reagan and Bush I)

No effects on transfers of either variable

Blinder and Watson (NBER 2014)

- "The U.S. economy not only grows faster, according to real GDP and other measures, during Democratic versus Republican presidencies, it also produces more jobs, lowers the unemployment rate, generates higher corporate profits and investment, and turns in higher stock market returns." (p. 1)
    - Gap is 1.8 percentage points in postwar period: D = 4.35%, R = 2.54% (and variances are about equal)
    - 41 of 49 recession quarters occurred under R's

Figure 1

A. Average annualized GDP growth, by term

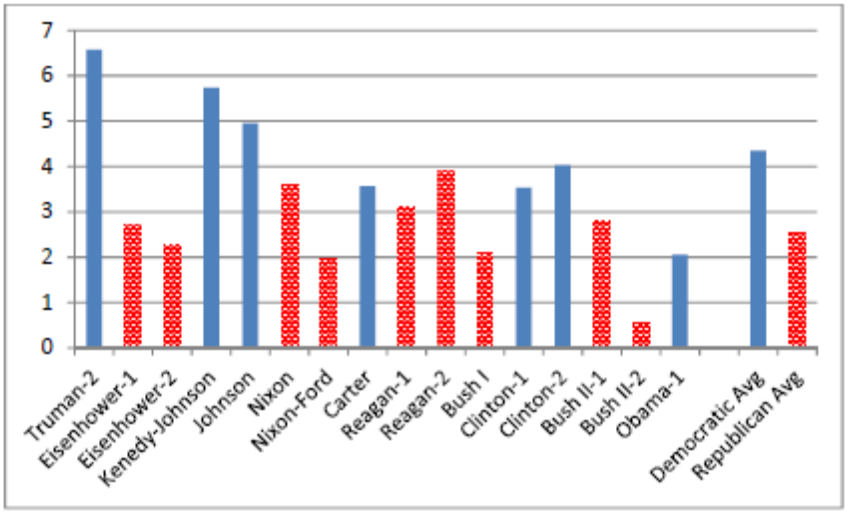


Table 1
Average values by party of president

Variable	Democratic	Republican	Difference	*p*-value
A. GDP and Recessions				
GDP (GR)	4.35 (0.57) [0.46]	2.54 (0.33) [0.45]	1.80 (0.66) [0.64]	0.01
Quarters-in-Recession	1.14 (0.51) [0.56]	4.56 (0.78) [1.03]	-3.41 (0.93) [1.13]	0.01
B. Other Output Measures				
GDP Per Capita (GR)	3.11 (0.46) [0.41]	1.35 (0.36) [0.45]	1.76 (0.58) [0.61]	0.01
Nonfarm Business Output (GR)	4.82 (0.56) [0.52]	2.67 (0.44) [0.61]	2.15 (0.71) [0.80]	0.01
Industrial Production (GR)	5.56 (0.96) [0.84]	1.79 (0.61) [0.93]	3.77 (1.14) [1.24]	0.00
C. Employment and Unemployment				
Employment (Payroll) (GR)	2.59 (0.41) [0.36]	1.17 (0.32) [0.38]	1.42 (0.52) [0.49]	0.02
Employee Hours (NFB) (GR)	2.22 (0.31) [0.39]	0.57 (0.39) [0.50]	1.65 (0.50) [0.58]	0.01
Employment (HH) (GR)	1.76 (0.28) [0.25]	1.20 (0.26) [0.31]	0.56 (0.38) [0.37]	0.17
Unemployment Rate (Level, PP)	5.64 (0.67) [0.41]	6.01 (0.41) [0.29]	-0.38 (0.78) [0.47]	0.62
Unemployment Rate (Change, PP)	-0.83 (0.42)	1.09 (0.45)	-1.91 (0.62)	0.01
D. Stock Returns and Corporate Profits				
Returns SP500 Index (PP)	8.08 (2.00) [2.57]	2.70 (2.84) [3.20]	5.39 (3.48) [4.23]	0.17
Corporate Profits (Share of GDI)	5.62 (0.32) [0.23]	4.74 (0.20) [0.16]	0.88 (0.38) [0.27]	0.03
E. Real Wages and Productivity				
Compensation/Hour (GR)	1.81 (0.54) [0.35]	1.43 (0.34) [0.27]	0.38 (0.64) [0.43]	0.54
Ouput/Hour NFB (GR)	2.55 (0.46) [0.37]	2.08 (0.31) [0.30]	0.46 (0.55) [0.49]	0.39
TFP (GR)	1.89 (0.47) [0.37]	0.86 (0.31) [0.35]	1.03 (0.56) [0.53]	0.08
TFP (Util Adj) (GR)	1.35 (0.37) [0.30]	1.16 (0.25) [0.28]	0.19 (0.45) [0.39]	0.66
F. Structural Government Surplus				
Surplus/Pot.GDP (PP)	-1.51 (0.86) [0.48]	-2.20 (0.22) [0.24]	0.69 (0.89) [0.51]	0.43

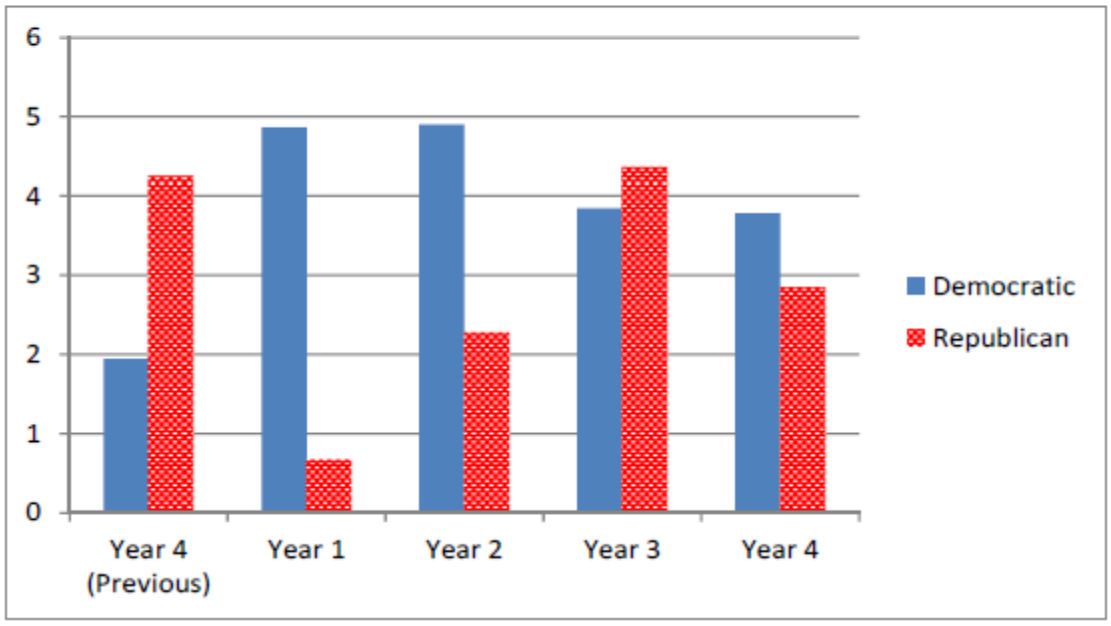
Variable	Democratic	Republican	Difference	*p*-value
G. Inflation				
Inflation PCED (Level, PP)	2.97 (0.95) [0.59]	3.32 (0.63) [0.41]	-0.35 (1.14) [0.68]	0.73
Inflation GDPD (Level, PP)	2.88 (0.88) [0.55]	3.44 (0.60) [0.39]	-0.56 (1.06) [0.64]	0.59
Inflation PCED (Change, PP)	1.05 (0.67)	-0.83 (0.87)	1.88 (1.10)	0.12
Inflation GDPD (Change, PP)	0.94 (0.69)	-0.82 (0.84)	1.75 (1.09)	0.15
H. Interest Rates				
3 Month T-bill Rate (Level, PP)	4.01 (1.10) [0.66]	4.87 (0.92) [0.58]	-0.86 (1.44) [0.82]	0.56
Federal Funds Rate (Level, PP)	4.75 (1.36) [0.82]	5.55 (1.10) [0.69]	-0.79 (1.75) [0.99]	0.65
3 Month T-bill Rate (Change, PP)	1.75 (0.91)	-1.47 (0.59)	3.22 (1.09)	0.00
Federal Funds Rate (Change, PP)	2.34 (1.37)	-2.09 (0.72)	4.42 (1.55)	0.00

Table 3
Average GDP Growth under presidents and by Congressional control

Partisan control of Congress	Party of President			All
	Democrat	Republican		
Democrats control both houses	4.69 (0.58) [80]	2.37 (0.56) [88]		3.47 (0.47) [168]
Divided Congress	2.30 (0.44) [8]	2.80 (1.07) [32]		2.70 (0.87) [40]
Republicans control both houses	3.88 (0.44) [24]	2.84 (0.84) [24]		3.36 (0.53) [48]
All	4.35 (0.46) [112]	2.54 (0.45) [144]		3.33 (0.34) [256]

Figure 2

A. Growth rates by year, within all 16 terms



- Do exogenous shocks to oil prices, productivity, defense spending, or uncertainty explain the difference? Only half of it:

B. Estimated Effects, 1949:Q4-2012:Q3, (D-R Gap = 1.92)

	Explained		Variable				
			Oil Prices	TFP	Defense Sp.	Baa-Aaa	Uncertainty
1	0.99 (0.10)		0.45 (0.11)	0.32 (0.07)	0.22 (0.04)		
2	0.94 (0.13)		0.47 (0.11)	0.30 (0.08)	0.22 (0.04)	-0.04 (0.10)	
3	0.88 (0.11)		0.41 (0.11)	0.34 (0.07)	0.23 (0.04)		-0.10 (0.05)
4	0.84 (0.14)		0.44 (0.11)	0.33 (0.07)	0.22 (0.04)	-0.06 (0.09)	-0.10 (0.05)

Day 37: Central-Bank Independence

Readings: Alesina & Summers, Acemoglu et al., Blinder 3, Loungani & Sheets

Blinder, Ch 3

- Goal independence vs. instrument independence
    - Which is crucial for avoiding political business cycle?
    - Ambiguity in Fed goals of "maximum employment" and "stable prices"
- Irreversibility
    - Difficult for other government entities to overturn FOMC actions
- Why independence?
    - Long time horizon
    - Avoiding inflation has short-term costs, long-term gains
- Evidence suggests more independent central banks in OECD have lower inflation and not lower growth.
    - Not robust to developing countries
    - Which way does causality (if any) run?
- Should or do central banks follow the market?
    - Cannot simply do what markets expect because markets often overreact.
- Credibility?
    - Blinder discounts usual argument.
    - No evidence that independent CBs have better Phillips curve tradeoff.
    - Traditional literature stresses precommitment or incentive.
    - Actual central bankers think more in terms of trust
        - Often able to achieve credibility without formal institutional means
- Is central bank independence consistent with democracy?
    - Constitution limits ability to change some things easily.
    - Elected officials delegated power to Fed.
    - Goals are chosen by Congress.
    - Leaders are appointed by elected officials.
    - Ultimately reversible
- Blinder favors greater openness as means for market to improve expectations of future short rates.

Alesina & Summers's result

- Measures of independence
    - Political elements (Bade & Parkin):
        - "institutional relationship between the central bank and the executive"
        - procedure to nominate and dismiss head of CB

        - role of government officials on CB board
        - frequency of contact between CB and executive branch
    - Political and economic independence (Grilli et al.):
        - Ability of CB to set policy objectives
        - Appointment of CB leaders by government
        - Length of terms
        - Government representation on board
        - Whether actions must be approved by government
        - Presence of price stability as explicit goal in charter language
        - Economic independence: ability to use instruments without interference and avoid monetizing deficits
- Sample: 1955–88, 16 countries
    - Countries with higher independence seem to have lower average inflation and less variable inflation.
    - No correlation between CBI and real growth or unemployment.

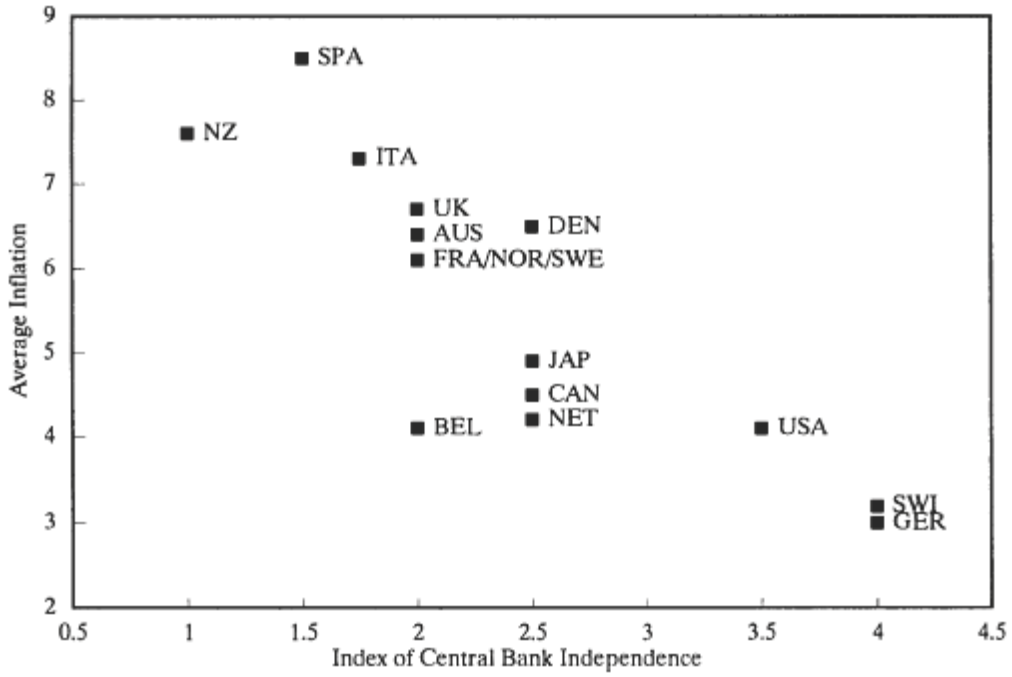


FIG. 1a. Average Inflation

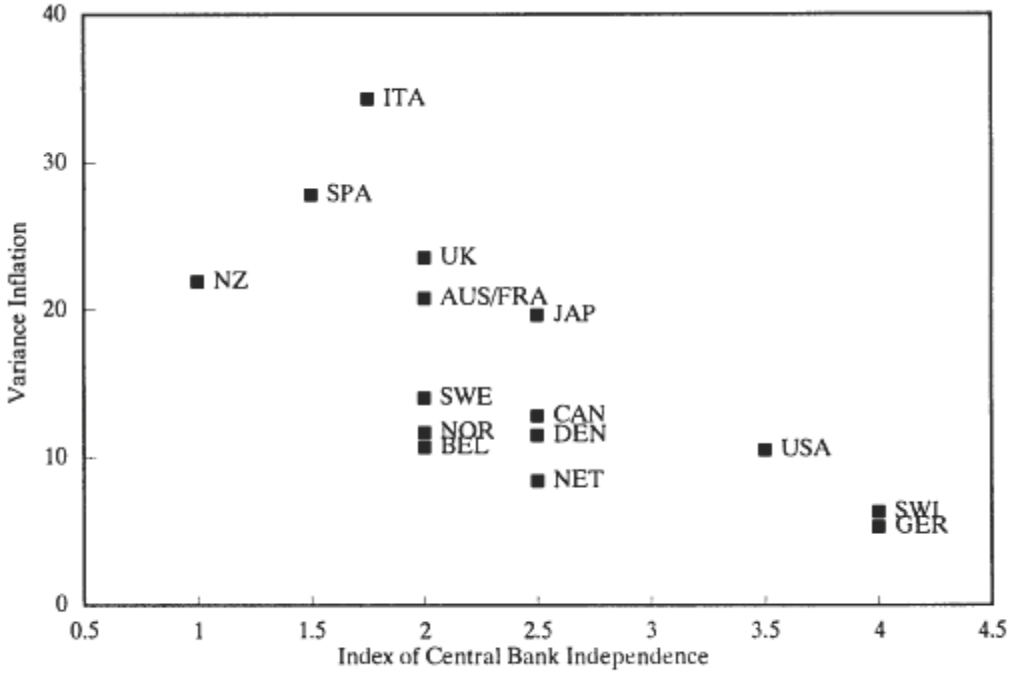


FIG. 1b. Variance Inflation

Loungani & Sheets

- Extend analysis to transition countries.
- Two measures: one weights political and economic independence equally; the other measures similarity to Bundesbank.
- Some evidence that higher initial inflation reduces CBI, but very low R^2.
- They then find evidence in panel regressions for 25 countries that inflation is bad for subsequent growth and investment.

TABLE 1

TEST ON CENTRAL BANK INDEPENDENCE

#	Test questions
	Independence in choosing goals
1.	Does the central bank law stipulate price stability as the central macroeconomic objective of the central bank?
	Economic independence
2.	Does the central bank control the "instruments" of monetary policy? ["Instruments" are (i) open-market operations, (ii) reserve requirements, (iii) discount rates]
3.	Is there any binding legal limit imposed on the direct financing of the government by the central bank?
4.	Is the government allowed to receive any direct financing from the central bank?
5.	Is the central bank subject to government directives in the execution of monetary policy?
	Political independence
6.	Can the governor of the central bank be dismissed by the executive branch or the parliament if there is conflict regarding monetary policy?
7.	Does the term of office of the central bank governor exceed the election cycle?
8.	Does the term of office of central bank board members exceed the election cycle?
9.	Is the governor appointed by the executive branch?
10.	Are any of the other central bank board members appointed by the executive branch?
11.	Is the number of central bank board members appointed by the executive greater than the number appointed by other bodies?
12.	Does a government official or representative sit on the central bank board?
13.	Does a government official or representative sit on the central bank board with a vote?
14.	Does a government official or representative sit on the central bank board with a veto?

TABLE 2

TEST SCORES

	Goal ind.	Economic Independence				Political Independence								
	Q #1	Q #2	Q #3	Q #4	Q #5	Q #6	Q #7	Q #8	Q #9	Q #10	Q #11	Q #12	Q #13	Q #14
Albania	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0
Armenia	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.5	0.0	1.0	1.0	1.0	1.0
Bulgaria	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0
Czech Repub.	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
Estonia	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.5	0.0	1.0	0.0	0.0	1.0
Hungary	0.0	1.0	1.0	0.0	0.5	1.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
Kazakhstan	0.5	1.0	0.0	0.0	0.0	0.5	1.0	1.0	0.5	0.0	1.0	0.0	0.0	1.0
Lithuania	0.0	1.0	0.0	0.0	0.0	0.5	0.0	1.0	0.5	1.0	1.0	0.0	0.0	1.0
Poland	0.5	1.0	1.0	0.0	0.0	0.5	1.0	0.0	0.5	0.0	1.0	1.0	1.0	1.0
Romania	1.0	0.0	0.0	0.0	0.0	0.5	1.0	1.0	0.5	1.0	0.0	1.0	1.0	1.0
Russia	0.5	1.0	0.0	0 0	0.0	0.5	1.0	1.0	0.5	1.0	1.0	0.0	0.0	1.0
Ukraine	0.5	1.0	0.0	0.0	1.0	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
Germany	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	1.0
Wt. given to Q. in CBI-DF	1/2	1/8	1/8	1/8	1/8	0	0	0	0	0	0	0	0	0
Wt. given to Q. in SIB	1/9	1/9	1/9	0	1/9	1/9	1/9	1/9	0	0	0	0	1/9	1/9

TABLE 4

INFLATION IN TRANSITION ECONOMIES: EVIDENCE FROM CROSS-COUNTRY REGRESSIONS

	Dependent variable in columns (1) to (6): Log inflation rate in 1993 Dependent variable in column (7): Inflation rate in 1993 (rank)						
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CBI-DF Index of central bank independence a la Debelle and Fischer	−2.49 (1.39)	·	·	·	·	·	·
SIB Index of similarity to Bundesbank	·	−6.37 (1.60)	·	·	·	−3.59 (1.08)	−0.40 (0.17)
FISCAL Fiscal balance in 1992	·	·	−0.10 (0.03)	·	·	−0.05 (0.01)	−0.09 (0.20)
REFORM INDEX de Melo et al. index, average over 1989 to 1992 period	·	·	·	−9.62 (1.52)	·	−5.67 (0.90)	−0.57 (0.12)
TENURE Average tenure of central bank chairman	·	·	·	·	−0.19 (0.07)	−0.01 (0.02)	−0.03 (0.16)
Intercept	6.86 (1.08)	9.55 (1.24)	4.25 (0.60)	8.41 (0.56)	7.93 (0.99)	9.03 (0.55)	13.42 (0.81)
R^2	0.12	0.45	0.38	0.77	0.40	0.91	0.93

NOTES: (i) Numbers reported in parentheses are standard errors based on a heteroskedasticity-consistent covariance matrix. (ii) In the regression reported in column (7), the variables are entered as ranks.

TABLE 5

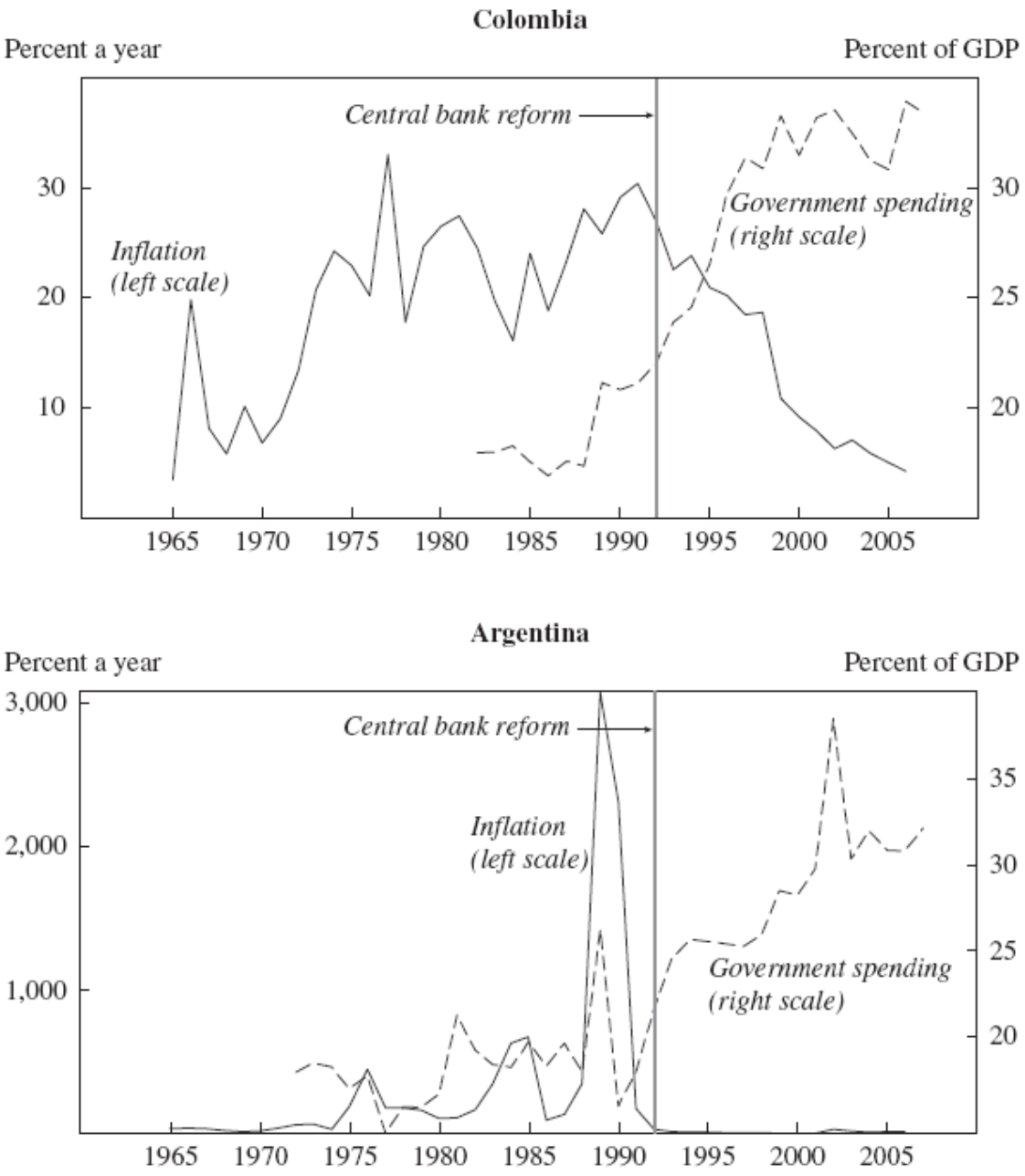
DETERMINANTS OF CENTRAL BANK INDPENDENCE MEASURES:
EVIDENCE FROM CROSS-COUNTRY REGRESSIONS

Independent variables	Dependent variable: SIB measure			
	(1)	(2)	(3)	(4)
INFL_PRE Initial inflation rate	−0.013 (0.005)	·	·	−0.013 (0.004)
FISCAL_PRE Initial fiscal balance	·	0.005 (0.005)	·	0.005 (0.005)
REFORM_PRE Initial reform index	·	·	0.20 (0.20)	0.22 (0.14)
Intercept	0.68 (0.07)	0.66 (0.06)	0.62 (0.07)	0.67 (0.08)
R^2	0.08	0.02	0.02	0.13

Acemoglu et al.: Institutional reform vs. policies

- Difficult to separate effects of policymaking institutions from effects of policies
    - Dictators can choose good policies
    - Democracies can choose bad ones
    - Even corruption-prone institutions can have non-corrupt leaders (Mandela?)
- Whether reform will succeed depends on "why distortionary policies were in place to start with."
    - Why do we observe bad policies?
        - Politicians have different preferences than population
            - Politicians may try to redistribute income to themselves or their backers
            - Ability to do so may be constrained by institutions
            - Absence of constraints → policy failure
        - May be politically impossible to remove distortions
            - Policies may change *de jure* but not *de facto*
            - CBI in Zimbabwe had no effect.
    - Highly distortionary policies are likely a signal of weak constraints on policymakers under existing institutions.
        - Benefit from true reform is high
        - True reform is very unlikely
    - Largest benefits from reform are likely in middle:
        - Policies are bad enough to make large improvement possible
        - Institutions are good enough to allow *de facto* reform to occur
- See-saw effect?
    - Does positive reform in one area lead to back-slipping in others?
- Overall results
    - "CBI reduced inflation in countries with intermediate levels of constraints on the executive but appears to have had no effect in countries with the strongest institutions. For countries with the weakest institutions, the general pattern is likewise one of no effect, although some specifications show a statistically significant, but generally non-robust, negative effect." p. 356–357

Figure 2. The Seesaw Effect in Colombia and Argentina



Source: International Monetary Fund, *International Financial Statistics* and *World Economic Outlook;* Jácome and Vásquez (2005).

- Theoretical model is useful
  - π is distortionary policy
  - **Citizen** preferences are $u(\pi) = -\eta\pi$
  - **Politician** preferences are $v(\pi, \rho, t) = \lambda u(\pi) + (1-\lambda)t - \rho\pi$
    - t is transfer from lobby group
    - $\rho\pi$ reflects added costs of distortion after reform (measured by ρ)
    - λ is the weight that the politician gives to public vs. own transfer
      - Authors equate this to constraints on power: λ=1 means politician must consider only public's preferences; λ=0 means public well-being can be totally ignored (and bribes rule)
  - **Lobby** preferences are $w(\pi, t) = \alpha\pi - (\beta/2)\pi^2 - t$
    - Gain from inflation distortion at decreasing rate
    - Lobby's bliss point is $\pi^* = \alpha/\beta > 0$
  - Lobby makes offer $(\hat{\pi}, \hat{t})$ to politician, who either
    - Accepts and implements $\hat{\pi}$, getting transfer $\hat{t}$, or
    - Rejects and sets $\pi = 0$
  - Politician accepts iff $\lambda u(\hat{\pi}) + (1-\lambda)\hat{t} - \rho\hat{\pi} \geq \lambda u(0)$, which thus becomes the constraint for lobby in making offer that will be accepted
    - This means that $\hat{t} = \frac{\lambda\eta + \rho}{1-\lambda}\hat{\pi}$ to meet threshold of acceptance by politician
    - Lobby chooses $\max_{\hat{\pi}\geq 0} \alpha\hat{\pi} - \frac{\beta}{2}\hat{\pi}^2 - \frac{\lambda\eta+\rho}{1-\lambda}\hat{\pi}$.
    - FOC for interior solution: $\alpha - \beta\hat{\pi} - \frac{\lambda\eta+\rho}{1-\lambda} = 0$
      - $\hat{\pi} = \frac{1}{\beta}\left[\alpha - \frac{\lambda\eta+\rho}{1-\lambda}\right]$.
      - So $\hat{\pi} = 0$ if $\alpha(1-\lambda) - \lambda\eta + \rho \leq 0$
      - If $\rho = 0$, then always choose $\hat{\pi} = 0$ if $\lambda \geq \bar{\lambda} \equiv \frac{\alpha}{\alpha+\eta}$.
        - If constraints on politician (λ) are high enough, don't bribe even without reform.
        - Reform is not very useful if policymaker is already constrained.
    - If $\lambda \leq \bar{\lambda}$ then reform reduces π
      - The greater is λ, the greater will be the reduction in π
      - $\frac{\partial\hat{\pi}}{\partial\rho} = \frac{1}{\beta(1-\lambda)}$, which is increasing in λ
    - Thus, effect of ρ on π is increasing in λ up to $\bar{\lambda}$, then zero

- Formal empirical results
  - Sample of 52 countries excluding former Communist countries and Africa
  - CBI dummy = 1 starting in year in which CBI index increases
  - Constraints on politician from Polity IV
    - 1 to 7 score.
    - Within 1 s.d. of mean → medium constraint
  - Estimating equation

$$y_{cs} = \sum_{j=1}^{k} \zeta_j y_{cs-j} + \phi_0 x_{cs} + \sum_{j=1}^{k} \phi_j x_{cs-j} + \delta_c + \omega_t + \varepsilon_{cs}. \quad (12)$$

  - Results

Table 1. OLS Fixed-Effects Regressions of Inflation on Central Bank Independence[a]

	Full sample (52 countries)			*Countries with change in CBI only (40 countries)*		
Variable	*1-1*	*1-2*	*1-3*	*1-4*	*1-5*	*1-6*
CBI dummy,[b] short-run effect	−0.036 (0.034)	−0.019 (0.012)	−0.031 (0.022)	−0.063 (0.030)	−0.028 (0.013)	−0.040 (0.023)
CBI dummy, long-run effect		−0.079	−0.087		−0.119	−0.164
p-value, long-run effect		[0.129]	[0.126]		[0.051]	[0.021]
p-value, five lags of inflation = 0		[0.000]	[0.000]		[0.000]	[0.000]
p-value, current and five lags of CBI dummy = 0			[0.826]			[0.072]
No. of observations	1,670	1,500	1,500	1,300	1,172	1,172
Adjusted R^2	0.50	0.83	0.83	0.47	0.84	0.84

Source: Authors' regressions.

a. The dependent variable is inflation/(1 + inflation), using inflation data from International Monetary Fund, *International Financial Statistics*. The sample period is 1972–2005. Each column reports a single ordinary least squares regression using unbalanced panel data with one observation per year, per country and including country and year fixed effects. Robust standard errors, adjusted for clustering by country, are in parentheses.

b. Takes a value of one in every year after a substantial reform to the country's central bank laws leading to more independence is introduced.

    - Results are quite weak, especially for long-run effect
  - When regression is broken by weak, medium, and strong constraints

Table 2. OLS Fixed-Effects Regressions of Inflation on Central Bank Independence Interacted with Executive Constraints[a]

	Full sample			*Countries with change in CBI only*		
Variable	*2-1*	*2-2*	*2-3*	*2-4*	*2-5*	*2-6*
CBI dummy × weak-constraints dummy	0.023	−0.016	−0.051	0.000	−0.026	−0.070
	(0.025)	(0.013)	(0.032)	(0.017)	(0.014)	(0.034)
CBI dummy × medium-constraints dummy	−0.071	−0.029	−0.048	−0.097	−0.039	−0.050
	(0.044)	(0.016)	(0.033)	(0.041)	(0.017)	(0.032)
CBI dummy × strong-constraints dummy	0.023	0.003	0.011	−0.004	−0.007	−0.004
	(0.027)	(0.008)	(0.011)	(0.021)	(0.008)	(0.011)
CBI × weak constraints, long-run effect		−0.068	−0.023		−0.104	−0.097
p-value, long-run effect, weak constraints = 0		[0.203]	[0.700]		[0.087]	[0.133]
CBI × medium constraints, long-run effect		−0.119	−0.125		−0.158	−0.196
p-value, long-run effect, medium constraints = 0		[0.070]	[0.056]		[0.033]	[0.010]
CBI × strong constraints, long-run effect		0.012	0.013		−0.028	−0.060
p-value, long-run effect, strong constraints = 0		[0.711]	[0.751]		[0.428]	[0.171]
p-value, five lags of inflation = 0		[0.000]	[0.000]		[0.000]	[0.000]
p-value, current and five lags of CBI dummy, weak constraints = 0			[0.081]			[0.006]
p-value, current and five lags of CBI dummy, medium constraints = 0			[0.441]			[0.035]
p-value, current and five lags of CBI dummy, strong constraints = 0			[0.500]			[0.469]
p-value, medium effect = weak effect[b]	[0.017]	[0.391]	[0.087]	[0.014]	[0.347]	[0.098]
p-value, medium effect = strong effect[b]	[0.016]	[0.010]	[0.004]	[0.017]	[0.011]	[0.005]
No. of observations	1,670	1,500	1,500	1,300	1,172	1,172
Adjusted R^2	0.51	0.83	0.83	0.49	0.84	0.84

Source: Authors' regressions.

a. The dependent variable is inflation/(1 + inflation), using inflation data from International Monetary Fund, *International Financial Statistics*. Each column reports a single ordinary least squares regression using unbalanced panel data with one observation per year per country and including country and year fixed effects. Robust standard errors, adjusted for clustering by country, are in parentheses. Assignment of countries to weak-, medium-, and strong-constraints categories is based on the average of the constraints on the executive (xcons) variable in the Polity IV data for 1972–2004. All countries within one standard deviation of the sample mean were assigned to the medium-constraints category.

b. p-values for are for the short-run effects in columns 2-1 and 2-4 and for the long-run effects in the other columns.

- Results are much stronger for the medium constraint countries.
- This is consistent with the authors' theoretical model.

Days 38 & 39: Political Economy Models

Readings: Rogoff, Persson/Svensson, Persson/Tabellini, Grilli et al., Manacorda et al.

Rogoff: Equilibrium budget cycles

- Analytically well-specified competence model similar to the one in Alesina & Roubini's Chapter 2.
  - Utility: $\Gamma_t = \sum_{s=t}^{T} \beta^{s-t} \left[U(c_s, g_s) + V(k_s) + \eta_s \right]$
    - c is private consumption
    - g is government-good consumption
    - k is government capital good
    - η is "looks" or popularity shock, $\eta_t^i = q_t^i + q_{t+1}^i$
  - Technology: $c_t = y - \tau_t$
  - Government budget constraint: $g_t + k_{t+1} = \tau_t + \varepsilon_t$
    - ε is competency term: $\varepsilon_t^i = \alpha_t^i + \alpha_{t-1}^i$
  - Incumbent's utility function: $E_t^I(\Gamma_t) + \sum_{s=t}^{T} \beta^{s-t} X \pi_{s,t}$
    - π is probability that incumbent is still in power
    - X is "ego rent" from staying in office
  - Election cycle: incumbent runs against random opponent every other period
  - Voters observe g and τ, but do not observe k_{t+1} before election.
- In perfect-information equilibrium, re-elect high-α incumbent but not low-α one
- Asymmetric information leads to possibility of pooling or separating equilibria
  - How will competent incumbent signal?
  - Increases visible signal g or τ relative to invisible k.
- Prediction: increases in government consumption or falls in taxes before elections, at expense of government capital investment
- This may lead to too much government consumption or too high deficits and too little government investment if it is repeated.

Persson & Svensson: Why would a stubborn conservative run budget deficits?

- Model is quite complex, with lots of nested indirect utility functions.
- Two periods linked by government budget constraint.
- If governments in both periods have same preferences, then no time inconsistency and no tendency to use government debt to influence successor.
- Suppose that period 1 government has lower preferred g to that of period 2 government.

- How can government 1 affect government 2's decision?
  - By amount of debt it leaves
  - More debt → less government spending in 2
- Two distortions:
  - Government consumption distortion: more or less government spending than desired. More government spending means higher tax rate, less labor effort, etc.
  - Intertemporal distortion: given the amount to be spent by government in the two periods, it is most efficient to have taxes smoothed over periods.
- "Stubborn" conservative: values government consumption distortion over intertemporal distortion, so is willing to have taxes misaligned across periods in order to influence successor's government consumption.
- Then stubborn conservative lowers taxes in first period to increase debt and constrain successor's government spending.
  - Taxes will be higher in second period (inefficient)
  - Government spending in second period will be higher than in first, but lower then second government would like.
- Reagan? Bush II?

Tabellini & Alesina: Voting on the budget deficit

- Similar in some ways to Persson/Svensson model.
- No politicians, but swing in preferences of median voter between two different public goods causes deficit to be larger than if consistent policies over time.
- Two periods and two different public goods (*f, g*), no interest or discounting, one unit of output in each period
  - $g_1 + f_1 - b = 1$, $f_2 + g_2 + b = 1$.
- Preferences of *i*th voter are $W^i = E\left\{\sum_{t=1}^{2}\left[\alpha^i u(g_t) + (1-\alpha^i)u(f_t)\right]\right\}$
  - α varies across voters.
  - Median voter with α^m decides policy in each period.
  - Distribution of α changes over time.
- Solve backwards, starting with second period:
  - FOC: $\alpha_2^m u'(g_2) - (1-\alpha_2^m)u'(1-b-g_2)$
  - Rewrite as $g_2^* = G\left(\underset{+}{\alpha_2^m}, \underset{-}{b}\right)$, $f_2^* = F\left(\underset{-}{\alpha_2^m}, \underset{-}{b}\right)$
- First period: don't know second period α^m, so objective is
  - $\max_{g_1, b}\left\{\alpha_1^m u(g_1) + (1-\alpha_1^m)u(1-g_1-b) + E\left[\alpha_1^m G(\alpha_2^m, b) + (1-\alpha_1^m)F(\alpha_2^m, b)\right]\right\}$

- Conclusions:
    - If preferences are different between α_1^m and α_2^m then first government will run deficit to enjoy consuming its preferred bundle now rather than allowing median voter in 2 to produce different bundle in 2.
    - Cost once again is less tax smoothing.

Grilli et al. on form of government

- Evidence suggests many countries on unsustainable debt paths in the 1980s. (How about now? Updated data.)
- Positive political theories: deficit larger if governments are more short-sighted
    - Deficit may be larger if parties are more polarized or current party's hold on power is unstable. (Review why…)
    - Deficit may be larger if different parts of government disagree.
        - Disagreement may result in postponement of policy changes and continuation on unstable trajectories.
    - Instability vs. weakness of leadership as explanations for deficits
- Institutions:
    - Presidential democracies
        - Lowest deficits
    - Majoritarian parliamentary democracies (<5 representatives per district)
        - Next-lowest
    - Representative parliamentary democracies (5+ representatives per district)
        - Highest deficits

Manacorda & Miguel: Do policies buy votes?

- Motivations of voters
    - Ideology
        - Partisan models (Hibbs et al.)
    - Competence
        - Models like Rogoff
    - Personal gain from policies
        - Models like Tabellini/Alesina voting on deficit
        - This paper finds natural experiment to test
- October 2004 Uruguay anti-poverty program: PANES
        - New center-left coalition government
        - Severe economic recession
        - Conditional cash transfer
            - Temporary (4/05–12/07)
            - Conditional on predicted income based on pre-treatment characteristics

        - Instability made permanent income hard to measure
        - Difficult to verify incomes in informal sector (easy to cheat)
        - Variables included demographics, education, presence of public employees, age of head, durables ownership, toilet facilities, whether renting, etc.
    - Households below specific threshold received benefit
        - Households with income > $1300/month were excluded, period.
    - Enforcement reported as near-perfect
        - Bureaucrats handled calculations
        - Data collectors were not told what variables would be used and how they would be weighted.
- Questionnaire followed up 18 months after program start
    - Survey designed by academics (authors)
    - Questioned people near threshold
        - 2/3 of sample qualified and 1/3 not
    - Included question about support for the government
- Analysis
    - Regression discontinuity model
        - Regress support on predicted income
        - Separate lines on two sides of the threshold
        - Use difference in predicted lines at the threshold to estimate effect of inclusion in program
    - Beneficiaries were 21–28% points more likely to favor current government relative to previous one. (Increase in support from 50s% to 70s%)

Figure 2: Program eligibility and political support for the government

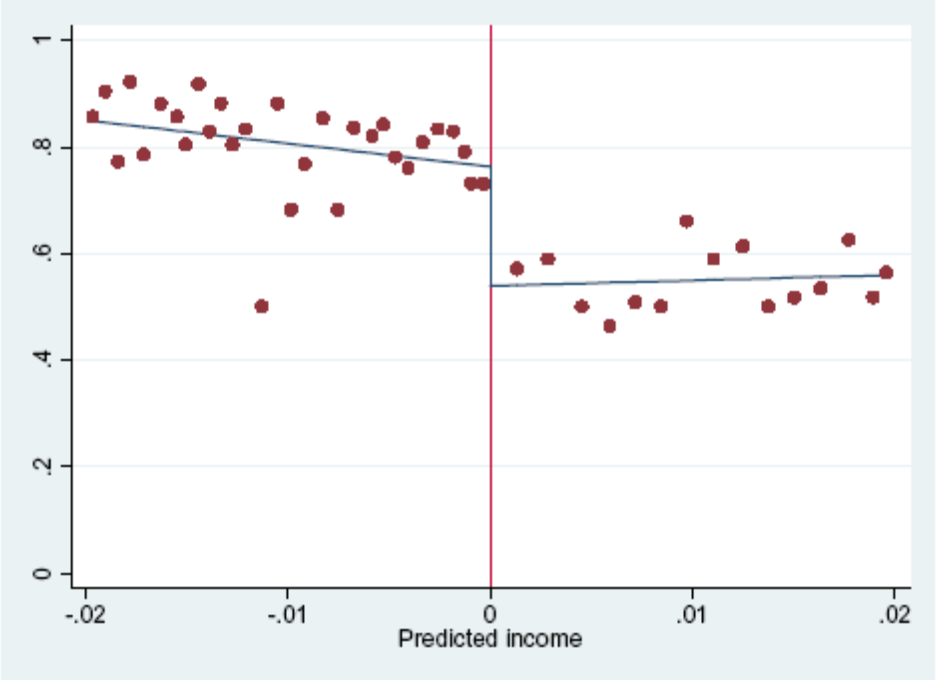


Table 2: Program eligibility, participation, and political support for the government

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A:	First stage: Ever received *PANES* (dep. var.)					
Program eligibility	0.991***	0.976***	0.964***	0.991***	0.977***	0.964***
	(0.003)	(0.010)	(0.021)	(0.003)	(0.010)	(0.024)
Panel B:	Reduced form: Government support (dep. var.)					
Program eligibility	0.256***	0.223***	0.249***	0.231***	0.209***	0.269***
	(0.026)	(0.054)	(0.087)	(0.028)	(0.056)	(0.090)
Panel C:	IV: Government support (dep. var.)					
Ever received *PANES*	0.258***	0.229***	0.258***	0.234***	0.214***	0.279***
	(0.026)	(0.055)	(0.089)	(0.028)	(0.057)	(0.093)
Score controls	None	Linear	Quadratic	None	Linear	Quadratic
Other controls	No	No	No	Yes	Yes	Yes

Notes: The table reports first stage (Panel A), reduced form (Panel B), and IV (Panel C) estimates of the effect of *PANES* on political support. The instrument is an indicator for a household score below the eligibility threshold. The endogenous variable is defined as ever having received *PANES*. Columns 1 to 3 include, in order, a polynomial in the standardized score of degree 0, 1 and 2, and these polynomials interacted with the eligibility indicator. Columns 4 to 6 additionally control for pretreatment characteristics (average household member age, average household education, number of household members, log per-capita income, interview month indicators, age, education and gender of the respondent, *departamento* indicators). Number of observations in columns 1 to 3: 2,098; in columns 4 to 6: 1,987. Standard errors clustered by score in brackets. Standard errors are almost identical (differing by roughly 1%) when we use the jackknife approach in McCrary (2008b). Statistically significant at 90% (*), 95% (**), and 99% (***) confidence.

- $1,768 to $2,357 (or 1/3 of per-capita GDP) to buy a vote
- To increase vote share by 1% point, spend 0.9% in additional social spending

Day 40 that I wish we had: Economic Origins of Democracy

Reading: Acemoglu & Robinson, 1-2

Paths of political development

- Britain: Monotonic convergence to democracy
- Argentina: Fitful oscillations between democracy and authoritarianism
- Singapore: Society is already egalitarian under nondemocracy and never changes
- Pre-apartheid South Africa: Suppression of democratic tendencies

Dynamics of political transition

- Elites
    - Begin with power under nondemocratic regime
- Citizens
    - No power initially
    - Have incentive to shift to democracy
- Democracy
    - Political equality
    - Economic policies favoring the majority
    - Motivation for favoring democracy is economic gain, not intrinsic
- Distinction between de facto and de jure power
    - Political institutions allocate de jure power
    - Democracy allocates de jure power to the majority (citizens)
- If citizens have de facto power
    - Could instigate democracy
    - Could force elites to give them more under nondemocracy
    - If political institutions are durable, introducing democracy is more likely to assure continuation of the citizen-friendly policies.
        - Key assumption: Political institutions are more durable than de facto power.
    - "Democracy emerges as a way of regulating the future allocation of political power." p. 24
- Why is de facto power unstable?
    - Need combination of factors:
        - Solve collective action problem
        - Overcome the power of the elites
        - Unlikely to be sustainable (could be co-opted by elites)
- Why do democratic transitions happen?

    - Elites usually extend franchise. Why?
        - To make credible promise of future pro-majority policies
        - Save high cost (to both sides) of revolution
- Paragraph on p. 27 summarizes theory.
- "Democracy is usually not given by the elite because its values have changed. It is demanded by the disenfranchised as a way to obtain political power and thus secure a larger share of the economic benefits of the system." p. 29
- What about overthrows of democracy?
    - More costly than simply rescinding pro-majority policies
    - Majority may have control of the military.

Democratic consolidation

- Factors leading to a coup are similar to those leading to a revolution: temporary de facto power (this time with the elites) and a desire to secure future de jure power.
- Determinants of democracy
    - Civil society
        - Well-organized citizenry
    - Shocks and crises lead to changes in de facto power that can lead to revolutions, but also to coups
    - Where does elite get its wealth? Landowners more opposed to democracy than owners of physical or human capital
        - Land is easy to tax → landowner opposed to democracy
        - Revolution may be more costly to physical and human capital owners, who may be more eager to avoid it.
        - Slavery and repressive labor practices are more sustainable in agriculture
        - Coups are also more likely because land is more likely to survive the strife.
    - Democratic institutions can be structured to limit the power of the majority
        - Guaranteed seats in parliament
        - Setting of district boundaries
        - This makes democracy less threatening to the elites
        - But may allow a second revolution to take place if majority is sufficiently unhappy
    - Greater inequality makes revolution more likely
        - But also increases burden of democracy on elites because citizens have no money to pay taxes, so may make aversion to democracy higher and increase repression.
        - Inverse-U-shaped effect: low likelihood of revolution in very equal and very unequal societies.
        - More inequality increases likelihood of coups. (Explains Latin America)

- Role of third group: middle class
  - May be driver of the process of revolution/democratization
    - Education and income allow for political activism
    - Elites may co-opt middle class and postpone revolution
  - May be buffer between elites and citizens
    - Interests may align somewhat with elite
    - Reduce threat to elite interests from democracy
  - Costa Rica and Colombia had middle classes; Guatemala, El Salvador, and Nicaragua did not.
- Globalization
  - Capital mobility makes it harder to tax elites, lowering cost to them of democracy
  - Trade may increase rewards to labor, reducing inequality
  - Effect may depend on where on the inverse-U-shaped curve the country is.
    - In repression situation, may reduce inequality and make democracy more likely
    - In middle inequality, may reduce inequality enough to make democracy unnecessary
    - Latin American elites owned abundant land resource, so may gain from trade and increase repression

- Diagrams

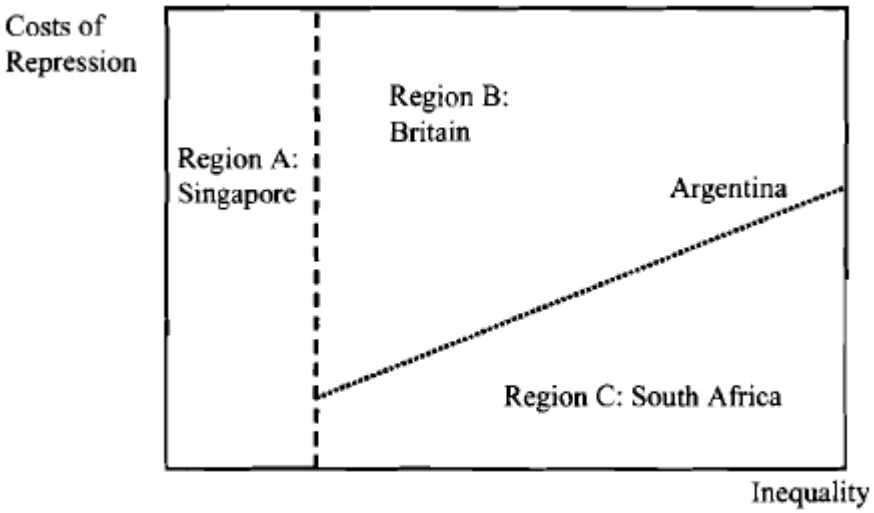
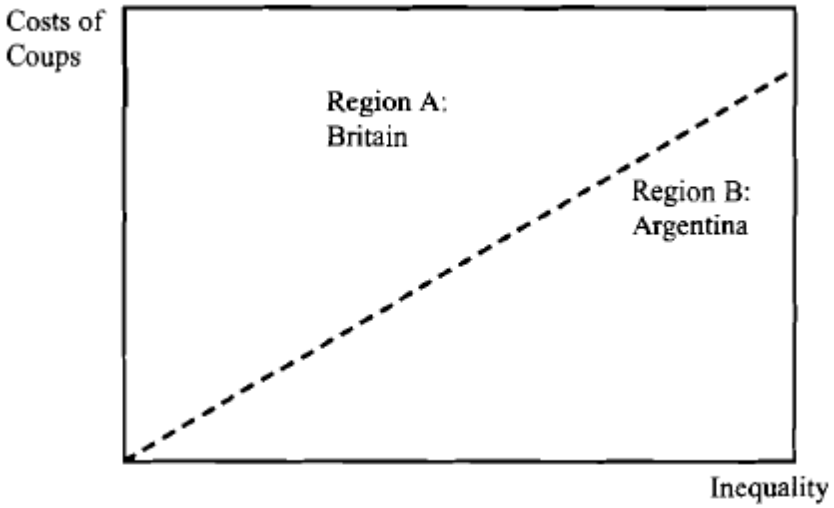


Figure 2.1. Democratization.



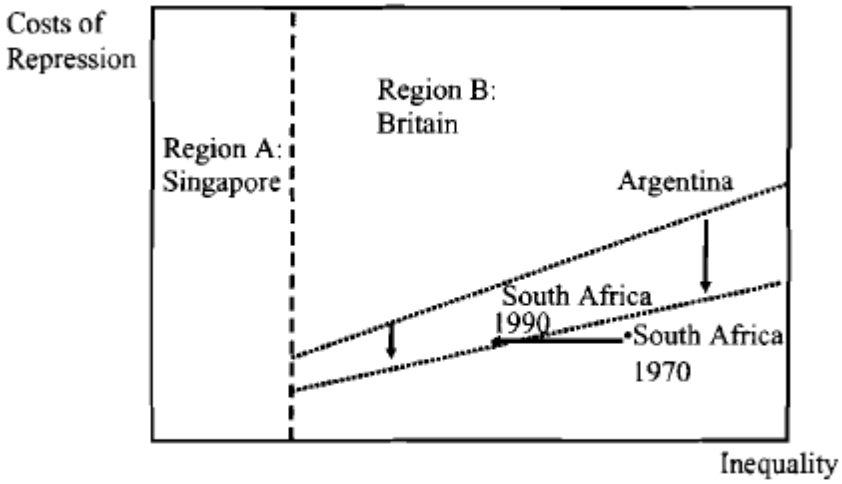


Figure 2.3. Democratization in South Africa.

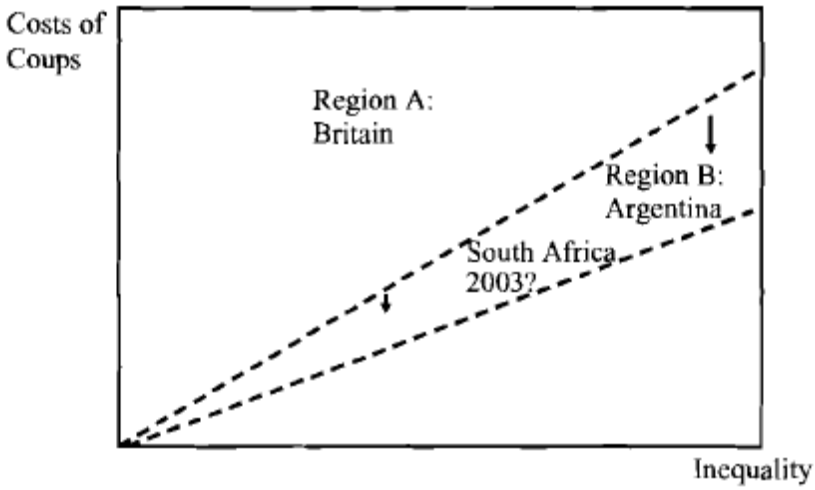


Figure 2.4. Democratic Consolidation in South Africa?