

Financial Sector, Monetary Policy and Central Banks: Selected Topics

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1. Economic Growth and the Financial Sector

Growth differences

- Relative wealth of countries changes
 - Growth rates differ with profound consequences
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- Compare Thailand and Myanmar since 1960
 - Compare Argentina and Canada since 1900
 - Compare India and Korea since 1950

Why do growth rates differ?

- Human resources
- Use of technology
- Investment ratios and capital accumulation
- Efficiency of allocation of resources
 - Financial intermediaries collect savings and allocate it to most productive capital uses

Investment not whole story

- Correlation of investment ratios and subsequent growth rates -- about .35
- Variation in growth rates among countries with similar investment ratios is very large large
- Remember the Soviet Union!
 - high savings rate
 - abundance of machinery
 - incomparable misallocations

What does financial sector accomplish?

- Screening of fund seekers (investment projects)
- Monitoring of recipients of funds
- Encourages mobilization of savings by providing attractive savings vehicles - may increase savings rate
- Economies of scale in project evaluation, origination and monitoring via corporate governance
- Provides opportunities for risk management and liquidity

What are the institutions that do this?

■ Entrepreneurial finance

- Self financing, trade credit, government support for start ups

■ Bank lending

- On commercial terms or extension of government's soft budget constraint
- Banks must balance roles: financing risky projects and providing stable money services

■ Capital market financing

- Venture capital, private equity, private placements, publicly traded bonds or equity

U.S. 1999

- Non-financial business sector external funds raised -- \$678 billion
 - Capital markets (directly via corporate bonds, commercial paper, equity, etc.) 19%
 - All financial intermediaries 47%
 - Other 34%

How big is the financial services industry?

- In U.S. about 8% of GDP is produced by financial services industry -- depository and non-depository financial institutions, brokers, insurance carriers and agents
- Larger than agriculture + mining
- Half as big as manufacturing

Financial intermediaries

Important services are produced, but

Do they make the world a better place?

Are we getting our money's worth from this large sector?

2. Money and Banks

Money and Banking

- Characteristics of money?
 - Transactions asset
 - Unit of account
 - Store of value
- What is money?
 - Currency and liquid (checkable) deposits
- Who creates it?

Importance of Money

- Unique transactions asset that facilitates trade (economic activity)
- Supply of money matters
 - Quantity theory of Money
 - $MV = PY$
- What are the consequences of
 - Hyperinflation
 - Systemic banking crises

Importance of Banking

- Banks are creators of transactions assets
- Quantity of money created effects inflation
- Sound banks needed for secure payments mechanism
- Quality of bank lending (and other intermediaries too) activity effects resource allocation and economic growth.
- Banks must strike a balance between sound banking (providing payments mechanism without risk) and risks involved in lending and resource allocation

Evolution of Banking

- Gold depository
- Loan brokering
- Fractional reserve banking

IMF Money Definitions

- Narrow money (M1)
 - = currency in circulation + private demand (transactions) deposits
 - Broad money (M2)
 - = M1 + quasi-money
- quasi-money = private term deposits

U.S. Monetary Aggregates

(billions of \$)

	<u>1978</u>	<u>1998</u>
M1	357	1094
Currency	96	517
M2	1367	4401
M3	1647	5996
Debt of non financial sectors	3203	16250
<i>GDP</i>	2296	8760

3. Banks and Central banks

Balance sheets

Market for reserves

Role of central bank

- Historically,
Lender of last resort to sound but illiquid banking institutions
- Influence or control quantity of money created, interest rates and credit availability
- Supervise soundness of banking system
- Regulate quality of intermediation

Bank balance sheet

Assets

- Reserves
- Cash
- Loans
- Securities

Liabilities

- Deposits
 - Demand
 - Time
- Borrowings from
 - Central bank
 - Other

Capital

Equity, Retained earnings,
Loan loss reserves

Central Bank Balance Sheet

Assets

- Securities Q
- Loans to banks B
- Foreign exchange reserves FX

Liabilities

- Currency C
- Reserves Res
- Other deposits OD

Central Bank influences

- Monetary control
 - Availability of reserves
 - Short term interest rates; exchange rates
- Bank regulation
 - Liquidity requirements
 - Capital requirements
 - Activity regulation
 - Bank examination
 - Loan classification
 - Risk measurement and management

Central bank balance sheet identity

$$Q + B + FX = C + Res + OD$$

MARKET FOR RESERVES

Res -- deposits at the central bank

- Who creates (supplies) Reserves?
- Who demands Reserves?

Supply of reserves

$$\text{Res}^S = Q + B(r, r^d) + \text{FX} - C + \text{OD}$$

Borrowings function - $B(r, r^d)$ – demand for borrowing by banks

Increasing function of inter-bank rate r

Decreasing function of discount rate r^d

Central Bank (usually) monopoly supplier
Influence of banks, fiscal authorities and public

Demand for Reserves

- Statutory reserve requirements
 - Depend on bank deposits
- Clearing balances
 - Maintained for inter-bank clearing

$$\text{Res}^D = F(D, T, k, r, r^d)$$

+ + + - -

D demand deposits; T time deposits

k required reserve ratio

Equilibrium in Reserves Market

$$\text{Res}^S =$$

$$Q + B(r, r^d) + \text{FX} - C + \text{OD}$$

$$\text{Res}^D = F(D, T, k, r, r^d)$$

$$\text{Res}^S = \text{Res}^D$$

Market for Reserves

- What are Federal funds?
Funds on deposit at Federal Reserve bank
- What determines equilibrium in reserves market?
- Does the Fed 'set' the Funds rate?
- Influencing the reserves market equilibrium

Monetary policy instruments

- Q -- open market operations – purchase or sale of securities by central bank which changes Q
- k -- reserve requirement ratios
- r^{discount} -- discount (central bank lending) rate

4. Other intermediaries

Banks are one of many

Banks are link to monetary policy

Banks are just one type of financial intermediary

<u>Assets</u>	<u>Liabilities</u>
Claims of intermediary on borrowers (investors)	Claims of lenders (depositors or savers) on intermediary
Resources go to investors	Resources from savers

Financial Intermediation

- Banks are increasingly doing much the same things that other intermediaries do
- Other intermediaries are doing much banking including the issuance of near money liabilities.
- Concern about money creation and inflation should, perhaps, be generalized to concern about credit creation
- Concern about bank regulation and soundness should, perhaps, be expanded to all systemic risks in overall intermediary sector.

Other financial institutions or markets

- Organized equity markets
- Money and bond markets
- Insurance companies
- Pension funds

Equity markets

- Technology allows entry – there are many new and competing equity markets; physical market location less relevant, access to information inexpensive
- Existence of stock market effects economic growth
 - Higher market value to GDP ratio
 - Higher trading volume
 - More investor legal protections

Role of stock markets in small countries

- Stock market important because it provides liquidity; facilitates market for companies; competition for concentrated banking sector
- It can not do so for thousands of companies
- Companies above critical size attracted to international markets
- Role for equity markets in small countries limited unless markets open and international

Development of other intermediaries

- Private pension sector
 - Third (private) pillar of social security
 - Needs government securities -- longer term maturity, liquid secondary market. That requires confidence in government and reasonable inflation expectations
- Life insurance industry
 - Also, long term liabilities so firms need long term assets

Capital markets in small country

- Often bank dominated
- Often lack long term instruments
- How to develop capital markets?
 - Open markets -- liberalize access to stock holding and trading
 - Macro stability so longer term instruments develop
 - Allow foreign entry and foreign participation

5. How central banks work

Open Market
operations

Foreign exchange
operations and
capital flows

Open Market Operations – an example

Fed buys my T-bill

ME

THE FED

Fed check +
T-bill -

T-bill + Fed
check +

I deposit the check in MY BANK

<u>ME</u>		<u>MY BANK</u>	
Bank deposit +		Fed check +	Bank deposit +
Fed check -			

MY BANK takes check to THE FED

<u>MY BANK</u>		<u>THE FED</u>	
Fed check -		Fed Check +	Fed deposit +
Fed deposit +			

SUMMARY: The Effect of an Open Market Purchase of Securities

<u>Federal Reserve Bank</u>			<u>MY BANK</u>	
<u>Assets</u>	<u>Liabilities</u>		<u>Assets</u>	<u>Liabilities</u>
T-Bill	Reserve Deposit		Reserve Deposit	Public's deposit

Capital flows and monetary policy

- How do international flows of capital work?
- How do central banks accumulate or lose reserves?
- What are the domestic monetary effects of capital flows?

Some capital transactions - A capital outflow

Sr. X instructs his bank in Mexico to convert Pesos into \$ so he can open an account in NY.

Mexican bank obtains \$ for Sr. X --

Case 1 - It has deposits in NY

Case 2 - It buys \$ on exchange market

Case 3 - It borrows \$ in NY

Case 4 - It gets \$ from central bank of Mexico

Case 1

Mexican bank has a balance in NY:

NY Bank

Sr. X deposit +

Mexican bank deposit -

Mexican Bank

\$ deposit -

Sr. X deposit -

Case 2 - Buy \$

Mexican Bank

\$ deposit + New peso deposit +

- Sells a peso deposit for \$
- Creates new peso deposit
- Peso depreciates

Uses \$ deposit to fund Sr. X's capital
outflow

Sr. X peso deposit -
New peso deposit +

Case 3 - Borrow \$

Mexican Bank

\$ deposit + Borrowing in \$ +

Bank uses \$ borrowing to fund Sr. X's
capital outflow

Sr. X's peso deposit -
Borrowing in \$ +

Case 4 - \$ from CB of Mexico

Sr. X's Mexican bank goes to the CB of Mexico to get \$

Mexican Bank

Reserve deposits - Sr. X's Peso deposit -

Bank in NY

\$ deposit of Sr. X +

CB of Mexico FX -

Central Bank of Mexico

FX reserves -

Reserve deposits -

Capital outflow with fixed exchange rate

- Domestic money supply falls
 - Sterilization likely
- FX reserves disappear

What might CB of Mexico do to keep its FX reserves?

- Raise interest rates to discourage Sr. X
- Capital controls -- prevent Sr. X's capital flight
- Borrow from banks abroad, other central banks or int'l. financial institutions
- Allow Peso to depreciate

Why is this choice so unattractive?

FX operations of Central Bank

If central bank supports its own currency, it buys its own currency and sells its FX reserves. It gives holders of reserve deposits, FX in exchange.

How does its balance sheet change? Res and FX decline.

FX

Q

B

Res

C

OD

Effects of FX sale

- FX
- Exchange rate
- Res -- Reserve deposits
- Domestic interest rates
- Output and inflation

Sterilization

- How would the central bank offset (sterilize) the domestic effects of exchange rate intervention?
- Open market operation --
 - Sale or purchase?

6. What can a central bank do?

Short term rates

Money and long
term rates

Exchange rate

Lender of last resort

Short term rates

- Monopoly supplier in market for reserves so it can determine interbank rate
- Does it matter? –
 - If there are no close substitutes for reserves in the clearing of transactions.
 - But, private clearing arrangements and electronic money networks can provide substitutes
- Central bank has major influence on short term rates since it is a major (not monopoly) player in money markets (T-bills, repos, etc.)

Money stock and long term rates

- Improved monetary control and tighten influence over market for reserves
 - DIDMCA – legislation in 1980 extended reserve requirements to all depositories
- Long term rates –
 - effect of expectations and real returns on supply and demand limit central bank's influence

Exchange rates

- In a small economy without much international holding of currency, the central bank's intervention can influence value of exchange rate. It can always sell its own currency and reduce its value. However, it is limited in its ability to buy currency and support exchange rate by availability of FX reserves
- In large economy and for international currencies, FX reserves are small relative to size of FX trading and gross international capital flows.

FX markets

- Daily volume of trading - 1998
 - \$637 billion in London
 - \$351 billion in NY
 - \$149 billion in Tokyo
- Up from total of \$500 billion in 1989

Lender of last resort

- Should not fund failure and result in implicit guarantee of entire banking system.
 - (Fed allowed discount window to do this in a few instances in '80s)
- Use as a response to crisis requires strategy
 - Prompt closure, merger and/or recapitalization
 - Significant losses to owners and managers should be anticipated (to avoid moral hazard)
 - Clear resolution of bad loan portfolios

Central bank influence depends on reputation and credibility

- Hard to establish, easy to lose
- Monetary policy effectiveness depends on credibility of long term goals and commitment to them

Reputation and Credibility of Fed over last 30 years

- 1970-79
 - Fed funds rate instrument and target of monetary policy
 - Weekly tracking of M1 and M2 started in 1970
 - 1975 started announcement of money growth targets
 - However, targets not a high priority compared to concern with unemployment and interest rate stability
 - Followed more than one M – sometimes contradictory
 - *Base drift* (constantly restate target, ignoring prior deviations)

High inflation in US and ineffective central bank

- Critical period – after first oil shock (1973) and recession (1973-3).
 - M growth increased 75-78 even as target ranges declined
 - Most M outcomes > mid-point of target range.
 - Unemployment declined and inflation started up in **advance** of second oil shock.

Volcker's October surprise

- Change in operating procedure dramatically announced on Oct. 6, 1979
- Introduced Non-borrowed reserves target
- No longer use an interest rate target with a perfectly elastic supply of reserves at the targeted rate
- Less a change than a signal of and camouflage for the Fed's serious effort to reduce inflation
 - Emphasis on reserves allowed bank to pursue higher Fed funds rates target and more interest rate volatility
 - Clear signal that business as usual had changed in Volcker's attitude to inflation
- In 5 months Fed funds rate increased 500 bp to 17+ %

Credibility reestablished in 1980s

- M1 growth

- 1979 5.5% 1980 7.3% 1981 2.3%

- Post 1982

- Financial innovation led to velocity instability
 - So, Fed altered its operating procedure again
 - Dropped borrowed reserves targets (too rigid when velocity unstable) and slowly moved back to the Funds rate itself
 - M1 allowed to deviate from target and monetary targets abandoned altogether in 1986
 - Procedure less important than signal from central bank and its reputation

Reputation, reputation, reputation

- 1985-86 expand M to help bring down value of dollar
 - M1 growth 11.9% in '85 and 15.2% in '86
 - M2 growth 8.6% and 8.9% respectively
- High real interest rate of early '80s (tight policy and disinflation) made \$ attractive. Capital inflow financed the Reagan era fiscal deficit, led to large current account deficit and enormous appreciation of \$
- Reputation allowed other goals to be pursued

Fed with credibility reestablished

- 1987 able to loosen monetary policy in response to stock market crash without fear of inflation emerging
- Early 1990's keep Funds rate very low (at 3%) to aid weakened banking sector
- 2001 reduced Funds rate dramatically as economy weakened.

All of these efforts were accomplished without having inflationary implications because the Fed's reputation was firmly established in the Volcker-Greenspan era.

Achieving central bank credibility

- Tough central banker

Central banker needs to be meaner than everyone else in order to resist temptation

- Incentive scheme for central banker

You're fired if targets not met (New Zealand)

- Replace central bank with a policy rule

- computer better than central bankers

- Remove temptation to change policy (the time inconsistency problem) by removing discretion.

More ways

- Increase transparency

- Public announcement of policy decisions and policy goals will influence expectations. Provides a specific test of credibility and forces central bank to be consistent.

- Independence of central bank

- Structure institution to minimize time inconsistency problem

Aspects of Central Bank independence

- Appointment of governor – by whom, for how long, subject to dismissal
- Presence of government officials in bank; requirement of government approval of policy; veto power; significance of informal contacts with government
- Mandate or statutory goals of central bank – is price stability sole objective or is pursuit of full employment also an objective. (I.e. how anxious is society to have a “mean” central banker)
- Budgetary or fiscal obligations of central bank – is central bank obligated to finance deficit?

Evidence on central bank independence

- Do countries with more independence have lower inflation?
- Evidence mixed for all countries
- BUT, for developed countries:

		<u>Average inflation 73-85</u>
Most independent:	Germany	4.1
	Japan	5.0
	U.S.	7.2
In between	Canada	8.1
	France	10.2
	U.K.	12.2
Least independent	Spain	15.2
	Italy	16.1

7. Fed and ECB Decision making and operations

A comparison

Some more on US
policy making

Fed decision making

- Foreign exchange operations – U.S. Treasury
- Discount rate – regional banks and Board
- Reserve requirements – Board, within legislated guidelines
- Open market operations - FOMC

Fed accountability

- Policy announcement
- Minutes after subsequent meeting
- Transcripts after 5 years
- Monetary Policy reports to Congress (Humphrey-Hawkins)

Euro decision making

- Governing council
 - Executive Board (6) + Central bank governors (12)
- Meet every two weeks
- Accountability – press conference after first meeting of month; minutes released after 30 years

Key rates

■ U.S.

- Discount rate and target Fed funds rate
- Effective fed funds rate and Repo rates

■ Euro

- Minimum bid rate on main refinancing operations
- Marginal lending and deposit facility
- EONIA Euro overnight index average

Reserve requirements

- U.S. –

- 10% on transactions deposits (above small min.) at all depositories; can be reserve deposits or vault cash
- No interest paid

- Euro –

- 2% on deposits and debt securities with maturity up to 2 years for all credit institutions; central bank deposits
- Interest paid at the average rate of main financing operations.

Fed policy operations

- Fed specifies target for Fed funds rate. Does not participate in funds market directly.
 - Funds market – uncollateralized – transactions are \$50-70 billion per day.
- Almost daily multiple price auction for repurchase transactions with government securities. Conducted with 39 primary dealers.
 - Repo market in U.S. governments trades about \$600 billion per day. Dealers use repos to finance their inventory.

Daily Open Market procedure

- Morning conference call between Board and Desk in NY. Manager's plan needs approval of an FOMC member.
- Temporary (same day settlement) Operations done by about 10AM.
- Outright purchases done later in day.

ECB policy operations

- All institutions subject to reserve requirements (7900) are eligible to participate but there are some requirements (so about 1000 participate).
- *Main refinancing operation* – every Tues AM, repurchase operations with two week maturity with (mostly) Euro area government securities. Temporary purchase that provides liquidity
 - Variable rate (auction) with minimum bid rate. Also can use fixed rate tenders (accept offers at policy rate and allocate to institutions)
- *Longer term refinancing* Monthly RP operation with 3 month maturity.
- Fine tuning facility with smaller group of institutions.

U.S. standing facility

- Discount window available to all institutions subject to reserve requirements; also seasonal borrowing facility for small institutions and extended credit facility for banks in trouble
- Discount window – now seldom used (in 1999 only about 25 borrowers in average week); below market lending facility

Euro standing facilities

- Marginal lending – available to all institutions subject to reserve requirements at rate of $\sim 1\%$ over refinancing rate.
- Deposit – institutions can place excess on deposit overnight at $\sim 1\%$ less than refinancing rate
- Marginal facilities –
Set floor and ceiling for interbank rate

Some more on Reserve Requirements in US

- Reserve deposit balances now quite small:
 - More vault cash (ATMs)
 - Sweep arrangements
 - Wholesale sweeps (of business accounts into assets elsewhere, e.g. RPs) since 1970s
 - Retail sweeps into non-reservable accounts at same institution (e.g. MMDAs) since 1994
- Between 1993 and 1997 Required reserve balances dropped by \$20 billion or 70%.

Policy issue

Do small reserve balances (relative to deposits or transactions) lead to volatility of Funds rate?

Funds market closes late in day and Funds rate volatile as banks often try to get or get rid of or obtain reserves

Conceptual issue

Do you need reserve requirements to conduct monetary policy?

- As long as there is a demand for reserve balances, then monetary policy has a channel for operations. It does not need required reserves.
- But, monetary policy operations will be sensitive to structure and even small changes in the payments system (e.g. bank mergers leading to more intra-institution clearing).
- If payments system changes are predictable then desk can react. If they are stochastic then interest rates volatility increases.
- Bank demand for settlement balances may not be related to money demand of public. Central bank needs to estimate demand for reserves to conduct monetary policy. It might be more difficult to do so when the demand for reserves is based on bank payments practice rather than being derived from the public's demand for deposits.

Alternatives

- Should we have more required reserves and pay interest on reserves?
 - Would this improve monetary control?
 - Would it reduce volatility?
- Practice elsewhere
 - ECB – broad and large reserve requirements
 - Emerging markets – large reserve requirements and important policy tool
 - UK, Canada, New Zealand – no reserve requirements

Some more on the central bank lending in US

- Purpose of lender of last resort (LLR) – the discount window
 - Liquidity facility
 - Emergency facility
 - Aid reserve management
- Can help in managing reserves but there is little use currently
 - Spread under Funds rate is small
 - Two week reserve accounting period gives banks time to adjust reserve holdings
 - Stigma associated with going to the window

Discount Window

- 1999 – on average about 25 banks using facility
- Managed facility – At Fed discretion
 - Borrowing must be for an ‘appropriate reason’ and borrower must first seek other sources.
 - Available to all institutions subject to reserve requirements.
 - Mostly used for seasonal borrowing at market rate.

Brief history of use of discount window

- In 1920's was source of about $\frac{1}{2}$ of Reserves
- Excess reserves in depression led to little use.
- In 1950's – discouraged and use of open market operations for reserve management took over.
- Still, until early 90s fair amount of use (averaged almost \$1 billion in '80s).
- Spread between discount rate and Funds rate influenced demand for borrowing
- Spread was used to influence availability of reserves without changing target interest rate.

Alternative – Lombard style lending

Access to borrowing readily available at a rate above interbank rate

Disadvantages --

- Regulation or restrictions on use needed. Otherwise banks can use access to liquidity to finance long term assets

Advantages of Lombard

- Eliminate unwarranted subsidy to borrowers that now exists
- No need to manage window access
- Provides alternative source of liquidity if govt. surplus reduces supply of bonds.
- Central bank exposed to credit risk
- Sets a ceiling on interbank rate but enables central bank to use spread to adjust availability of reserves without changing rate target. Helpful if aggregates are a concern.
- Will eliminate occasional Fed funds spikes

Some more on U.S. Open Market operations

- Open market operations conducted with primary dealers (now 39).
 - In secondary markets for govt. securities
 - Fed does not (by law) participate in primary market (Treasury auctions) except for roll overs of holdings that mature.
 - Repo market in U.S. governments (trades about \$600 billion per day as banks use repos for funds and dealers use repos to finance their inventory.)

Need for open market operations

- Estimate Nonborrowed reserves objective for maintenance period =
Required reserves (easier to forecast with LRA)
+ Excess reserves (assume \$1b) – BOR
- Forecast supply of Nonborrowed reserves
 - Vault cash applied
 - Effect of Float, Treasury deposits, currency demand
- Difference is reserve need for period
 - Add reserves if Nonborrowed reserves objective > forecast supply

Desk activity

- If required reserves are large relative to demand for clearing purposes, then the system can absorb errors. If the desk supplies fewer reserves than needed one day, the banks can substitute with reserves held on later days of maintenance period. So funds rate not so volatile until last few days of 2 week period.
- However, now demand for clearing purposes is large relative to required reserves. If a bank holds a lot of reserves one day, it is unlikely to offset with lower reserves the next day because that might result in a daylight overdraft and a penalty.
- So banks might now be more eager to get rid of excess reserves and more eager to borrow when there is a deficiency. Leads to more volatility.
- Desk forecasts very important. Treasury balances most difficult to forecast. Variation in Treasury balances around tax dates can be enormous.

Desk activity

- Volatility and forecast errors led to LRA
- Fed now entering market more frequently – concern about volatility
- What happens if there are no govt. securities?

Types of operations

■ Outright purchases

- About 5-15 times a year; total of \$15-25 billion
- Which issues? – Judgments about supply, yield curve anomalies, maturity distribution

■ Outright sales

- Now rare, Desk maintains a reserve need

■ Temporary operations

- RPs common to add reserves (as there is almost always a temporary reserve need; i.e. Non-bor. Res. Objective > forecast supply)
- Matched-sale purchase (to drain reserves) used only occasionally

Summary

Pros and cons of operating instruments

- Reserve requirements
 - Clumsy
- Central bank lending
 - Easily politicized and misused
- Open market operations
 - Requires existence of a market to use

8. Monetary Policy Rules

Rules, discretion
and inflation

Monetary policy by rule?

- No central bank is likely to give up ALL human discretion. Idea of using a PC to conduct open market operations by formula (let reserves grow $x\%$ per year period) is an appealing monetarist fantasy.
- Can a rule be a helpful guide? Can it reduce instances of destabilizing policy?
- Rule can respond to information as long as it does so in a consistent and known fashion.

Taylor's rule

- Rule for setting Fed funds target from known information and goals.
- Fits Fed behavior rather closely for last 15 years
- Fed funds target =
 - Real rate of interest + Fed's inflation target
 - + an adjustment if inflation deviates from target
 - + an adjustment if real GDP deviates from potential

Should the Fed adopt a rule?

- Almost appears as if it has – Taylor's rule fits policy well since late '80s
- But, there will always be uses of discretion to deviate from a 'rule'
 - 1987 market crash, 1990's bank crises
- So, rule is really a call for transparency
 - Does disclosure interfere with Fed's conduct of policy and lead to volatility as Fed used to argue
 - Or does failure to disclose increase financial market uncertainty and increase volatility

Fed's gradual move to transparency

- Until 1970's no announcement of policy until years later
- 1975 announcement of money growth targets for two month periods; 1978 Humphrey-Hawkins annual growth targets
- 1989 publish mid point of Fed funds range and minutes published after subsequent meeting
- 1990s – Suits to force disclosure; Greenspan accused of leaking information
- Feb. 1994 – Fed announced policy change
- July 1995 – Fed announced specific funds target
- Most policy changes now at regularly scheduled FOMC meetings.

Rules and anchors?

Consensus rejects activist discretionary monetary policy and has emphasizes:

- Policy rules
- Rules as guidelines – e.g. Taylor's rule
- Nominal anchor – “Anchor” policy to a target

Consensus that price stability is goal of monetary policy and only mission of central bank

Rejection of discretion and multiple objectives --

- Uncertainty about effects of policy
- No *long-run* Phillips curve tradeoff between unemployment (output gap) and inflation
- Time inconsistency problem – builds inflationary bias into policymaking
- Costs of inflation – greater awareness

What are costs of inflation?

■ Shoe leather

- Small if inflation small < 0.1 % of GDP if inflation < 10% but 1% of GDP if inflation > 100%

■ Financial sector

- Money services instead of intermediation, over investment in real assets

■ Uncertainty of *future prices* and of *relative prices*

- Increase of inflation from 2 to 10% can have information costs of 2% of GDP

■ Tax distortions

- Loss of 2-3% of GDP at 10% inflation

Who benefits from inflation?

- Debtors -- often large state owned firms
- Government --
 - Seignorage revenues
- Banks -- profitable due to large interest margins (spread between loan rates and rate on transactions deposits)

9. Targets and Goals

Monetary Policy Goals

- Growth, unemployment
- International position
 - Current account
 - Exchange rate
- ‘Overall’ economy
- Inflation
 - Adopted by ECB and others as ONLY goal

Targets

- Monetary aggregates
 - No longer useful – velocity unpredictable
 - Accountability difficult
 - Commitment to inflation goal uncertain
- Short term interest rate
 - Difficult to determine ‘appropriate’ level
 - Same accountability and commitment issues
- Exchange rate – nominal anchor (to a low inflation country)
- Inflation targets

Is there a difference between money and rate targets?

- Examine differences between
 - Real sector shock
 - Financial sector shock

Real sector shock

- Suppose there is a surprise increase in economic activity. Money demand increases and rates rise.
 - With R target $\rightarrow$ bring rates back down, ease policy, accommodate shock $\rightarrow$ inflation
 - With M target $\rightarrow$ offset shock

In presence of real sector instability, M targets might be better for stabilization policy. However, velocity must be sufficiently predictable and stable to allow choice of the M target.

Financial sector shock

Suppose there is a portfolio or financial sector shock (e.g. move to caution and an increased taste to hold money)

- With M targets, move to offset increase in money holding → unwarranted tightening
- With R targets → accommodate shock

R targets might be better to stabilize if shocks are coming from the financial sector.

M aggregates targets

- Despite attractions of monetary aggregates as a policy target – transparency, real sector stabilizer – it is now largely useless.
- Increased instability of velocity makes use of M aggregates impossible

Exchange rate target

- Anchors inflation expectations to inflation in other country
- Fixes inflation rate for traded good → direct influence on inflation rate
- With strong, credible commitment provides policy rule
 - If currency begins to depreciate – tighten
 - If currency begins to appreciate – loosen

Problems with exchange rate targets

- With open capital markets, lose independent monetary policy. Can't respond to domestic shocks.
- Import shocks from anchor country automatically
- Lack of transparency when central bank is both targeting exchange rate and influencing it (using FX reserves for market intervention)
- Exposed to speculative attacks
- Sudden depreciations lead to severe financial sector disruptions

Advantages of Exchange rate target

- Transparent target - market observed exchange rate available daily
- Nominal anchor but does not have to be fixed - crawling peg
- Can allow for variation -- exchange rate band or cones

Exchange rate targets often fail in very open economies

- Difficult to set *appropriate* nominal exchange rate target when market rate influenced by both inflation differentials and capital flows.
- Set target to keep real exchange rate constant -- forced to offset any influence of capital flows on exchange rate
- Vary target when there are capital inflows implies real exchange rate changes

Example – the ERM

- France in 1987 and the UK in 1990 pegged to DM to control inflation.
 - UK inflation went from 10% to 3% in 1992
- German reunification in 1990 → domestic shock that led to increased interest rates 90-91 (due to uncertainty, fiscal deficits).
- Interest rate shocks spread through ERM
- Speculative attacks as markets bet against willingness of UK and others to accept domestic real sector implications of imported rate shock.
- Sept. 1992 – ERM collapsed although France maintained peg.
- Was economic performance in drop outs (UK) worse than in hold outs (France)? NO. UK real sector did better and inflation was not appreciably different.
- Cost of loss of independent monetary policy can be too high.

Elements of inflation targeting

- Transparent medium term target – announced to public.
- Commitment to price stability and accountability explicit.

Advantages of inflation targeting

- Transparent, understood by public
- Allows for domestic policy responses including deviations from targets due to supply shocks
- Single goal avoids time inconsistency
- But, other goals not irrelevant
 - Inflation targets allow for gradual disinflation
 - Lowering of medium term inflation target gradually to long term stable prices
- Communication – inflation reports for accountability.
- Useful anchor without constraints

Problems with inflation targets

- Inflation not directly controlled
- Need to set realistic target and very gradual adjustment to establish credibility
- Long lags in monetary policy impact on inflation make evaluation difficult
- Has been used as an implicit anchor for countries that have already largely succeeded with a disinflation.

10. Pillars of Monetary Policy

I Macro monetary control

II Financial sector regulation

Risk management and measurement

- Financial sector regulatory capabilities
 - Skilled bank examiners
 - Willingness to apply rules
 - No political influence
 - Ability to avoid moral hazards
- Financial sector regulatory structure
 - Transparent rules
 - Appropriate incentive structures

Why manage risk?

- Bank run
- Banking system panic –
 - contagious bank run
- Solvent banks can be subject to a run
- Other FIs vulnerable too

Bank runs

- Deposit withdrawals start slowly
- Bank can run down its liquid assets or borrow
- Withdrawals snowball; bank cut off from market sources of borrowing
- Assets left – illiquid or non performing
- Liquidity problem is now a solvency problem

Policy

Avoid crisis

- Capital adequacy regulation
- Examination, supervision

Crisis life jackets

- Discount window
- Deposit insurance

11. Issues in risk management policy

Lender of last resort
Deposit insurance
Capital adequacy

Lender of last resort

- Central bank provides liquidity to banking system
- Collateralized loans to solvent but illiquid banks
- Why was it more important years ago?
- Where does a bank go now?
 - liability management
 - market for borrowed funds (Fed funds, RPs, CP) or asset sale markets (govt. securities, loan sales)
- Fed's discount window is the last resort

Central Bank lending

- Discount rate is below (in recent times) Funds rate
 - Unwarranted subsidy to borrowers?
- Alternative in use elsewhere
 - Free access to borrowing but at higher rate but it exposes central bank to credit risk.
 - Easier to manage
 - Also sets a ceiling on interbank rate.
 - Used by many central banks including ECB

Major problem

- Access to central bank lending by weak banks. Moral hazard to increase riskiness of activities. Inability of central bank to close access on a timely basis.
- Further complicated by widespread adoption of deposit insurance -- either explicit or implicit (too big to fail or social policy)

Deposit Insurance and other guarantees of FIs

- Deposit insurance (1933)
 - FDIC created in 1933 for banks and thrifts
- Securities Investors Protection Corporation (SIPC) - 1970
- Pension Benefit Guaranty Corporation (PBGC) - 1974
- Insurance company guarantees against risks of terrorism – under consideration

Rationale for deposit insurance

- In a run, the first to the door are protected. Deposit insurance helps the ‘small’ (and perhaps less savvy) saver from being beat in the rush.
- Although closure of a mismanaged institution is a good thing, in a contagious run depositors do not distinguish between the good and the bad.
- Contagious run – a panic – has systemic effects on payments system, money supply, lending and the macro economy.

Insurance is the wrong word

- Is deposit insurance really insurance?
- Insurance
 - Payment made to shift risks from one party to another
 - Payment related to market value of service
- Guarantee scheme with tax is NOT insurance

But, combination of
central bank lending facility
deposit insurance
can be a lethal combination.

Example -- Savings and loan crisis
(S&Ls) in the U.S. in 1980s

S and L crisis

- Duration mismatch and interest rates rose 79-82 reducing market value of long-term mortgage assets
- Bank legislation 1980 and 1982
 - Increase deposit insurance \$40,000 to \$100,000
 - Remove interest rate ceilings
 - Allow thrifts to enter consumer and commercial lending
- Regulatory forbearance –
 - Allow thrifts to grow out of crisis
 - Avoid closure because insurance fund under capitalized

More causes

- Budget cuts – fewer bank examinations
- Recession – decline in real estate values
- Logical managerial response
 - Bet the bank – risky loans
 - Deposit brokers to bring in insured money
- Thievery -- fraud, insider loans
- Too big to fail doctrine
 - If failed bank is too big to fail or to liquidate, or closure may start contagion, then insurer keeps bank going and deposit insurance is implicitly extended to all.
 - Large depositors have no incentive to monitor.

Response

- 1989 restructuring of deposit insurance
 - FDIC includes BIF and SAIF
 - Resolution Trust Corp.
 - Take over failed thrifts – liquidate assets, recapitalize banks, pay for merger
- FDICIA 1991
 - Prompt corrective action (PCA) – mandatory intervention when bank capital falls
 - Risk based deposit insurance premia

Designing deposit insurance

- Problem
 - How to prevent runs and panics
 - And avoid promoting risk taking
 - And avoid being the guarantor of all private sector banking activity
- Deposit insurance prevents runs but it reduces depositor discipline
- Enables banks to borrow cheap (insured deposits) and undertake risky activity
- Wrong incentives when a bank is weak

Owners and depositor incentives

- Bank owners are always in risk taking business but once bank is in trouble – owner has little to lose – and everything to gain from more risk.
- And with deposit insurance, depositors do not have incentive to monitor activity (particularly with implicit coverage for all).
- Mispriced insurance – adds to the incentive to take risk. Insurance premium does not depend or vary with nature of bank business.

Improving deposit insurance

1. Make deposit insurance premium depend on bank risk profile (leverage and asset risk)
 - Implemented by FDIC in 1994
 - Premium varies among bank categories
 - Well capitalized, adequately capitalized, undercapitalized
 - Regulators rankings based on asset quality, loan standards and operating risks: healthy, supervisory concern, substantial supervisory concern

More

2. Higher capital requirements

3. Strict closure rules

Moral hazard increases when net worth falls to zero. Mandate that regulators intervene and require closures.

4. Make insured depositors responsible.

Lower cap or apply it to all accounts.

Take haircuts.

Beyond deposit insurance and central bank lending

- Strategy for bank closure decision
- Strategy for actual disposition
- Which countries have such strategies?
Difficult to have in place in highly concentrated banking industry
- U.S. - *prompt corrective action* - after S&L crisis
 - Mandated responses as capital adequacy deteriorates

What's the best way to close a failed bank?

FDIC supposed to use least cost approach

- **Payoff** – liquidate assets and payoff insured depositors first and then uninsured.
- **Purchase and Assumption** – Transfer assets and liabilities to another bank and add cash infusion from insurer. (All depositors are protected, no incentive to monitor)
- **Open assistance** – Subordinated debt or capital infusion to allow bank to continue to operate.

Closure by payoff - example

Liquidation value	Insured deposits	60
Of assets 80	Uninsured deposits	40

Insurer pays off insured depositors (60) and sells assets for 80. Proceeds are shared on pro rata basis with uninsured depositors (60% to FDIC and 40% to uninsured depositors).

Losses

Insured depositors = 0

FDIC $60 - .6(80) = 12$

Uninsured depositors $40 - .4(80) = 8$

Closure by P&A - example

Balance sheet transferred to acquiring bank:

Value of assets	80	Insured deposits	60
Cash infusion	20	Uninsured deposits	40

Losses:

Insurer 20 – any premium that acquiring bank may pay for good will, deposit base and on going business activity.

Depositors 0

Preventing problems

Capital adequacy

Capital needed to

- Absorb unanticipated losses
- Provide enough confidence to stay in business
- Provide partial protection to liability holders in event of liquidation
- Acquire plant and other real investments

Bank capital - definitions

- Market value of capital depends on:
 - Interest rate risk
 - Credit risk
- Book value of capital
 - Assets and liabilities kept at historical value
 - Par and surplus value of shares + accumulated retained earnings + loan loss reserve

How are books kept?

- If everything always marked to market than a 'normal' rate spike could lead to widespread insolvency.
- Only securities 'available for sale' continuously priced at market. Deposits and investment securities are kept at book.
- Wide discretion about decision to write-off non-performing loans – when and to what extent
- Wide discretion about setting loan loss reserves

Why do banks keep bad loans on the books?

- Inadequate loan loss reserves
- Recognizing loan losses sends signal to public
- Inadequate bank examination often fails to force loss recognition and write-down.

Should regulation be based on market value accounting?

- Hard to implement with non-traded assets
 - But, market values now exist for many more assets – loan sales, securitization
 - And, as long as cash flows are known, market value can be estimated
- Leads to ‘too much’ volatility
 - If long-term assets are really kept long-term, why change equity when there are unrealized gains and losses
- Discourages long-term intermediation, leads to short-termism

Measuring bank capital

- Core capital is book value of equity
- Core capital / assets = leverage ratio
 - More than 10% bank is 'well capitalized'
 - Under 2% bank is 'critically undercapitalized'
- FIDICIA PCA requires action if bank not 'well capitalized' leading to receiver for critically undercapitalized bank

What's wrong with leverage ratio?

- Based on book value not market value
- Asset risk not taken into account
- Off balance sheet activities ignored

1988 Basle Capital Accord

- Establish uniform capital framework
- Encourage intl. banks to strengthen capital
- Reduce competitive inequality from differences in supervisory requirements
- Introduce risk based capital requirements

Risk based capital requirements

Basle agreement

Total risk-based capital ratio = Tier I and Tier II capital / Risk-adjusted assets $\geq$ 8 %

Tier I (core) capital ratio = Core cap / Risk-adjusted assets $\geq$ 4 %

Non-technical definitions:

Tier I (core) capital = book value of equity

Tier II (supplementary) capital = allowance for loan losses, perpetual debt, certain preferred stock (liabilities with very low priority)

Calculating risk adjusted assets - example

Risk based assets – each category gets a specific weight (0,20,50 or 100%)

$$20(0) + 15(.2) + 30(.5) + 35(1.0) = 53$$

$$\text{Total capital} / \text{Risk adjusted assets} = 15/53$$

T bills	20	Deposits	85
Municipal bonds	15		
Mortgages	30	Tier I capital	10
Business loans	35	Tier II capital	5

Also, capital for off balance sheet activities

1996 amendments to agreement introduced capital requirement for Loan commitments, FX exposure, Etc.

Total risk based assets = Risk adjusted on balance sheet assets + risk weighted credit equivalent for Off balance sheet activity

How Risk Adjustment Works

On Balance Sheet Assets are assigned to one of five credit risk buckets and then weighted by the bucket's risk weighting:

- **0 %:** Very low risk assets; e.g., claims on or guarantees provided by qualifying governments
- **10 % / 20 %:** Claims on or guarantees provided by certain institutions such as qualifying depository institutions
- **50 %:** Primarily for residential mortgages
- **100 %:** Standard risk weight for most claims
- Off Balance Sheet Assets are converted to a credit equivalent (based on the estimated size and likely occurrence of credit exposure and relative degree of credit risk) and then multiplied by the appropriate risk weight which may be the risk weight of the actual asset or the counterparty.

Problems with Basle I approach

- Do risk weights reflect relative risks?
 - Are all business loans alike? (100% rating for AAA company and flybynight.com)
- Balance sheet arbitrage - incentives
 - Make your business loans look like mortgages
 - Sell off mortgages and buy mortgage backed securities
- Portfolio correlations – benefits of diversification ignored
- Discouraging effect on intermediation
 - Traditionally, banks are information specialists who lend where there is no market. But, 100% risk weight implies high capital cost.

New Accord on the way

- Pillar I – min. amount of capital required (not % of assets) based on
 - Standardized approach – more credit risk buckets (uses credit ratings)
 - Internal ratings approach – approved use of bank's own risk modeling (e.g. VAR)
 - Capital charge for operational and trading risks

And

- Pillar II - Supervision
 - Standards for assessing capital
 - Standards for evaluating management
 - Mandates early intervention
- Pillar III – Disclosure and Market discipline
 - Disclose info on internal models
 - Information about capital
 - Sets industry norms, aids competition

The Timeline for a New Accord

- June 1999, Basel Committee released for comment its proposal for a new capital adequacy framework
- Comments from banks, industry groups and interested parties
- Second consultative package released early 2001
- 250 comments on BIS web site
- Implementation delayed from 2001 to 2004 to 2005

Market Risk and regulatory use of VAR

- Uncertainty in value of FI's assets and liabilities due to *any* changes in market conditions.
- Usually measured as \$ exposure (**value at risk**) over some time period.
- Capital requirements based on \$ exposure

Value at Risk -- VAR

- VAR – Worst loss from holding a security or portfolio for a given period of time given a specific probability
- E.g. A daily VAR of \$10 at 99% confidence level → expect loss from position to be more than \$10 only once in every 100 trading days.
- What is the max loss over a given time period such that there is a small probability that the actual loss will be larger?

Approaches to VAR

- Variance-Covariance approach.
- It is most common – used commercially (e.g. J.P. Morgan's – Riskmetrics)
- *historical simulation* and *Monte Carlo* approaches.

VAR – general ideas

Market Risk is the estimated potential loss under hypothesized adverse circumstances over some horizon

Daily Value at risk = (\$ market value of position) x (Daily price change or volatility associated with adverse situation)

For fixed income portfolio:

Price volatility = (Price Sensitivity from duration model) x (Size of an 'adverse' daily yield move)

VAR definitions

- W = current market value
- x = % price change over horizon
- x^* = % price change associated with hypothesized worst case
- Value in 'worst' case $(1+x^*)W$
- $VAR = W - (1+x^*)W = -x^*W$

Distribution of returns

- Assume x normally distributed with mean 0 and standard deviation s
- The cut-off rate – the worst case – is defined by the confidence interval chosen.

Threshold limits

<u>Confidence Interval</u>	<u>Threshold</u>
99.87 %	-3.0
99.0	-2.33
95	-1.65

$x^* = (\text{Threshold}) (\text{standard deviation})$

$\text{VAR} = - (\text{Threshold}) (\text{std. Dev.}) W$

Example

- Value of position = \$10 million
- Mean daily % price change = 0
- Standard deviation 0.75%

- VAR with 99% confidence interval
 - $(-2.33) (.0075) (\$10M) = \$174,750$
- Worst case daily loss at 99% confidence interval

Portfolio aggregation

VAR for portfolio of different assets

- Take the case where a financial intermediary owns many assets
- What is total VAR for the FI's portfolio?
- Is it the sum of the VAR for each?

NO !

- VAR uses the standard deviations of price changes
- Recall that a variance of a sum is not found by adding.
- Need to consider covariances or correlations of volatility (price changes) of portfolio components

Variations on approach

- We assumed normality of returns.
- Could use a different distribution
- OR ***historic simulation***
 - avoid distribution assumption
 - Avoid estimation of parameters (mean, standard deviation)
- Make inferences about ‘adverse’ change from historic behavior

Determine adverse change from history

- Look at returns from each portfolio component for the past 500 days
- Order the returns by size.
- Take the threshold for an adverse change is one experienced less than 5% of the time
- Choose the return from the 25th worst day of the last 500 ($25 = 5\% \text{ of } 500$)
- VAR from a 5% risk is that return * value of the position.

Another variation

Monte Carlo approach

- Use hypothesized variance covariance structure and generate 1000 random scenarios
- VAR for 95% confidence interval is the 50th worst simulated loss

Implications for bank regulation of this simple VAR overview

- VAR is a risk management tool -- extremely valuable for comparisons of institutions and situations
- VAR does not provide a closed form metric for capital requirement
- Application involves judgment
- Will require audit and examination of modeling by bank regulators

CONCLUSION

- Transition problems not over or solved
- Because, many issues are still outstanding in all countries
 - Macro targeting
 - Regulation
 - Risk measurement, evaluation
 - Regulatory responses