

Macroeconomic Theory and Policy

Lecture 18

Monetary Policy

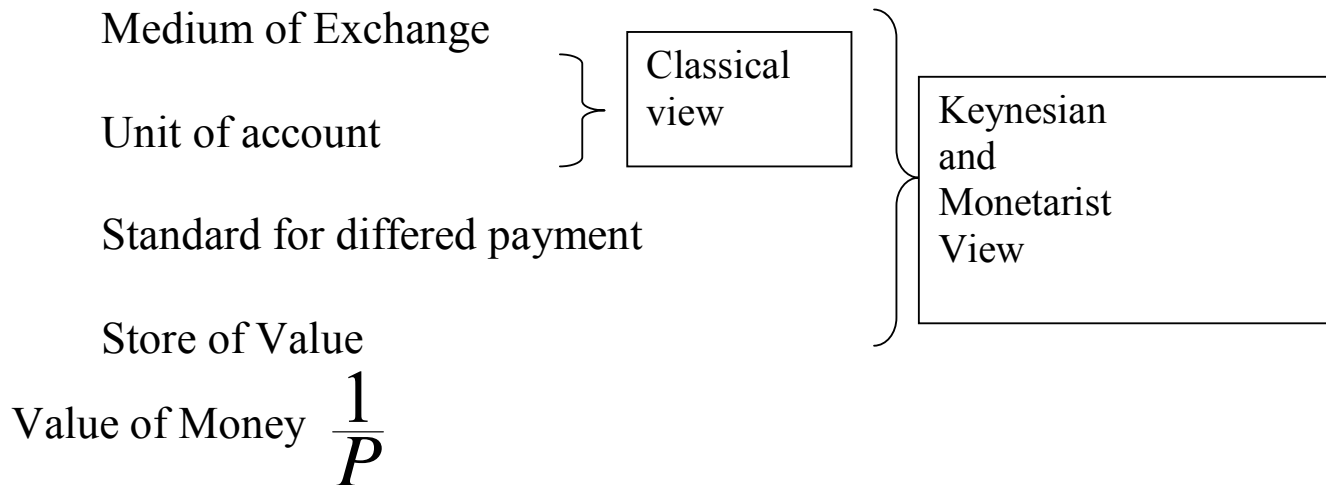
Basic Points About Money

Origin of money with Goldsmiths; Bank of England -1694

What is money?

Currency, Demand and time deposits, Financial assets
and other liquid assets

Why do people want money?



Money Supply

Various types of money: M0, M1, M2, M3, M4 ;

Money multiplier: $m = \frac{1}{r}$

If we considering a leakage in the currency holding:

$$m = \frac{1+c}{r+c}$$

$$\Rightarrow M_0 = R + C \quad (\text{a})$$

$$\Rightarrow M_4 = C + D \quad (\text{b})$$

$$\Rightarrow \text{then dividing (b) by (a)} \quad \frac{M_4}{M_0} = \frac{D+C}{C+R} = \frac{1+c}{c+r}.$$

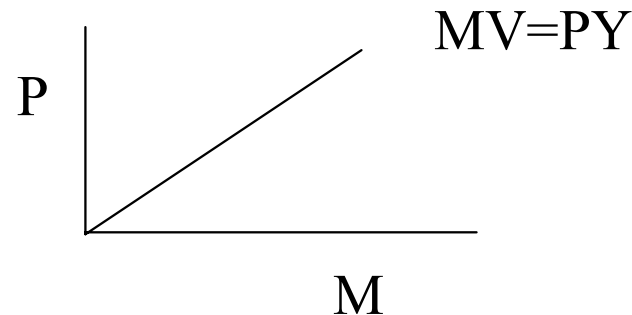
If people held more currency then multiplier becomes smaller.

Quantity Theory of Demand for Money

Cambridge equation of money demand: $\frac{M}{P} = kY \Rightarrow$

$$M \left(\frac{1}{k} \right) = PY$$

If Y and V are constants how does the relation between prices and money supply look like?



- Classical dichotomy: Price level is proportional to the supply of money; no link between monetary and real sectors.

No link between supply of money and the interest rate and the real side of the economy; missing link for Keynes.

Milton Friedman's View on Demand for Money

$$M = k(r^e, r^b, r^D, r)PY$$

Opportunity cost of holding money is high at the higher interest rate. People prefer to hold bonds, equities and durable asset such as house at the higher interest rate. They expect that interest rate will fall and price of these assets may rise.

At lower interest rate people want to hold more money because they expect interest to go up and other assets to become cheaper later on.

Milton Friedman's View on Velocity of Circulation for Money

The velocity of money depends on portfolio allocation process of individuals. It is stable.

In the short run change in money has some real impacts in output.

In the long run, however, increase in money only causes only an increase in price level but does not have any impact in the real economy.(as given in Cagan's model below).

Monetary policy is a string that can be pulled to halt inflation but which cannot be pushed up to control unemployment.

Objective Targets and Instruments of Monetary Policy

Ultimate objective: stability (P, r, E), high growth rate of output, low unemployment rate

Targets: inflation only; or money supply only; or exchange rate only; all of them; or two of them; or none of them.

Instruments: Open market operation on treasury bills -
rediscounting

Fixing the interest rate, credit control

Money supply rule, reserve requirement

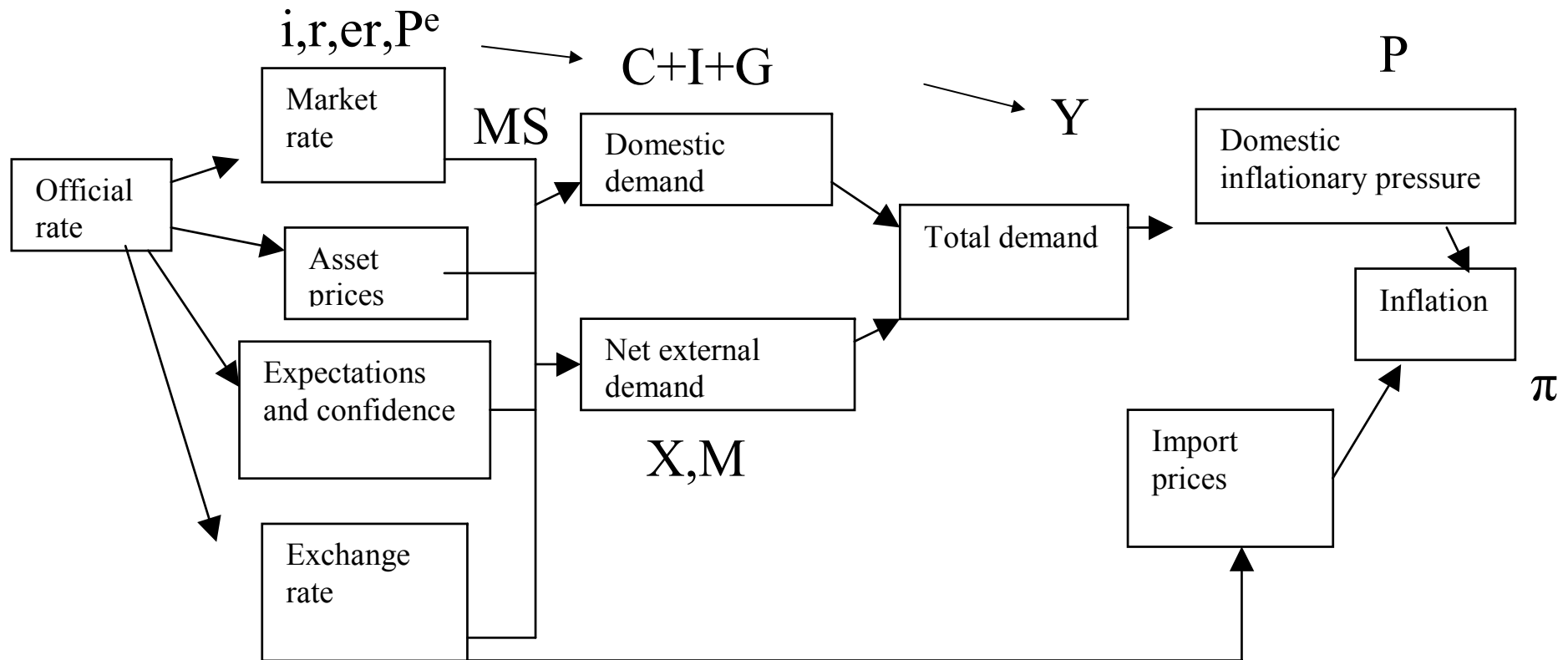
Deposit insurance

Effectiveness of monetary policy depends upon

Central bank independence and credibility ie, who appoints the governor?

Moral hazards - bank panics, systematic risk, regulation -
bank supervision

Bank of England's View on Transmission Mechanisms of Monetary Policy: How Does Money Supply Affect the Price Level?



Two Conditions to have real effect of Monetary policy

Central bank controls monetary base $M1 = R + C_u$

Prices do not adjust instantaneously

$$M \uparrow \quad i, r \downarrow \quad C, I, X, G \uparrow \quad Y \uparrow \quad P \uparrow \quad \pi \uparrow \quad \frac{M}{P} \downarrow \quad i, r \uparrow$$

Effects of Changes in the Rate of Interest

First round effects

Households: saving, housing, wealth,
foreign asset, portfolio allocations

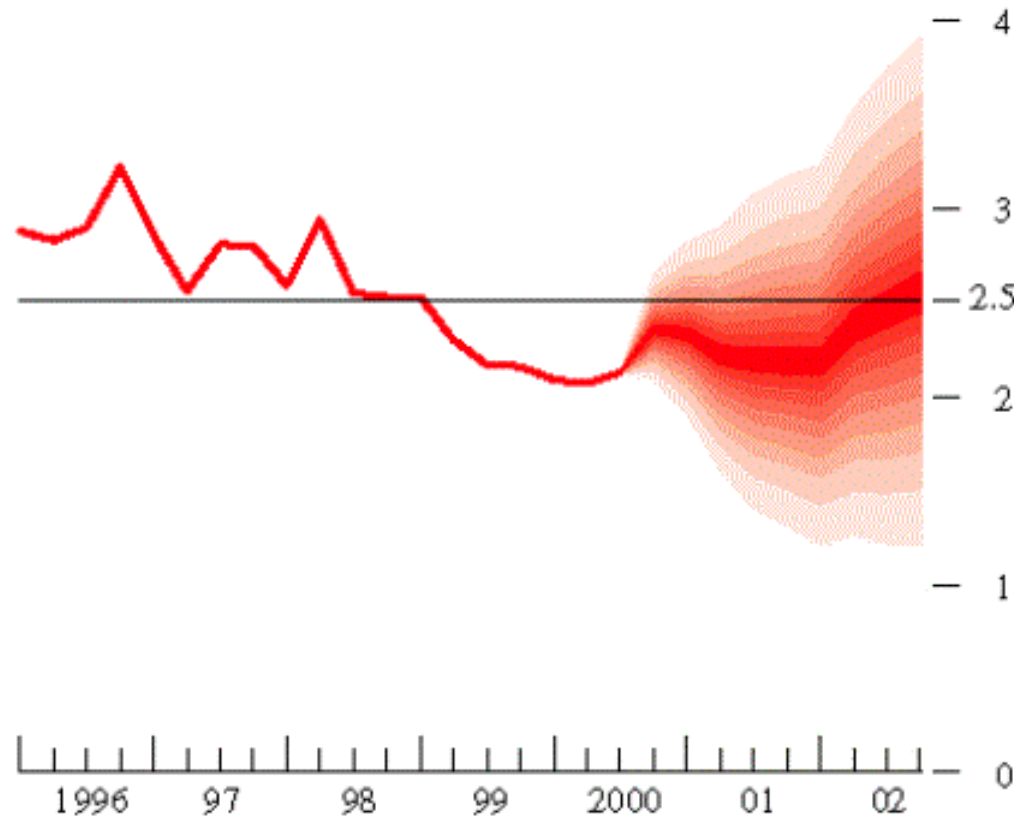
Firms: cost of capital, debt-equity,
portfolio allocations

$$P_2 = (1+i)P_1 \Rightarrow P_1 = \frac{P_2}{(1+i)}$$

Second round effects: consumption
spending, additional demand for goods

Time lags: anticipated and unanticipated
policy changes.

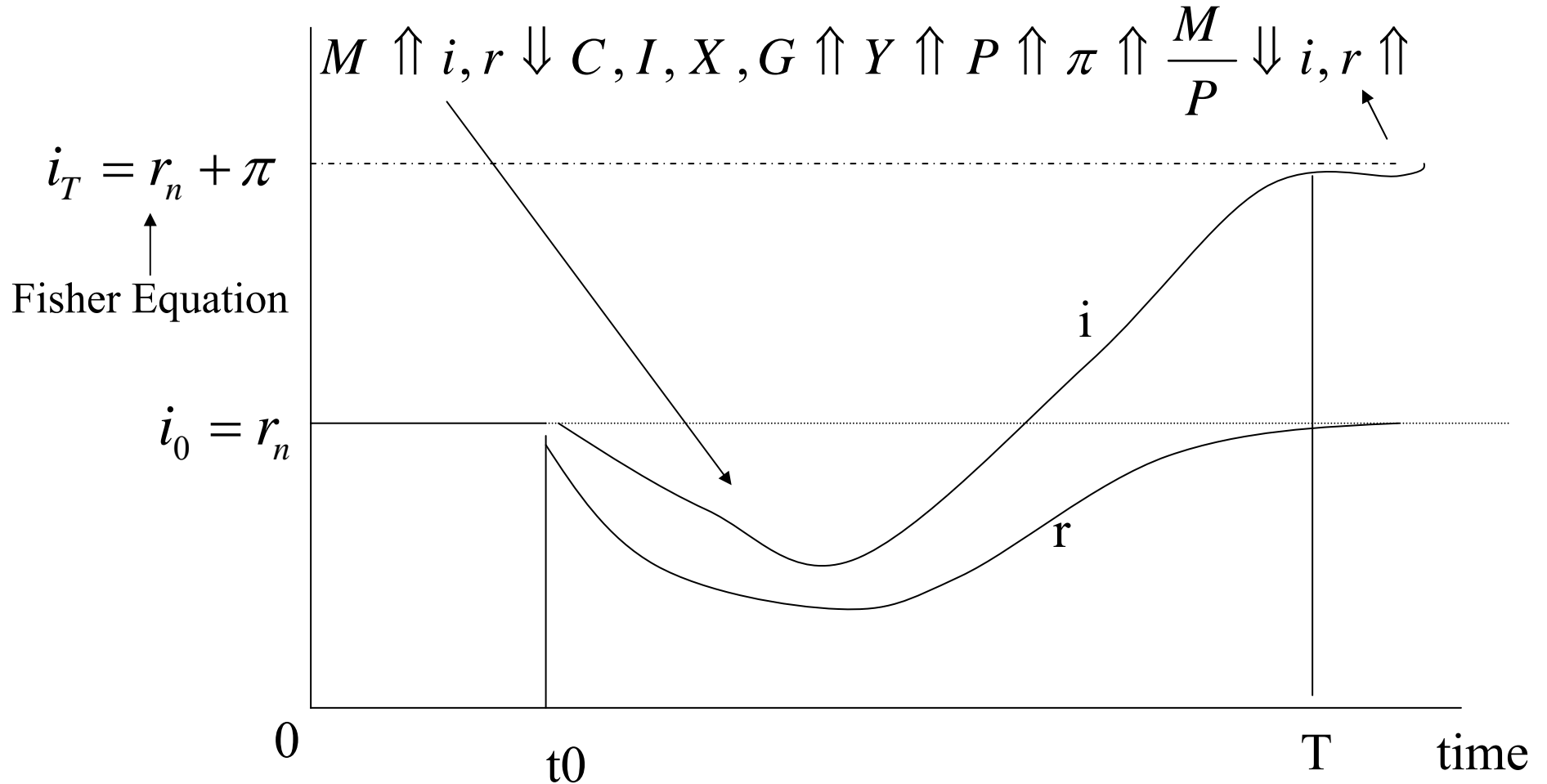
Bank of England's Fan Chart for Forecast of an Economic Variable



B&W Figure 9.7

Source: Inflation Report, Bank of England, November 2000

An Increase in Money Supply Can Lower Real and Nominal Interest Rates in the Short but not in the Long Run



Monetary policy can have some real effect in the short run but not in the long run.
 Short runs become shorter with more accurate expectations

Transmission Mechanisms of Monetary Policy

- Interest rate Channel

- Lower interest rate
- More borrowing and Spending
- More aggregate demand

Open Market Operation

- Exchange Rate Channel

- Lower interest rate
- Depreciation of domestic currency
- More exports and less imports
- Higher aggregate demand

Buy back own currencies selling some foreign assets to avoid depreciation - sterilisation
selling its currency to avoid appreciation

- Credit Channel

- Lower interest
- More reserves
- More lending
- Higher aggregate demand

Deficit financing

Rediscounting of Treasury Bills

- Balance Sheet Channel

- Lower interest rate
- Increase in prices of stocks, bonds and other assets
- More wealth
- More aggregate demand

Moral hazards - bank panics, systematic risk, regulation - bank supervision

Open Market Operation: Interest Rate Channel

Expansionary Monetary Policy

Short run:

Central bank reduces the repo rate

Commercial banks and financial institutions find it profitable to sell bonds to the central bank

Central bank raises their reserves

Commercial banks have more money to lend

Firms and households find it cheaper to borrow

They borrow and create more deposits

Demand for goods and services rises

Money supply expands

Long run:

Prices will eventually rise following higher demand

Real money supply (M/P) shrinks

Interest rises back to natural position

Open Market Operation: Interest Rate Channel

- Contractionary Monetary Policy

Short run:

Central bank raises the repo rate

Commercial banks and financial institutions find it profitable to buy bonds from the central bank

Central bank sell bonds and reduces reserves of the financial institutions

Commercial banks have less money to lend

Firms and households find it expensive to borrow

They pay back loans and close deposits accounts

Demand for goods and services falls

Money supply contracts

Long run:

Prices will eventually fall

Real money supply increases

Interest rises back to natural position

Assets and Liabilities of the Financial System of An Economy

Central bank	
Assets	Liabilities
Loans to the government Loans to the commercial banks Foreign asset (currency) Gold and other precious metals	Currencies in circulation Reserves of the commercial banks Deposit of the government Claim by foreigners and Net worth
} Monetary Base	} M4 RESERVE
Commercial banks	
Assets	Liabilities
Loans to the government Loans to the private sector Reserves and deposit at the central bank Claim on foreign assets	Deposits of private sector Deposit of the government sector Obligation to foreigners Network
Government Sector	
Assets	Liabilities
Deposit with the commercial banks Deposit with the central banks Loans to foreigners Other assets	Borrowing from the central bank Borrowing from the private sector Foreign debt Network
Private sector	
Assets	Liabilities
Deposit at commercial banks Tangible wealth Currency and precious metal	Loans from the banking system Payment due to the government Network

Contribution of Monetarism in Macroeconomic Policy

- Supply of money is the determinant of the national income
- In the long run, the influence of money is primarily on the price level and other nominal magnitudes. Real output and employment are not determined by monetary factors.
- In the short run the supply of money does affect the output. Money is the dominant factor in causing cyclical fluctuations in output and employment in the short run.
- Private sector is inherently stable and instability is primarily the result of the government policy.

Interest Determination Rule to Achieve the Inflation Target:

Taylor Rule

$$y_t - y_t^* = -d(i_{t-1} - i_{t-1}^*) \quad d > 0 \quad (9)$$

where y_t is actual output y_t^* is trend output, i_t is the actual interest rate and i_t^* the basic interest rate,

One period lag is assumed between the interest rate decision and the change in the output.

$$\pi_t = \pi_t^* + c(y_{t-1} - y_{t-1}^*) \quad c > 0 \quad (10)$$

where π_t and π_t^* are actual and target inflation rates.

Interest rate rule:

$$i_t = i_t^* + a(y_t - y_t^*) + b(\pi_t - \pi_t^*) \quad a > 0; b > 0 \quad (11)$$

Reduced Form Equation of the Interest Determination Model

$$y_t - y_t^* = -d(i_{t-1} - i_{t-1}^*)$$

$$\pi_t = \pi_t^* + c(y_{t-1} - y_{t-1}^*)$$

$$i_t = i_t^* + a(y_t - y_t^*) + b(\pi_t - \pi_t^*) \quad a > 0; b > 0$$

(11)

Substituting the output and inflation equations in the interest rate rule:

$$i_t = i_t^* + a\left(-d(i_{t-1} - i_{t-1}^*)\right) + b\left(-cd(i_{t-2} - i_{t-2}^*)\right)$$

$$i_t = i_t^* - ad(i_{t-1} - i_{t-1}^*) - bcd(i_{t-2} - i_{t-2}^*)$$

$$i_t + adi_{t-1} + bc di_{t-2} = i_t^* + adi_{t-1}^* + bc di_{t-2}^* \quad (12)$$

Interest Rule: A Numerical Example

Target inflation	2.50%
Target interest rate (basic)	5.00%
Initial interest rate	11.00%
Initial output gap	2.00%
Initial inflation	2.00%

ad-square ==> 0.0625

(ad)square
>4bcd for
stability

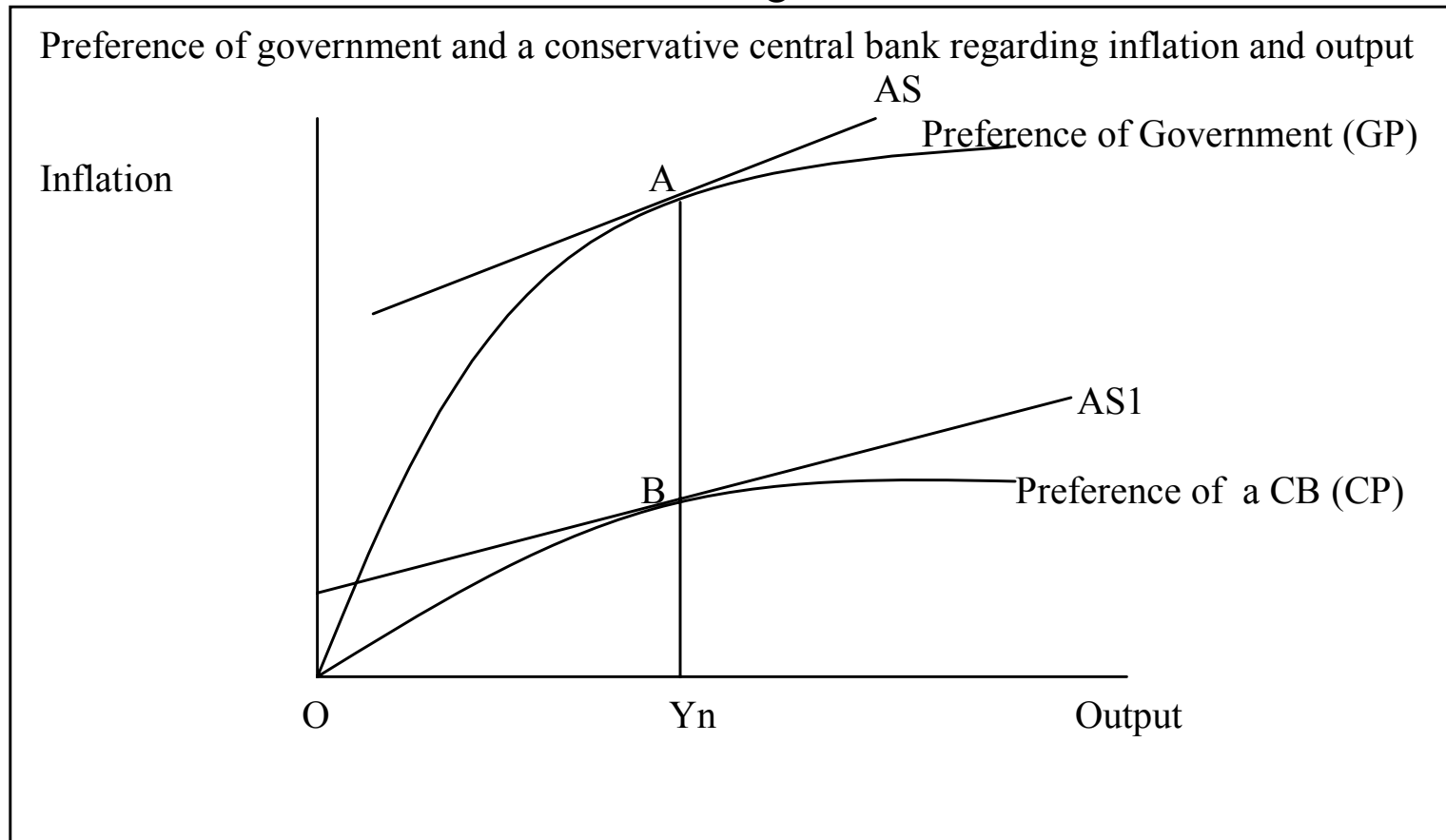
4bcd ==> -0.25

a	0.5
b	0.5
c	0.25
d	-0.5

Year	Output gap	Inflation gap	Actual interest rate
1996	0.02000	-0.00500	0.11000
1997	-0.03000	0.00500	0.06250
1998	-0.00625	-0.00750	0.06813
1999	-0.00906	-0.00156	0.06969
2000	-0.00984	-0.00227	0.06895
2001	-0.00947	-0.00246	0.06903
2002	-0.00952	-0.00237	0.06906
2003	-0.00953	-0.00238	0.06905
2004	-0.00952	-0.00238	0.06905

Why Should the Central Bank Be Independent? Inflation Biases of a Government and a Central Bank

Figure 1



Inflationary Bias Model-Loss Functions of a Government and a CB and Supply Constraint

Governments objective function:

$$\underset{\pi_t}{Min} L^G = \frac{1}{2}\pi_t^2 + \frac{b}{2}(y_t - y_t^*)^2 \quad (1)$$

Central banks' objective function:

$$\underset{\pi_t}{Min} L^{CB} = \frac{1+\varepsilon}{2}\pi_t^2 + \frac{b}{2}(y_t - y_t^*)^2 \quad (2)$$

Aggregate supply Constraints:

$$y_t = (\pi_t - \pi_t^e) + u_t \quad (3)$$

Inflation Bias of the Government

$$LG = \frac{1}{2}\pi_t^2 + \frac{b}{2}\left(\left(\pi_t - \pi_t^e\right) + u_t - y_t^*\right)^2$$

$$\frac{\partial LG}{\partial \pi_t} = \pi_t + b\left(\left(\pi_t - \pi_t^e\right) + u_t - y_t^*\right) = 0$$

$$\rightarrow \pi_t = \frac{b}{1+b}y_t^* - \frac{b}{1+b}u_t$$

Inflation Bias of the Central Bank

$$LCB = \frac{1+\varepsilon}{2} \pi_t^2 + \frac{b}{2} \left((\pi_t - \pi_t^e) + u_t - y_t^* \right)^2$$

$$\frac{\partial LCB}{\partial \pi_t} = (1+\varepsilon) \pi_t + b \left((\pi_t - \pi_t^e) + u_t - y_t^* \right)$$

$$\rightarrow \pi_t = \frac{b}{1+\varepsilon+b} y_t^* - \frac{b}{1+\varepsilon+b} u_t$$

Here ε is the inflation aversion factor. Since $\varepsilon > 0$ the central bank would choose lower rate of inflation than the government.

Lessons for Price Stability From Analysis of the Central Bank Independence

1. Bind the central bank with a zero inflation rate target.
2. Appoint the most conservative central banker.
3. Make the central bank as independent as possible from the government.
4. Peg the exchange rate to the currency of a country with one or more of the above characteristics.

A brief story of monetary policy in the UK and the EU

Fixed peg system in the Gold Standard and the Bretton Woods.
Exchange rate was the nominal anchor of monetary policy.

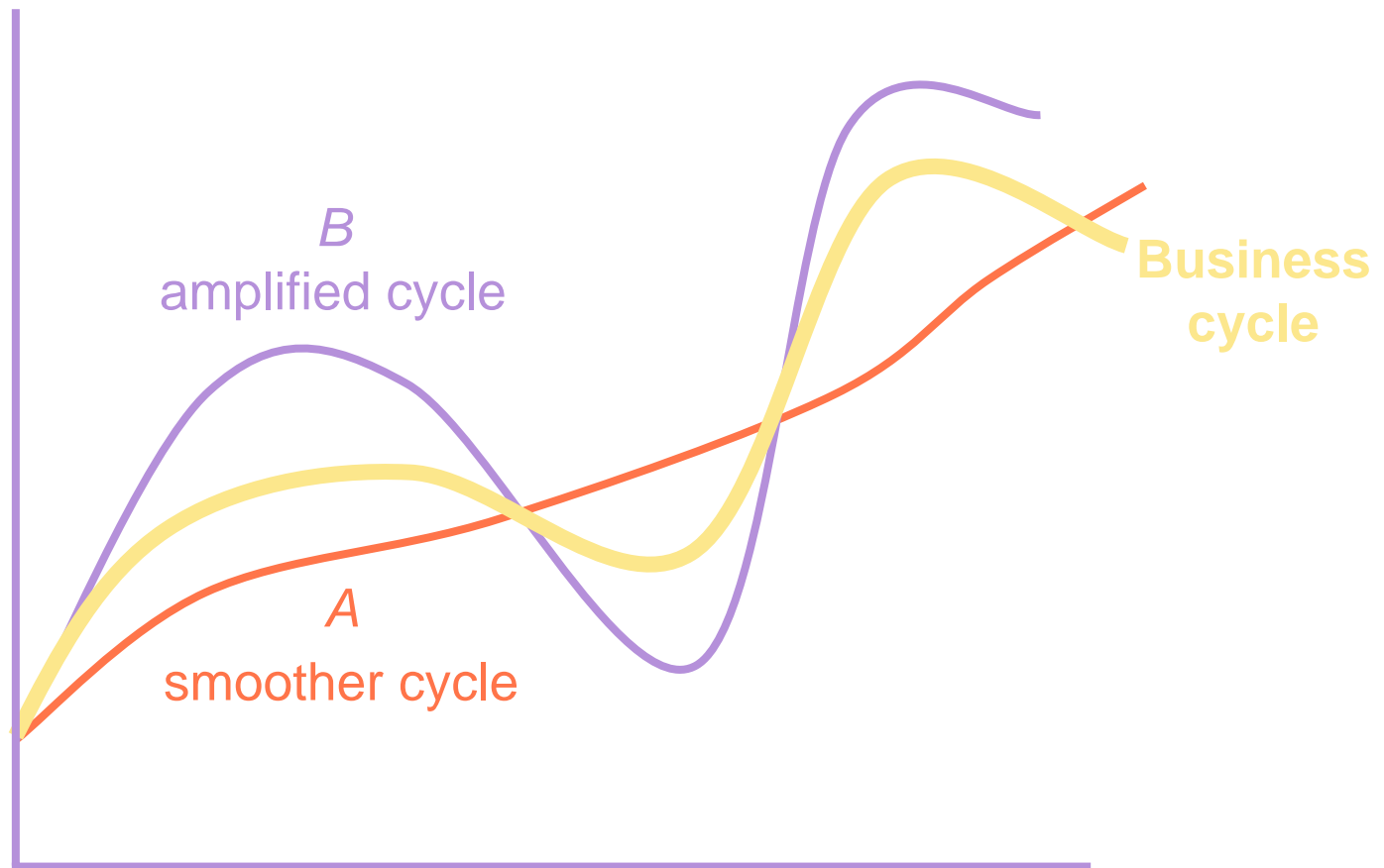
Targeting money supply during 1970s. Stop and Go Cycles.

Monetarism in the Thatcher and Reagan administrations.

Inflation targeting during 1980s.

Central bank independence during 1990s.

Euro 1999.



References

Bernanke B. S. and F.S. Mishkin (1997) Inflation Targeting: A New Framework for Monetary Policy, *Journal of Economic Perspectives*, vol. II, no.2, Spring, pp. 97-116.

Bhattarai (2002) *Inflation and Growth*, mimeo, University of Hull.

Goodhart Charles (1989) The Conduct of Monetary Policy, *Economic Journal*, 99, June, pp. 293-346.

Hicks, J. R. 1937: Mr. Keynes and the "Classics"; A Suggested Interpretations, *Econometrica* 5: 1937.

Monetary Policy Committee, Bank of England Transmission Mechanism of Monetary Policy.

Friedman, M. (1968), "The Role of Monetary Policy," *American Economic Review*, No.1 vol. LVIII March

Kydland, Finn E. and Prescott, Edward C. 1977: Rules Rather than Discretion: The Inconsistency of Optimal Plans, *JPE* vol. 85, no. 3, pp. 473-491.

Laidler D and M Parkin (1975) Inflation: A Survey, *The Economic Journal*, vol. 85, Issue 340, December, 741-809.

Tobin, James (1969), A general Equilibrium Approach to Monetary Theory, *JMCB*, 1969 pp. 15-29, 1969.