

Medium-term adjustment and the Inflation dynamic

Keynesian, Monetarism, New Classical, New Keynesian

PART I : Keynesian and Monetarism

EE312 Topic 4, 5, 6 (for Section 046402)

Read: Froyen Ch.9-10, Mankiw Ch.13

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1 Introduction

- Previous chapters.
 - Shocks can divert output from the long-term trend $\Rightarrow$ Generating business cycles volatility.
 - Deviation from the long-term level can be in conjunction with the inflation/deflation $\Rightarrow$ Generating business cycles comovement.
 - Account for general properties of business cycles under two different contexts: closed v.s. opened economy

1.1 Deviation from trend

- Questions
 - Can this be occurring permanently?
 - If not, what is the adjustment process?
 - How long does it take time?

1.1.1 Statistical Evidence

1. Money and business cycles

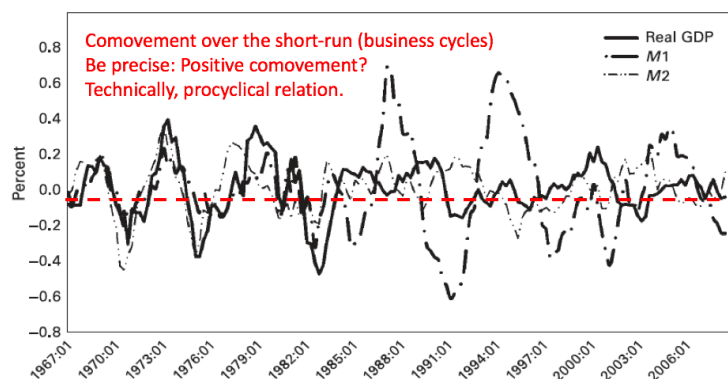
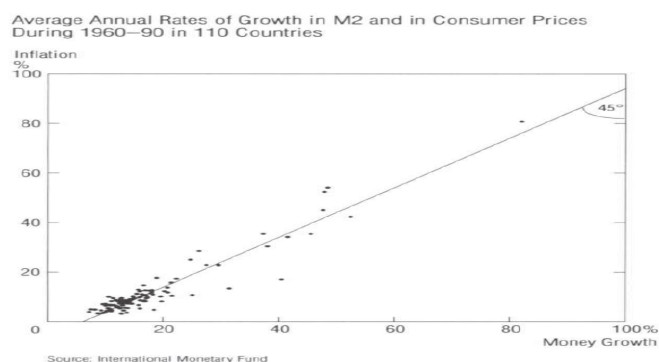


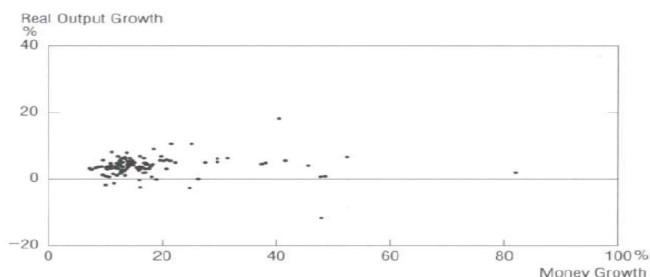
Figure 1.6
Detrended money and real GDP, 1967:1–2008:2.

2. Money and inflation: long-term evidence



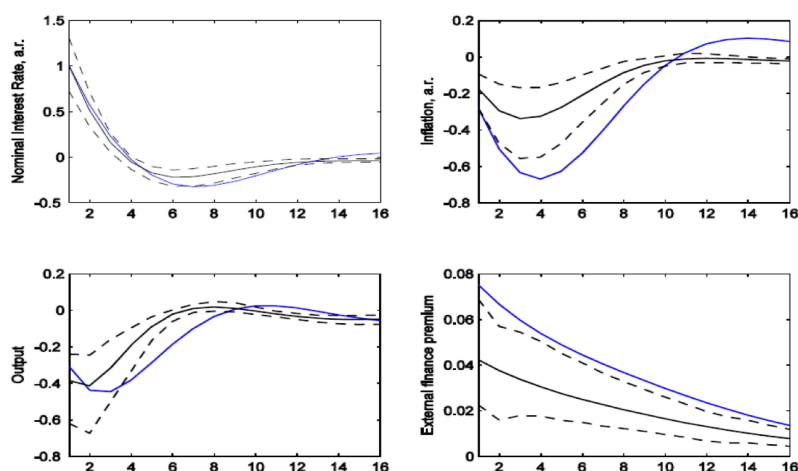
3. Money and output: long-term evidence

Average Annual Rates of Growth in M2 and in Nominal Gross Domestic Product, Deflated by Consumer Prices During 1960–90 in 110 Countries



Source: International Monetary Fund

4. Shocks do not last forever



1.1.2 Deviation from trend

1. Can this be occurring permanently?
 2. If not, what is the adjustment process?
 3. How long does it take time?
- Empirically, the answer appears to be NO.
 - Doesn't seem to last forever.
 - Slowly converge back to trend line...
 - Statistical evidences... but why?
 - Conventional wisdom drawn from statistical evidences is that output would tend to revert to the trend through some adjustments process in **labor market** and **inflation dynamic**.
 - Provide “**theoretical foundations**” that explains about inflation/labor market adjustment and how economy reverts to the long-term trend, called **medium-term adjustment**.

1.2 Historical evolution of Competing theories

- Knowledge on medium-term theory and Inflation dynamic has its long history.
- The state-of-art on our existing knowledge has by far come a long way, undergoing several battles and debates in their ideas and beliefs. (at least since 1960s)
- It worth understanding how theory has evolved over time, and how academic literature has gradually reached to the point where we are currently standing.

Compare / Contrast on

Question 1: What do they view about inflation dynamic? Essential features?

Question 2: How we reach medium-term adjustment?

Question 3: Policy implications

Historical evolution of Competing theories

Keynesian : CH4

Q1: Permanent trade-off in inflation / unemployment / output

Q2: No discussion about medium-term adjustment.

Q3: Supporting activism policy (fiscal policy)

Monetarist : CH4

Q1: No permanent trade-off; Natural level exists

Q2: Inflation expectation acceleration

Q3: Constant money supply rule.

New Classical : CH5

Q1: No permanent trade-off / price misinterpretation.

Q2: Inflation expectation; quick response.

Q3: Rule-based policy; avoid being a source of shock

New Keynesian: CH6

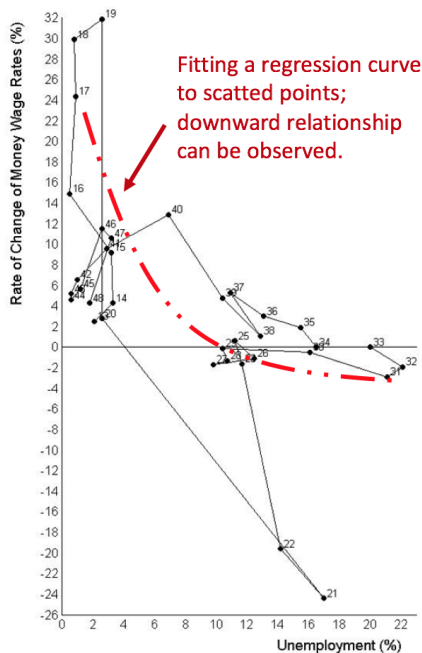
Q1: No permanent trade-off / price/wage rigidity

Q2: Inflation expectation; but slowly adjust because of frictions.

Q3: Systematic Feed-back policy

2 The discovery of inflation dynamic

- Comovement between prices and real economic activities was first mentioned in economics in 1958.
- 1958 A.W. Phillips discovered the inverse relation between the rate of unemployment and the rate of increase in money wages.
 - Wage inflation decreases with unemployment rate.
 - Studies based on the UK data for 1861-1957.
 - The relation has been highly stable.
- The discovery
 - The relation between wage inflation and unemployment rate for the UK during 1913-1948.



2.1 The name 'Phillips curve'



Alban William Phillips (1914-1975),
the London School of Economics.

- 1960 Paul Samuelson and Robert Solow found a similar relation in the US data for 1900-1960. The relation is dubbed 'the Phillips curve'.
- Subsequently, economists uncovered a similar relation when looking into the comovement between the CPI inflation and the unemployment rate.

2.2 The Phillips curve equation

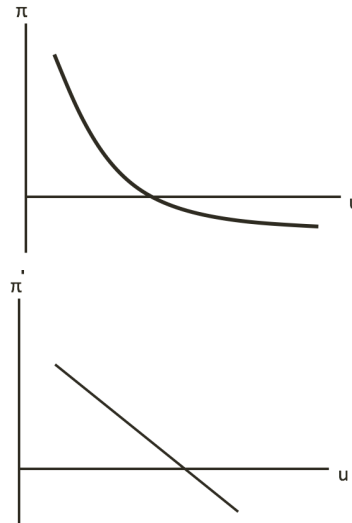
- π = the rate of inflation.
- u = the rate of unemployment.
- ε = the strength of the effect of u_t on π_t .

1. Non-linear Phillip Curve

$$\pi_t = \varepsilon \left(\frac{1}{u_t} \right)$$

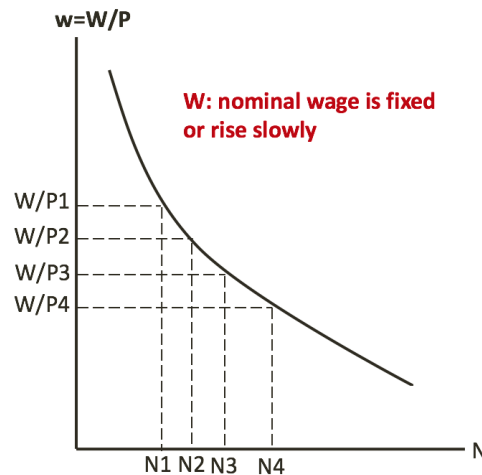
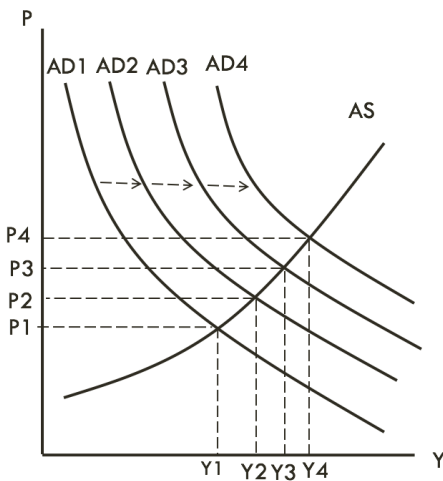
2. Linear Phillip Curve

$$\pi_t = -\varepsilon u_t$$



3 Keynesian

3.1 Keynesian Interpretation : Phillip Curve

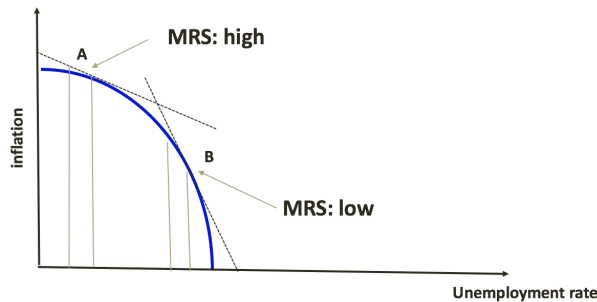


3.2 Policy implications

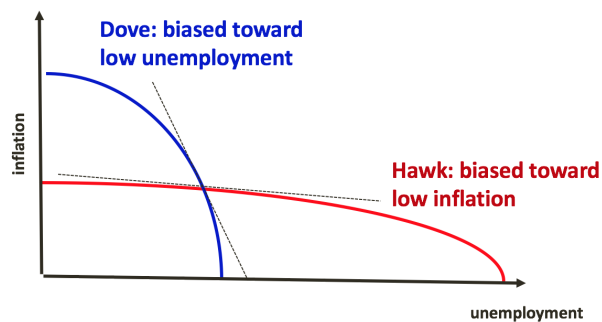
- Provide no discussion about medium-term adjustment.
- There is a **trade-off** between inflation and unemployment; it is thought to be a **permanent** one!
- Policymakers can choose between different combinations of inflation and unemployment, based on **preferences**.

– Policy preference

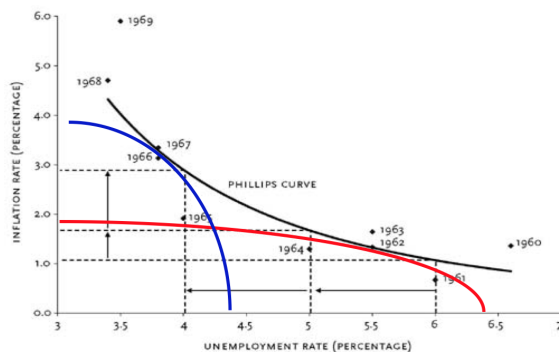
- * One common (intuitive) way to capture policymakers' preference is to consider a loss function.
- * Why loss function?
 - Both inflation and unemployment are BAD.
- * A commonly used loss function is the quadratic loss function.
 - $L = \alpha_{\pi}\pi^2 + \alpha_u u^2$



- Law of diminishing marginal utility
- Government is willing to sacrifice with higher inflation rate for a lower 1% unemployment more under B (low inflation) than under A (high inflation).



- They can achieve low unemployment if they are willing to tolerate higher inflation. (HAWK)
- Or they can achieve 'price stability' or zero inflation if they tolerate higher unemployment. (DOVE)
- Beliefs over the permanent trade-off has slowly changed government's behavior from hawk becoming dove.

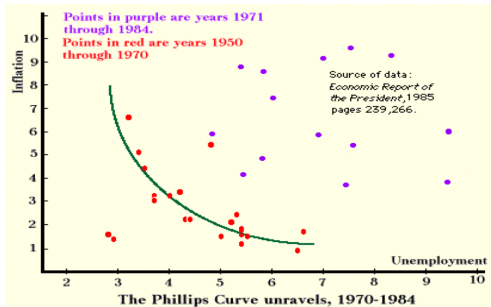


The curve became an empirical basis of Keynesian economics of the 1960s.

4 Monetarist

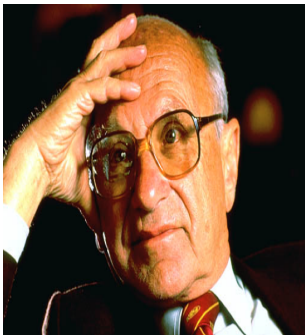
4.1 The breakdown

- Some economists warned that the relation may be **superficial**; however, no one listened back then.
 - No proof of the data supporting their idea.
- In the 1970s, the Phillips curve broke down.

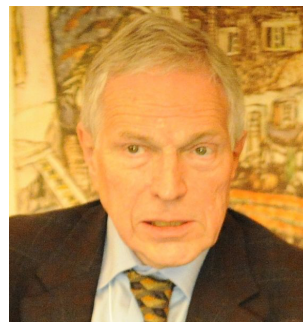


- High inflation and high unemployment — **stagflation**. Oil price hikes by the OPEC.
- Persistent positive inflation caused people to amend their expectations about inflation and their behaviors — **expected inflation**.
- Effects of expected inflation on wage/price settings.
- “Theory ahead of the business cycle measurement”

4.2 Critique by Friedman and Phelps



Milton Friedman (1912-2006), University of Chicago Nobel Prize 1976.



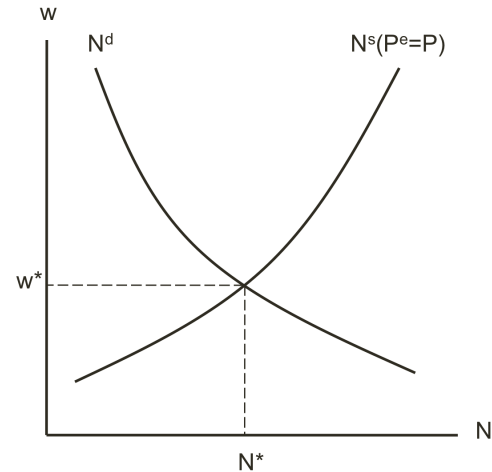
Edmund S. Phelps, Jr. (b1933), Columbia University Nobel Prize 2006.

Milton Friedman and Edmund Phelps (1968):

- The trade-off works if inflation is near zero.
- It requires workers to under-predict inflation repeatedly. (Why wouldn't labor raise wage to keep up with inflation?)
- The natural rate of unemployment exists in the labor market.
- If the government keeps unemployment below the natural rate, the result will be higher inflation.
- The trade-off disappears in the long run, i.e. vertical long-run Philips curve.

4.3 The natural rate of unemployment

The **equilibrium real wage rate** (w^*) when workers have adjusted to the price change.



- Natural rate of unemployment is positive.
- It is determined by the structure (and efficiency) of the labor market, i.e. frictions and distortions.
 - Legal minimum wage rate, other benefits from employers, unemployment benefits.
 - Labor unions' strength; labor protection laws.
 - Labor market information cost and availability.
- It changes overtime as the labor market structure changes.

4.4 The expectations-augmented Phillips curve

4.4.1 The Equation

$$\pi_t = \pi_t^e - \varepsilon(u_t - u^*)$$

- π_t = the inflation rate at period t
 π_t^e = the expected inflation rate for period t.
 u_t = the unemployment rate at period t
 u^* = the natural rate of unemployment

4.4.2 Adaptive expectations hypothesis

$$\pi_t^e = \theta \pi_{t-1}$$

$$0 \leq \theta \leq 1$$

$$\pi_t = \theta \pi_{t-1} - \varepsilon(u_t - u^*)$$

The agents predicts current inflation based on “past inflation”.

4.4.3 Near-zero inflation before 1970

- The UK and US economies before 1970 had very low inflation — π_t^e is near zero.
 - So the traditional Phillips curve was valid, given u^* .

$$\pi_t = \pi_t^e - \varepsilon(u_t - u^*)$$

$$\pi_t^e = 0$$

$$\pi_t = -\varepsilon(u_t - u^*) = \varepsilon u^* - \varepsilon u_t$$

$$\pi_t^e = \theta \pi_{t-1}$$

$$0 \geq \theta \geq 1$$

$$\pi_t = \theta \pi_{t-1} - \varepsilon(u_t - u^*)$$

$\theta = 0$: stable relation between inflation and unemployment — traditional Phillips curve.

$\theta > 0$: current inflation depends on past inflation and unemployment.

$$\pi_t = \theta \pi_{t-1} - \varepsilon(u_t - u^*)$$

$$\theta = 1$$

$$\pi_t - \pi_{t-1} = -\varepsilon(u_t - u^*)$$

$\theta = 1$: the unemployment rate affects the rate of change in the inflation rate, given u^* .

- If $u > u^*$, decelerating (decreasing) inflation
- If $u < u^*$, accelerating (increasing) inflation

4.5 The modified Phillips curve

4.5.1 High persistent inflation from 1970

- The case for augmented-expected inflation began to receive the support in 1970s.
- People change the way they form inflation expectations.
 - The value of ϑ was rising quickly and finally close to 1.
 - This-year inflation is expected to be the same as last-year inflation.
 - The original Phillips curve (and trade-off) broke down.

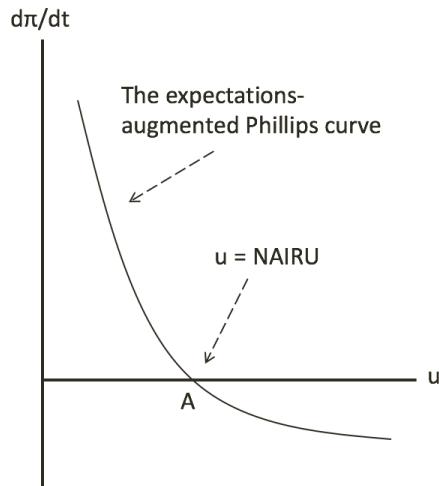
4.5.2 The Equation : Modified Phillips curve

$$\pi_t - \pi_{t-1} = -\varepsilon(u_t - u^*)$$

- The **change in inflation** depends on the difference between the actual and the natural unemployment rates, i.e. **unemployment gap**.

- When $u > u^*$, inflation decreases (decelerating)
- When $u < u^*$, inflation increases (decelerating)
- When $u = u^*$, inflation is constant

- Change in inflation = $f(\text{unemployment gap})$
- A = unemployment with constant inflation.
- Actual inflation equals expected inflation.
- Or the non-accelerating inflation rate of unemployment — NAIRU



4.6 Policy implications under Monetarism

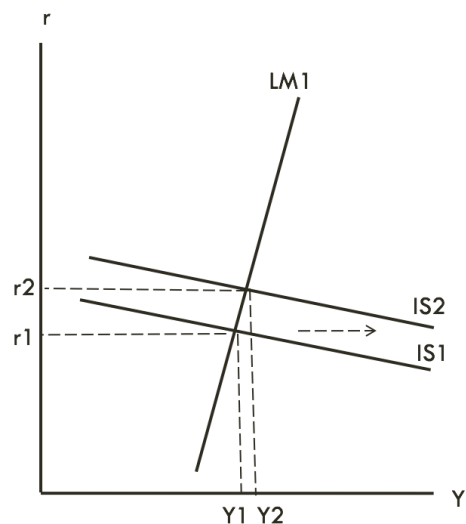
- Fiscal v.s. monetary policy?
- The optimal design of monetary policy?

4.6.1 Fiscal v.s. monetary policy

- The first issue has **nothing to do** with the implications drawn from the inflation dynamic and medium-term adjustment theory.
- Milton Friedman's attack on Keynesianism.
 - Private investment is highly sensitive to the interest rate (flat IS curve).
 - Money demand is interest-rate inelastic (steep LM curve).
- Fiscal policy financed by bond issue is **NOT** effective — very strong crowding-out effect.
- Monetary policy is very powerful

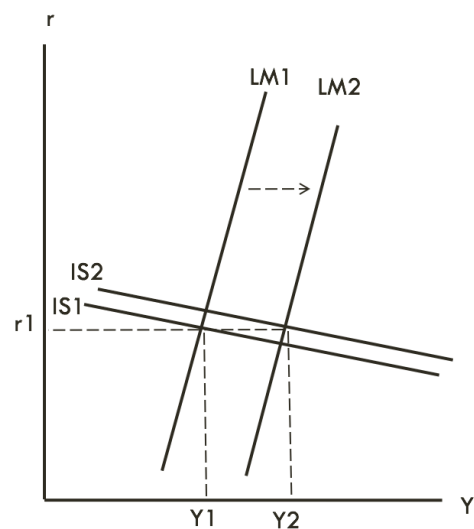
1. Bond-financed fiscal policy

- An increase in G shifts IS right.
- Bond financing raises the interest rate which depresses private consumption and investment.



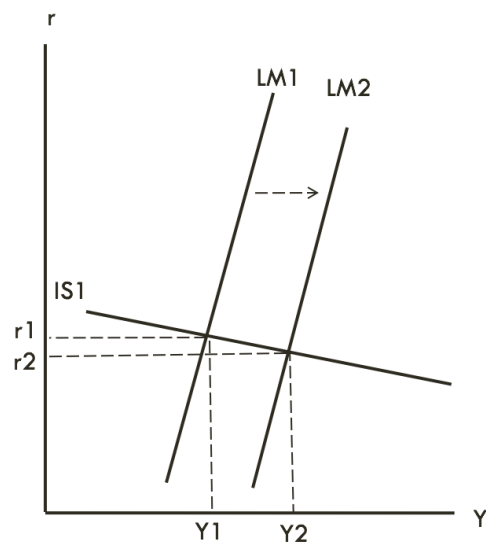
2. Fiscal policy + printing money: Debt-monetized

- An increase in G financed by new money shifts both IS-LM to the right with no crowding-out effect.
- It is a fiscal-monetary policy mix!



3. Strong monetary policy

- An increase in M_s shifts LM right.
- Lower interest rate causes sensitive investment to increase.
- AE and output increase strongly.



4.6.2 Optimal design of Monetary policy

4.6.2.1 Two important implications drawn from the inflation dynamic that guides the design of monetary policy

- **Principle 1:** Don't be too ambitious as we are constrained by the **long-term natural rate** or **NAIRU**.
 - This obviously follows from the modified version of Phillips curve.
 - Inflation will keep rising if central bank attempts to push the economy beyond its limit (natural level); no permanent trade-off
 - So, choosing $u = u^*$ and hence keeping the inflation rate constant is more desirable then.
- **Principle 2:** Maintaining low inflation is good for the long-term $\Rightarrow$ **anchoring low expected inflation**.
 - Following the principle 1, inflation is driven by expected inflation.
$$\pi_t^e = \pi_t^e - \varepsilon(u_t - u^*)$$
$$\pi_t = \pi_t^e \quad \text{if } u_t = u^*$$
 - **Committing to a low inflation rate will bring about a low inflation rate then.**
- **Why low inflation is good?**
 - Inflation affects consumers' welfare.
 - * Price stability is preferred by consumers and firms.
 - Stable price (and low inflation) is favorable to the private sector's smooth growth.
 - * High inflation is typically associated with high volatility in inflation rate, followed by costly management to avoid the inflation risk.
 - If negative shocks hit inflation, credible commitment of low inflation would mitigate the impact of negative shocks.
 - * Agents believe that it will be temporary. They won't drastically revise their inflation expectation.

4.6.2.2 Rule v.s. discretion

- To anchor low stable inflation, **monetary policy rules are recommended**.
- Two competing approaches: Rule V.S. Discretion
 - Discretionary monetary policy is difficult and costly; targets are missed most of the time.
 - Persistent high inflation in the 1970s discredited such policy.
- Rule-based approach to monetary policy make the way inflation expectation gets anchored much more easier than under the discretion approach.

4.6.2.3 Feedback v.s. Non-feedback rule

- Two competing approaches for policy rules: Feedback v.s. Non-feedback rule
- Friedman (1968) advocated the latter.
 - It is hard to design a feedback rule that can be timely implemented.
 - Lag effects of policy can lead to serious misperceptions and mistakes when using feedback policy rules
 - The constant money-growth rule
 - Operationally, he instead suggested a constant money-growth rule. Set a constant growth rate of some monetary aggregates (e.g., M1 or M2). Closely monitor the level of money supply growth.
 - The idea is supported by the quantity theory of money.
- Friedman's quantity of money

$$MV = PY$$

Where

Y = real output

P = price level

M = the level of money supply

V = the velocity of money

- If “V” is stable, nominal income growth is determined by money growth.
- Unfortunately, the relation broke down after 1980s; countries were forced to abandon this policy approach