

MEDIUM-TERM ADJUSTMENT THEOREM

SECTION 2: PHILIPS CURVE AND INFLATION DYNAMIC

Kittichai Saelee

EE312

Thammasat university

AGENDA

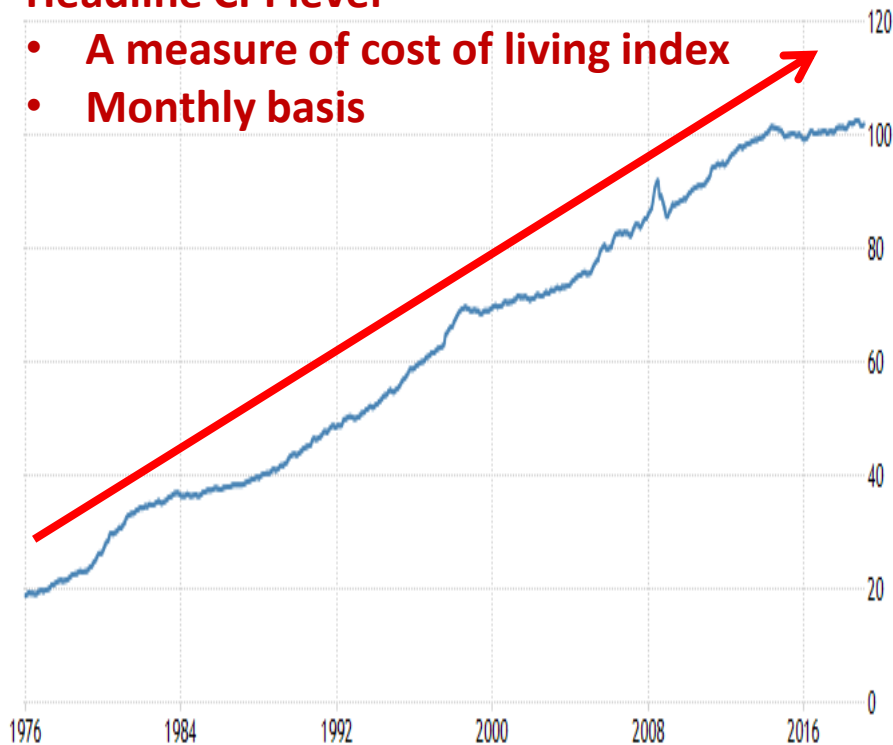
- **An overview: stylized-fact of inflation**
- **General theory of inflation: Long-run perspective**
- **General theory of inflation: Business cycle perspective and inflation dynamic**
- **Implications for policy design**

General concept of inflation

Inflation is a rise in general price level.

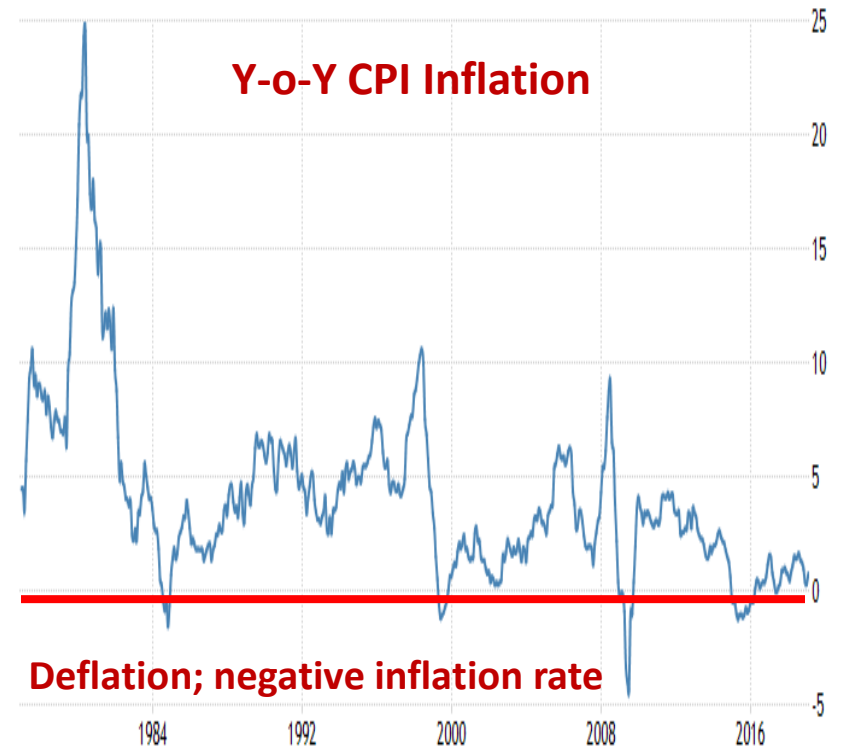
Headline CPI level

- A measure of cost of living index
- Monthly basis



SOURCE: TRADINGECONOMICS.COM | BUREAU OF TRADE AND ECONOMIC INDICES, THAILAND

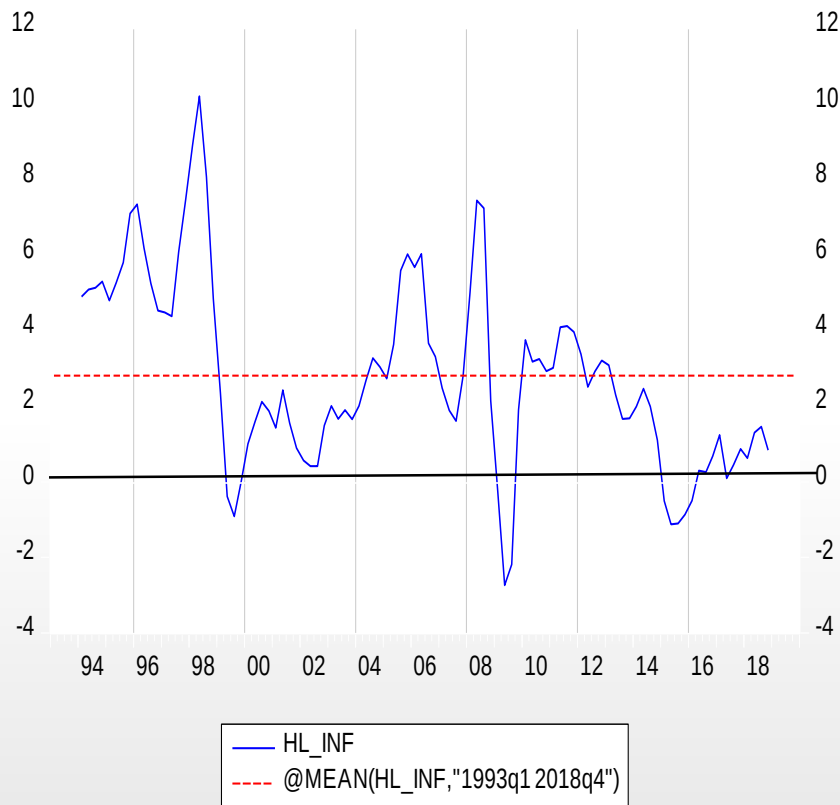
Y-o-Y CPI Inflation



SOURCE: TRADINGECONOMICS.COM | BUREAU OF TRADE AND ECONOMIC INDICES, MINISTRY OF COMMERCE, THAILAND

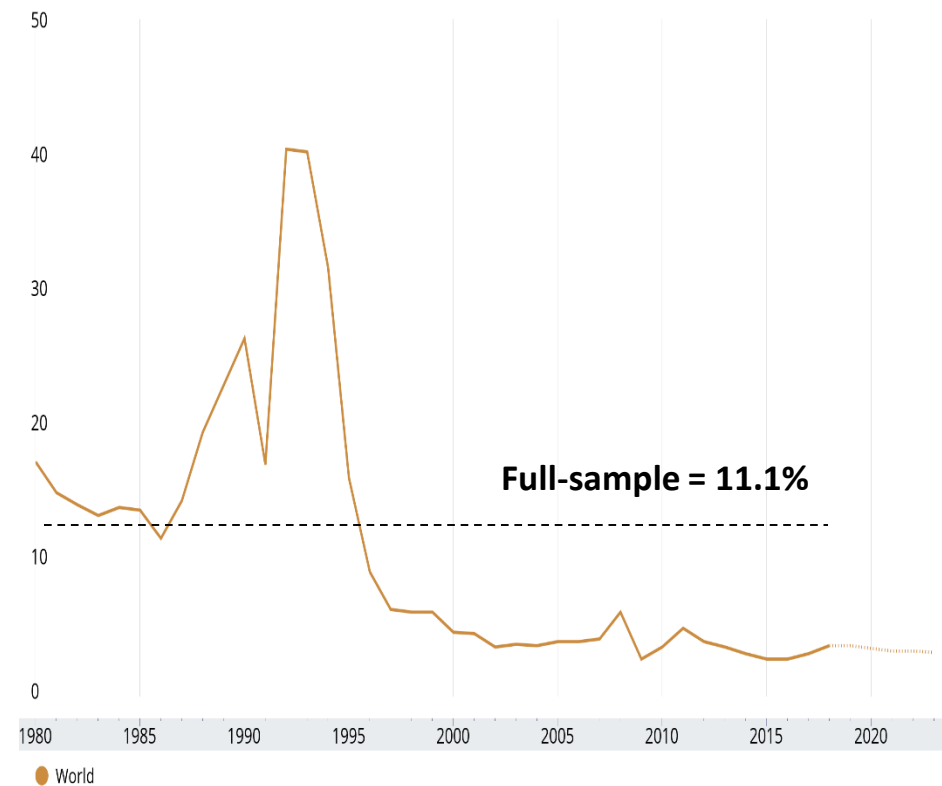
Stylized facts 1 “Positive (average) inflation is a global phenomena”

Average inflation rate is positive; overtime, cost of living has increased.



IMF DataMapper

Inflation rate, average consumer prices (Annual percent change)



Global inflation rate (annual)

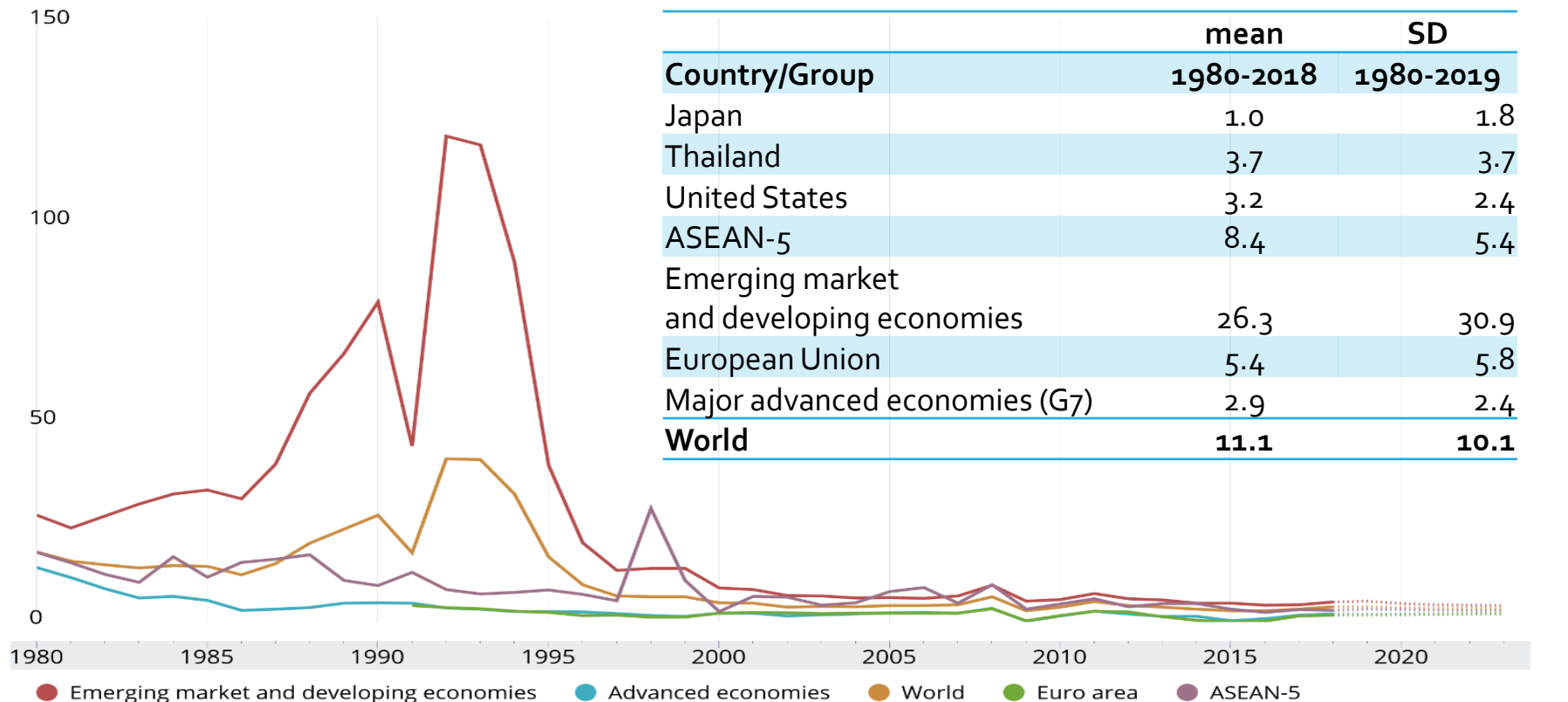
©IMF, 2018, Source: World Economic Outlook (October 2018)

Stylized facts 2 “inflation outcome has varied across countries”

2.1 Inflation rates among the advanced economies have been lower than those in emerging markets

2.2 Lower average inflation rate *tends to be associated with* lower inflation volatility.

IMF DataMapper

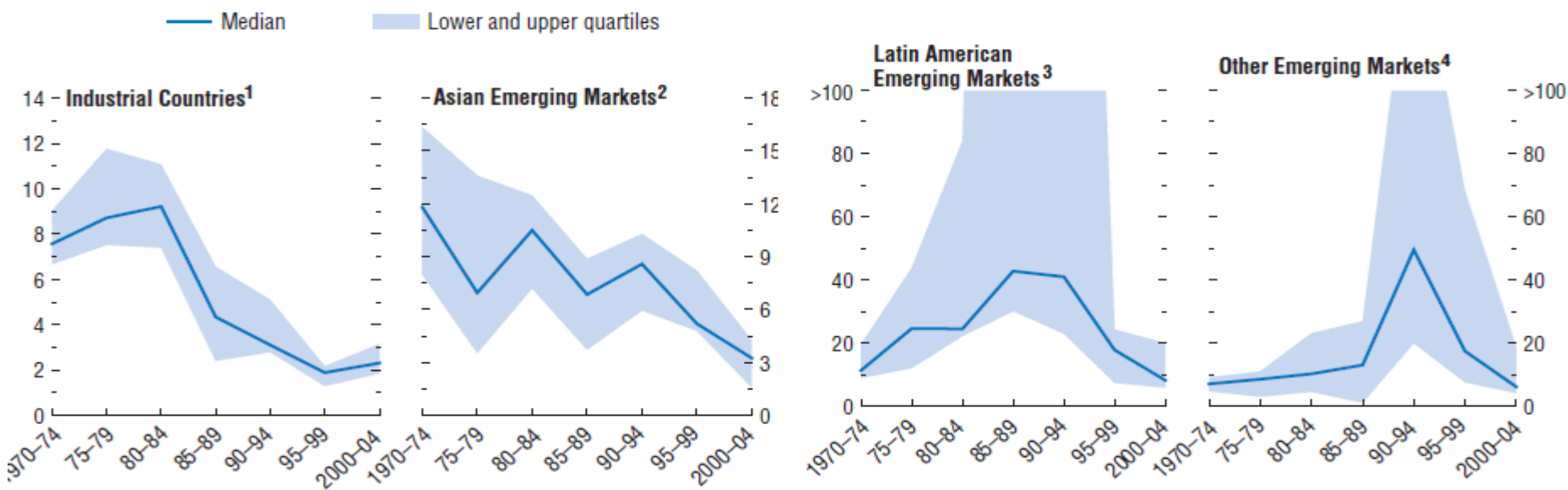


©IMF, 2018, Source: World Economic Outlook (October 2018)

Stylized facts 3 “Declining trend of inflation rate has been a global phenomena.”

Inflation rate has slowly declined among different countries; average inflation during the 2000s has been much lower than that of before 2000s.

Country/Group	1980-1984	1985-1990	1991-1994	1995-1999	2000-2004	2005-2009	2010-2014	2015-present	before 2000	after 2000	1980-2018
Japan	3.9	1.1	1.8	0.4	-0.5	0.0	0.4	0.6	1.9	0.1	1.0
Thailand	8.4	3.2	4.6	5.1	1.7	3.2	2.8	0.2	5.3	2.0	3.7
United States	7.5	3.6	3.2	2.3	2.6	2.6	2.0	1.5	4.2	2.2	3.2
ASEAN-5	14.1	13.8	8.7	11.8	4.8	6.7	4.7	2.9	12.1	4.8	8.4
Emerging market and developing economies	27.6	45.5	93.7	19.7	7.1	6.6	5.7	4.6	46.7	6.0	26.3
European Union	11.3	6.9	12.2	5.3	2.7	2.3	1.9	1.0	8.9	2.0	5.4
Major advanced economies (G7)	7.9	3.3	3.1	1.8	1.8	2.0	1.7	1.3	4.0	1.7	2.9
World	14.9	16.6	32.7	8.9	4.2	4.3	4.0	3.2	18.3	3.9	11.1

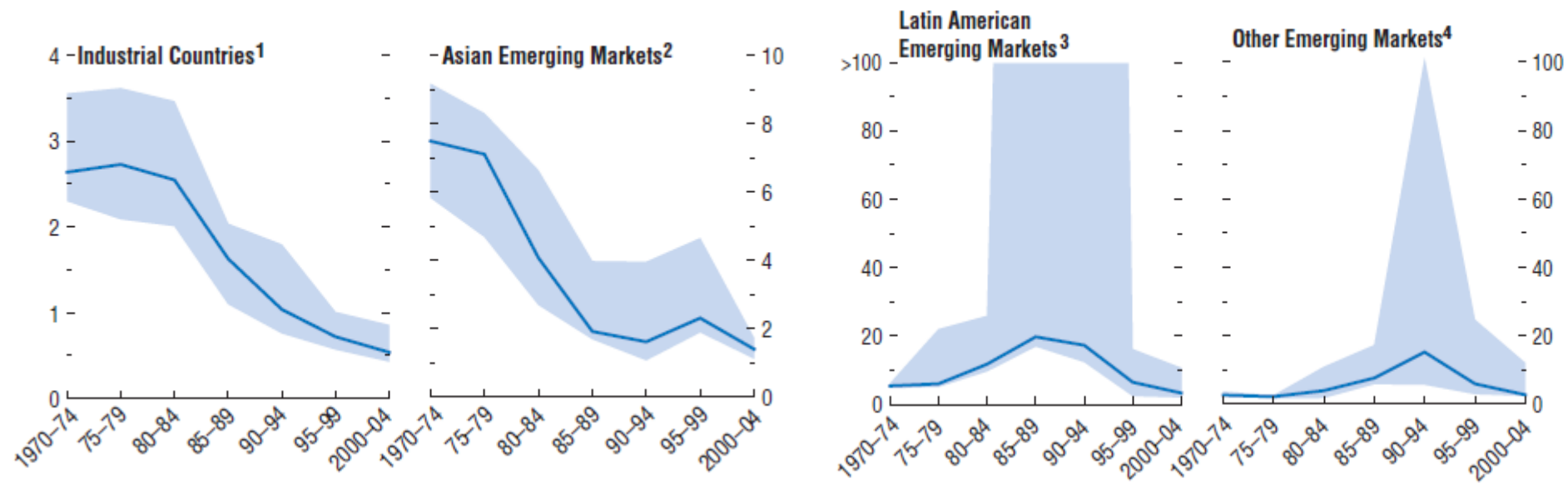


Stylized facts 4 “Along with its declining trend, inflation volatility has reduced too”

Since 2000, most countries have been successful in maintaining the price stability, i.e. *achieving low and stable inflation rate*.

Country/Group	before 2000	after 2000	1980-2018
Japan	1.9	0.5	1.8
Thailand	4.3	0.9	3.7
United States	2.9	0.5	2.4
ASEAN-5	5.3	1.0	5.4
Emerging market and developing economies	33.1	0.5	30.9
European Union	6.0	0.3	5.8
Major advanced economies (G7)	2.9	0.4	2.4
World	10.1	0.4	10.1

— Median Lower and upper quartiles



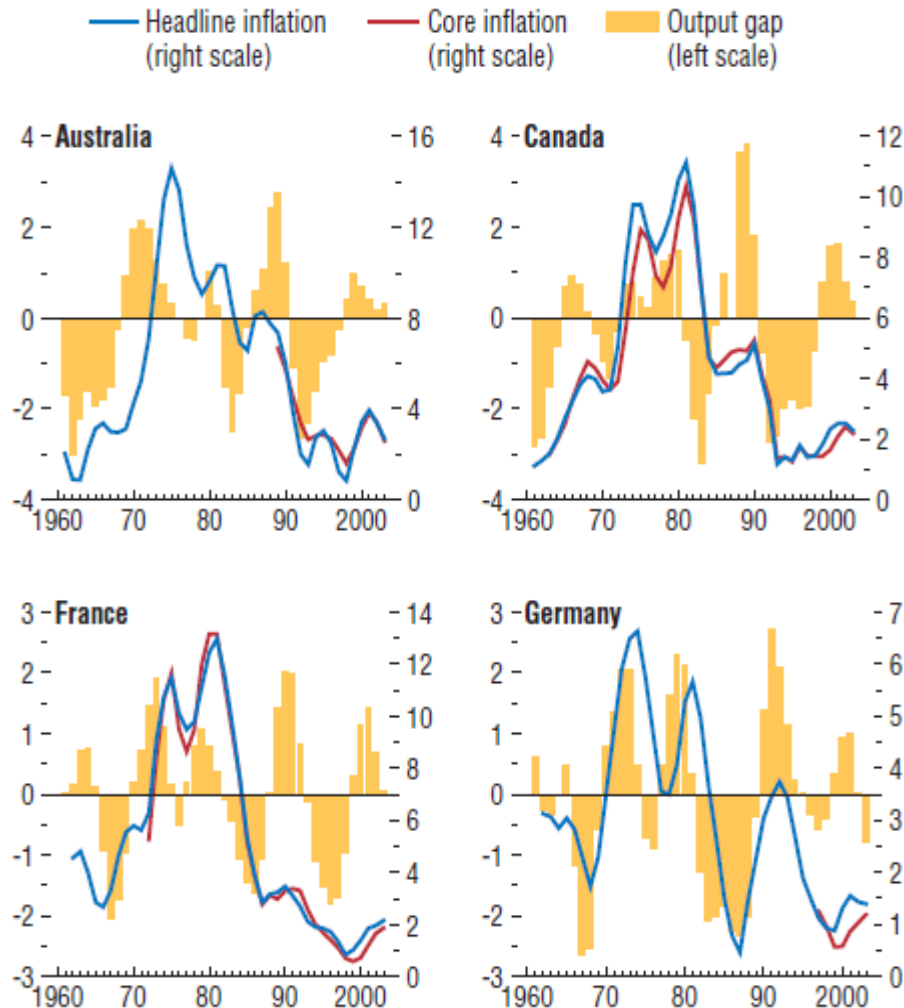
Stylized facts 5 “CPI inflation rate exhibits *some cyclical patterns*”

From business cycle perspectives, actual inflation rate moves around (downward) trend, and positively relates to output gap

Table 3.1. Estimates of Output-Inflation Sensitivity and Inflation Persistence in Advanced Economies¹

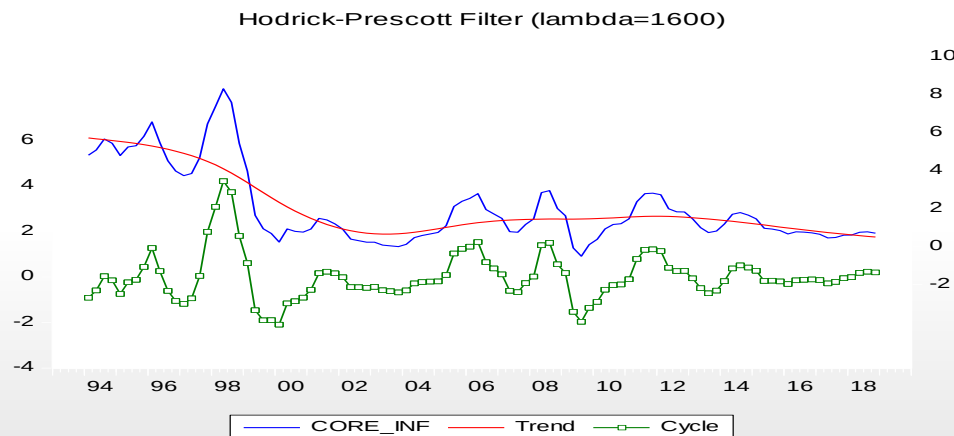
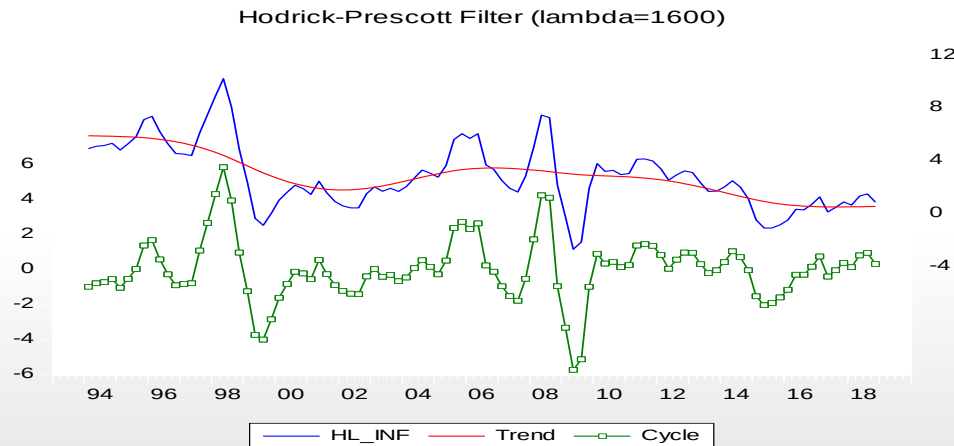
Inflation-output elasticity

1960	0.3
1983	0.3
2004	0.2



Stylized facts 5 “CPI inflation exhibits *some cyclical patterns*”

From business cycle perspectives, actual inflation rate moves around (downward) trend, and positively relates to output gap



5.1 Core is less volatile than headline

	CORE_INF_CYC	HL_INF_CYC
1993-2018	1.04	1.765
1993-1999	1.66	2.34
2000 - now	0.73	1.55

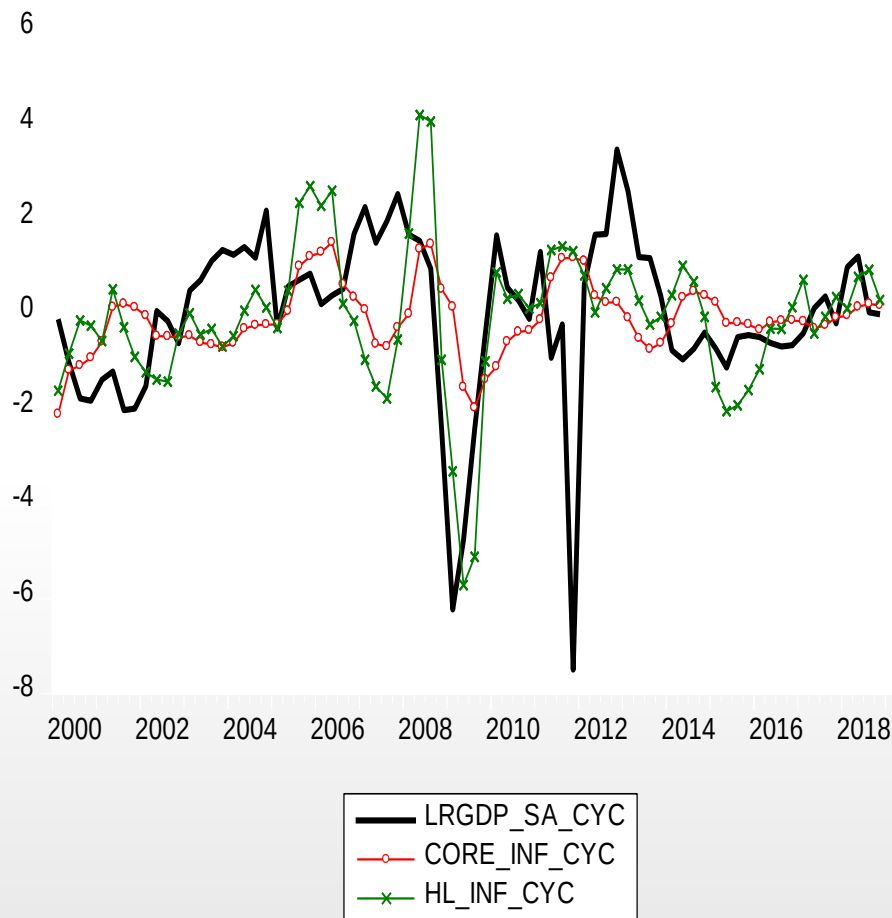
5.2 Both core and headline inflation are positively correlated.

Covariance Analysis: Ordinary
Date: 03/12/19 Time: 22:54
Sample: 2000Q1 2018Q4
Included observations: 76
Balanced sample (listwise missing value deletion)

Correlation Probability	CORE_INF_...	HL_INF_CYC	LRGDP_SA...
CORE_INF_CYC	1.000000 ----		
HL_INF_CYC	0.699870 0.0000	1.000000 ----	
LRGDP_SA_CYC	0.044387 0.7034	0.390608 0.0005	1.000000 ----

Stylized facts 5 “CPI inflation exhibits some cyclical patterns”

From business cycle perspectives, actual inflation rate moves around (downward) trend, and positively relates to output gap



Dependent Variable: HL_INF
Method: Least Squares
Date: 03/13/19 Time: 17:26
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.855629	0.231154	3.701552	0.0004
LRGDP_SA_CYC	0.172464	0.068793	2.506986	0.0146
DUM_2012Q1	-0.593524	0.234432	-2.531759	0.0137
DUM_GFC	-0.102385	0.432224	-0.236878	0.8135
HL_INF(-1)	1.133760	0.128467	8.825325	0.0000
HL_INF(-2)	-0.475238	0.191781	-2.478029	0.0157
HL_INF(-3)	-0.012009	0.184490	-0.065092	0.9483
HL_INF(-4)	0.049713	0.110812	0.448627	0.6551

Dependent Variable: CORE_INF_CYC
Method: Least Squares
Date: 03/13/19 Time: 17:49
Sample (adjusted): 2000Q1 2018Q4
Included observations: 76 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.026072	0.040238	-0.647934	0.5191
LRGDP_SA_CYC	0.059823	0.023961	2.496659	0.0149
CORE_INF_CYC(-1)	1.020801	0.114004	8.954064	0.0000
CORE_INF_CYC(-2)	-0.219503	0.170268	-1.289159	0.2016
CORE_INF_CYC(-3)	0.061212	0.157784	0.387945	0.6992
CORE_INF_CYC(-4)	-0.250139	0.101086	-2.474507	0.0158

Stylized facts: Key Questions?

Based on the facts, economists aim to explain the *cause and process of inflation* from two perspectives.

- **Long-run perspective:**
 - What drive the average inflation? (**Quantity theory of money**)
- **Business cycle perspective:**
 - How to explain the cyclical relationship of inflation? (**Phillips relation**)
 - What explain the moderation in the inflation rate and inflation volatility? (**Good luck/Good policy/Secular factors**)

AGENDA

- **An overview: stylized-fact of inflation**

- **General theory of inflation: Long-run perspective**

- **General theory of inflation: Business cycle perspective and inflation dynamic**

- **Implications for policy design**

How do economists explain the long-run (sustained) inflation?

In the long-run, economists “strongly” believe that *money growth* drives the “sustained” inflation rate.

- The famous theorem used to explain the average inflation is **the quantity theory of money**

$$M \times V = P \times Q$$



$$\% \Delta M - \% \Delta Q = \% \Delta P$$

- “Inflation is always a **monetary** phenomena. This usually occurs when **money growth is higher than output growth.**”

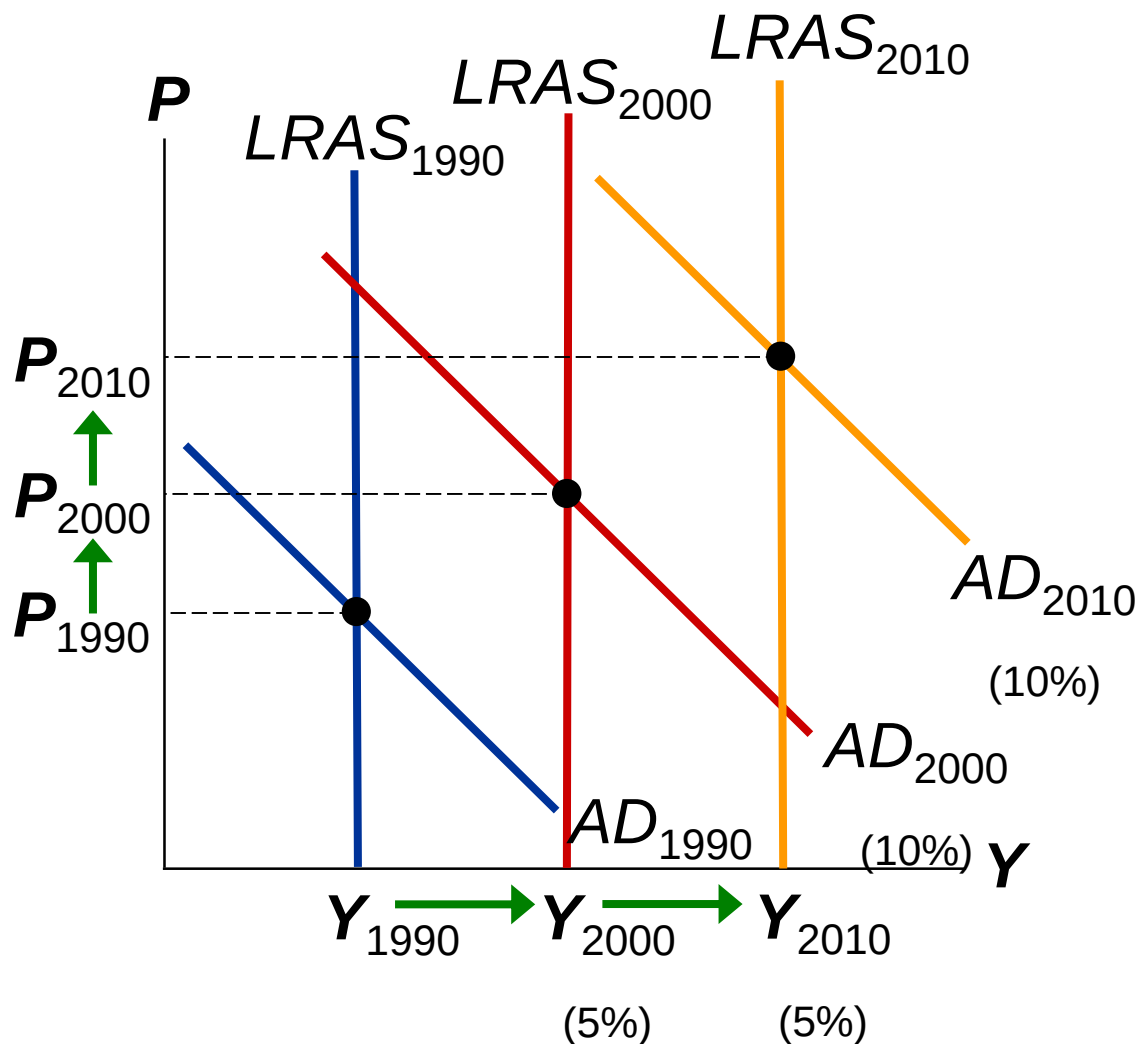
How do economists explain the long-run (sustained) inflation?

Using *AD* & *AS* to depict “long-run” inflation

Over the long run,
tech. progress shifts
LRAS to the right

and **growth in the
money supply**
shifts *AD* to the right.

Result:
ongoing inflation
and growth in
output.

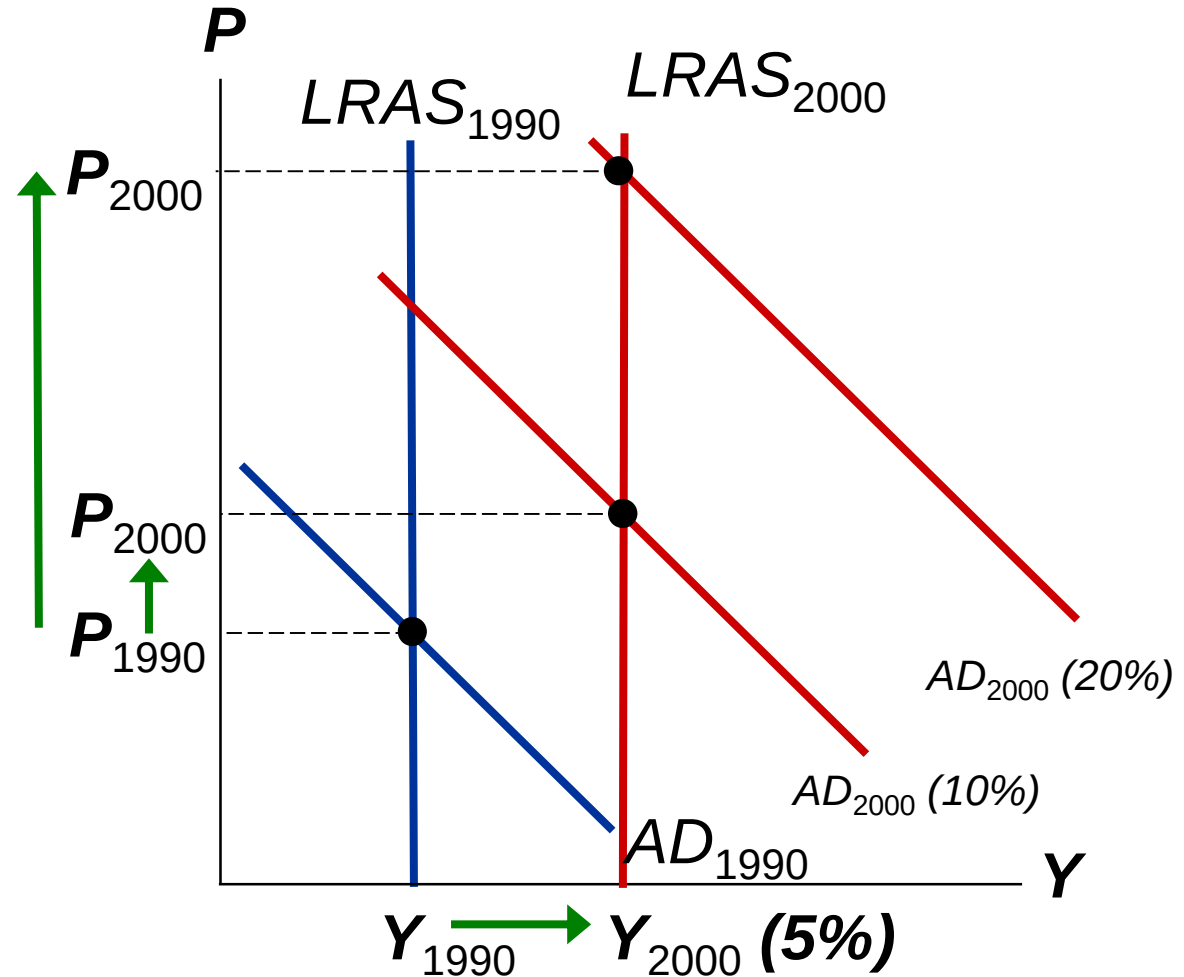


How do economists explain the long-run (sustained) inflation?

Higher money growth; higher inflation rate!

With higher money growth, AD grows more over time.

Result:
“Higher” long-term inflation



How well does the theory explain facts?

**The answer depends time horizon;
how long is the long-run?**

ADJUSTED MONEY GROWTH AND INFLATION

$\% \Delta M - \% \Delta Q$ v.s. $\% \Delta P$

FIGURE 3a 2-YEAR AVERAGES

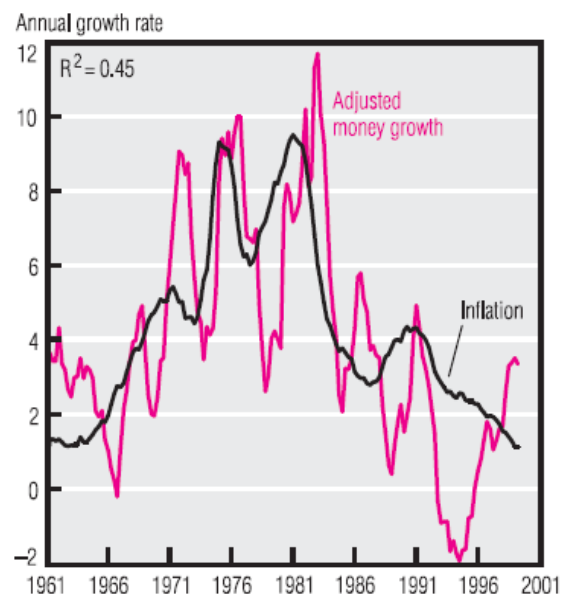


FIGURE 3b 4-YEAR AVERAGES

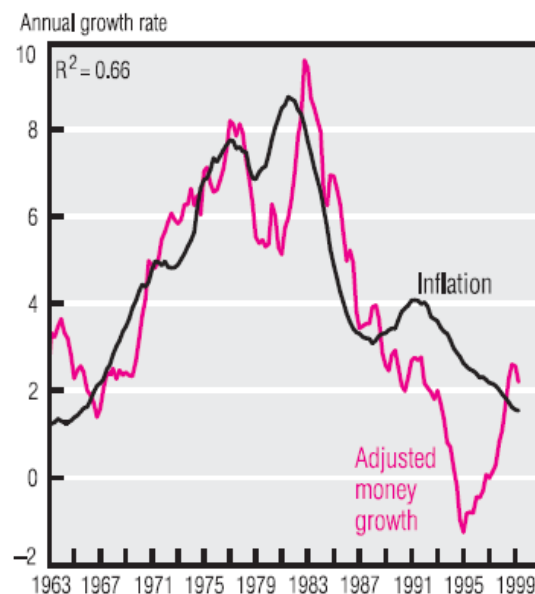
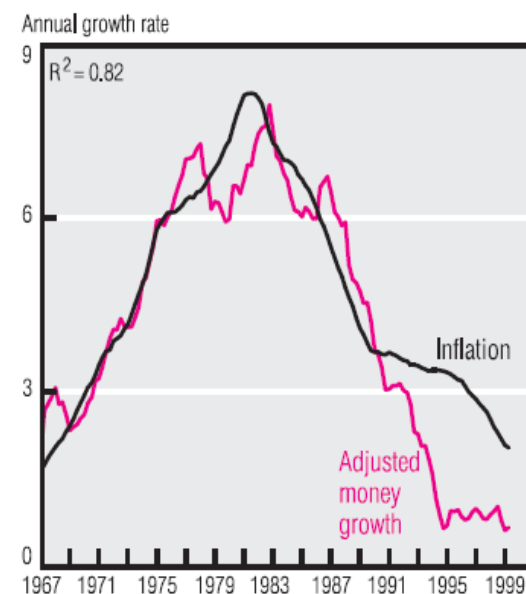


FIGURE 3c 8-YEAR AVERAGES



NOTE: Money is defined as M2. Inflation is defined using the implicit GDP price deflator (chained). Adjusted money growth is defined as money growth minus real GDP growth.

SOURCES: U.S. Department of Labor, Bureau of Labor Statistics; Board of Governors of the Federal Reserve System; and DRI/McGraw-Hill.

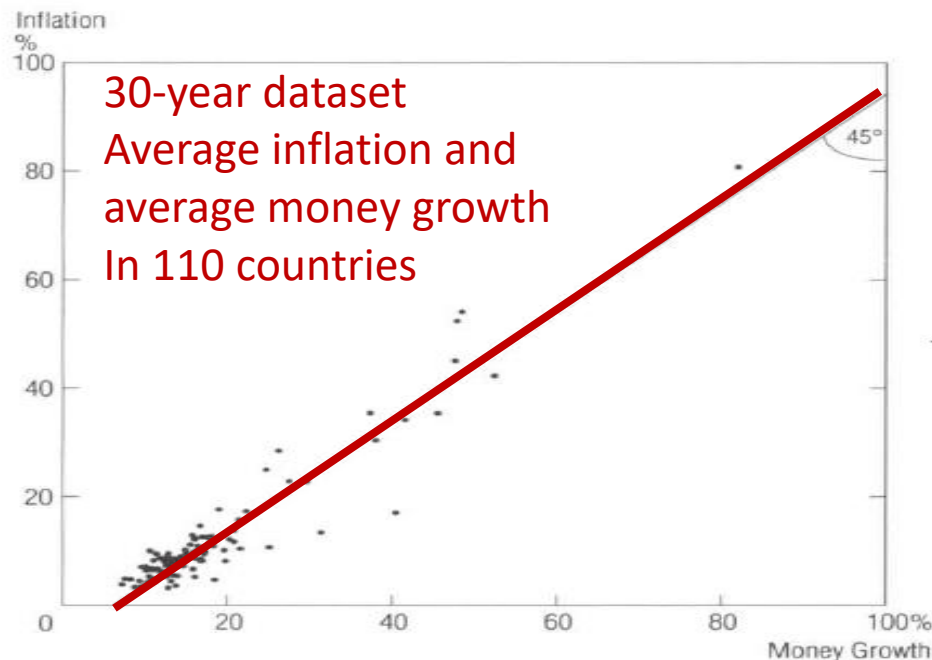
How well does the theory explain facts?

For long horizon data, many studies with cross-country comparison confirm the validity of the quantity theory.

Chart 1

Money Growth and Inflation: A High, Positive Correlation

Average Annual Rates of Growth in M2 and in Consumer Prices
During 1960–90 in 110 Countries



Source: International Monetary Fund

Table 1

Correlation Coefficients for Money Growth and Inflation*

Based on Data From 1960 to 1990

Sample	Coefficient for Each Definition of Money		
	M0	M1	M2
All 110 Countries	.925	.958	.950
Subsamples			
21 OECD Countries	.894	.940	.958
14 Latin American Countries	.973	.992	.993

*Inflation is defined as changes in a measure of consumer prices.
Source of basic data: International Monetary Fund

- Money growth **positively correlates** with inflation rate
- The finding is **robust!**

AGENDA

- **An overview: stylized-fact of inflation**
- **General theory of inflation: Long-run perspective**
- **General theory of inflation: Business cycle perspective and inflation dynamic**
- **Implications for policy design**

Business cycle perspective and inflation dynamic

Inflation dynamic concerns with the movement of inflation rate over the course of business cycles

- The famous theorem widely cited to explain the inflation dynamic is the Phillips relation
 - Negative relation between inflation and unemployment
- The relation was **one of the most controversial issues** in economics
 - Is the negative relation stable? Policy implications?
- Nowadays, **old debates** seem to be settled, but now being replaced by other **newer debates**
 - **Puzzle after the GFC:** Why has the negative relation between inflation and unemployment been less strong?

A brief history of theory of inflation dynamic

Phillips relation: comovement between inflation and “real economic activities”. The relation was first mentioned in 1958 by A.W. Phillips

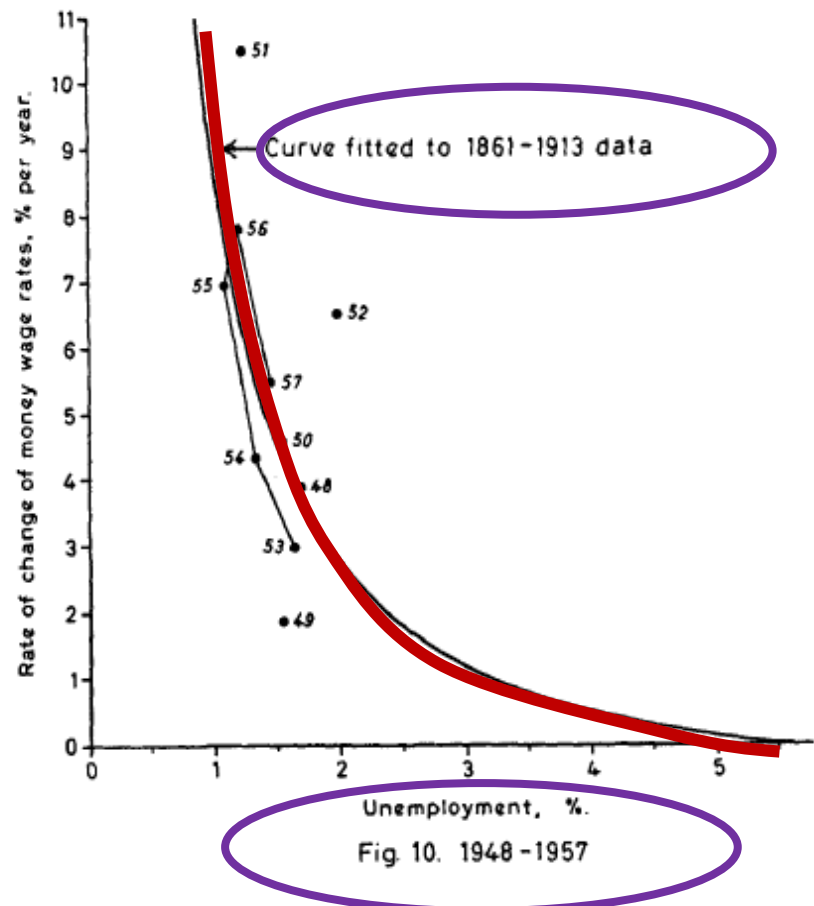
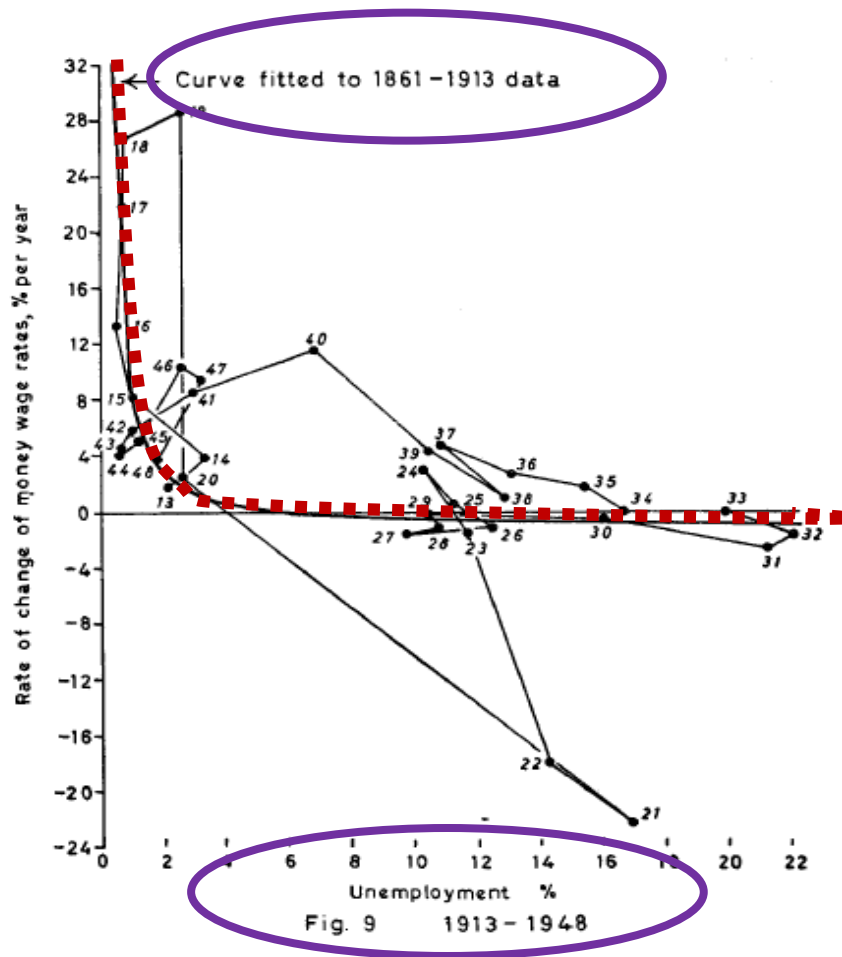


Alban William Phillips (1914-1975),
the London School of Economics.

- He discovered the inverse relationship 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**

A brief history of theory of inflation dynamic

What do we mean by the highly stable relation?
>> high predictive (forecasting) performance



A brief history of theory of inflation dynamic

The name '*Phillips curve*'



- 1960 Paul Samuelson and Robert Solow found a similar relation in the US data for 1900-1960.
 - To give the credit to Phillips, 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**.

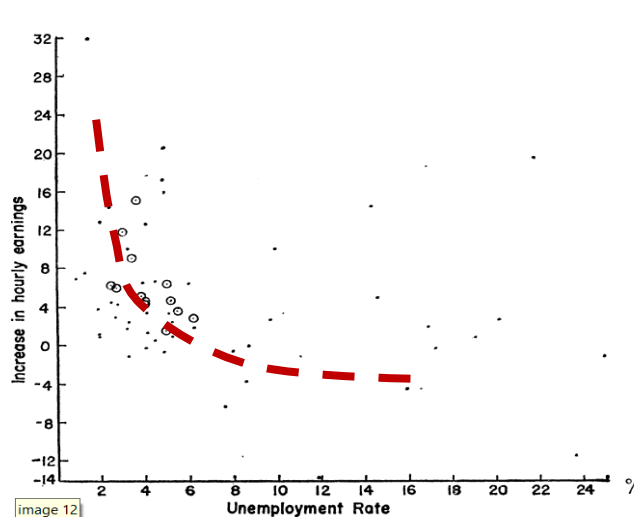
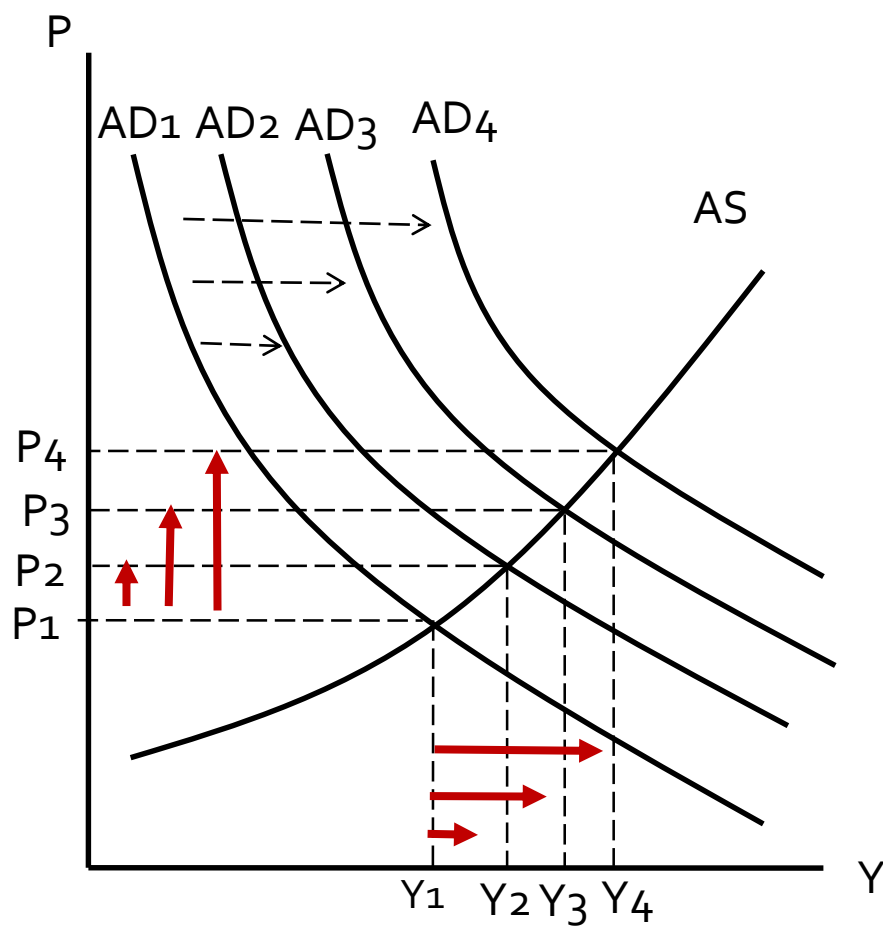


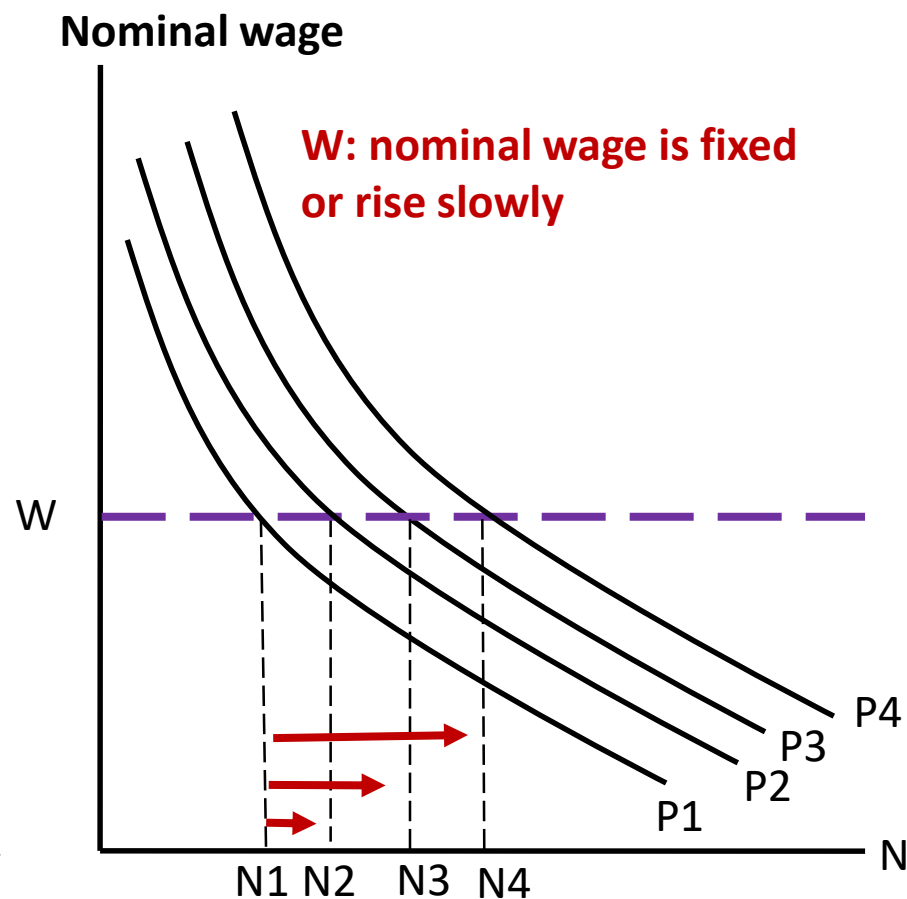
FIGURE 2
MODIFIED PHILLIPS CURVE FOR U.S.
This shows the menu of choice between different degrees of unemployment and price stability, as roughly estimated from last twenty-five years of American data.

Early explanation: Keynesian interpretation

Keynesian's economist interpreted the Phillips relation using the *nominal rigidities concept*; demand-pull effect



lower unemployment rate; higher rate of increase in price



Higher employment; lower unemployment rate

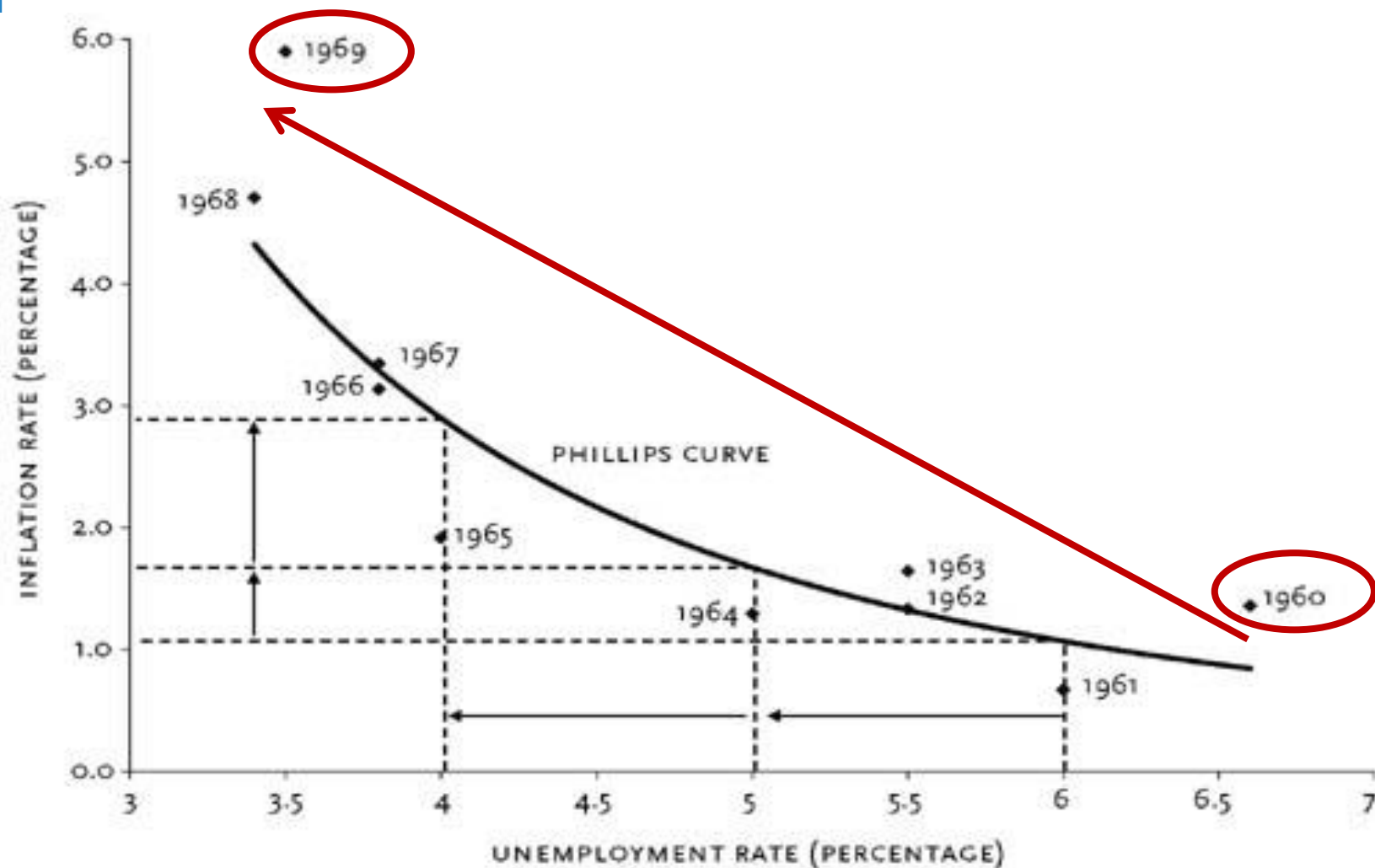
How important was the discovery of Philips relation?

The discovery greatly influenced the thinking paradigm of many policymakers; they became more interventionist.

- Because of the negative relationship, economists, as well as policymakers, believed in the *trade-off* between inflation and unemployment
 - Higher unemployment → Lower inflation
 - Lower unemployment → Higher inflation
- The trade-off is *permanent and can be exploited*
- Policymakers can choose between different **combinations of inflation and unemployment**, based on **preferences**.
 - (observed) Outcomes determined by **preference**.

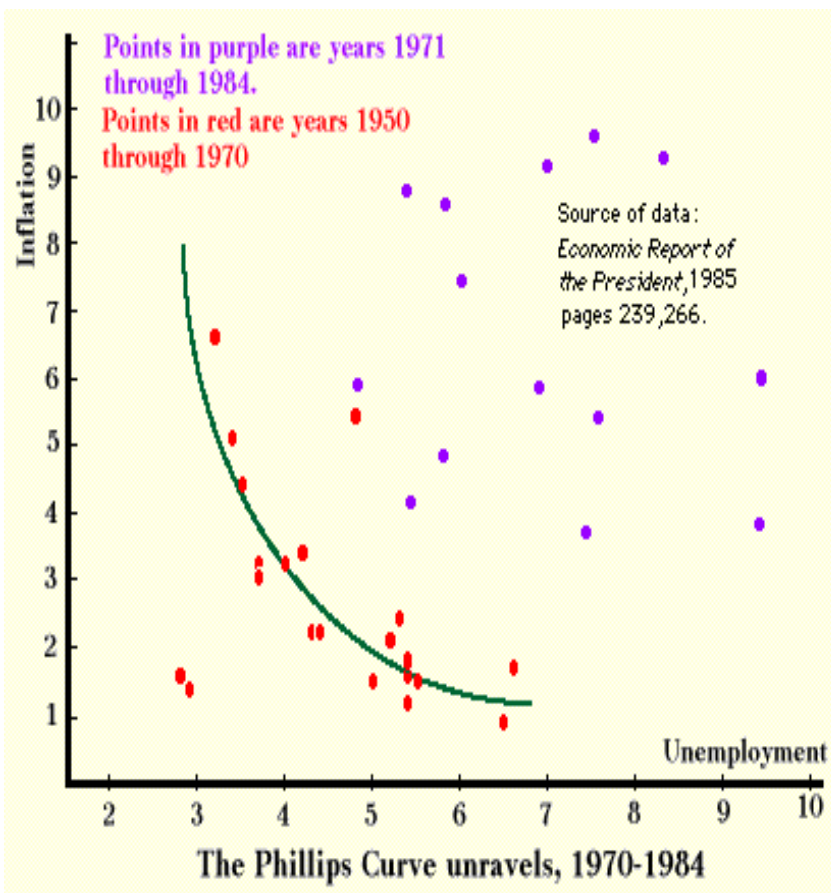
How important was the discovery of Philips relation?

During the 1960s, policymakers exploited the trade-off, and pursued aggressive expansionary policy, i.e. pro-growth policy



The breakdown of Philips curve: Oil shocks

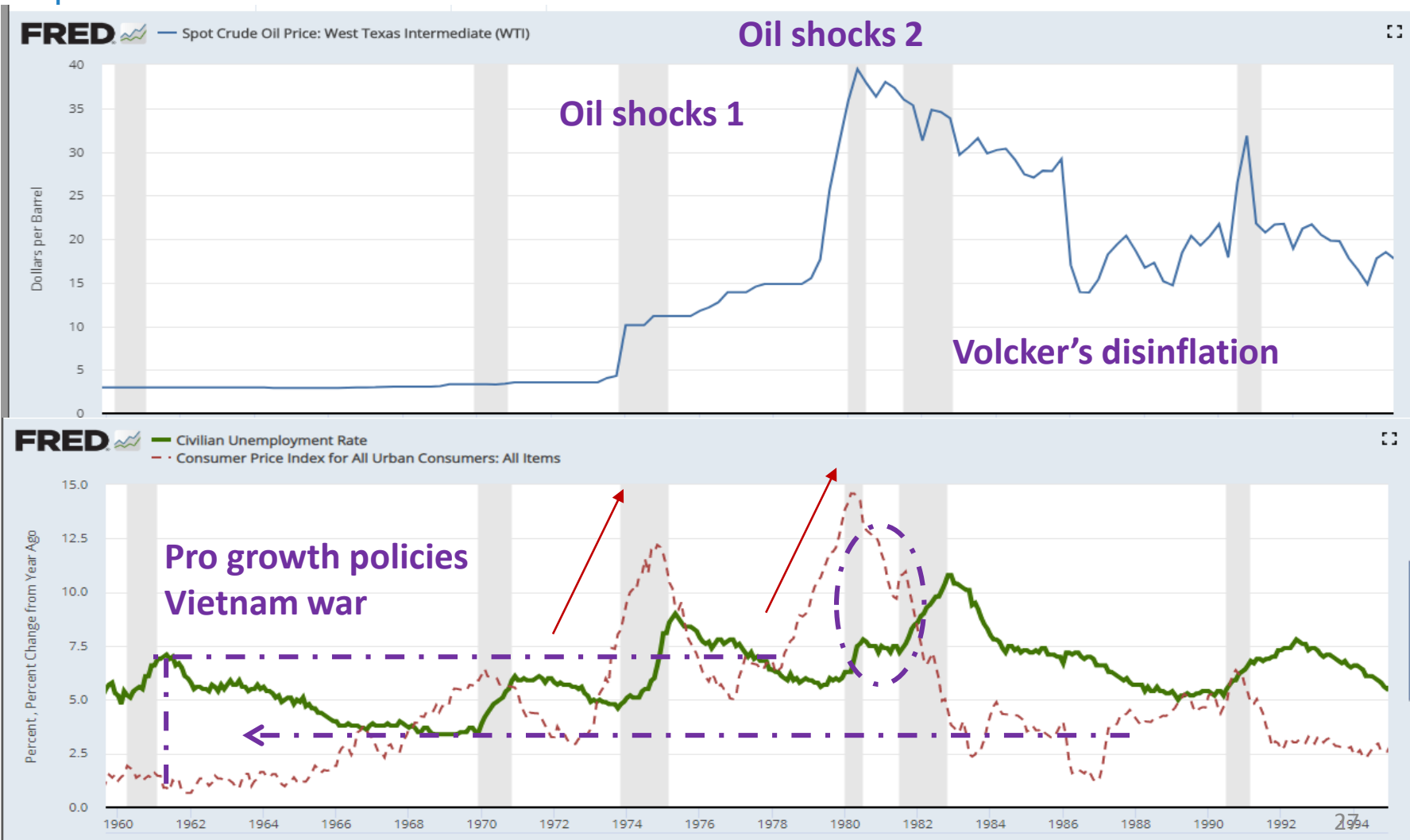
1970s was a good test for the Phillips curve; unfortunately, Phillips relation had seemed to have a wreckage at the first place!



- High inflation and high unemployment
--- **stagflation**.
 - Oil price hikes by the OPEC.
 - Inflation rises and high unemployment
- Shouldn't this be obvious? The Stagflation? Why break down?

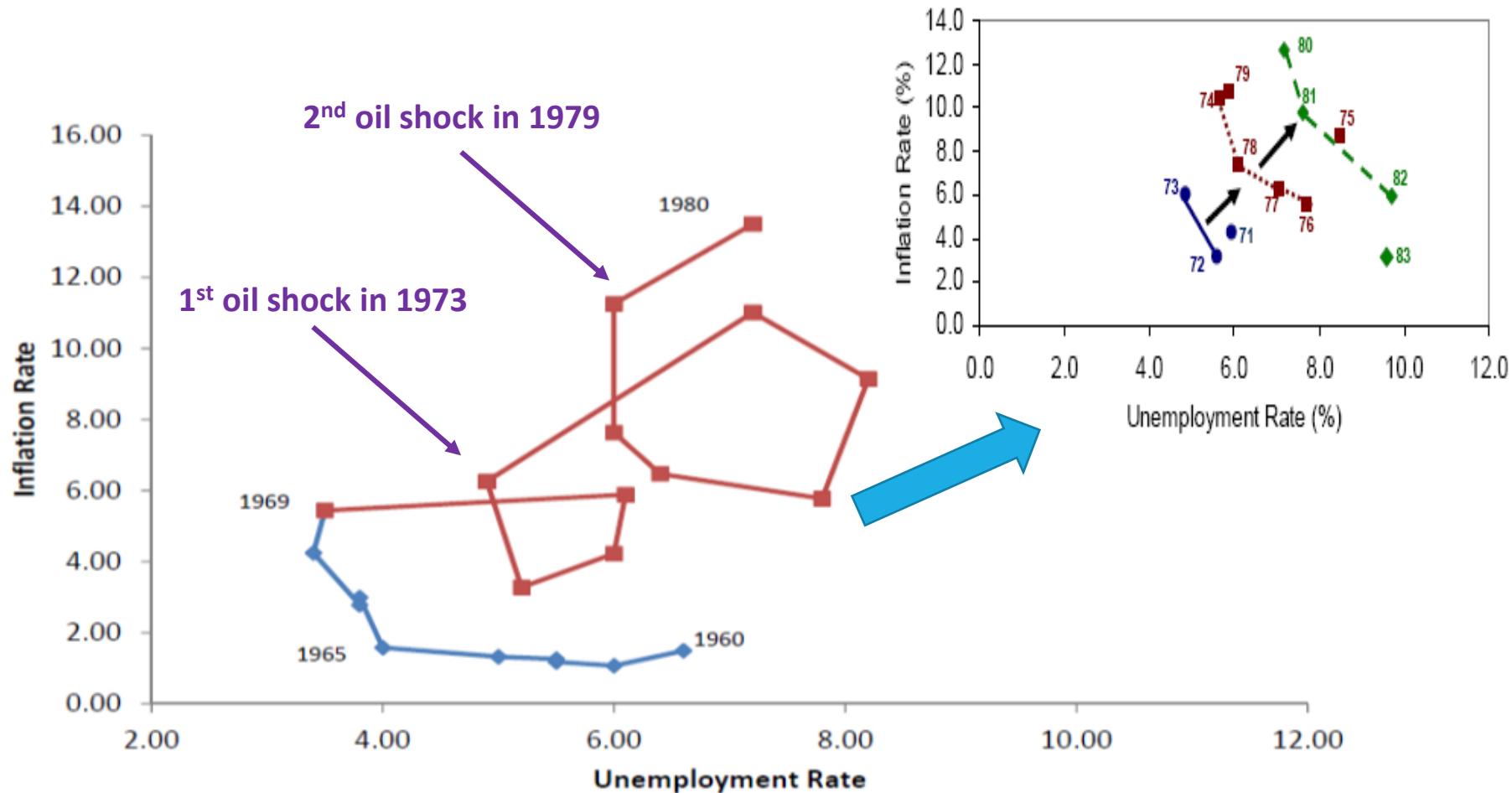
The breakdown of Philips curve

Why inflation rate did not come down even the oil price had reached its new stable high with no further increase, and the recession had been over.



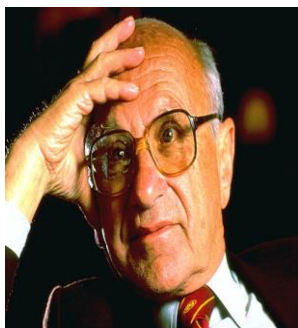
The breakdown of Philips curve: Accelerating inflation spiral

There seemed to be an inflation spiral during the 1970s; this suggested that the concept of inflation might be more complicated than economists thought they had known



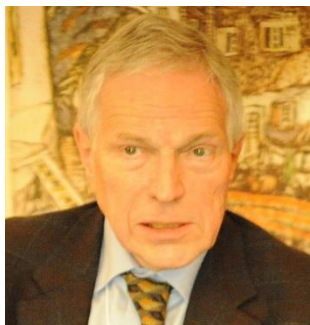
The rise of expectation-augmented Philips curve

Some economists had earlier warned that the Keynesian-based Phillips relation, and the conception on permanent tradeoff, may be *superficial*



Milton Friedman (1912-2006),
University of Chicago

Nobel Prize 1976.



Edmund S. Phelps, Jr. (b1933),
Columbia University

Nobel Prize 2006.

- The **accelerating of inflation** during 70s was the result of the *misconception* on the knowledge of inflation dynamic.
- Friedman and Phelps argued that there had been **NO such thing as a permanent trade-off**; the tradeoff exists in the short-run, but cannot be exploited.
- Friedman and Phelps argued for the role of the **natural rate of unemployment and inflation expectation** as additional factors that importantly explain the inflation dynamic.

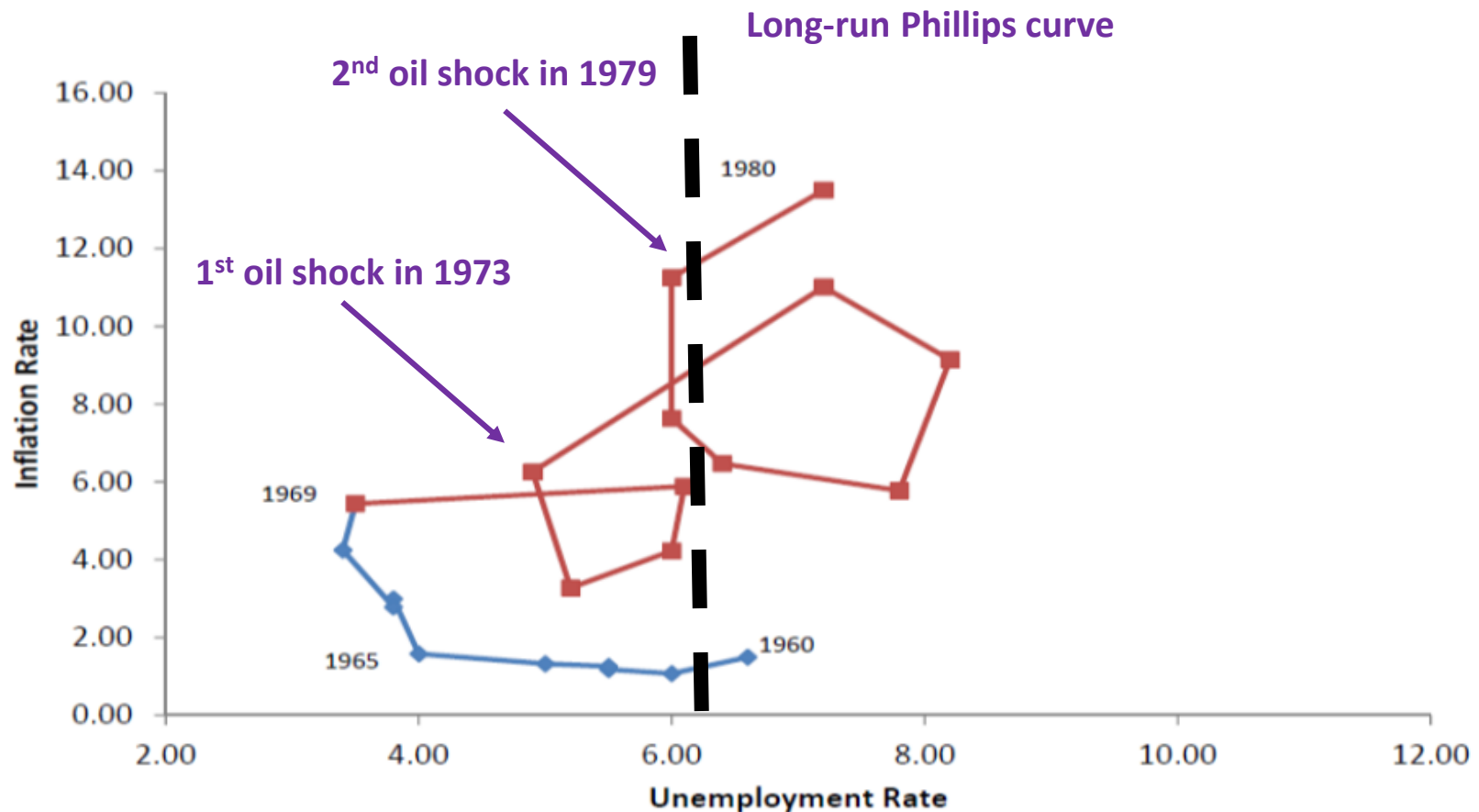
The rise of expectation-augmented Philips curve

Some economists had earlier warned that the Keynesian-based Phillips relation may be *superficial; inflation expectation plays a very important role*

- Friedman and Phelps argued that workers usually require higher wage under the presence of **inflation expectation**.
- When **inflation is expected to be higher**, workers **would require higher wage growth**.
- So, if the actual inflation is correctly expected, workers will be able to keep the same real wage as before, after getting paid higher in the nominal term
- The observation that we had lower unemployment during the higher inflation was merely the **result of misprediction** that should not last forever.
- In the long-run, workers can be quickly incorporating this into the way inflation expectation is formed, and hence the tradeoff should disappear; **the true Phillips curve is Vertical**

The breakdown of Philips curve: Accelerating inflation spiral

Accelerating inflation spiral was the self-discovery process of the long-run Philips curve



The rise of expectation-augmented Philips curve

Friedman and Phelps proposed the following notion of expectation-augmented Phillips curve

- They developed a notion of **expectation-augmented Phillips curve**.

$$\pi_t = \pi_t^e - \varepsilon(u_t - u_t^n)$$

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_t^n = the **natural rate of unemployment** at period t

The rise of expectation-augmented Philips curve

A notion of expectation-augmented Phillips curve

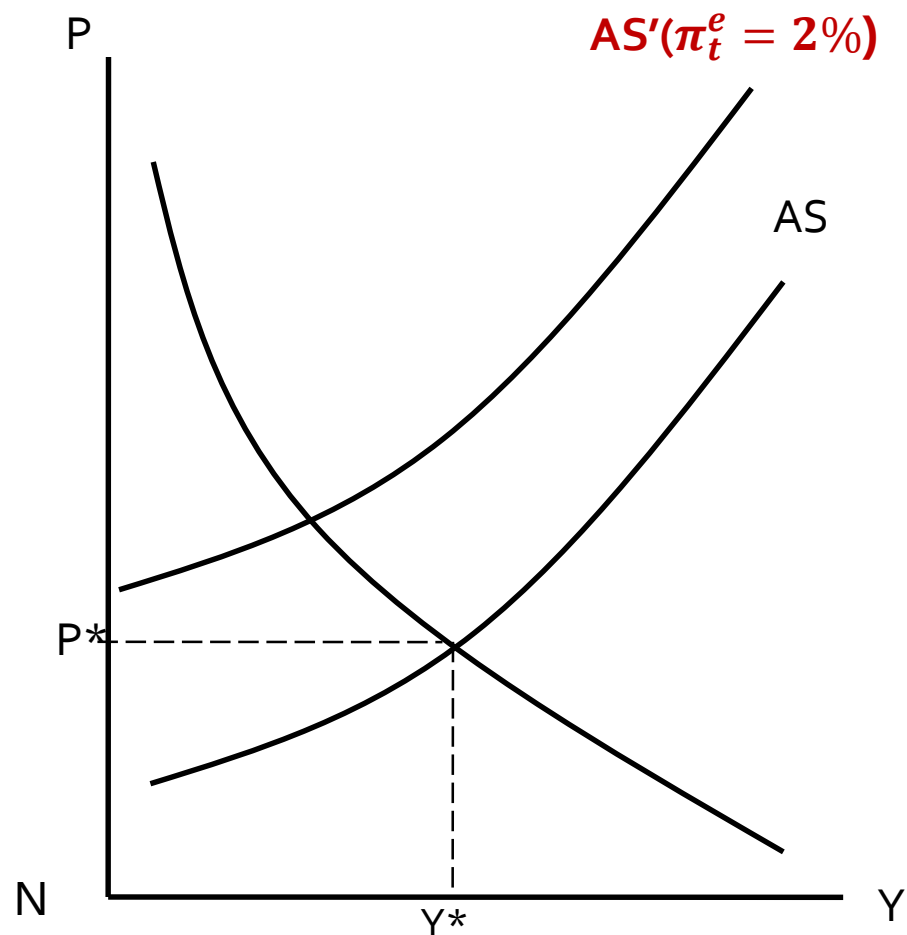
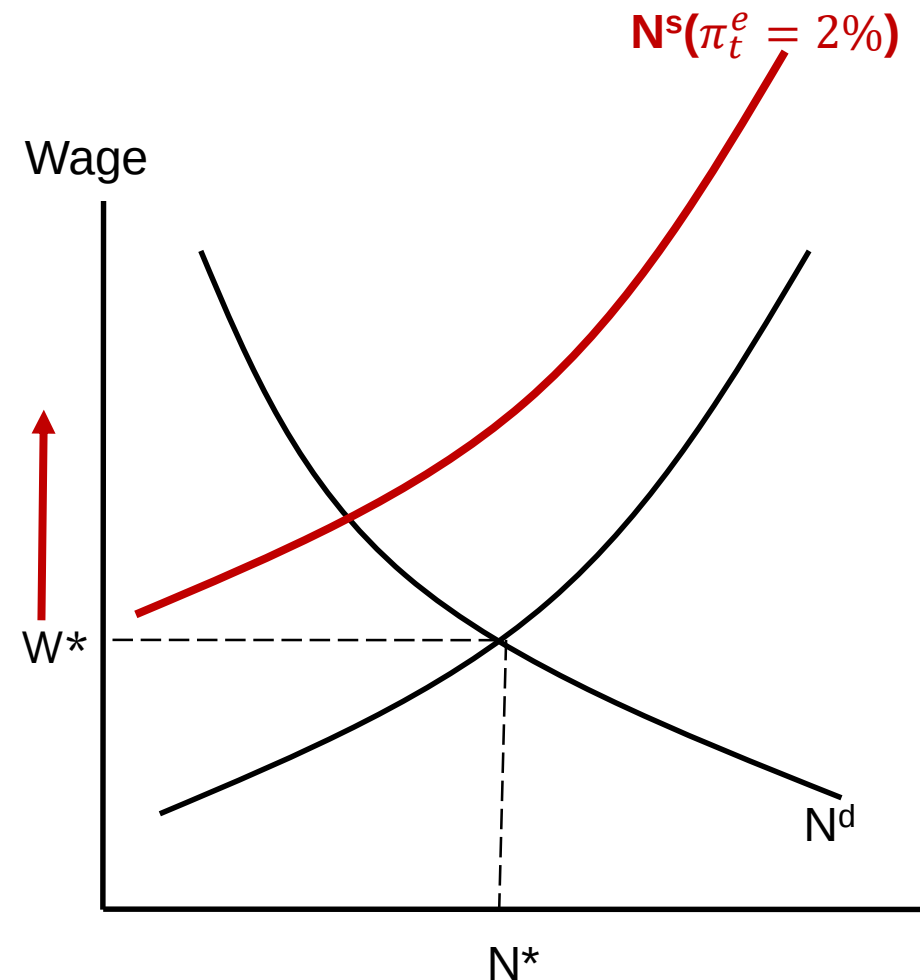
➤ **The expectation-augmented Phillips curve** captures the mechanism that Friedman and Phelps argued for

$$\pi_t = \pi_t^e - \varepsilon(u_t - u_t^n)$$

- If the $\pi_t = \pi_t^e$, then $u_t = u_t^n$
- If the $\pi_t > \pi_t^e$, then $u_t < u_t^n$
- If the $\pi_t < \pi_t^e$, then $u_t > u_t^n$

The expectation-augmented Philips curve: derivation

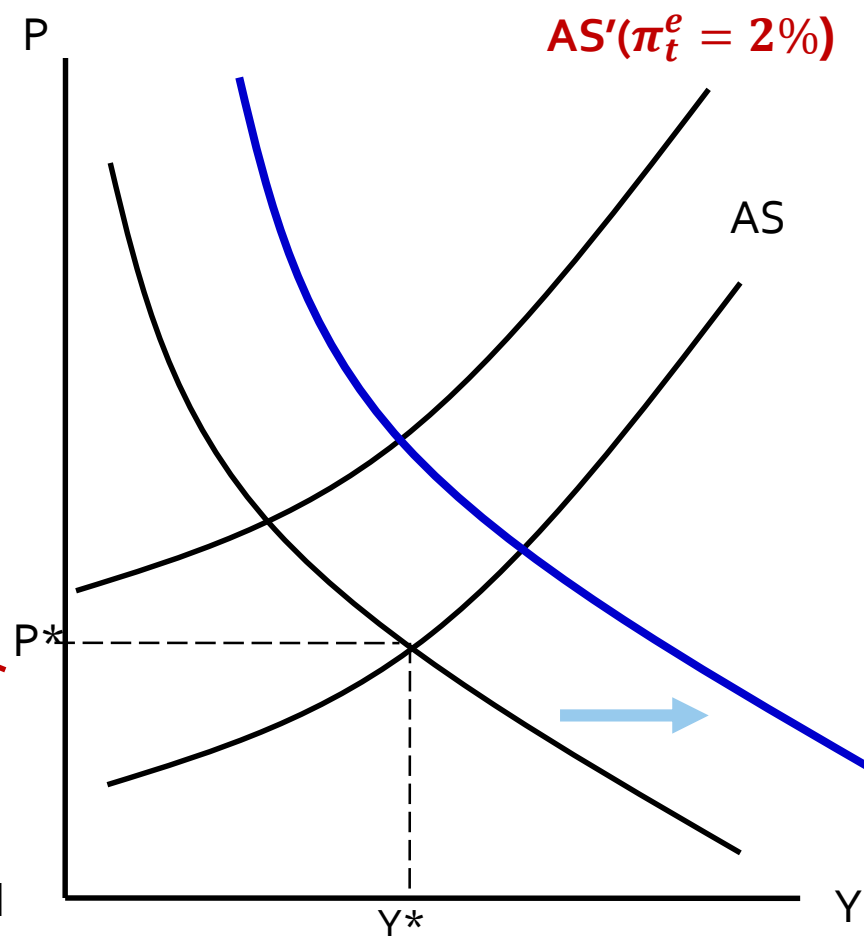
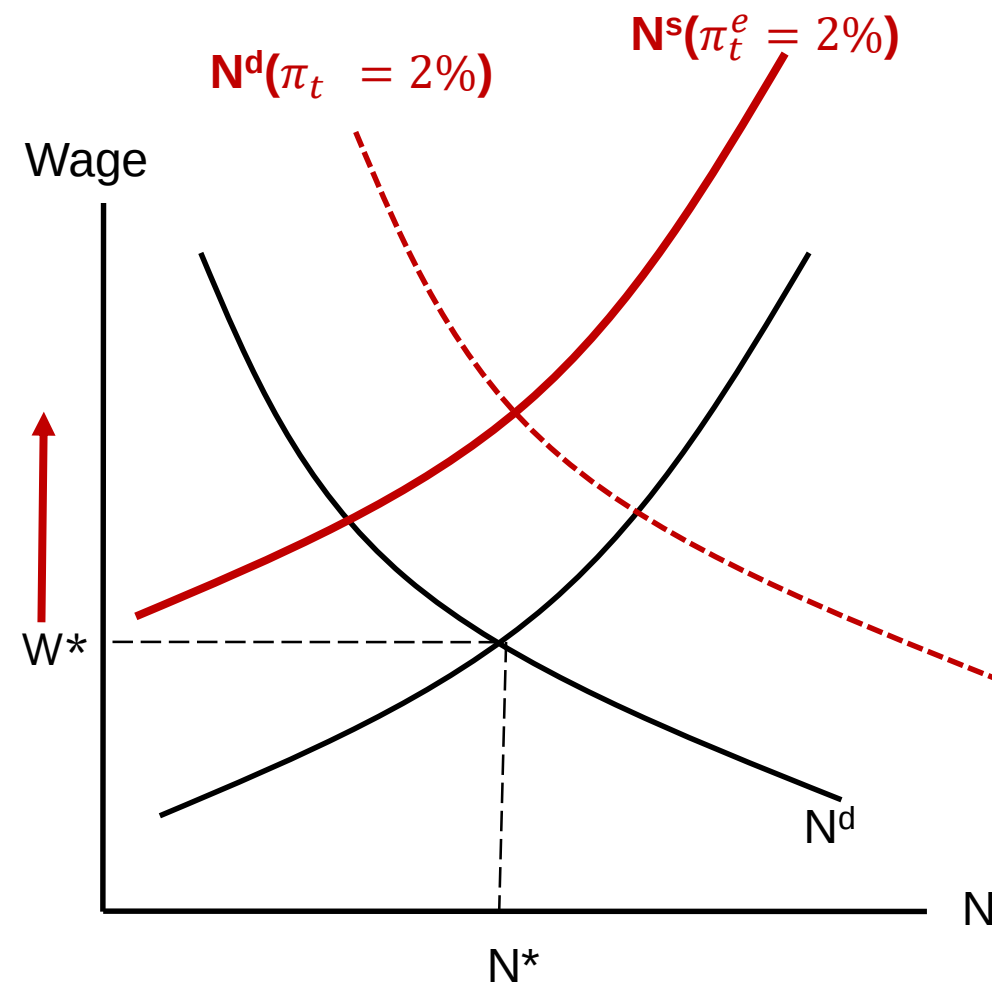
1. Suppose we started from the natural level (N^*, y^*)
2. Assume that workers expected a 2% inflation rate, and incorporated the expectation into the wage-setting and labor supply decision



The expectation-augmented Philips curve: derivation

3. Suppose money growth ensures that the actual level of inflation is 2%.

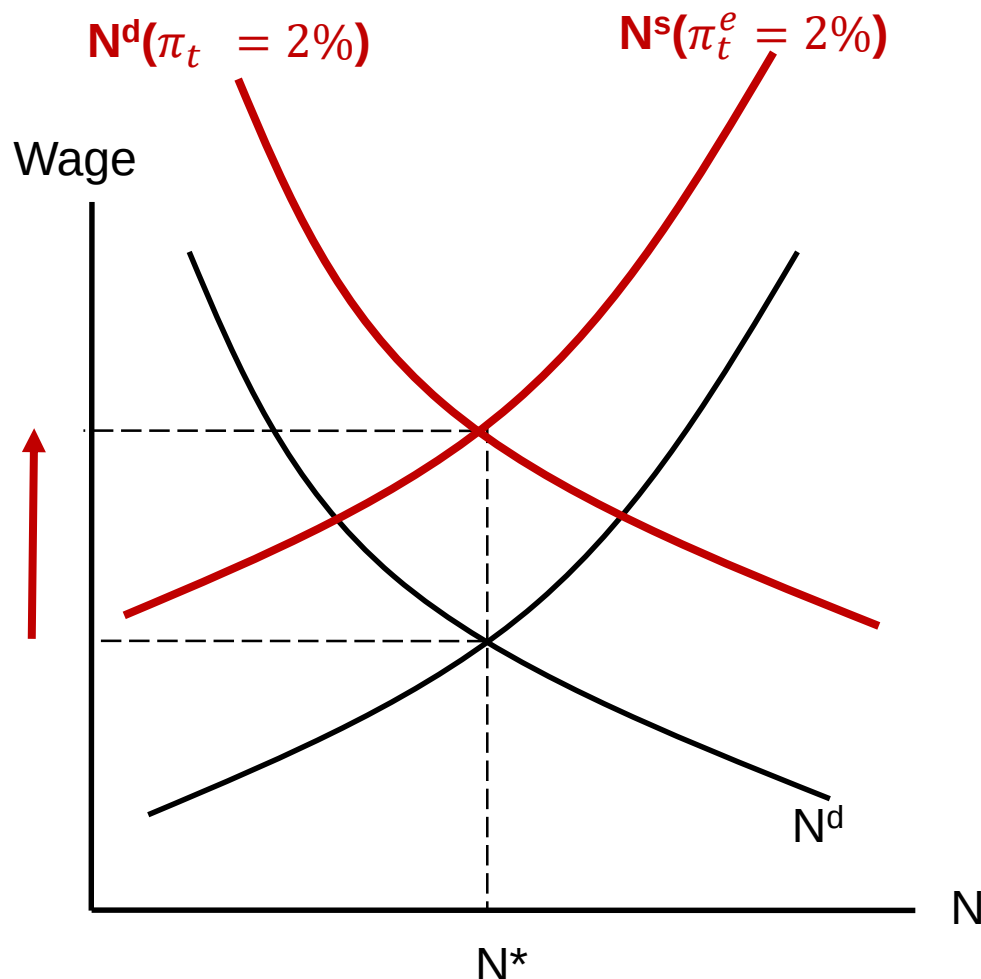
4. 2% increase in price will increase demand for labor; real wage is kept the same, and hence the level of employment and output



The expectation-augmented Philips curve: derivation

Assume that workers expected a 2% inflation rate, and incorporated the expectation into the wage-setting and labor supply decision

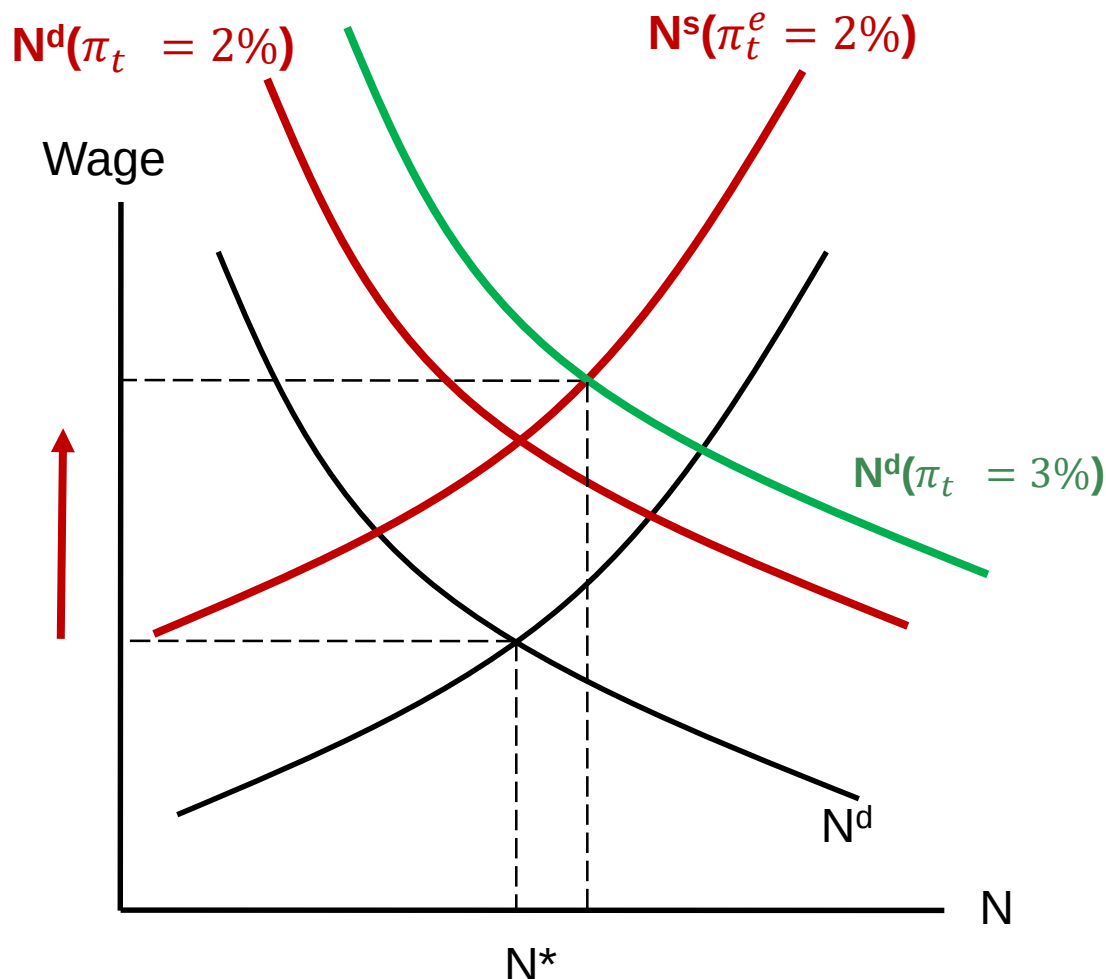
- For simplicity, suppose the original real wage is equal to "1" and the economy was operating at the natural rate of unemployment.
- With 2% expected inflation, workers should require for more pay, at least equal to 2%
- Recall that higher price will result in higher demand for labor; if the actual inflation is also 2%, demand for labor will increase to sufficiently result in a proportionate increase in nominal wage.
- Economy will continue to produce at the original N^* , i.e. natural rate of unemployment



The expectation-augmented Philips curve: derivation

Assume that workers expected a 2% inflation rate, and incorporated the expectation into the wage-setting and labor supply decision

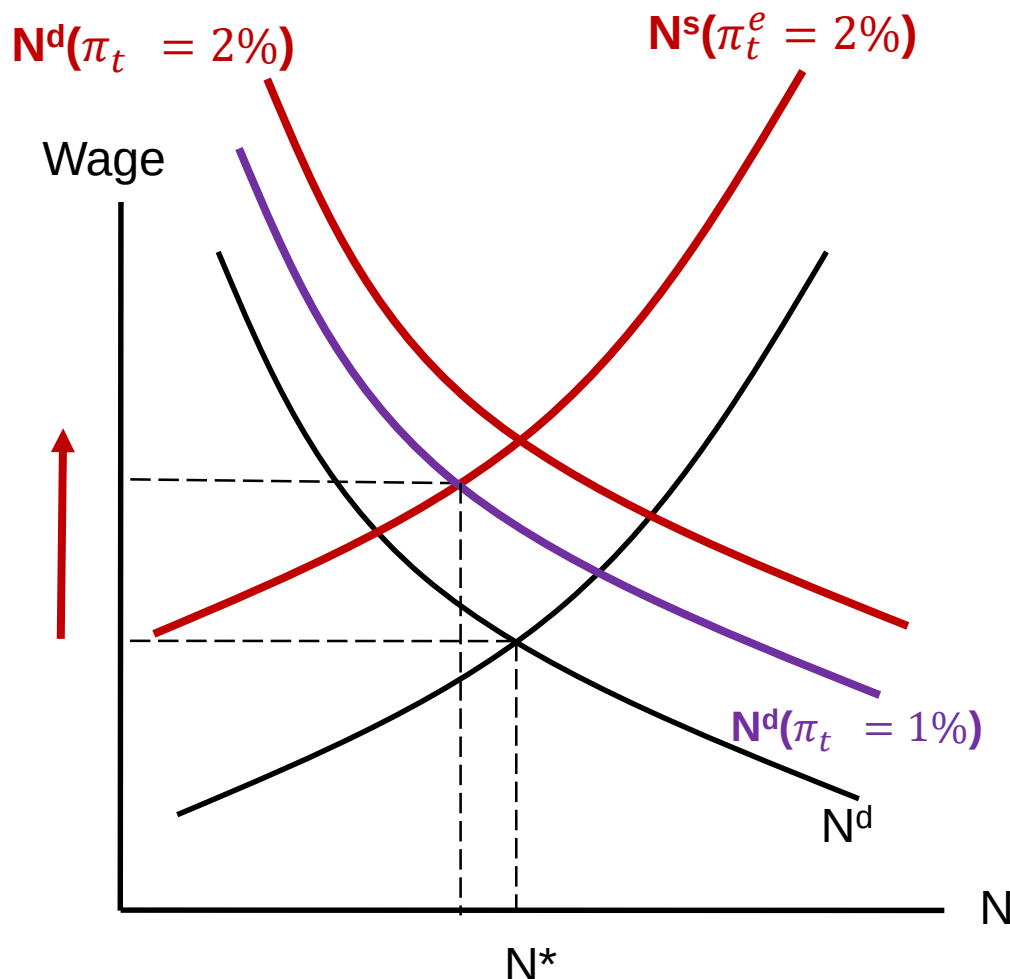
- But if actual inflation is 3%, then what?
- Workers were lead to believe that inflation will be 2%; They should have asked for an even more higher pay if they had known about this.
- Real wage is lower than expected.
- Overemployment: $u_t < u_t^n$



The expectation-augmented Philips curve: derivation

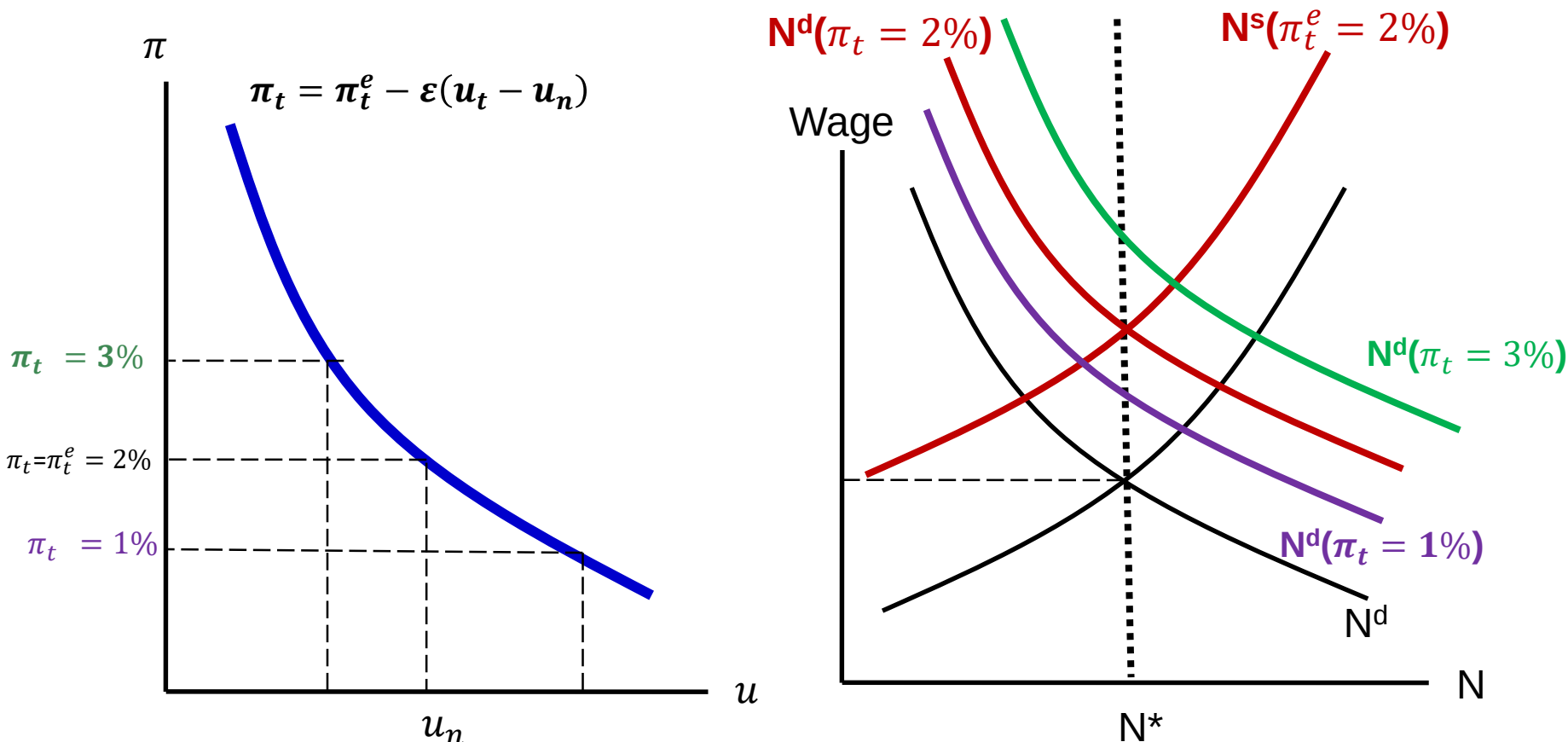
Assume that workers expected a 2% inflation rate, and incorporated the expectation into the wage-setting and labor supply decision

- But if actual inflation is 1%, then what?
- Workers were lead to believe that inflation will be 2%; asking too high nominal wage increase
- Real wage is higher than expected
- Underemployment: $u_t > u_t^n$



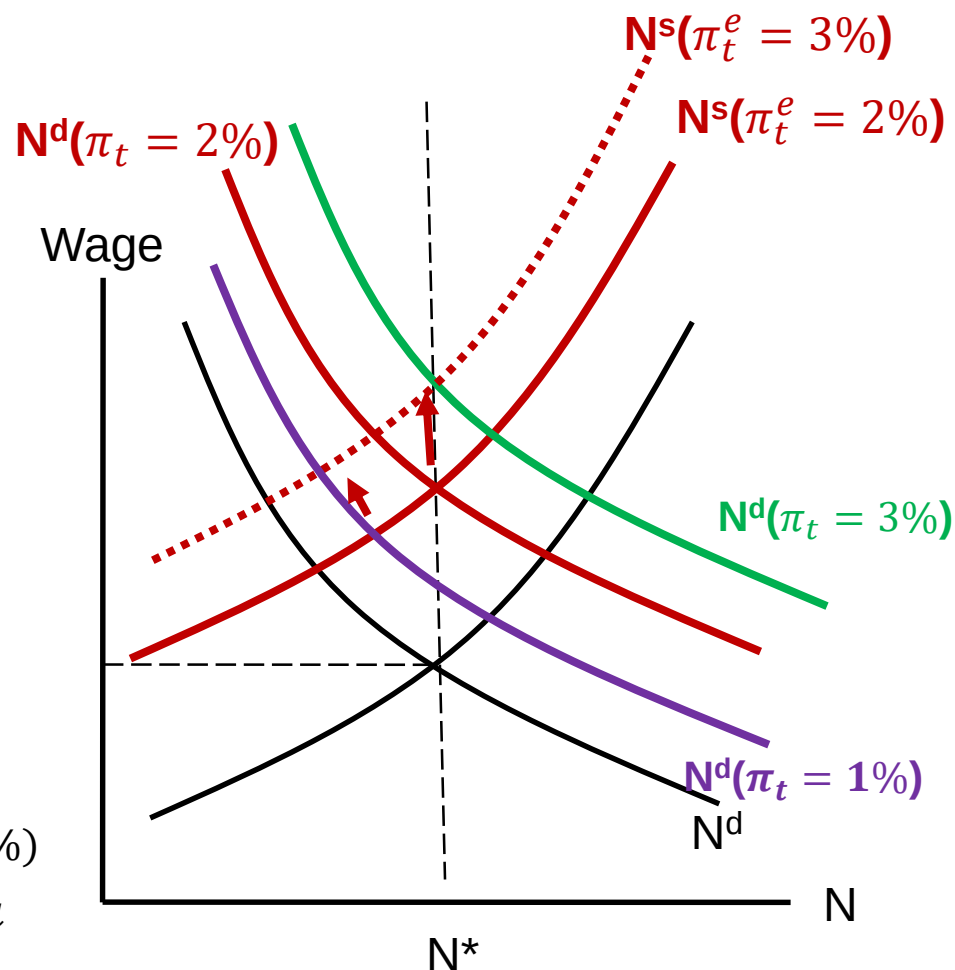
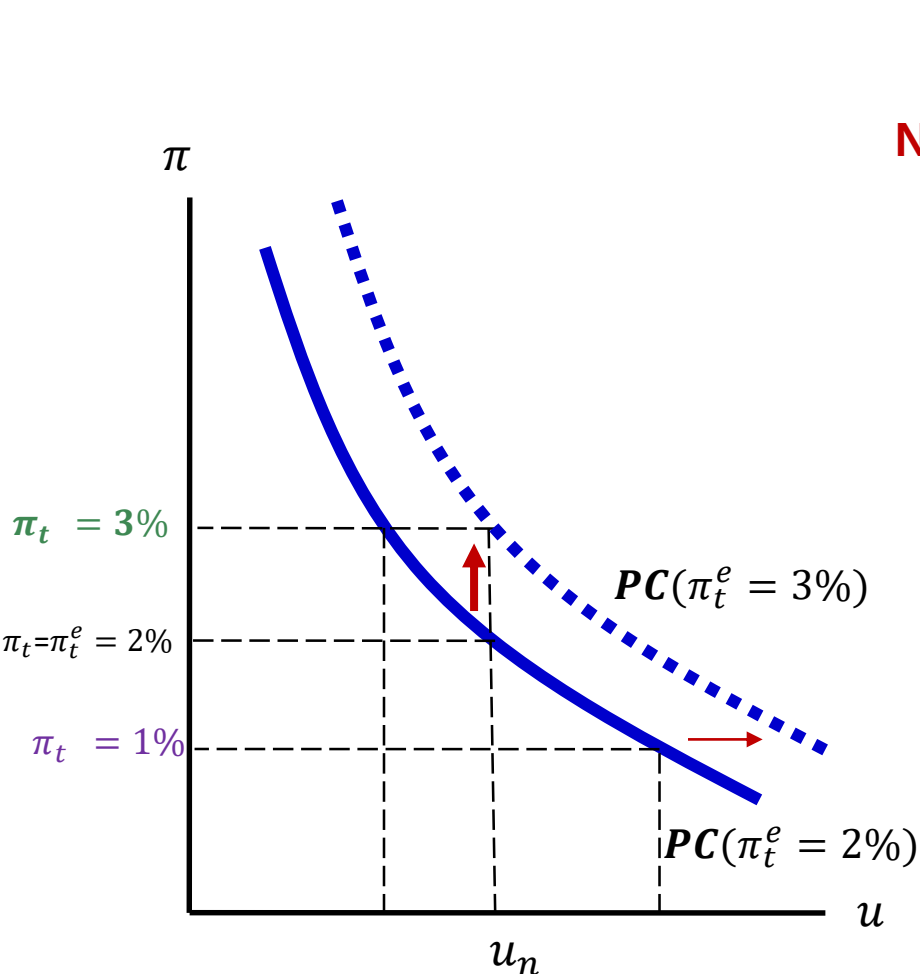
The expectation-augmented Philips curve: derivation

Assume that workers expected a 2% inflation rate, and incorporated the expectation into the wage-setting and labor supply decision



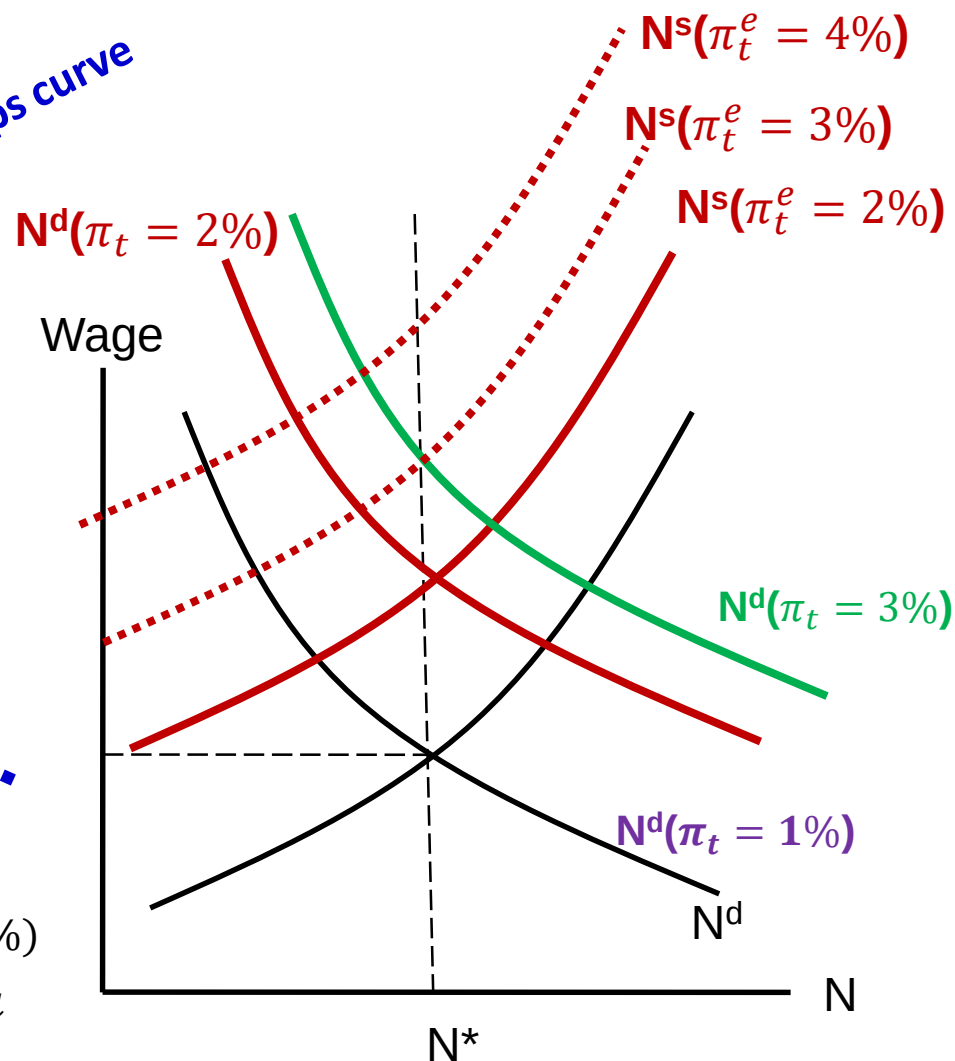
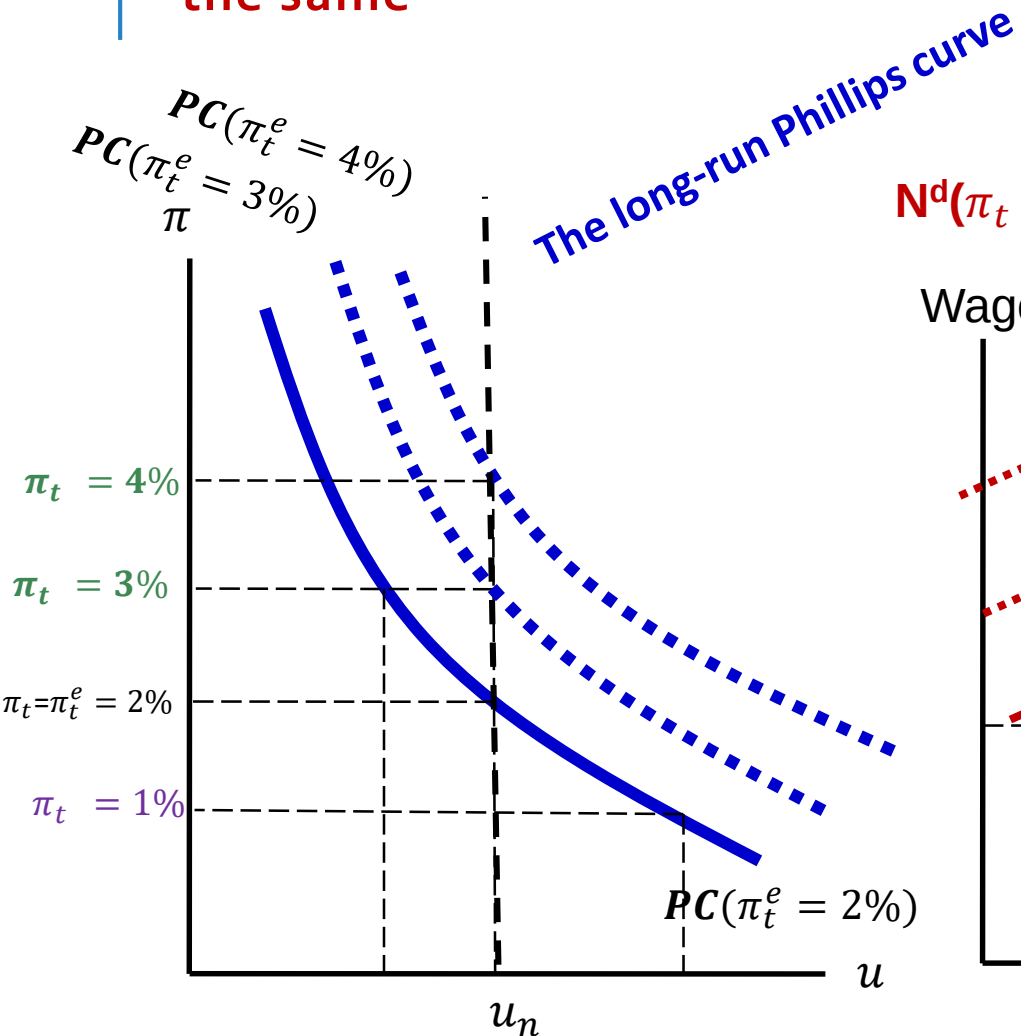
The expectation-augmented Philips curve: derivation

Higher expected inflation will shift up the Phillips curve; higher unemployment rate for the same actual inflation



The expectation-augmented Philips curve: derivation

Given correct expectation, higher expected inflation will lead to higher inflation; however, the unemployment rate remains the same



Why did the economists get lured to believe that the relationship between “inflation” and “output” can be captured by the Phillips curve -- permanent trade off?

➤ The tradeoff works if *inflation is near zero*.

- Priori to the oil-shock, inflation was low.
- Moreover, people were slow to adjust their inflation expectation
- Workers did not bother asking for a higher pay often.
- This made it look like that the Phillips relation did exist.

The oil shocks simply unveiled the true relationship

➤ The tradeoff **DOES NOT** work if *inflation starts to rise*.

- As the oil shocks happened, people started to realize the impact of inflation.
- They are quickly to adjust their inflation
- **Rising inflation expectation persists even if the oil price became stable afterwards**
- The previously existed trade-off relationship turned out to be no longer true.

Friedman and Phelps argued for the role of the *adaptive expectation as a behavioral explanation for the slowly accelerating inflation observed.*

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

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

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

- **Adaptive expectation:** The agent gradually learns from the past, and predicts current inflation based on *past inflation* -- a behavioral-based expectation

As the inflation had been low before 1960, agents perceived that inflation was not of their concern; θ is near zero

- The UK and US economies before 1960 had very low inflation
 - Agents are sometime inattentive.
 - So, when inflation is closed to zero, they don't bother --- θ is near zero.
 - So the **traditional Phillips curve** was valid, given u_t^n .

$$\pi_t = \pi_t^e - \varepsilon(u_t - u_t^n)$$

$$\pi_t^e = 0$$

$$\pi_t = -\varepsilon(u_t - u_t^n) = \varepsilon u_t^n - \varepsilon u_t$$

- This made the inflation dynamic look very much like a simple downward-sloping relationship between inflation and unemployment rate

As the policymakers had been lured into the tradeoff fallacy, they pursued pro-growth policy; inflation started to rise while agent began to concern with inflation

- The UK and US economies before 1970 had moderate inflation
 - Agents are still inattentive, but become more concerned.
 - θ is slowly changing from zero to positive.
 - So the **traditional Phillips curve** was valid, given u_t^n .

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

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

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

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

1970s was the unfolding story. Inflation quickly accelerated. Oil shocks simply unveiled the problem that had been swept under the rug.

➤ 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.

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

$$\theta = 1$$

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

➤ $\theta = 1$, the unemployment rate affects the rate of change in the inflation rate, given the natural rate level.

As long as $u_t > u_t^n$, **decelerating** (decreasing) inflation.

As long as $u_t < u_t^n$, **accelerating** (increasing) inflation.

AGENDA

- **An overview: stylized-fact of inflation**
- **General theory of inflation: Long-run perspective**
- **General theory of inflation: Business cycle perspective and inflation dynamic**
- **Implications for policy design**

1. Do not trust any claim without theoretical consideration!

- The original claim on Phillips relation is a good example of the problem generated by the reduced-form approach used in economic study.
- Data-driven method might work, but can be dangerous!
- Subsequently, most economics framework have emphasized at the micro-founded approach since 1970s.

2. Tradeoff may exist, BUT cannot be exploited!



Thomas Sargent

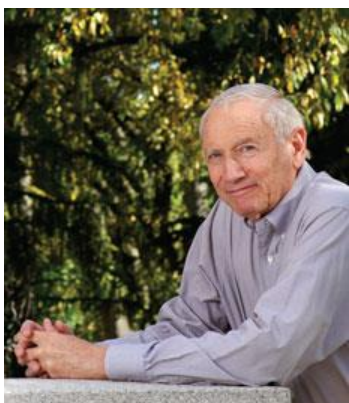


Robert Lucas

- Friedman (1968) argued for this statement; however, it had received little response
- This was until mid of 1970s when Friedman's concept was further formalized by team of economists – i.e. Sargent, Lucas, Wallace and Barro.

- Later, they are called a group of “**New Classical economists**”

- They believed and advocated in the concept of **rational expectation** in economic analysis, and seek for **behavioral implication of rational expectation on policy effects**.



Neil Wallace



Robert Barro

The problem of adaptive expectation calls for a new way of the expectation formation approach, i.e. the rational expectation

- Adaptive expectation is often called a ***backward looking expectation*** because it only uses the **past information**
 - Previous inflation is high; current is expected to be high
 - However, the expected rate will NOT be higher than the past experience.
- With the adaptive hypothesis, workers will tend to ***systematically under-predict*** the inflation rate, and thus hurting themselves.
- Rational expectation **that makes use all relevant information might be a better behavioral assumption**
 - A forward-looking agent can benefit from having better predicted the future.

The notion of rational expectation

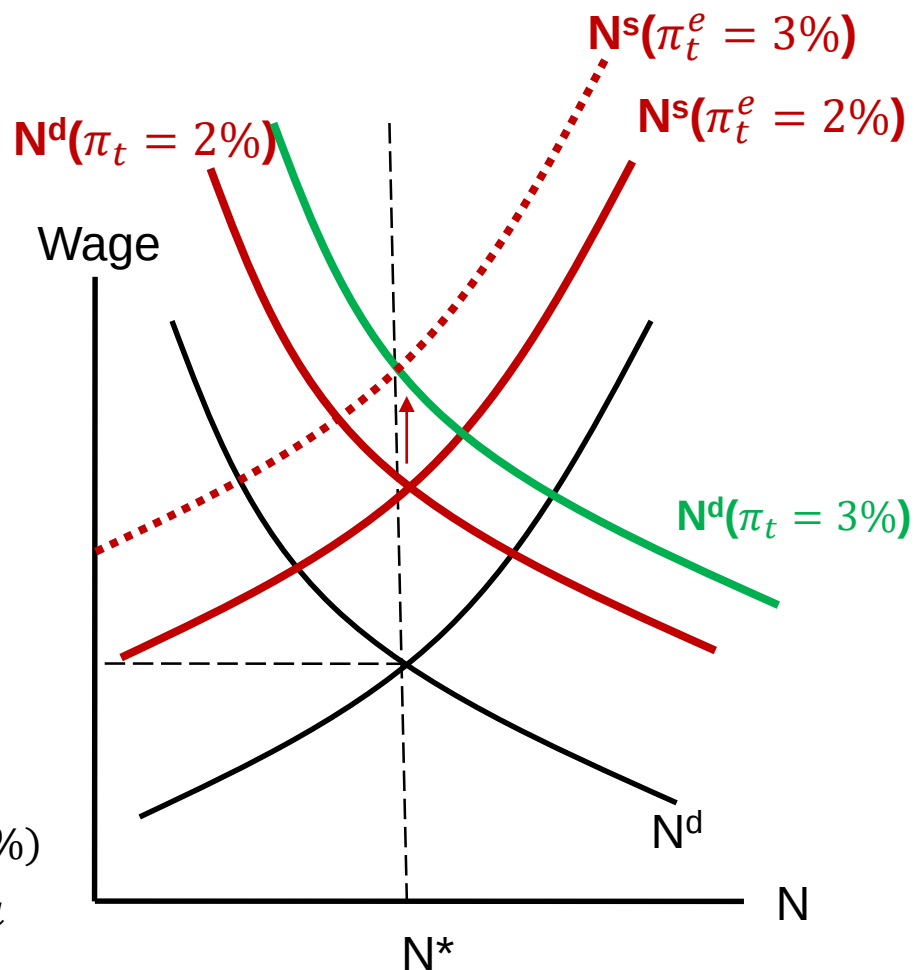
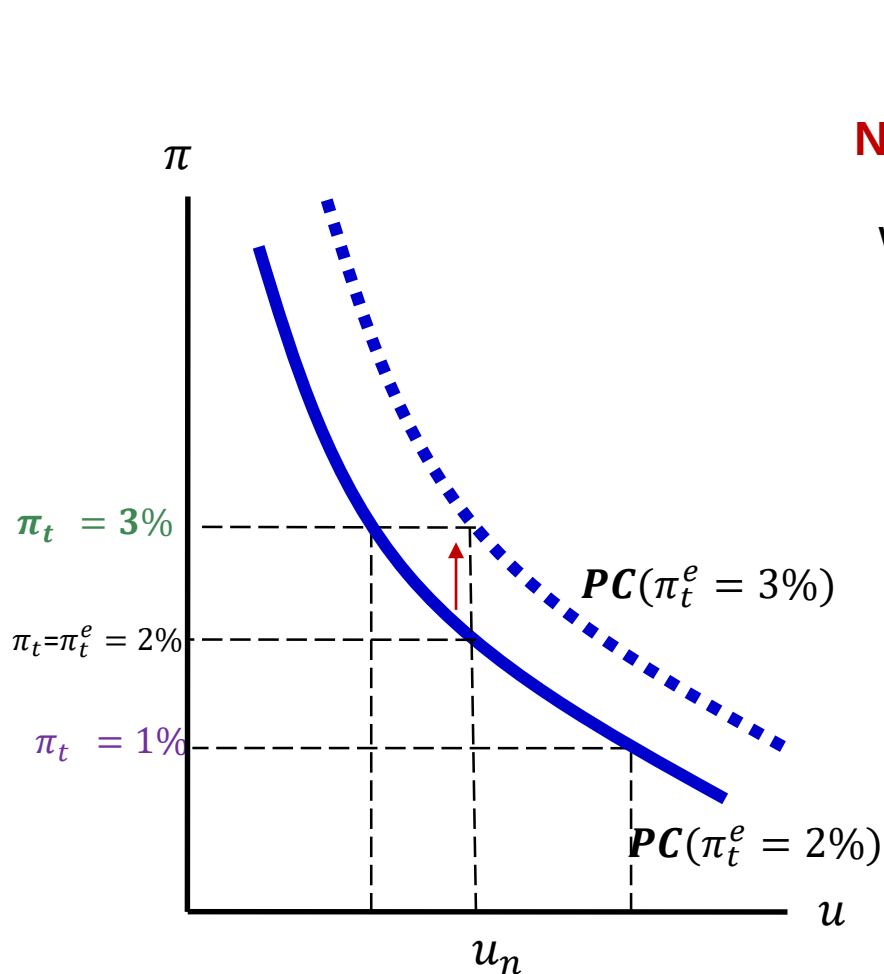
- John Muth (1952) adopted this notion in his classical work “**Rational expectation and the theory of price movements**”
 - Agents can make more profit if their forecasts are *more accurate*.
- Rational expectation-based forecast is the **optimal forecast** from the statistical point of view.
 - Let $Y_t^e = E(Y_t | \Omega_t)$ be optimal forecast of Y_t where Ω_t is information set.
 - Unbiased: $E(Y_t - Y_t^e) = 0$
 - Efficient: $E(Y_t - Y_t^e)^2$ is minimum

Given the rational expectation, the first implication is that anticipated policy will be neutral!

- An anticipated demand management policy will **not** matter to the real output!
 - Consider for example an anticipated change in the level of money growth from 2% to 3%
- Given the new high money growth, workers expected the inflation to change from 2% to 3%
- With the rational expectation, they quickly incorporated this information into the wage-setting
- Once the policy is implemented, it will not generate any real-effect

The rational expectation and New classical economics

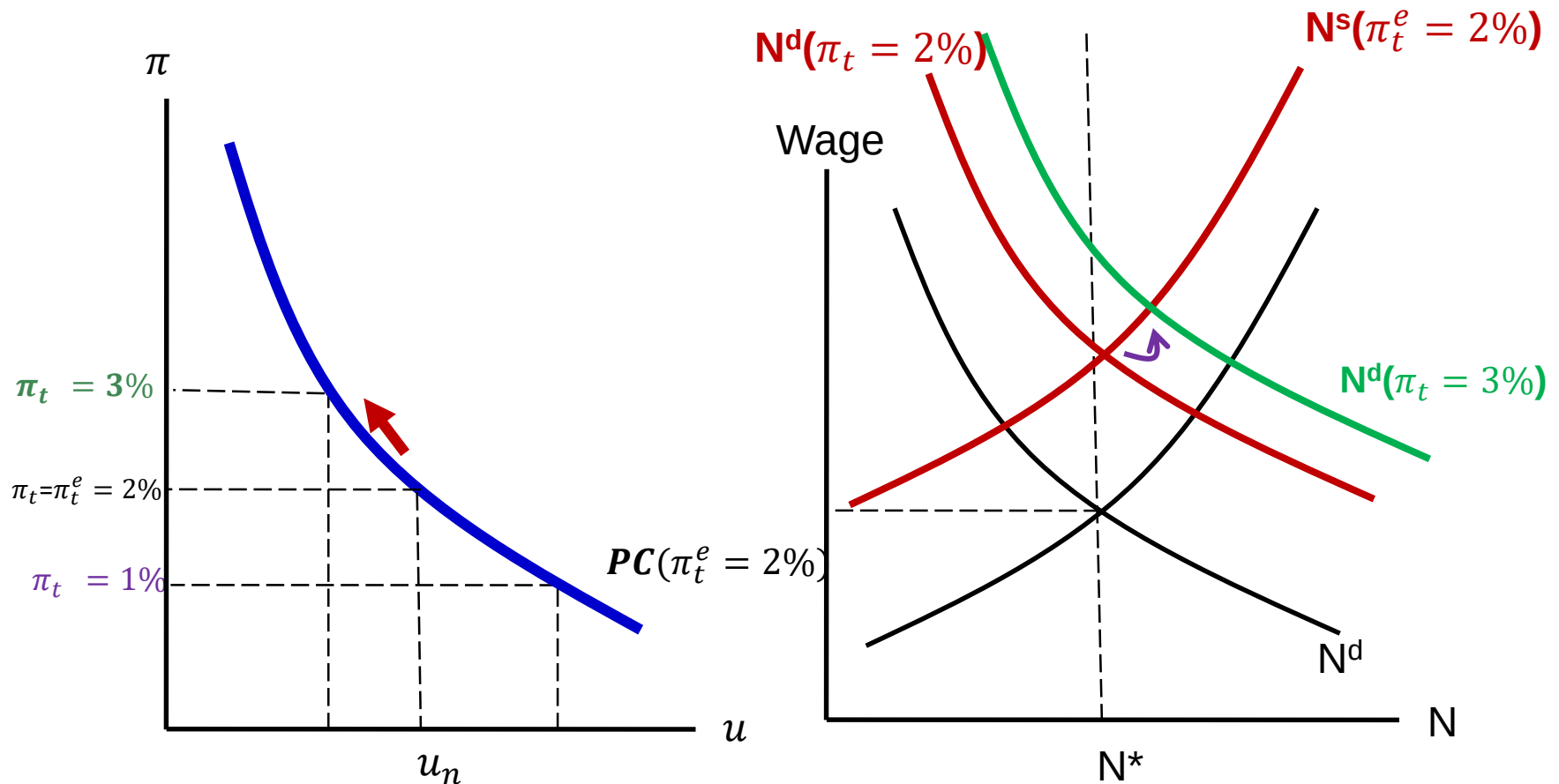
Anticipated policy will be neutral



“Surprised” policy matters...

- Suppose workers expected a 2% money growth policy.
- Central bank surprises the market by increasing the money growth to 3%
- Workers then underpredict the inflation, and hence setting their nominal wage for too low.
- Firms benefit from this, can will choose to hire more labor.
- The final outcome is the increase in output in the equilibrium.

Surprised policy matters.....

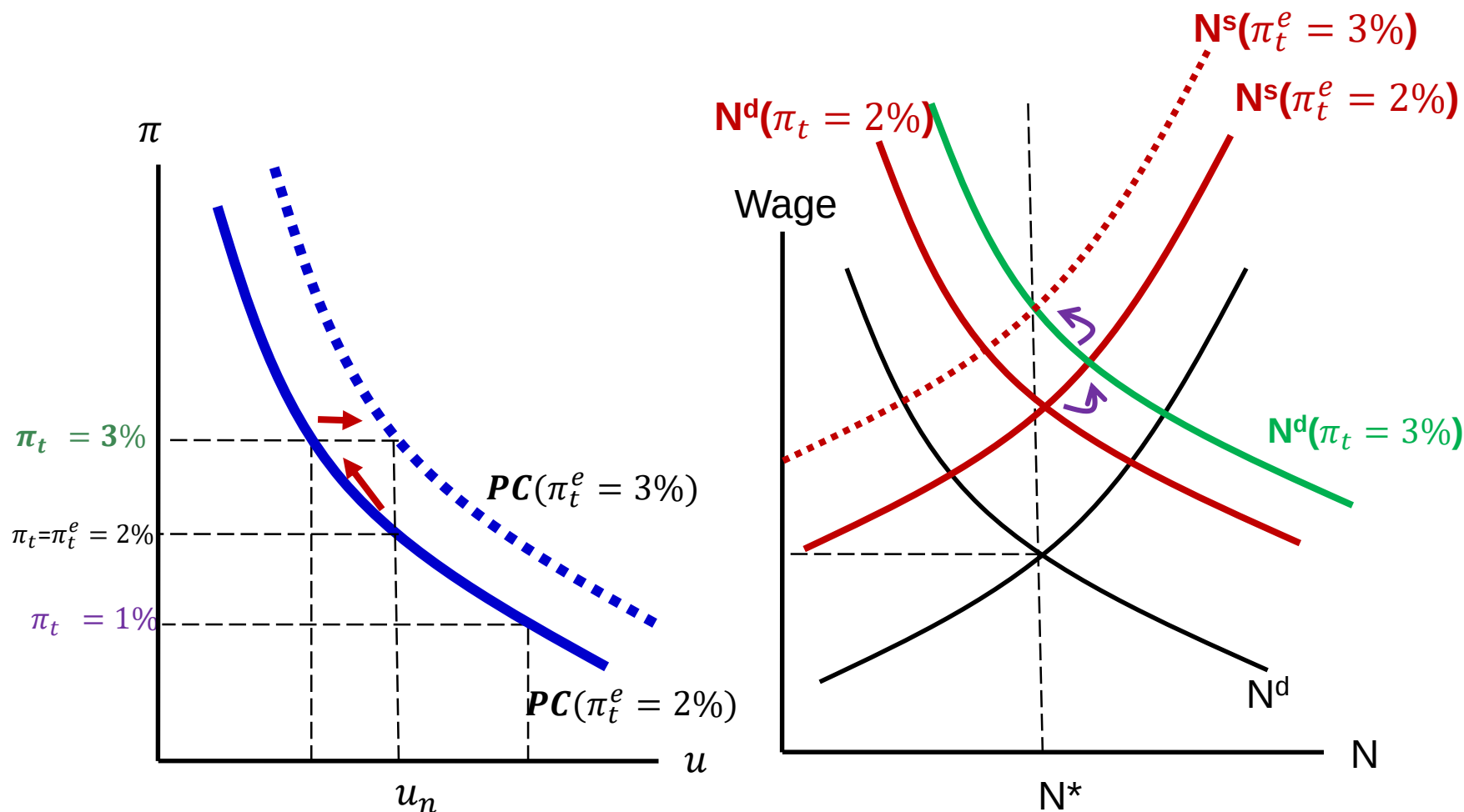


“Surprised” policy matters...but does not last long

- Workers will soon realize the error; they will revise their inflation expectation upward
- Cost of production will rise, and hence discourage firms from choosing to overly produce its output beyond the natural level
- **The self-correction mechanism revisits!**
- **What will be left behind is the higher sustained (or trend) inflation rate.**

The rational expectation and New classical economics

Surprised policy matters...but does not last long

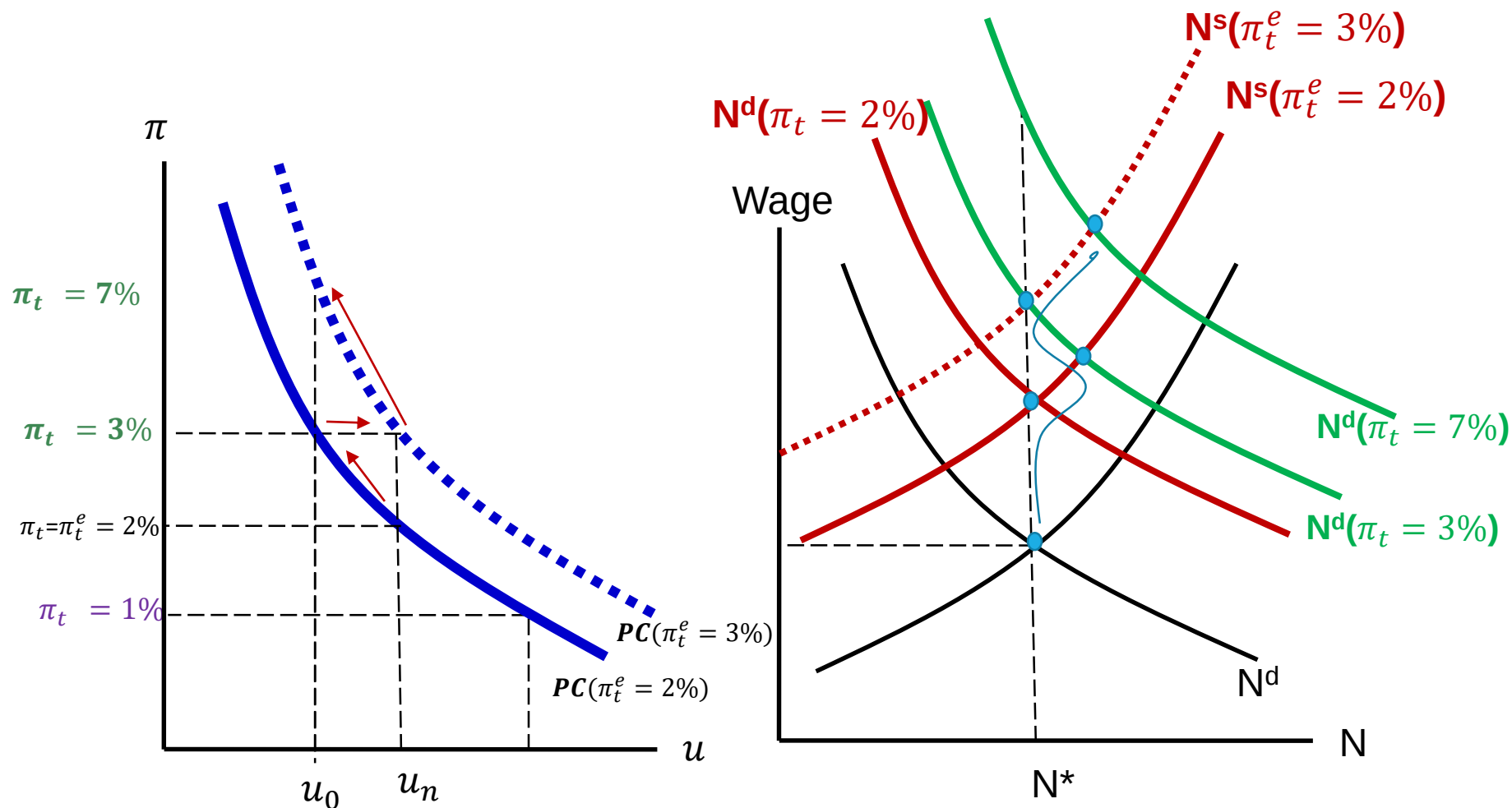


Neither anticipated nor surprised policy are good for the *long-term*; the damage lasts long!

- **Anticipated policy** → inflation pushed up suddenly.
- **Surprised policy** will result in lower unemployment rate (short-term gain) and higher inflation (short-term loss)
 - The tradeoff **should not be exploited!**
 - Inflation expectation will play role, and undo the initial real effect.
 - **What only left behind is the *higher sustained (trend) inflation rate*.**
 - **At the end, we only have long-term loss, without any gain!**

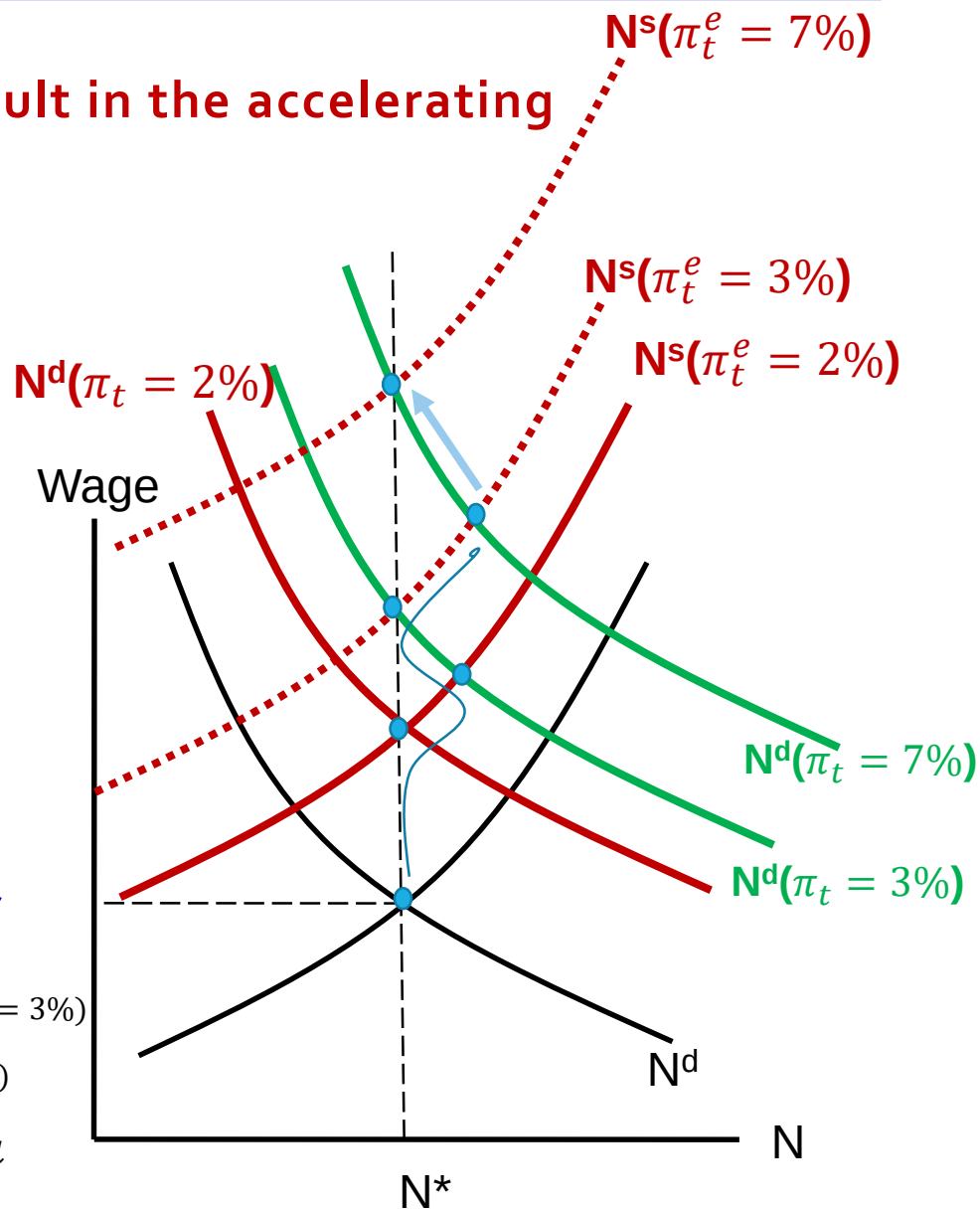
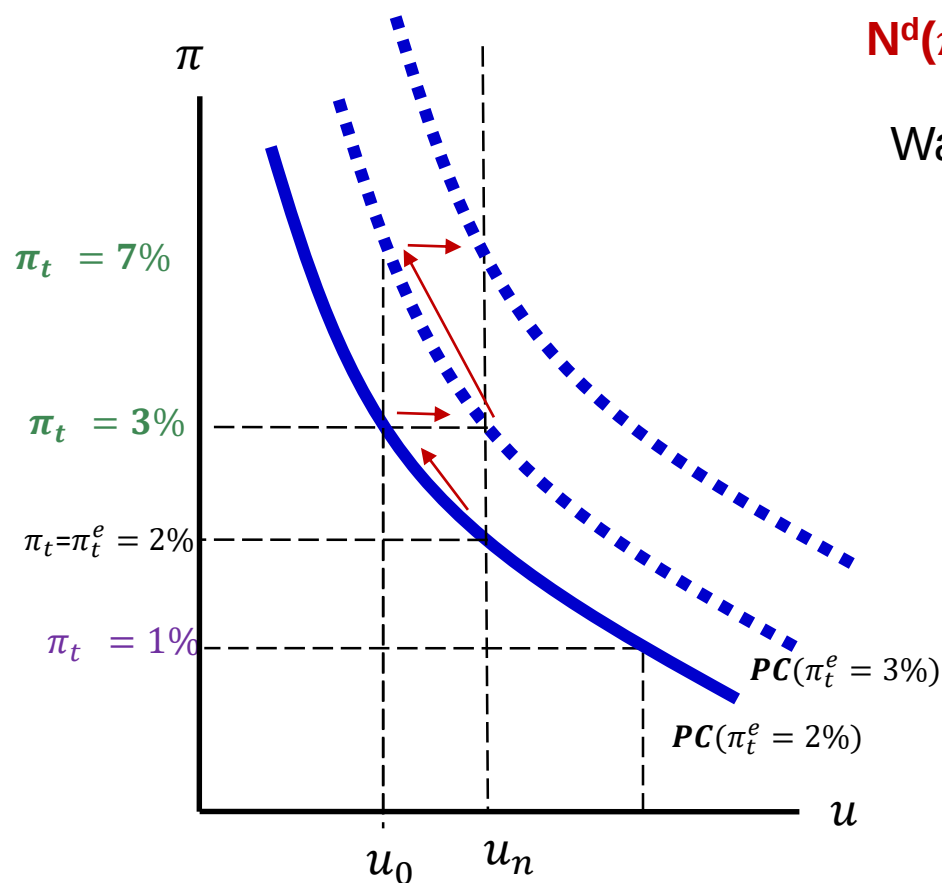
The rational expectation and New classical economics

Surprised policy matters...but does not last long



The rational expectation and New classical economics

Opportunistic policy will result in the accelerating inflation spiral

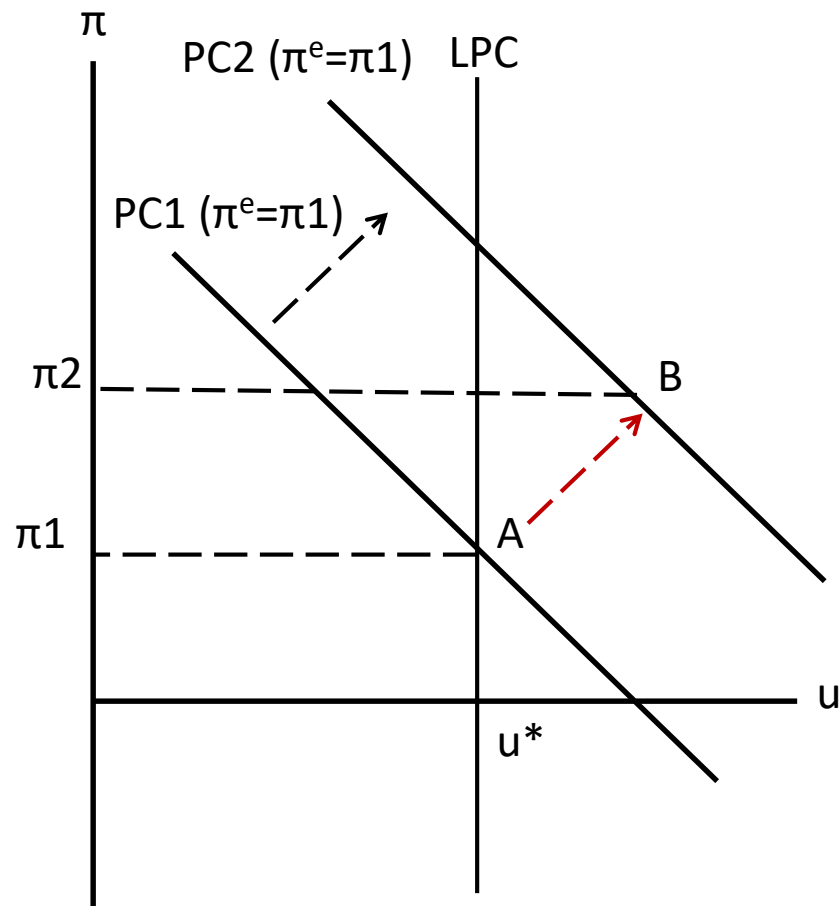


Practical policy design should be *less ambitious*, and aim at *achieving price stability*, i.e. having low and stable inflation!

- As we have no real output gain in the long-term, policy should be a rule-based – **avoiding be another source of shock / don't surprise markets!**
- Rule-based central bank should aim at having **low and stable inflation** as its primary objective – **inflation targeting!**
 - A number of studies have found a huge benefit from anchoring the inflation expectation -- keeping inflation in check or controlled
 - To successfully anchoring inflation, central bank should act tough to build the reputation
 - This will be rewarding as it helps mitigate the impact of negative supply shock

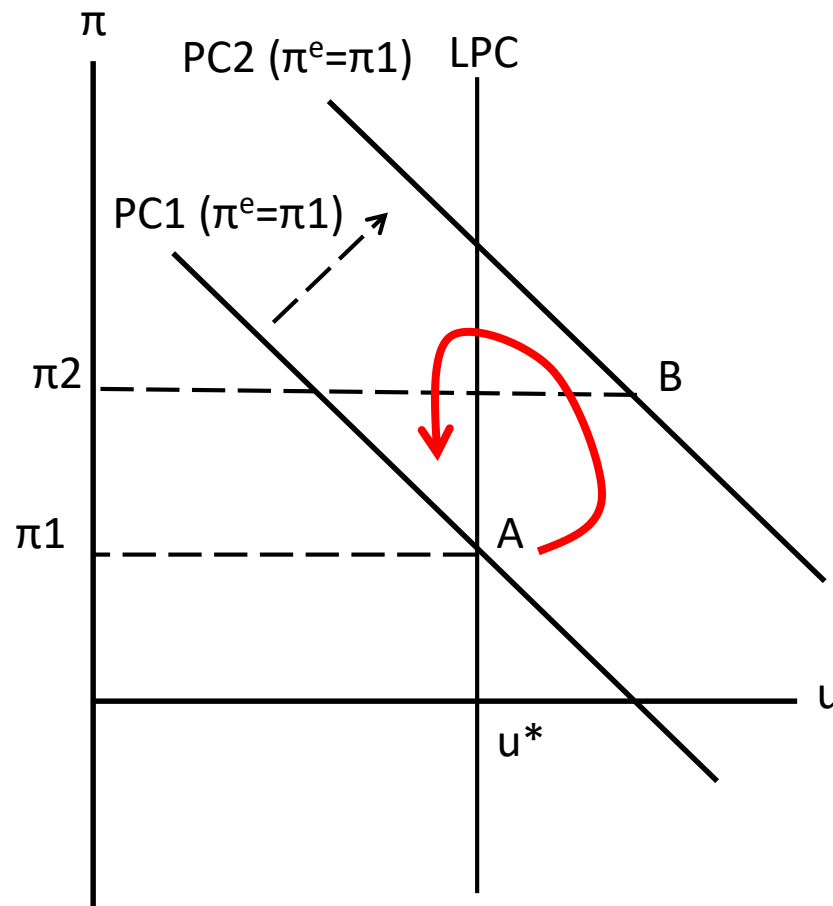
Why anchoring low inflation can help mitigating the effect of negative supply shocks?

- Negative shocks **temporarily** hit the economy (oil shock)
 - Phillips curve will temporarily shift up to PC_2 ($\pi^e = \pi_1$).
- Responding to negative shocks, central bank raises the interest rate to show their commitment in keeping inflation low.
 - **Stagflation problem** → equilibrium is B.
 - Actual inflation rises, but not rapidly.
- Good thing: **Inflation expectation remains anchored at π_1** even the actual inflation is π_2 .



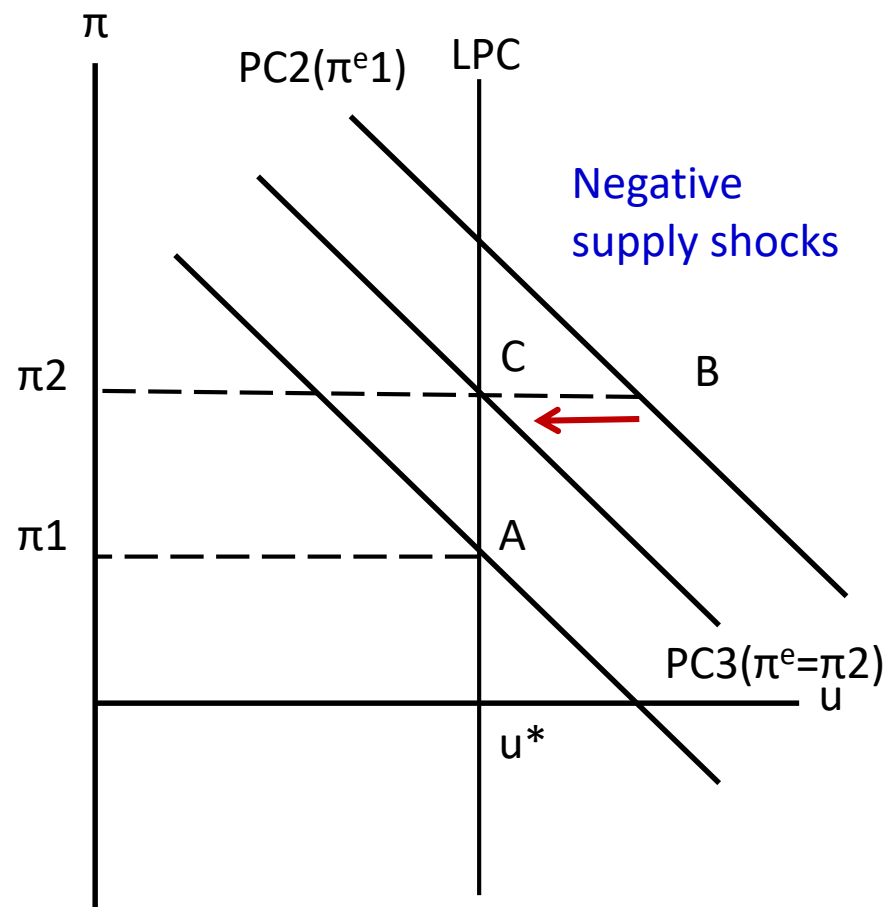
Why anchoring low inflation can help mitigating the effect of negative supply shocks?

- Consider **next period** when shocks have been gone; everything is back to $PC1$ ($\pi^e = \pi_1$)
 - This is because the inflation expectation remains anchored at π_1 , not being revised to π_2 .
 - **Return to natural equilibrium with the same level of inflation as before → A**
- Benefit from anchoring the low inflation expectation makes the transition path less painful.
 - **Benefit from a temporary stagflation**



Why anchoring low inflation can help mitigating the effect of negative supply shocks?

- Instead, if the central bank does not commit to a low inflation, the effect of negative shocks will last, and cause high inflation economy.
- Even if the period of shocks have passed by, economy would still remain at "C" when we have high inflation ($\pi^e = \pi_2$).
- The attempt to bring down inflation would require another stagflation, i.e. require a strong medicine.



Why anchoring low inflation can help mitigating the effect of negative supply shocks?

- To fight the inflation, central bank must aggressively raise interest rate and show their intention to create the disinflation come down; equilibrium stagflation occurs at D
- Once public starts to believe this, inflation expectation will gradually come down, given by $PC_4(\pi^e = \pi_1)$
- **However, it is more painful transition.**

