MEDIUM-TERM ADJUSTMENT AND THE INFLATION DYNAMIC: PART II

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AGENDA THIS PART!

- Labor market in details
- **Phillips curve and inflation dynamic**
- **Policy implications**
- Current state-of-the-art of inflation dynamic model

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PHILLIPS CURVE AND INFLATION DYNAMIC

- **History of Phillips curve**

- Expectation-augmented Phillips curve: monetarism and new classical

- Implications for policy design

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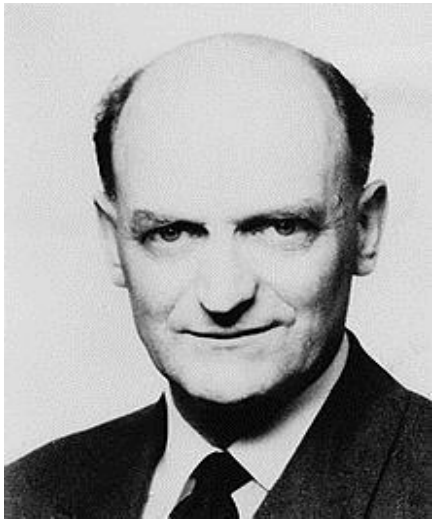
HISTORY OF PHILIPS CURVE



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

- Comovement between inflation and real economic activities was first mentioned in economics in 1958 by A.W. Phillips

- 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.

HISTORY OF PHILIPS CURVE

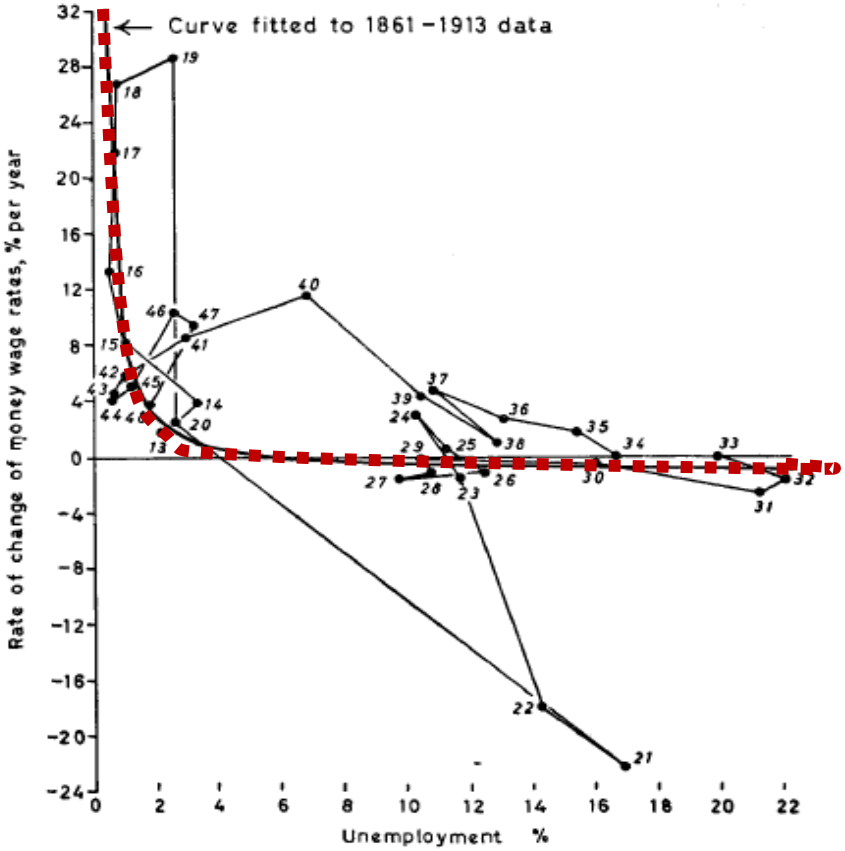


Fig. 9 1913 – 1948

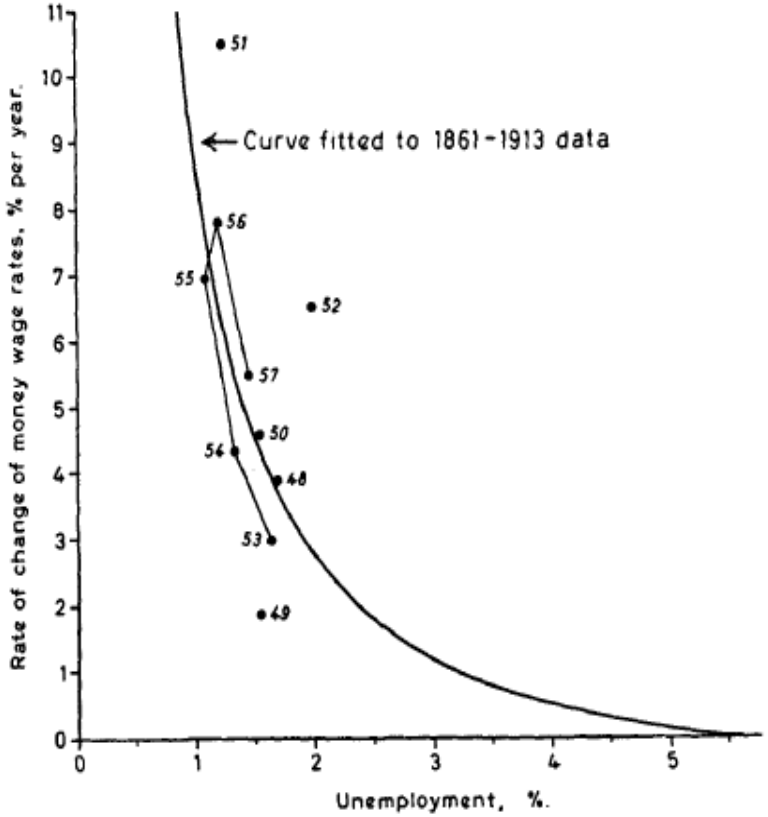


Fig. 10. 1948–1957

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**.

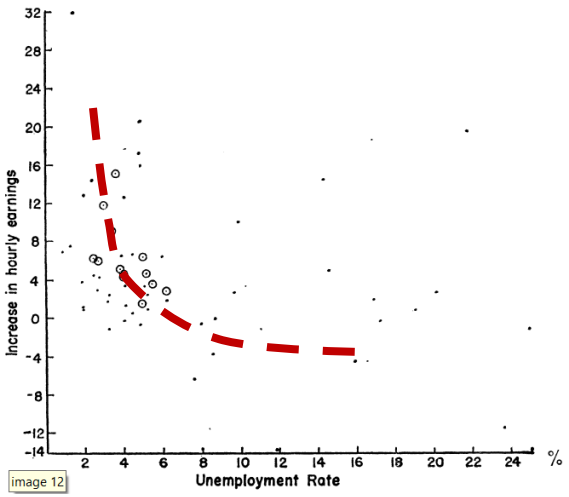


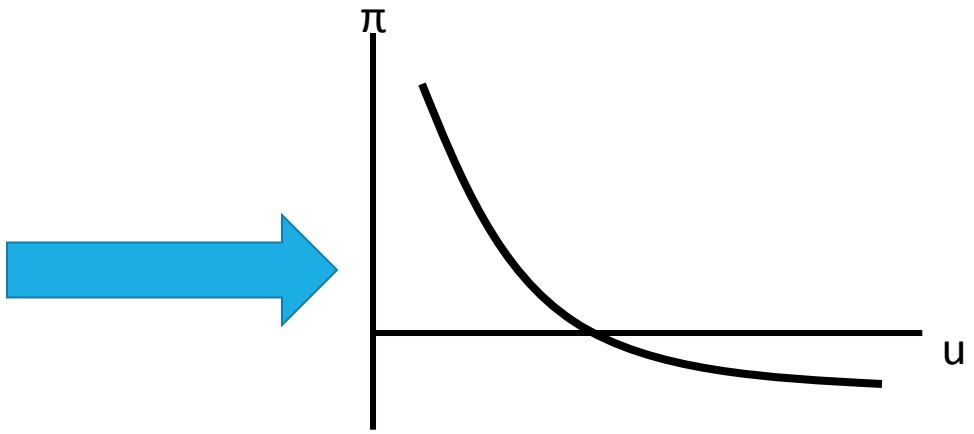
FIGURE 2

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.

VERSIONS OF THE PHILLIPS CURVE

Non-linear Phillips curve

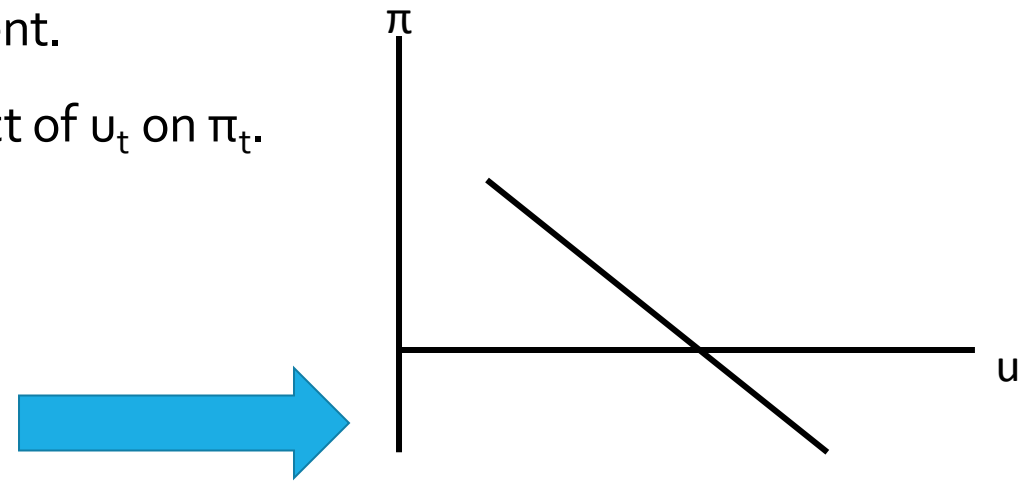
$$\pi_t = \varepsilon\left(\frac{1}{u_t}\right);\ d\pi/du = -\varepsilon\frac{1}{u_t^2}$$



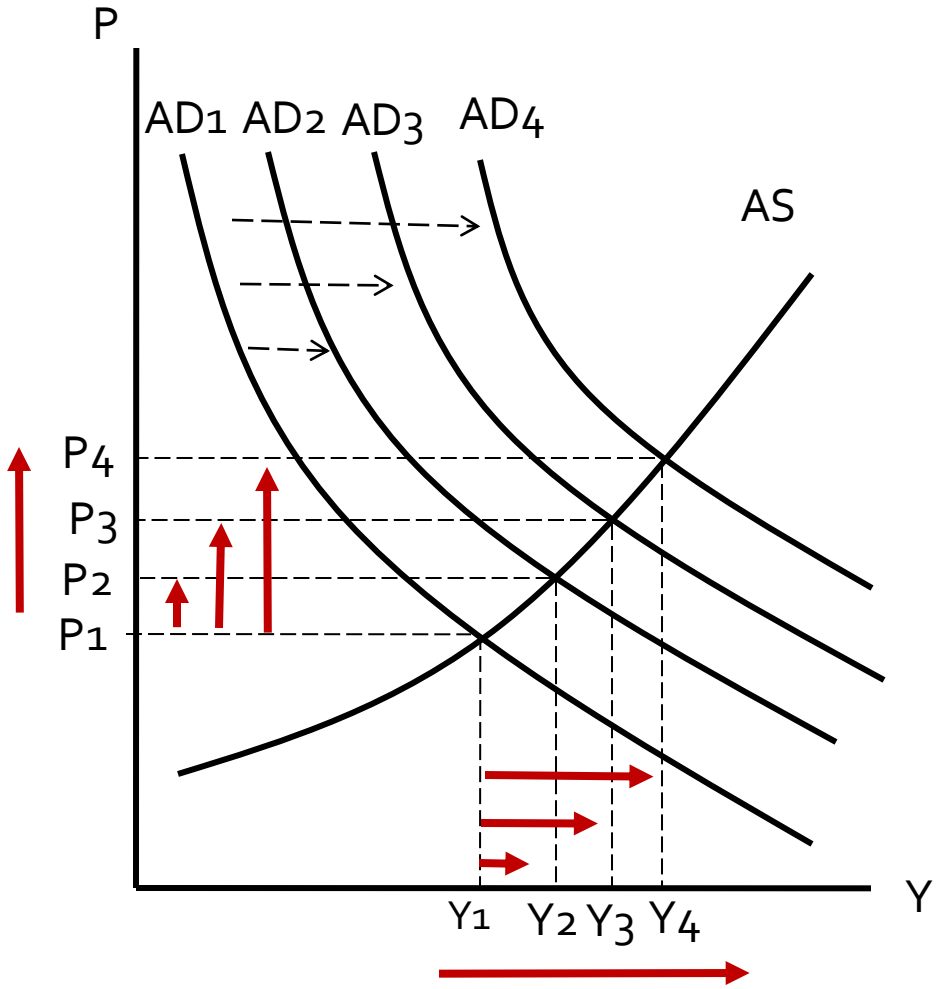
- π = the rate of inflation.
- u = the rate of unemployment.
- ε = the strength of the effect of u_t on π_t.

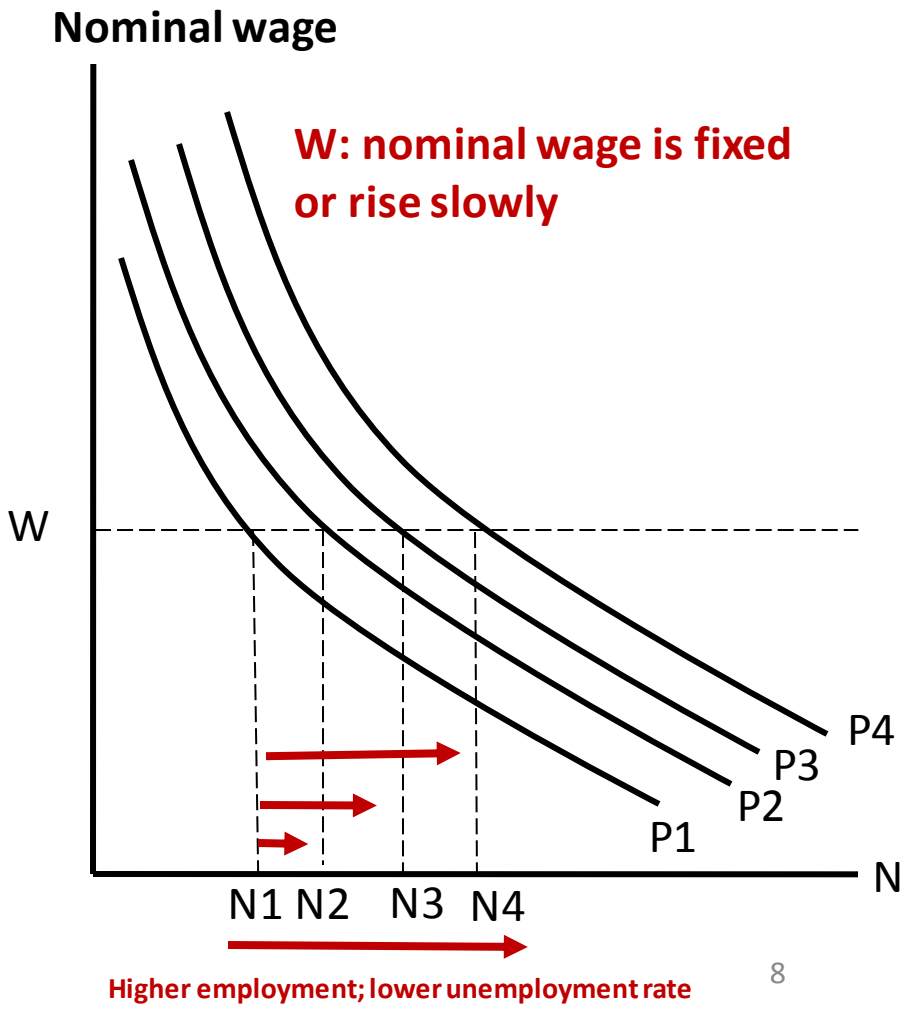
Linear Phillips curve

$$\pi_t = -\varepsilon(u_t);\quad d\pi/du = -\varepsilon$$



KEYNESIAN INTERPRETATION: NOMINAL WAGE





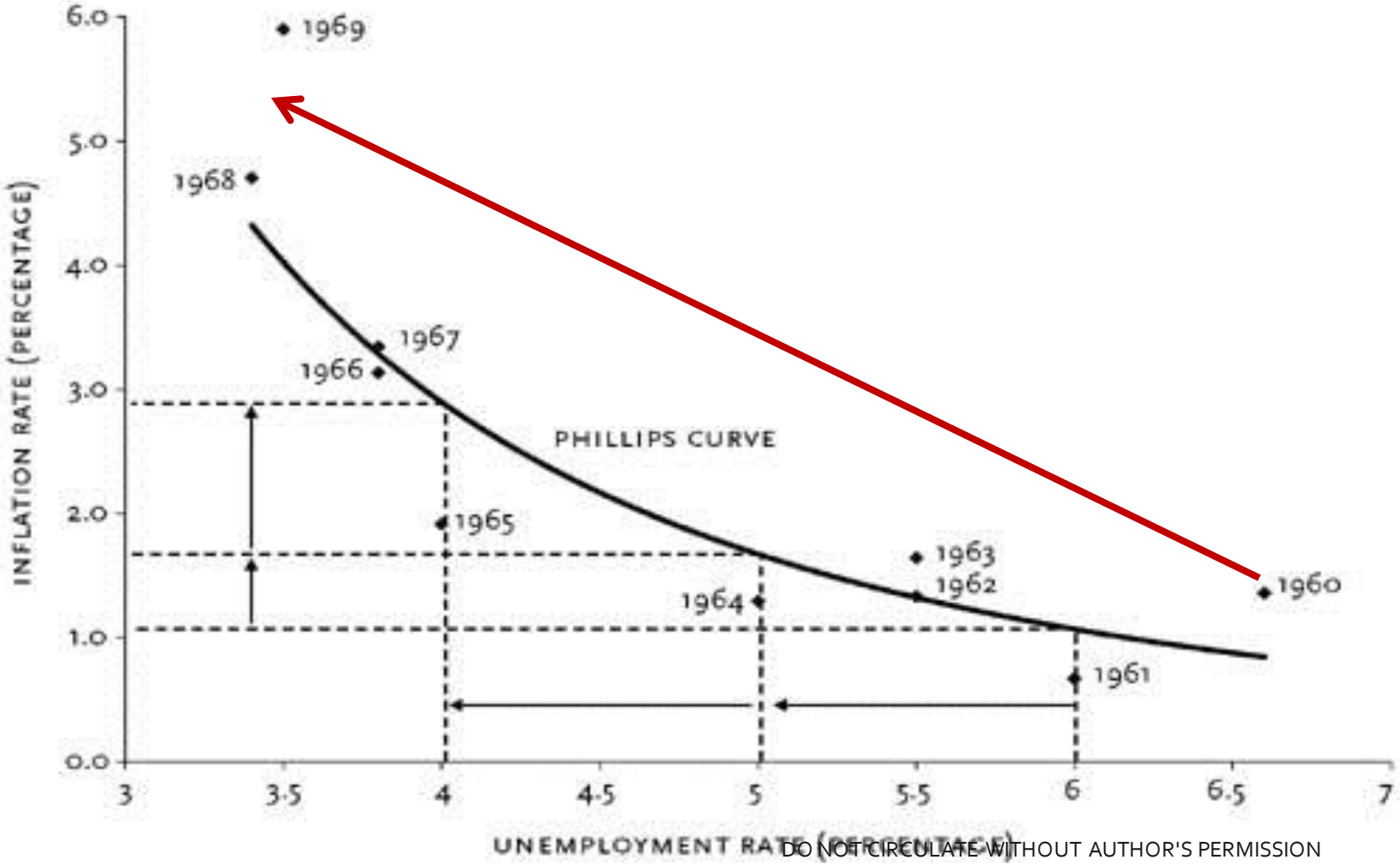
POLICY IMPLICATIONS

- The ***trade-off*** *between inflation and unemployment*; it is thought to be a ***permanent*** one!

- Active intervention works, i.e**. interventionist!**

- Policymakers can choose between different **combinations of inflation and unemployment**, based on **preferences**.
  - (observed) Outcomes determined by **preference**.

Inflation and unemployment outcome between 1960 – 1969:



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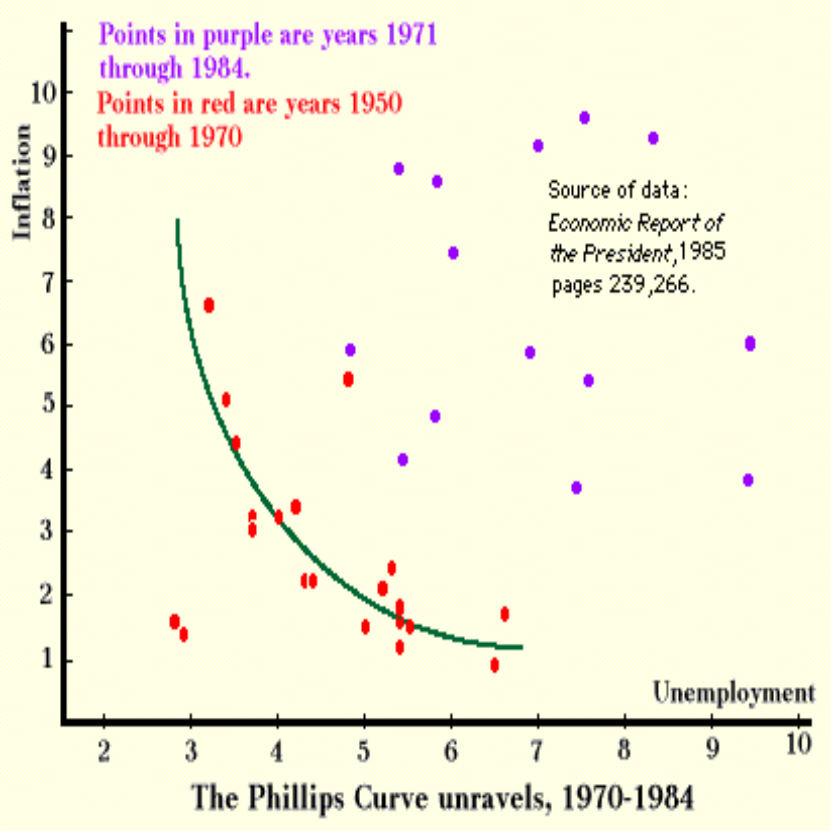
PHILLIPS CURVE AND INFLATION DYNAMIC

- **History of Phillips curve**

- **Expectation-augmented Phillips curve: monetarism and new classical**

- Implications for policy design

THE BREAKDOWN OF PHILIPS CURVE

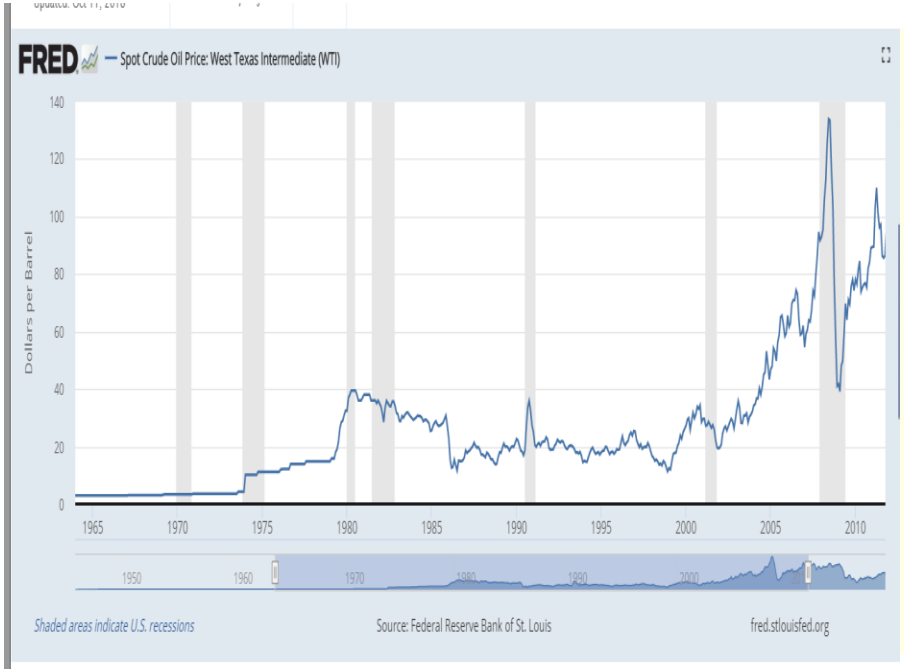


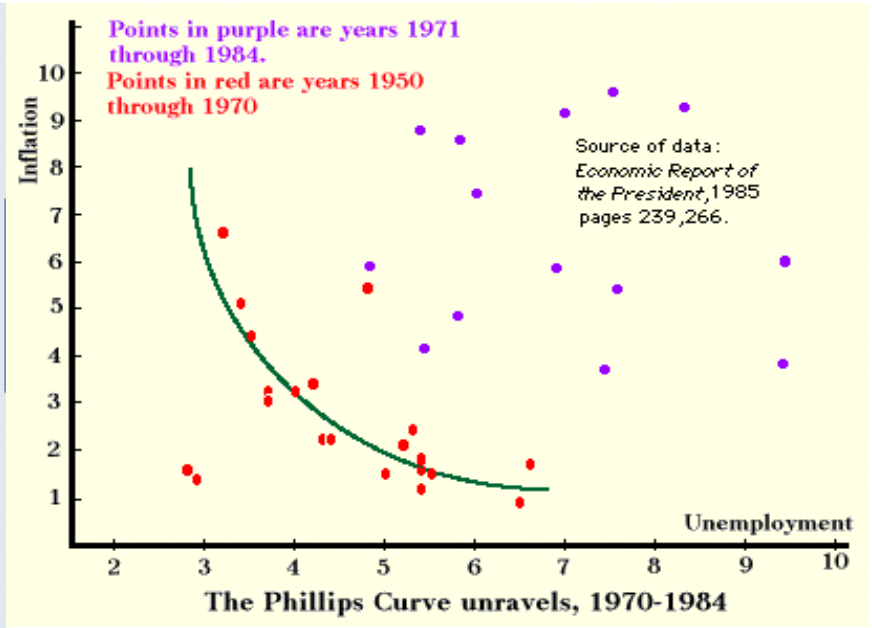
The Phillips Curve unravels, 1970-1984

- **In the 1970s, the Phillips curve broke down.**
- 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

- **Puzzle:** why inflation did not come down even the oil price has reached its new stable high.
  - Why did the CPI price keep rising further despite that the increase in oil price had already paused.





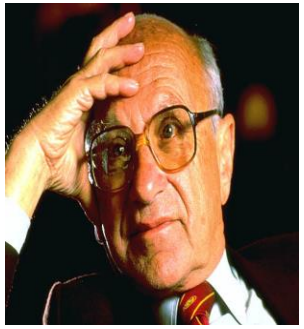
THE BREAKDOWN OF PHILIPS CURVE

- **Puzzle:** why inflation did not come down even the oil price has reached its new stable high.
  - Why did the CPI price keep rising further despite that the increase in oil price had already paused.

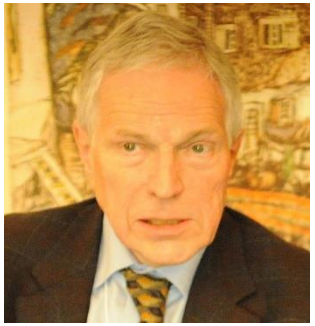
- One might resolve the puzzle by relating to delay hypothesis
  - Shouldn't be the delay as inflation seems to sustain at a new high level!

- Later on, economists found that we had completely misunderstood about what drives the inflation – inflation dynamic
  - This misconception lead to the wrong prescription of the policy actions, and further made the problem bigger.

CRITIQUE BY FRIEDMAN AND PHELPS: THE RISE OF EXPECTATION-AUGMENTED PHILIPS CURVE



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



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

Nobel Prize 2006.

- Many economists had earlier warned that the Keynesian-based Phillips relation may be **superficial**;
  - No one listened; "***Theory ahead of the measurement***"
- Lead by two proponents in **monetarists**, Phelps and Friedman 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^e_t = 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

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EXPECTATION-AUGMENTED PHILLIPS CURVE: THE NATURAL RATE OF UNEMPLOYMENT

- Recall wage setting equation: $W_t = P_t^e F(u_t, z_t)$
  - W = nominal wage *W*, set by wage setters
  - P_t^e = expected price
  - u_t = *unemployment rate*
  - z_t= *other factors that affect* wage determination – unemployment benefits or bargaining power

- Recall price setting equation: $P_t = (1 + m)\frac{W_t}{A_t}$
  - (1+m) = mark-up
  - A is productivity

EXPECTATION-AUGMENTED PHILLIPS CURVE: THE NATURAL RATE OF UNEMPLOYMENT

- Combing the two wage-price setting equations yields us,

$$P_t = (1+m)\frac{P_t^e F(u_t, z_t)}{A_t}$$

- If worker can perfectly anticipate the CPI price, we yield that

$$\mathbf{1} = (\mathbf{1}+\boldsymbol{m})\frac{\boldsymbol{F}(\boldsymbol{u_t}, \boldsymbol{z_t})}{\boldsymbol{A_t}}$$

- The level of unemployment rate is determined by the above condition is called the "**natural rate of unemployment (u_t^n)** " – the level of unemployment under an ideal environment

EXPECTATION-AUGMENTED PHILLIPS CURVE: THE NATURAL RATE OF UNEMPLOYMENT

- Notice that $u_t^n = G(A_t, z_t, m)$
  - z_t and $(1 + m)$ positively relates to u_t^n
    - Higher z_t → higher bargaining power to worker (recall the search friction theorem)
    - Higher $(1 + m)$ → higher monopoly to firm; firms choose the lower quantity to seek for higher price.
  - A_t negatively relates to u_t^n
    - Higher productivity makes it more profitable for firm to hire more people; natural rate of unemployment drops.
- Fundamentally, the natural rate level is determined by real factors or real frictions

EXPECTATION-AUGMENTED PHILLIPS CURVE

- What is the intuition behind the expectation-augmented Phillips curve?

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

  - Note first, worker sets "wage $\bar{W}$" before observing the "price"
    - Given the expected inflation, worker demands higher nominal wage payments
    - Actual inflation closely keep track with expected inflation
  - Now suppose worker can correctly guess the actual inflation, the pre-determined wage $\bar{W}$ will be exactly equal to the level that would prevail under flexible adjustment
    - Actual real wage will be equal to the equilibrium real wage (under flexible adjustment)
  - As a result, the economy attains the full-employment equilibrium, and hence natural rate of unemployment

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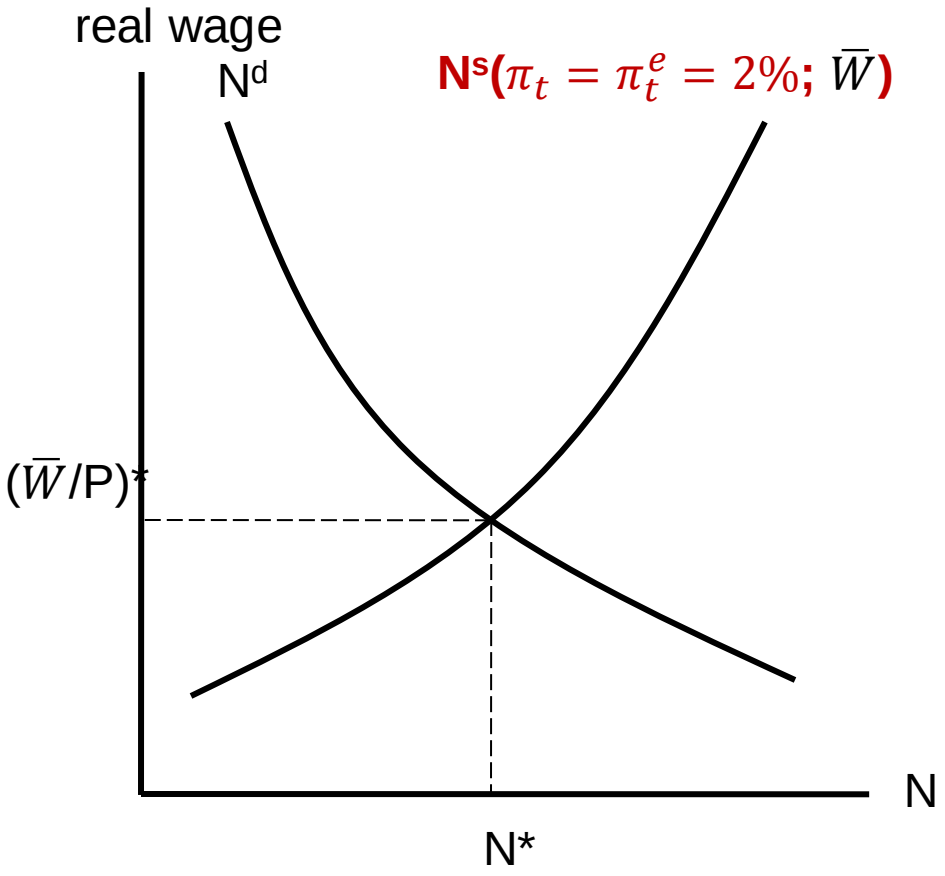
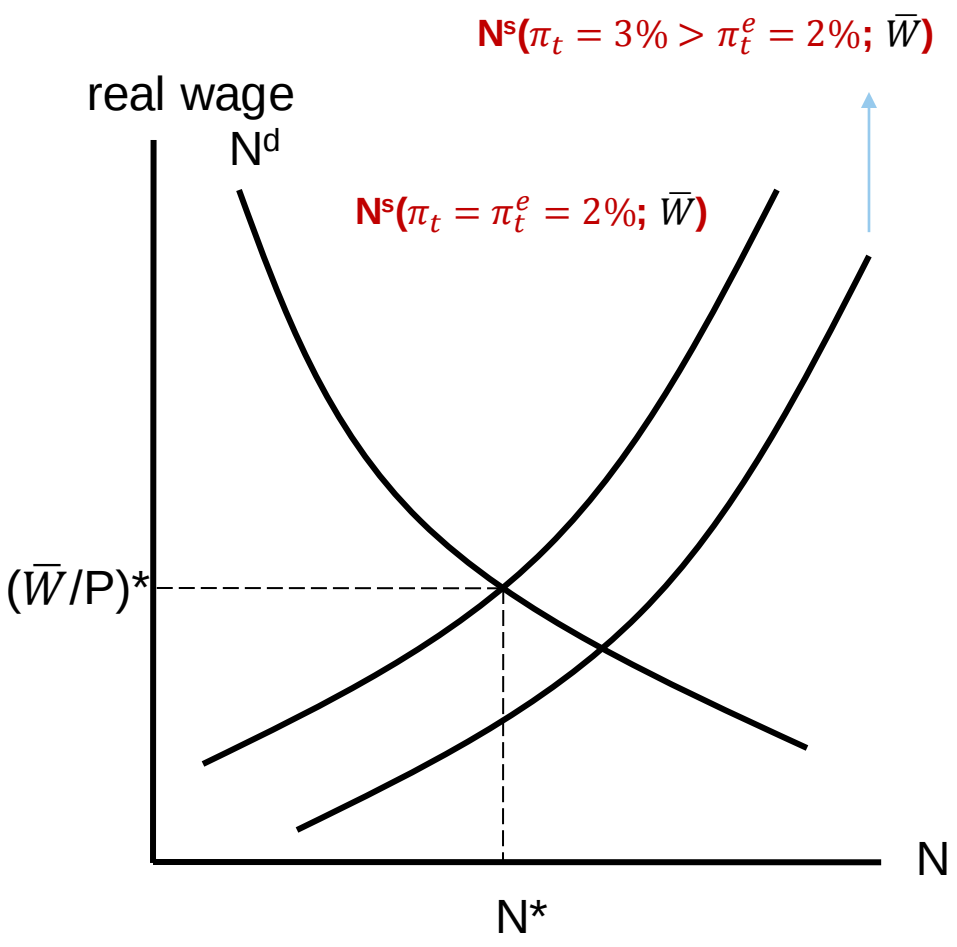
EXPECTATION-AUGMENTED PHILLIPS CURVE

- Suppose that workers guess that inflation will be 2%, each sets their pre-determined wage equal to $\bar{W}$
- Then, supply the labor based on the given **$N^s(\pi_t = \pi_t^e = 2\%; \bar{W})$**
- If they correctly guess the inflation, the pre-determined wage is matched with the same level of wage that would arise under perfect foresight – ideal labor market condition.
- The labor supplied is then optimal compared to the one under ideal labor market condition.
- Hence, equilibrium employment, as well as unemployment, reflects the natural level.



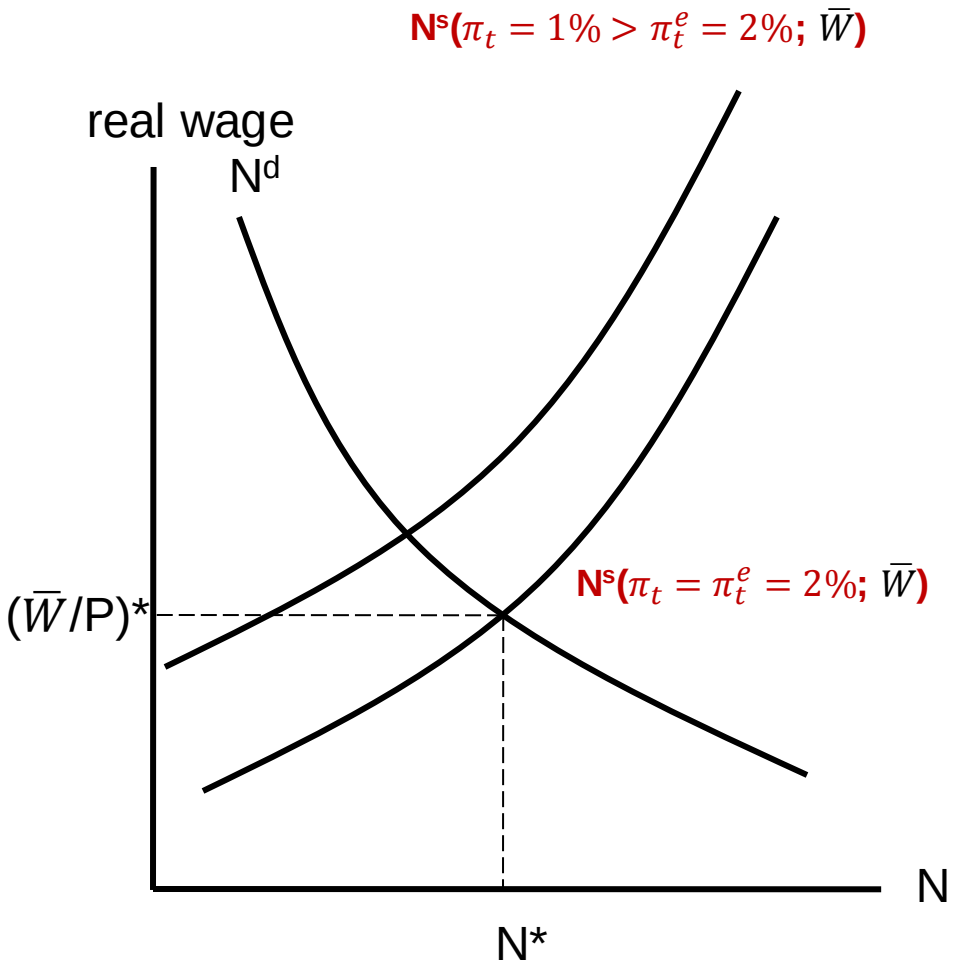
EXPECTATION-AUGMENTED PHILLIPS CURVE

- Suppose that workers guess that inflation will be 2%, each sets their pre-determined wage equal to $\bar{W}$
- Then, supply the labor based on the given **$N^s(\pi_t = 3\% > \pi_t^e = 2\%; \bar{W})$**
- They've under predicted the inflation, and hence setting nominal wage to be too low.
- They are supply too much labor that the optimal one under ideal labor market condition
- Employment is too high, unemployment is too low comparing to the ideal one.



EXPECTATION-AUGMENTED PHILLIPS CURVE

- Suppose that workers guess that inflation will be 2%, each sets their pre-determined wage equal to $\bar{W}$
- Then, supply the labor based on the given **$N^s(\pi_t = 1\% > \pi_t^e = 2\%; \bar{W})$**
- They've over predicted the inflation, and hence setting nominal wage to be too high.
- They are supply too low of labor, compared to the optimal one under ideal labor market condition
- Employment is too low, unemployment is too high comparing to the ideal one.



EXPECTATION-AUGMENTED PHILLIPS CURVE: WORKS AND MUTATION?

- 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 trade-off 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.

EXPECTATION-AUGMENTED PHILLIPS CURVE: WORKS AND MUTATION?

- The trade-off DOES not work if ***inflation starts to rise***.
  - As the oil shocks happened, people starts to realized 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.

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EXPECTATION-AUGMENTED PHILLIPS CURVE: WORKS AND MUTATION?

- It appears that the reasoning provided by Friedman and Phelps makes sense if we can rationalize they way people form their expectation in such a way.
  - Ignoring and slow to adjust → quickly incorporate → Keep fearing as a stigma
- Friedman and Phelps argued for the form of the *adaptive expectation*

EXPECTATION-AUGMENTED PHILLIPS CURVE: THE ADAPTIVE EXPECTATION

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

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

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

- Adaptive expectation: The agent predicts current inflation based on *past inflation* -- a behavioral-based expectation

EXPECTATION-AUGMENTED PHILLIPS CURVE: THE ADAPTIVE EXPECTATION

- 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.

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

$$\pi_t^e = 0$$

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

EXPECTATION-AUGMENTED PHILLIPS CURVE: THE ADAPTIVE EXPECTATION

- 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.

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

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

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

- θ > o: current inflation depends on past inflation and unemployment.

EXPECTATION-AUGMENTED PHILLIPS CURVE: THE ADAPTIVE EXPECTATION

➢ 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.

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

$$\theta = 1$$

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

- θ = 1, the unemployment rate affects the rate of change in the inflation rate, given u*.
  - If $u_t > u_t^n$, decelerating (decreasing) inflation.
  - If $u_t > u_t^n$, accelerating (increasing) inflation.

NEW CLASSICAL PHILIPS CURVE: SHORT-COMINGS?

- During the 1970s, oil shock was the catalyst!
  - Inflation jumps

- Inflation expectation jumped up, and remained at a highly sustained level – people stigmatized the inflation acceleration.
  - Behavioral-based explanation; nowadays so popular to explain why Japan has been trapped under deflation or low inflation.

- Then, why they have kept thinking that inflation will remain high even that oil shock was temporarily.
  - Shouldn't they learned that ignorance on inflation forecast will hurt them as they were hurt before.

EXPECTATION-AUGMENTED PHILLIPS CURVE: CRITICISM TO THE ADAPTIVE EXPECTATION

- To understand this, one to think about another version of expectation-augmented Phillips curve.

- The version is the one in which expectation is formed upon the rational expectation! – replacing the adaptive expectation.

- The idea of rational expectation is commonly discussed among those who classify themselves as New classical economists

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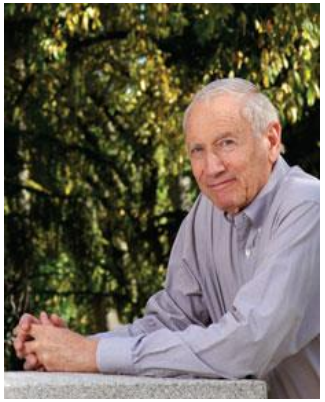
NEW CLASSICAL ECONOMICS


Thomas Sargent


Robert Lucas


Neil Wallace


Robert Barro

- The heritage of the Monetarism school.
  - Developed around early of 1970s: **Lucas, Sargent and Wallace**.
  - Emphasize at the role of "***Rational expectation"*** in macroeconomics
  - Developed notion of **rational expectation-augmented Phillips curve.**
  - Developed a famous proposition: **The irrelevant of anticipated policy.**
  - Provide a good framework for understanding the **medium-term adjustment**

AUGMENTED-RATIONAL EXPECTATION PHILLIPS CURVE

- The curve is often called "**New Classical Phillips curve**".
- Consider as the extension of **Phelps-Friedman Philips** curve.
- Agents instead form their forecast using the ***rational expectation***, rather than the ***adaptive expectation***.
- Why rational expectation?

RATIONAL EXPECTATION

- Expectation is so pervasive in economics decision making.
- Form of expectation: ***adaptive v.s. rational expectation***.
- The expectation formed under the adaptive hypothesis has ignored some information in the forecasting.
  - Previous inflation is high; current is expected to be high.
  - The expected rate will NOT be higher than the past experience.
- Adaptive expectation is often called a **backward looking expectation.**

RATIONAL EXPECTATION

- Workers that incorporate only past information into wage bargaining tend to **systematically under-predict** the inflation rate: hurting themselves.
  - **Why would all the workers allow this to happen?**
  - **Why don't they behave as a *forward-looking* agent?**

- Rational expectation that makes use all relevant information might be welfare-improving to agents.

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: $E(Y_t - Y_t^e)^2$ $is\ minimum$

RATIONAL EXPECTATION IN MACROECONOMICS

- In 1971 and 1972, Robert Jr. Lucas provided two elaborative frameworks that argue for the *neutrality of money* under the *rational expectation*.
  - Strong neutrality of money: money does not cause the change in output. (Classical dichotomy)

- Classical dichotomy: the *separation between real and nominal variable.*

RATIONAL EXPECTATION IN MACROECONOMICS

- Neutrality of money under Lucas's concept is less strong
  - Surprise in the level of money creation can affect output *whereas* anticipated money creation is neutral under the rational expectation.

- The notion is developed under the model commonly known as "*Money surprise model*"
  - Phelps-Friedman-Lucas money surprise model

PHELPS-FRIEDMAN-LUCAS MONEY SURPRISE MODEL: MODEL ENVIRONMENT

1. Labor can renegotiate a new wage scheme every period; however, (fixed/variable) wage must be set one-period in advance.

- fixed wage contract: fixed nominal wage; irrelevant to the number of hours worked

- variable wage contract: fixed nominal wage, but nominal wage is rising as the number of hours worked increase

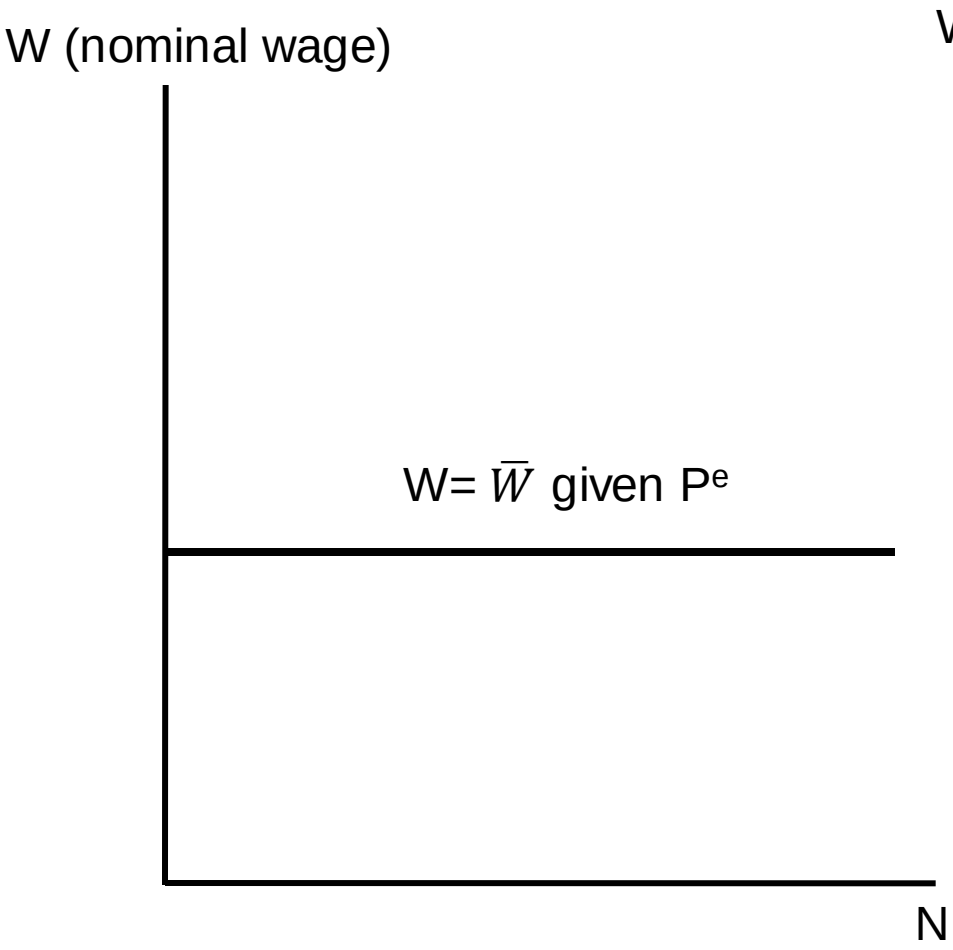
PHELPS-FRIEDMAN-LUCAS MONEY SURPRISE MODEL: MODEL ENVIRONMENT

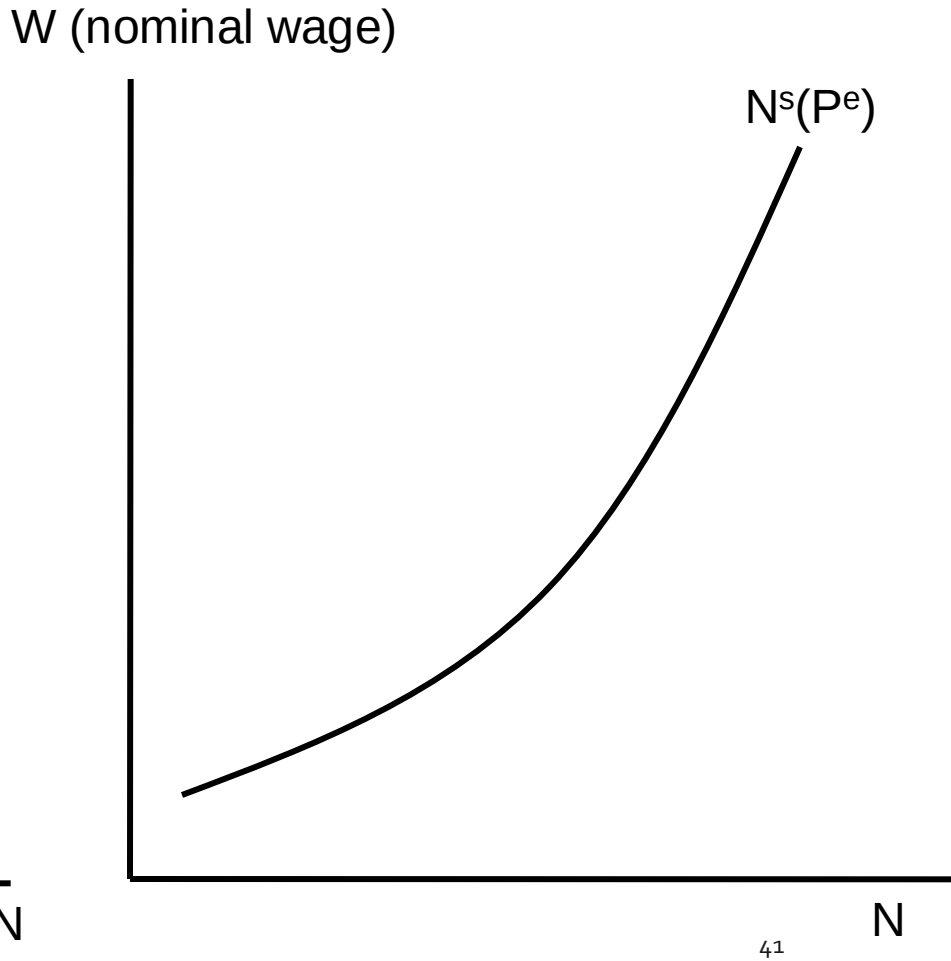
2. When labor engages in wage bargaining activity, labors take into accounts all relevant and available information in the market.

- Labor uses the most up-to-date information to make a best forecast in the level of price and inflation, namely expected price and expected inflation.

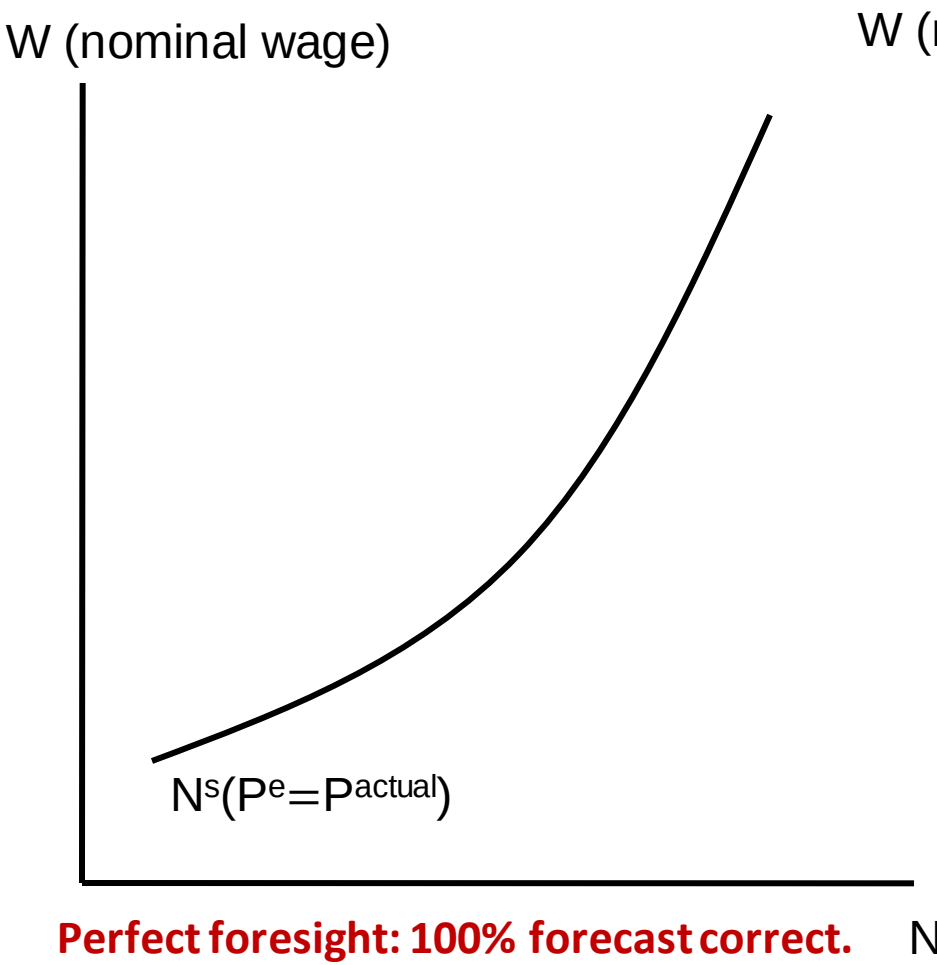
- Then, labor demand for the predetermined nominal wage and supply the amount of labor hours at given wage contract agreed.

PHELPS-FRIEDMAN-LUCAS MONEY SURPRISE MODEL: MODEL ENVIRONMENT

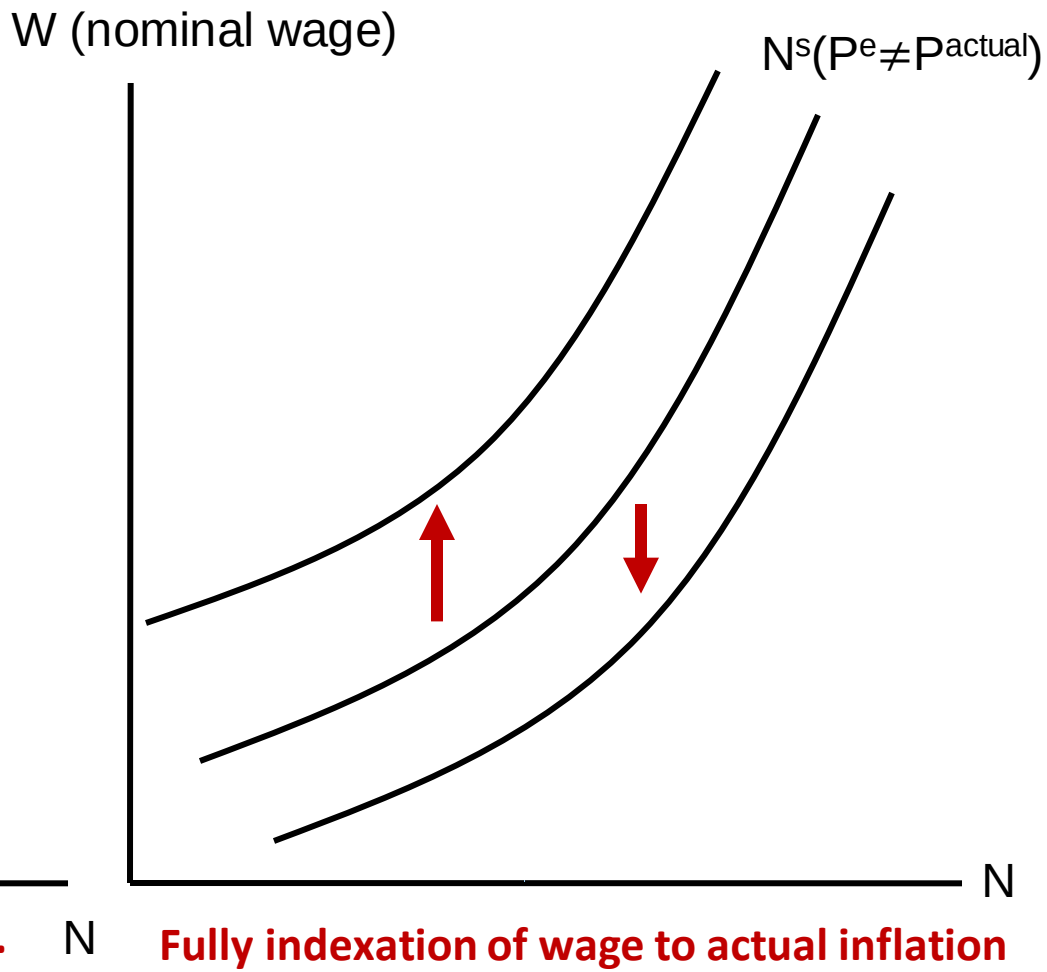




CLASSICAL WAGE SCHEME: PERFECT FORESIGHT AND FULL INDEXATION

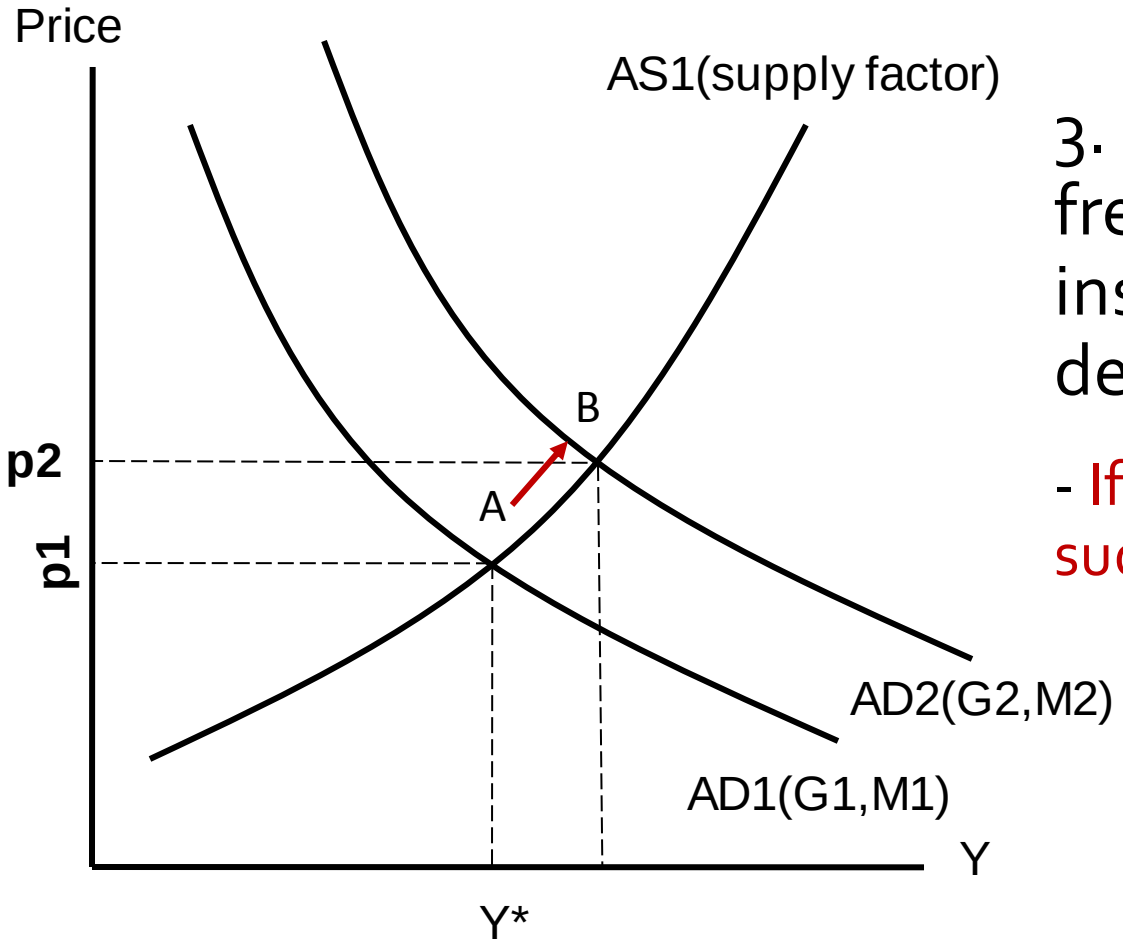


Perfect foresight: 100% forecast correct.



Fully indexation of wage to actual inflation

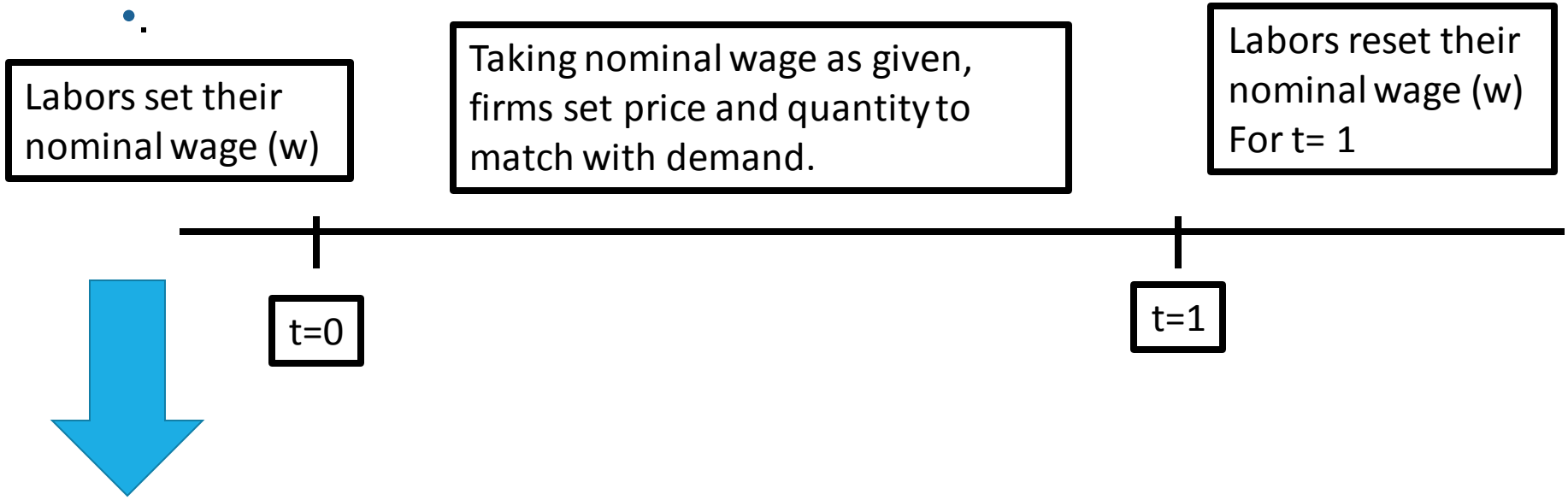
PHELPS-FRIEDMAN-LUCAS MONEY SURPRISE MODEL: MODEL ENVIRONMENT



3. Firms can set price freely; price is adjusted instantaneously to demand conditions.

- If demand rises, firms can suddenly raise their price.

TIMELINE OF DECISION/ACTION



Rational expectation: Based on all relevant information.
Future events; behavior of governments shocks; (anticipation in oil price/labor market conditions) → setting wage in the way that benefits worker most.

TIMING OF DECISION MATTERS

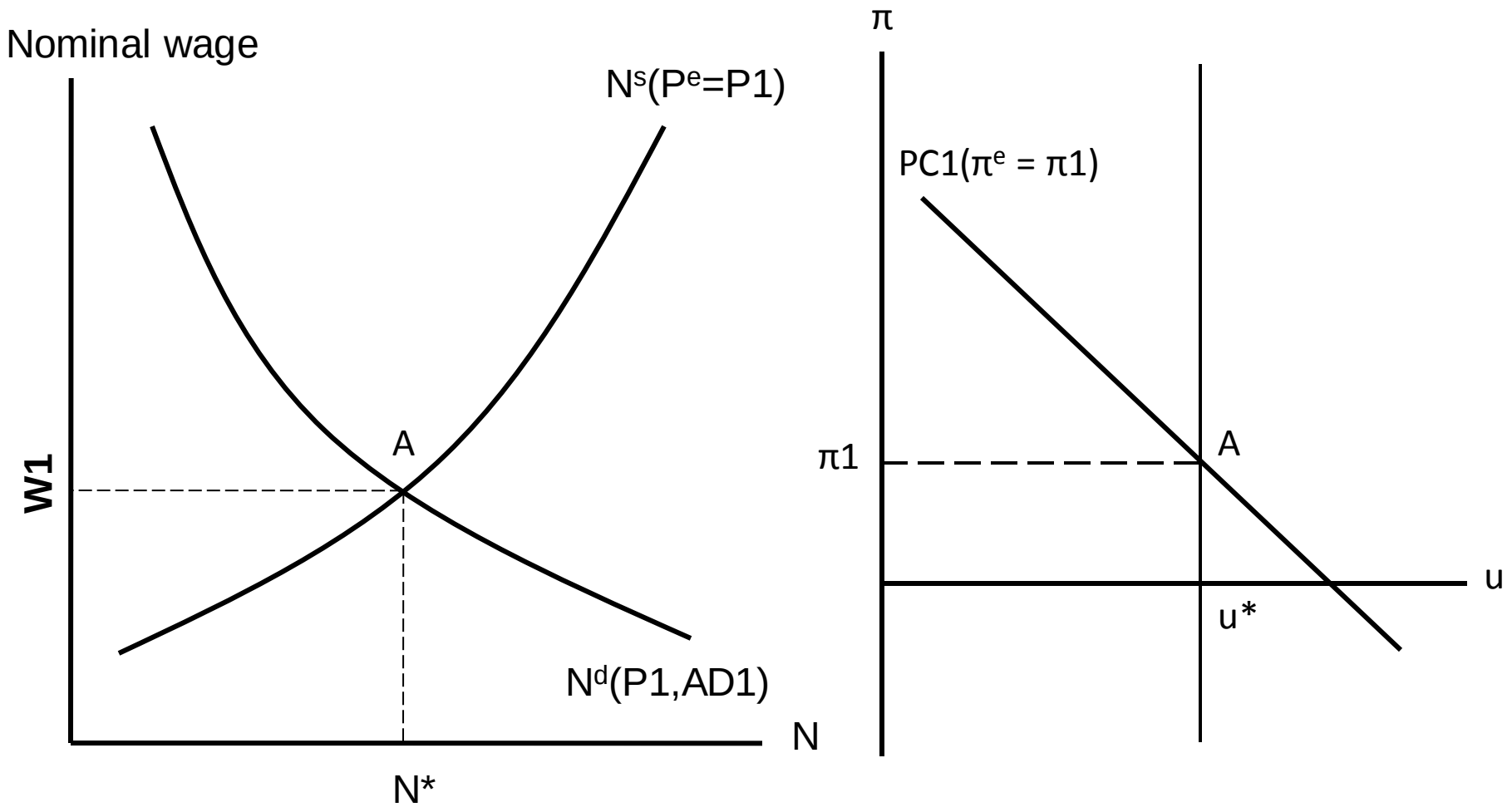
- **The Phelps-Friedman-Lucas money surprise model**:
  - Workers do not perceive the actual price/inflation --- **expected price/inflation**.
  - Workers' perception lags behind *actual* inflation. (no perfect foresight / no indexation)

- The delay in wage adjustment (lag behind) has lead to a real effect of monetary surprise.
  - The effect should be *temporary*

MECHANISM TOWARD THE NEUTRALITY RESULT

- Suppose we start from a natural rate equilibrium (N*).
  - Natural unemployment rate is u* (output is Y*)
- Actual price is P1; labor perfectly anticipates this. ($P^e = P1$)
- Actual inflation is π1; labor perfectly anticipates the correct value ($\pi^e = \pi 1$)
- At the P1 and π1, aggregate demand condition is equal to AD1.
  - Suppose that central bank adopts a 10% money growth rule.

WORKERS' EXPECTED PRICE AND BARGAINED WAGE SETTING



MONEY SURPRISE….

- The central bank temporarily increases the money-supply growth rate (*unanticipated* money growth), i.e. x1% → x2% (x2>x1)

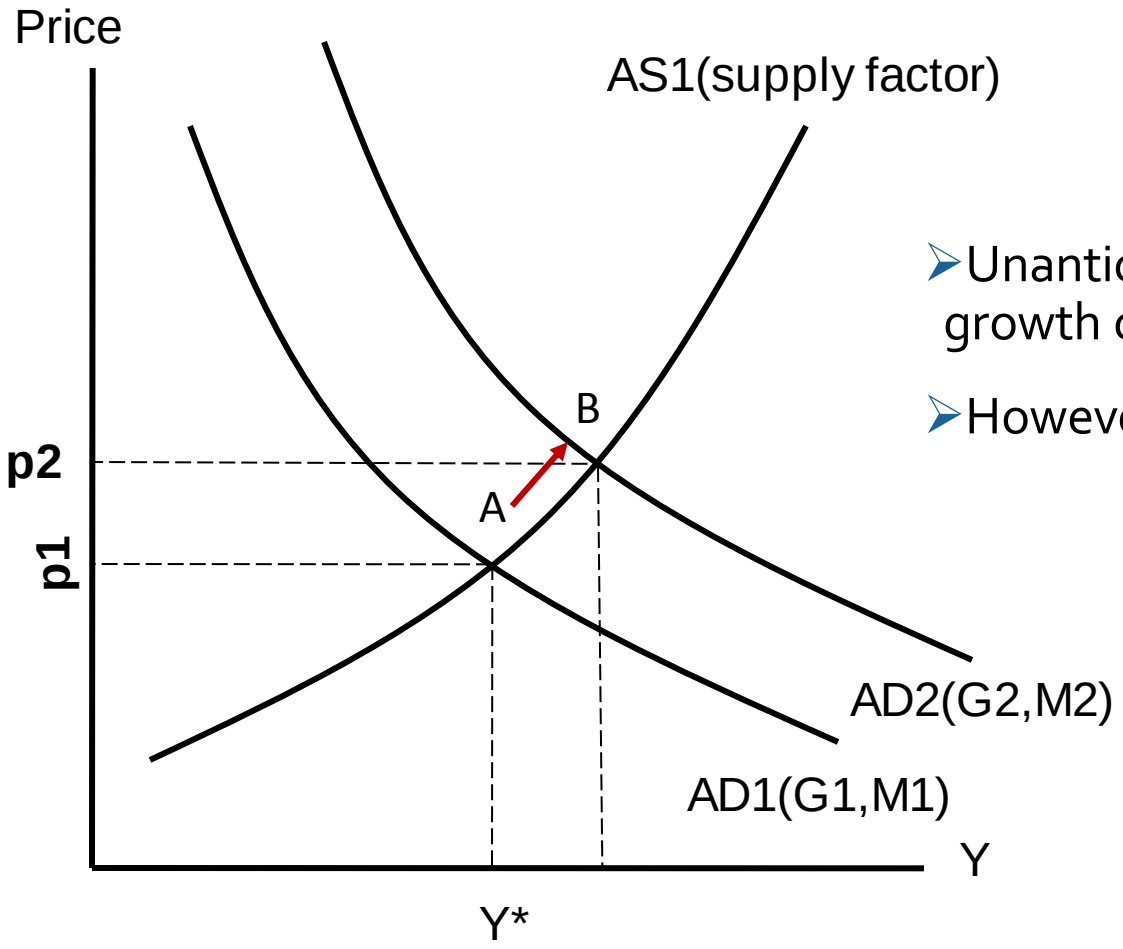
  - Product prices increase **faster** than money wages (under both fixed and variable wage contract).

  - The actual real wage (W/P) falls and firms demand more labor.

  - With the given wage contract, labor must supply as they've agreed with the employer.
    - Alternative interpretation could be that workers **mistakenly** see higher money wages as higher real wages at the previous price level.

  - Workers supply more labor; employment/output increases.

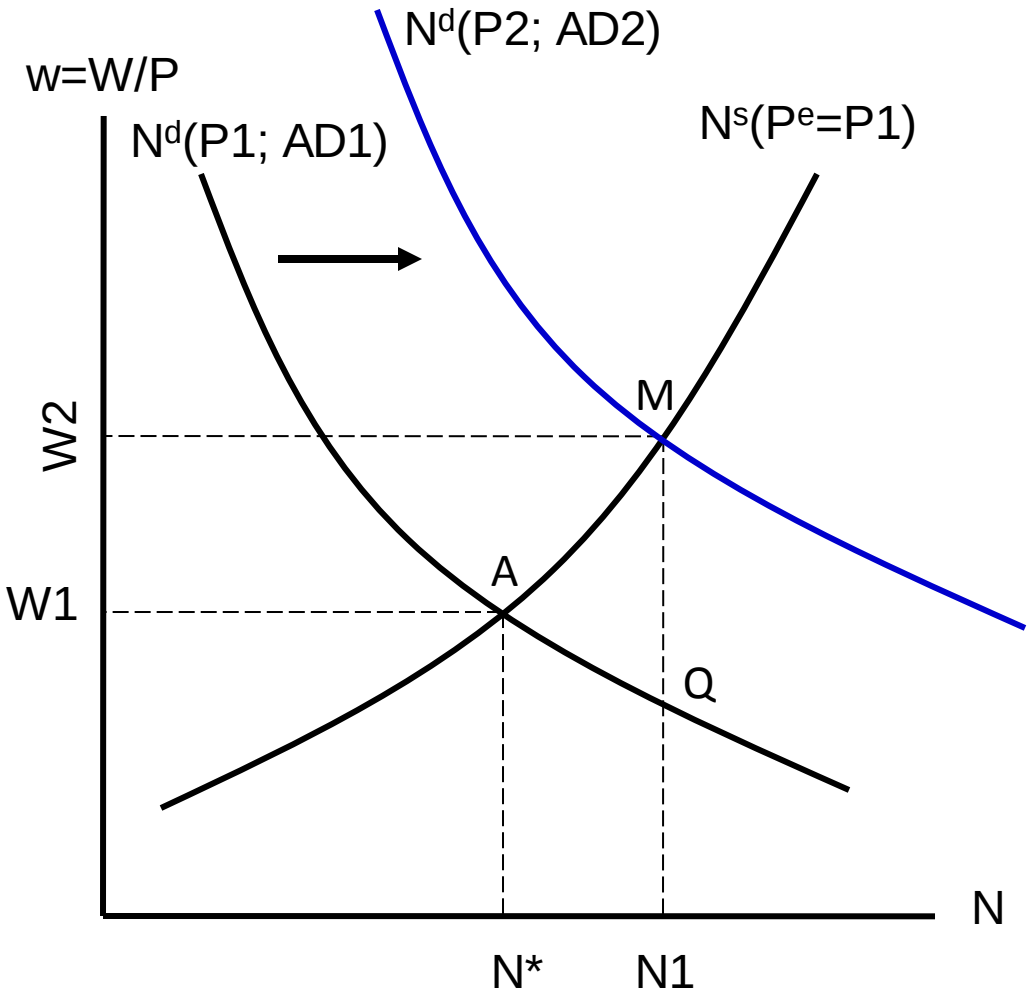
ACTUAL PRICE RISES…



- Unanticipated increase in money growth causes AD shift.
- However, AS is still fixed.

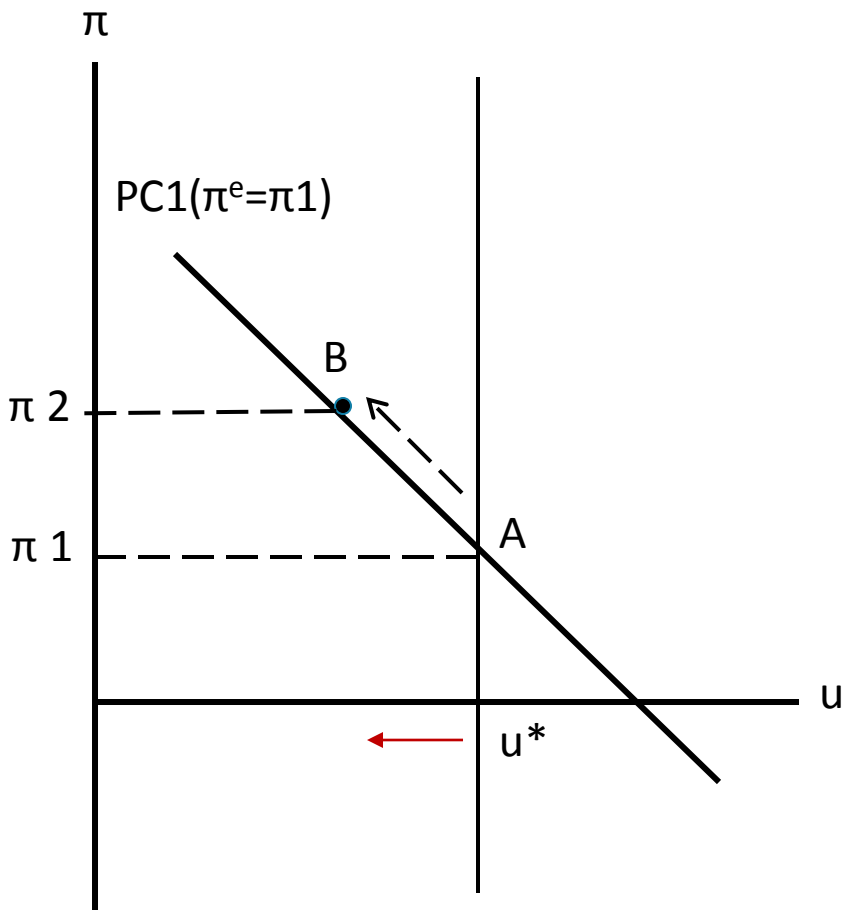
EXPECTED P^E LAGS BEHIND ACTUAL P

- Money wages increase from W1 to W2 and the price from P1 to P2.
  - $\Delta P/P > \Delta W/W$
- Labor supply and employment increase.



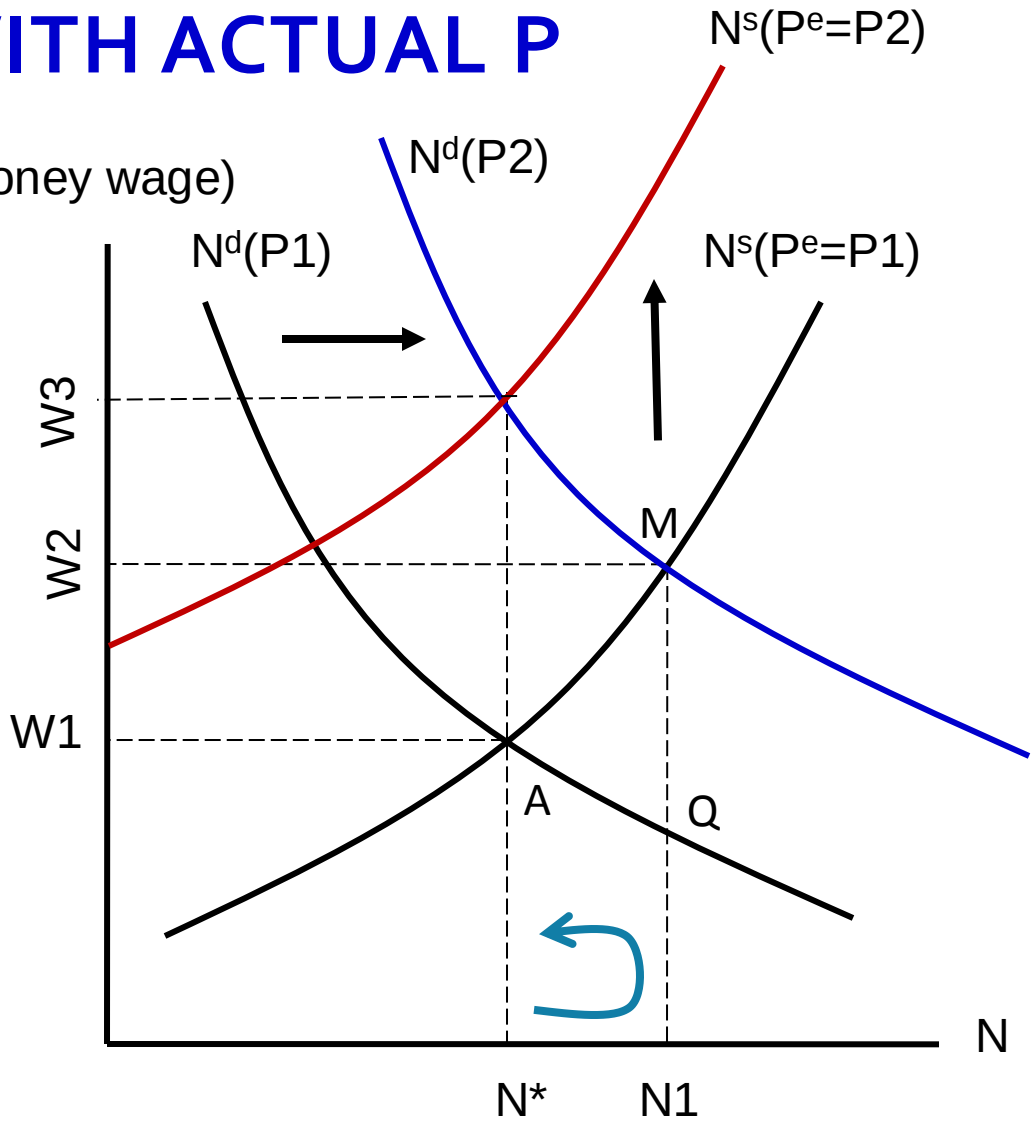
FALLING U AND RISING Π

- Higher money growth means higher inflation.
- Unemployment falls below u*.
- The economy moves from A to B.
- Unanticipated error in the price and inflation expectation (due to the surprise) causes worker to supply more labor; if nominal wage can be fully indexed with the actual price and inflation rate, they would not have done that.



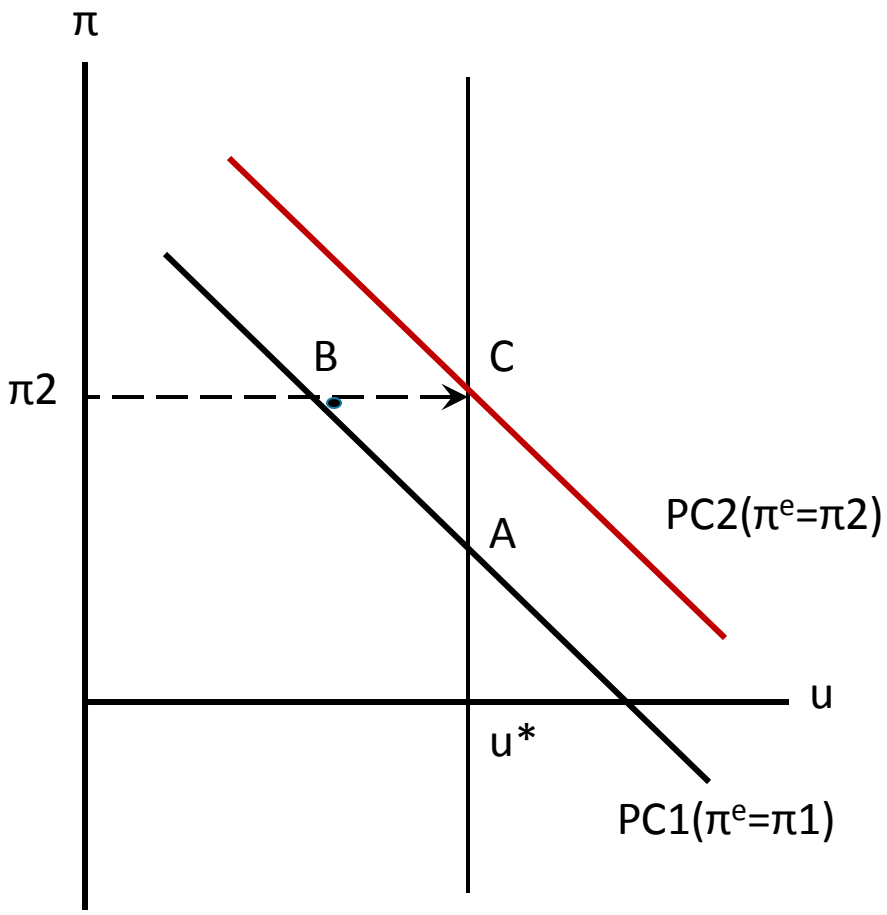
P^E CATCHES UP WITH ACTUAL P

- Finally, workers realize that the actual price is P2 and "suddenly" demand higher money wages in the next period.
- Employment drops to the natural rate.



ACTUAL U RETURNS TO U*

- Workers adjust their expected inflation upwards.
- Unemployment returns to u*.
- PC1 shifts to PC2 because of higher expected inflation.
- The economy moves from B to C.



MEDIUM-TERM ADJUSTMENT

- The proposition on neutrality sheds some light on the medium-term adjustment process.

- Without shock, output remains at full-employment level, as well as the unemployment that will remain at the natural level.
  - We now refer to both the natural level and full-employment level as "long-term trend"

- With shock hitting the economy, output, as well as unemployment deviates from the trend in the same way that a "surprisingly" higher money growth causes the expansionary deviation.

MEDIUM-TERM ADJUSTMENT

- Based on the New Classical economics, the deviation occurs temporarily.

- Worker will renegotiate for the new contract which reflects the current status of macroeconomy – currently updated information set.

- The previously existing trade-off (temporary deviation) will soon be offset by the change in inflation expectation and the adjustment in the labor market.

DO NOT CIRCULATE WITHOUT AUTHOR'S PERMISSION

PHILLIPS CURVE AND INFLATION DYNAMIC

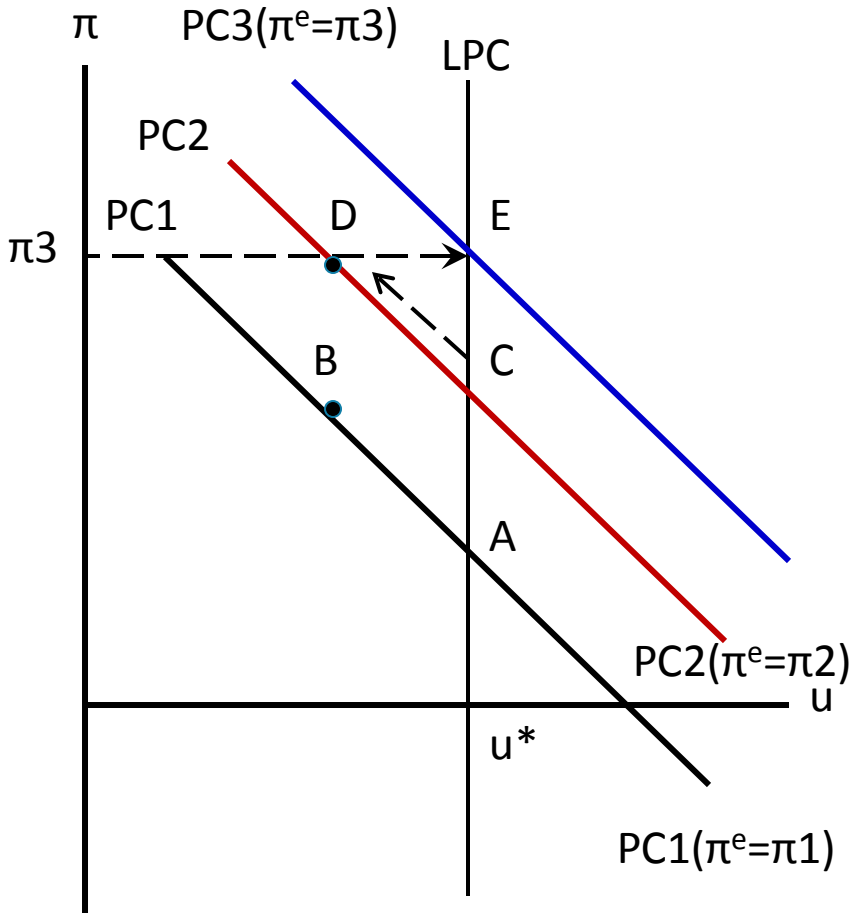
- History of Phillips curve
- Expectation-augmented Phillips curve: monetarism and new classical
- Implications for policy design

POLICY IMPLICATIONS

- Don’t try to be too ambitious --> Set policy in a rule-based fashion
  - Surprise will eventually hurt
  - Anticipated surely hurts

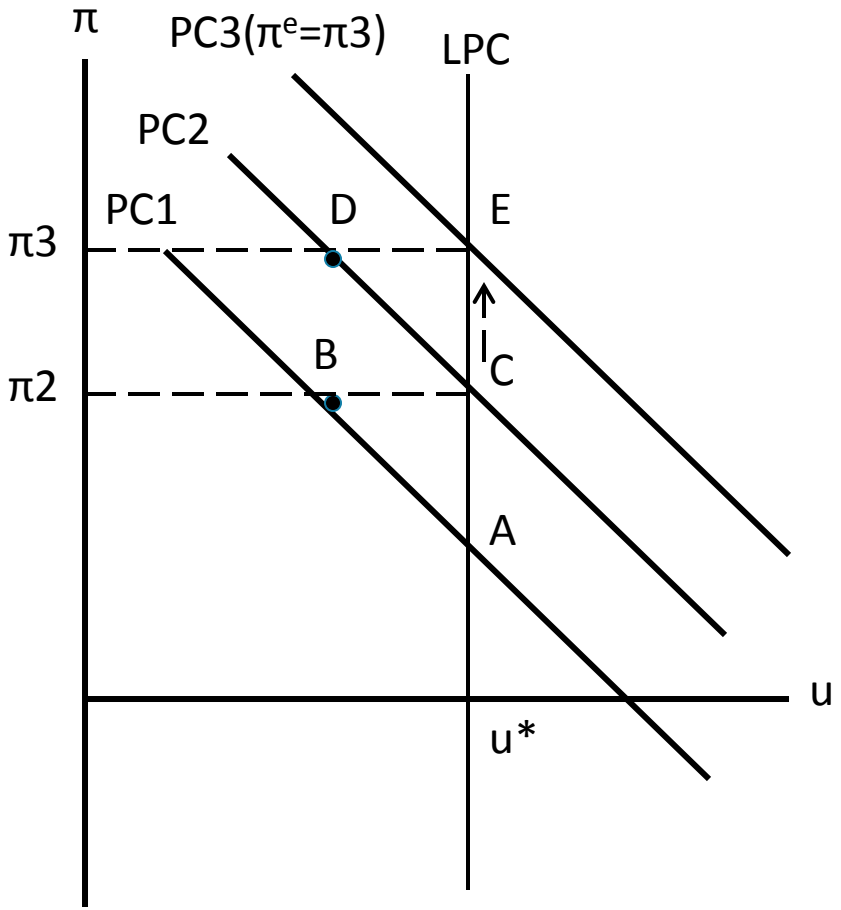
DON'T TRY TO BE TOO AMBITIOUS: SURPRISE WILL HURT!

- Attempt to surprise the market would end up badly; wage-price-inflation spiral will occur.
- The central bank repeats the ambitious policy; opportunistic approach and surprise the market.
- The economy moves from C to D in the short run, but to E in the long run with higher expected inflation.



DON'T TRY TO BE TOO AMBITIOUS: ANTICIPATED WILL HURT TOO!

- At C, higher money growth is anticipated.
- Workers adjust their P^e and π^e immediately.
- The real wage is the same, so employment and output are the same.
- Only higher inflation; no real effects.

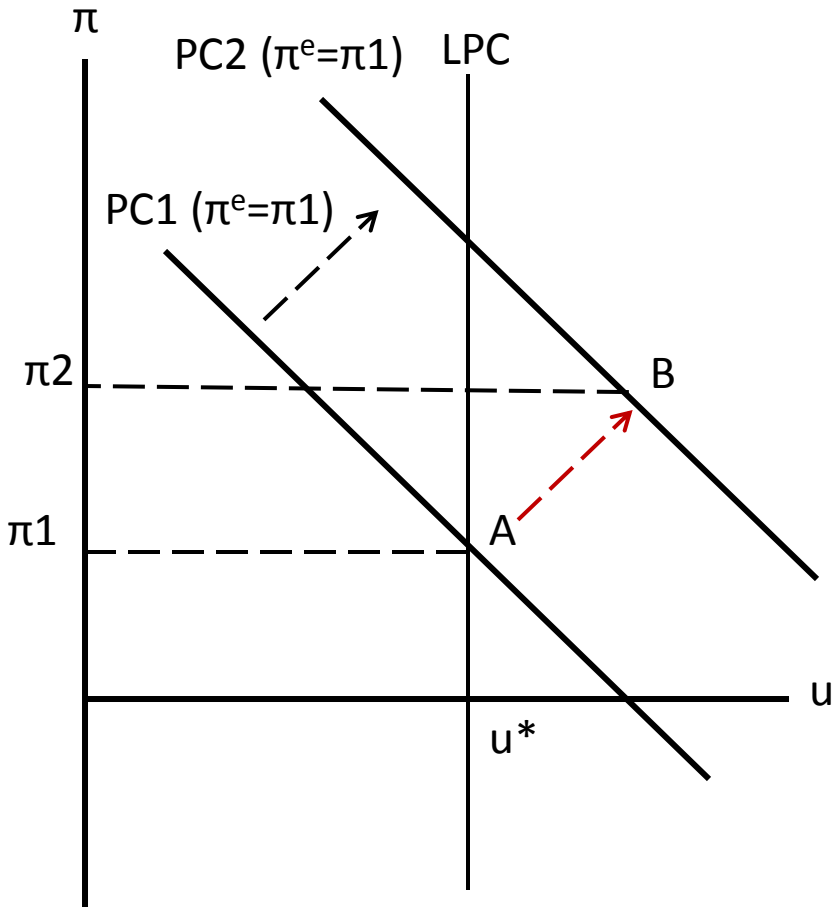


POLICY DESIGN

- As we have no real gain in the long-term, monetary policy should be a rule-based – avoiding be another source of shock
- What should be a good characteristic of the rule-based?
- Rule-based central bank should set low 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

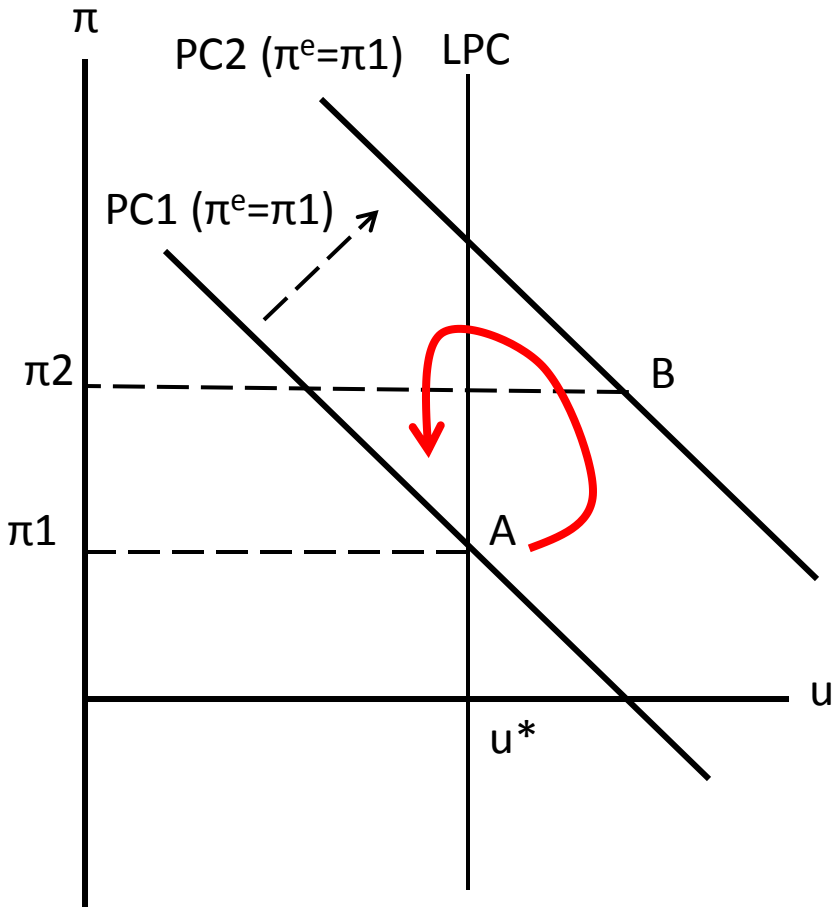
WHY ANCHORING LOW INFLATION CAN HELP MITIGATING THE EFFECT OF NEGATIVE SUPPLY SHOCKS?

- Negative shocks temporarily hit the economy (oil shock)
  - Phillips curve will temporarily shift up to PC2 ($\pi^e=\pi 1$).
- 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 π1 even the actual inflation is π2.



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 $\pi 1$, not being revised to $\pi 2$.
  - 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

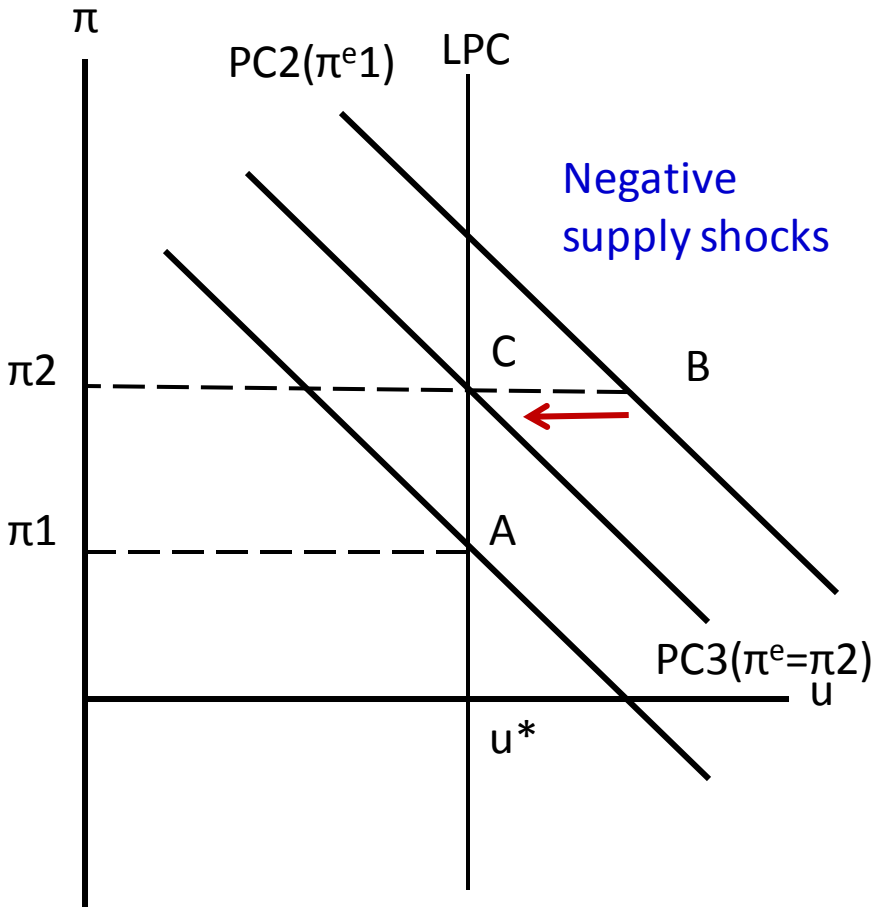


WHY ANCHORING LOW INFLATION CAN HELP MITIGATING THE EFFECT OF NEGATIVE SUPPLY SHOCKS?

- Instead, if the central bank does not commit to a low inflation, the effect of negative shocks will last, and cause high inflation economy.

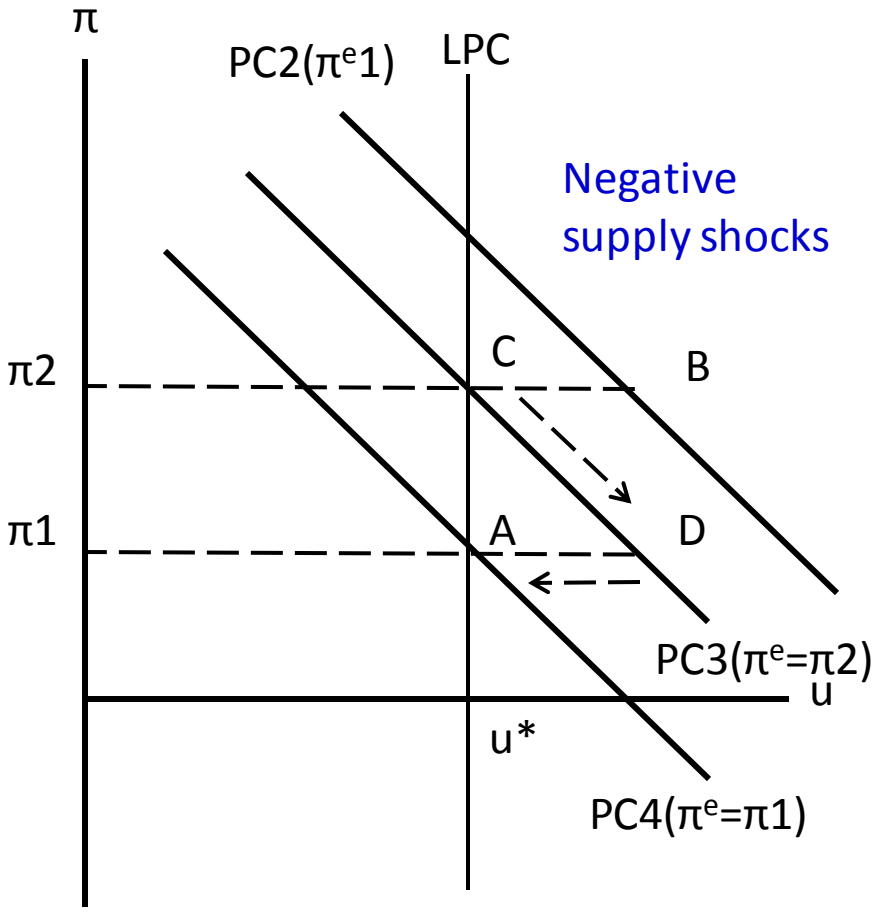
- Even if the period of shocks have passed by, economy would still remain at "C" when we have high inflation ($\pi^e=\pi 2$).

- 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.



WHY INFLATION HAD REMAINED HIGH AFTER OIL SHOCK

- Back to the story posted earlier, why inflation had remained high after oil shock?

  - Following the Adaptive expectation, people get stigmatized with high inflation, and create high expectation.

  - Following the rational expectation, high inflation expectation occurs because of the behavior of the central bank – CB does not show a strong signal to bring the inflation down.

SUBOPTIMAL RESPONSE TO INFLATION MAKE INFLATION PERSISTS TOO LONG AND INSTABILITY

$$i_t = constant + beta * inflation + gamma * (output\ gap)$$

	beta	Gamma
1970s (Pre-Volcker)	**0.83**	0.27
After 1980s (Volckey-Greenspan)	**2.15**	0.93

TABLE I
AGGREGATE VOLATILITY INDICATORS

	Standard Deviation of:			
	Inflation		Output	
	Level	*hp*	*Gap*	*hp*
Pre-Volcker	2.77	1.48	2.71	1.83
Volcker-Greenspan	2.18	0.96	2.36	1.49
post–82	1.00	0.79	2.06	1.34