Econ 702 Macroeconomics I

Charles Engel and Menzie Chinn

Spring 2020

Lecture 22: Monetary Policy

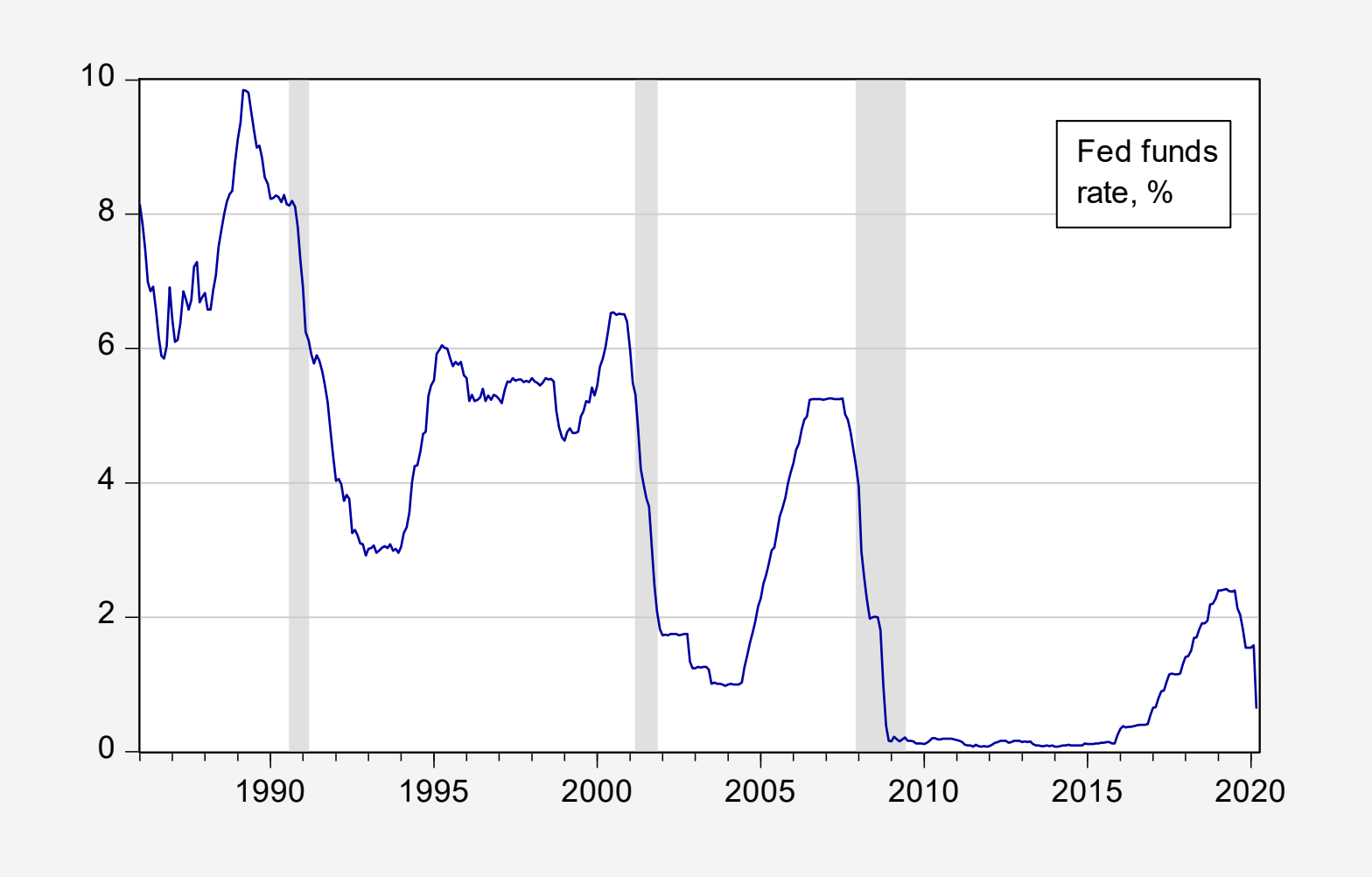
Outline

- Is monetary policy exogenously determined
- How is optimal monetary policy defined?
- “Divine coincidence” and strict price stabilization
- Natural rate of interest

Policy Exogeneity?

- In our expositions, we have treated fiscal policy and monetary policy as being conducted in a vacuum
- That is, we treat government spending and money supply changes as exogenously determined
- Let's take a look at the real world conduct of monetary policy as summarized by the policy rate – in the US the Fed funds rate

Monetary Policy As Actually Executed



Recap of the Model

$$C_t = C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t) \tag{27.1}$$

$$N_t = N^s(w_t, \theta_t) \tag{27.2}$$

$$P_t = \bar{P}_t + \gamma(Y_t - Y_t^f) \tag{27.3}$$

$$I_t = I^d(r_t, A_{t+1}, K_t) \tag{27.4}$$

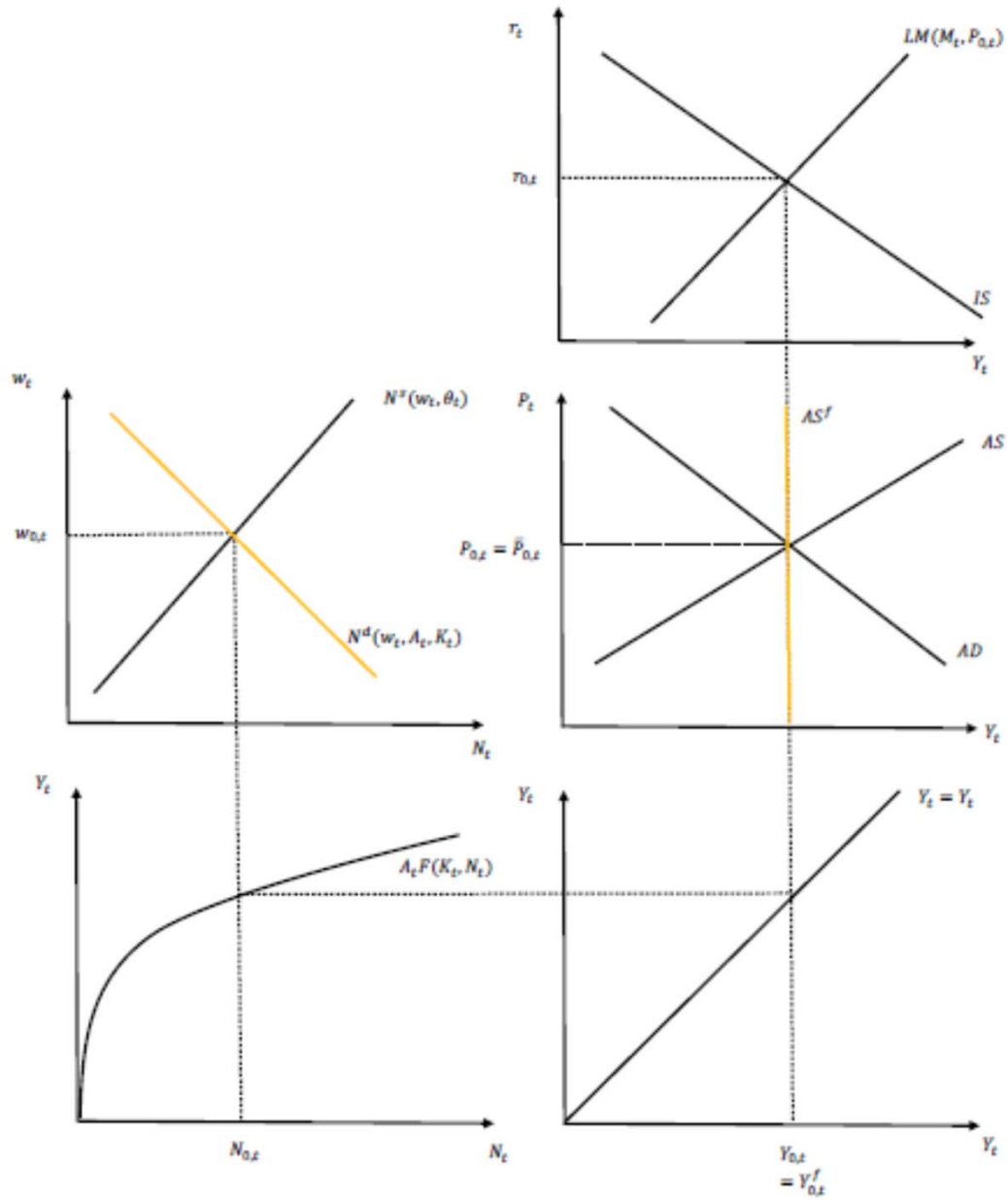
$$Y_t = A_t F(K_t, N_t) \tag{27.5}$$

$$Y_t = C_t + I_t + G_t \tag{27.6}$$

$$M_t = P_t M^d(r_t + \pi_{t+1}^e, Y_t) \tag{27.7}$$

$$r_t = i_t - \pi_{t+1}^e \tag{27.8}$$

Figure 27.1: Equilibrium in the Partial Sticky Price Model



What's the goal of monetary policy

- Point of monetary policy is to re-establish the flexible price equilibrium in response to shocks
- Consider IS shocks (government spending, future productivity)
- Then supply shocks (current productivity, disutility of work)
- And finally expected price shock (or materials price shock)

Figure 27.2: Optimal Monetary Response to Positive IS Shock

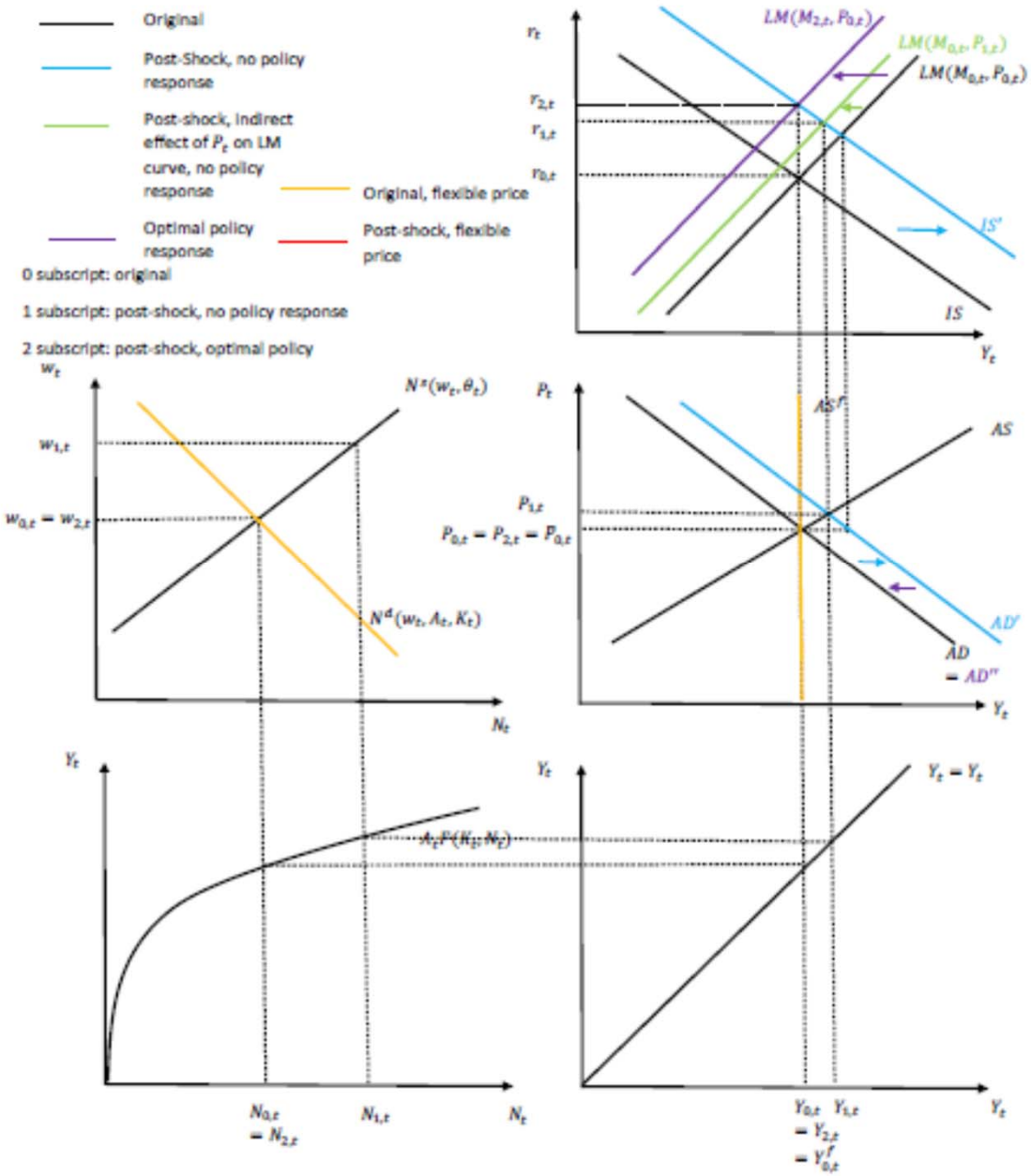


Figure 27.3: Optimal Monetary Response to Increase in A_t

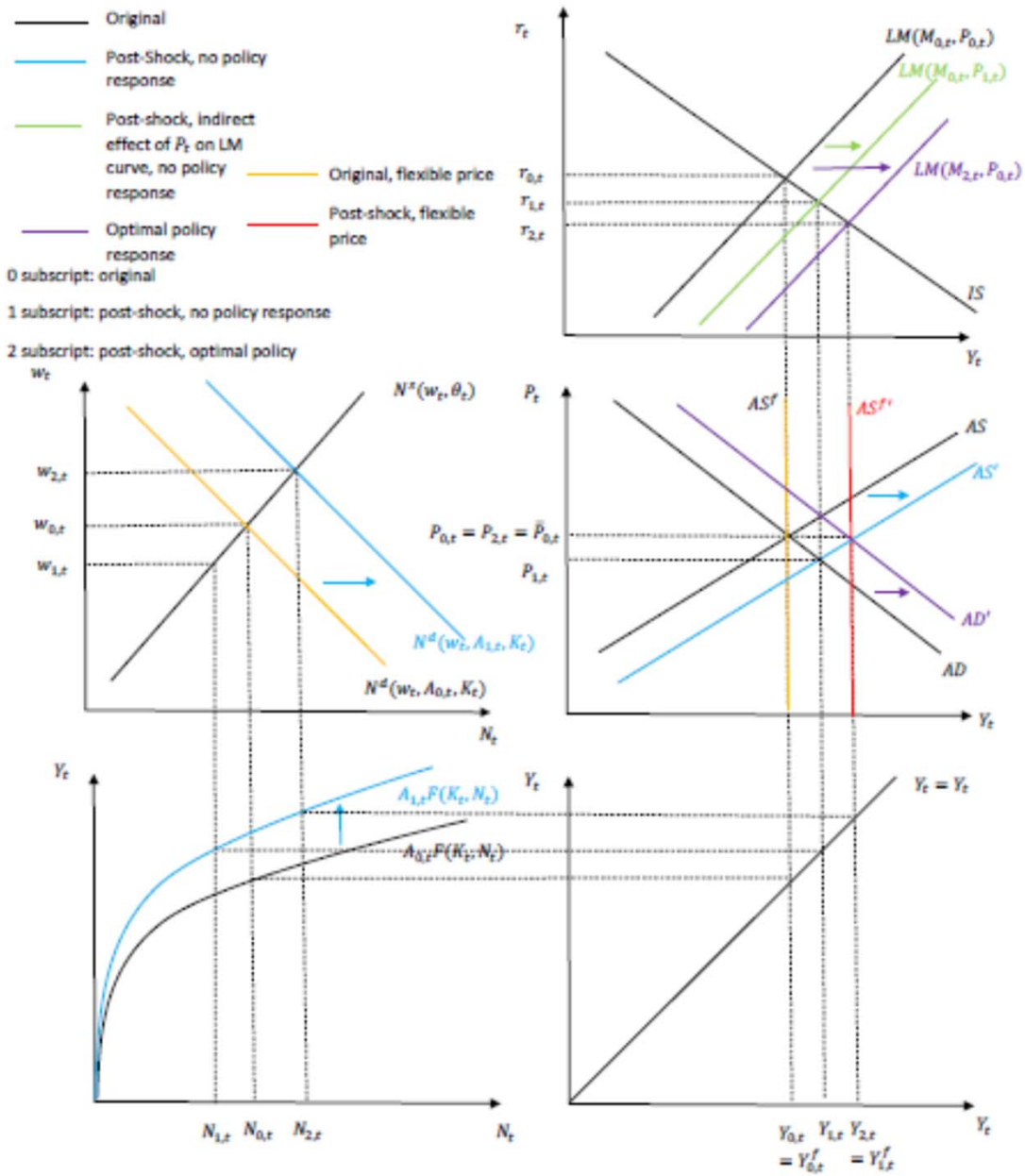
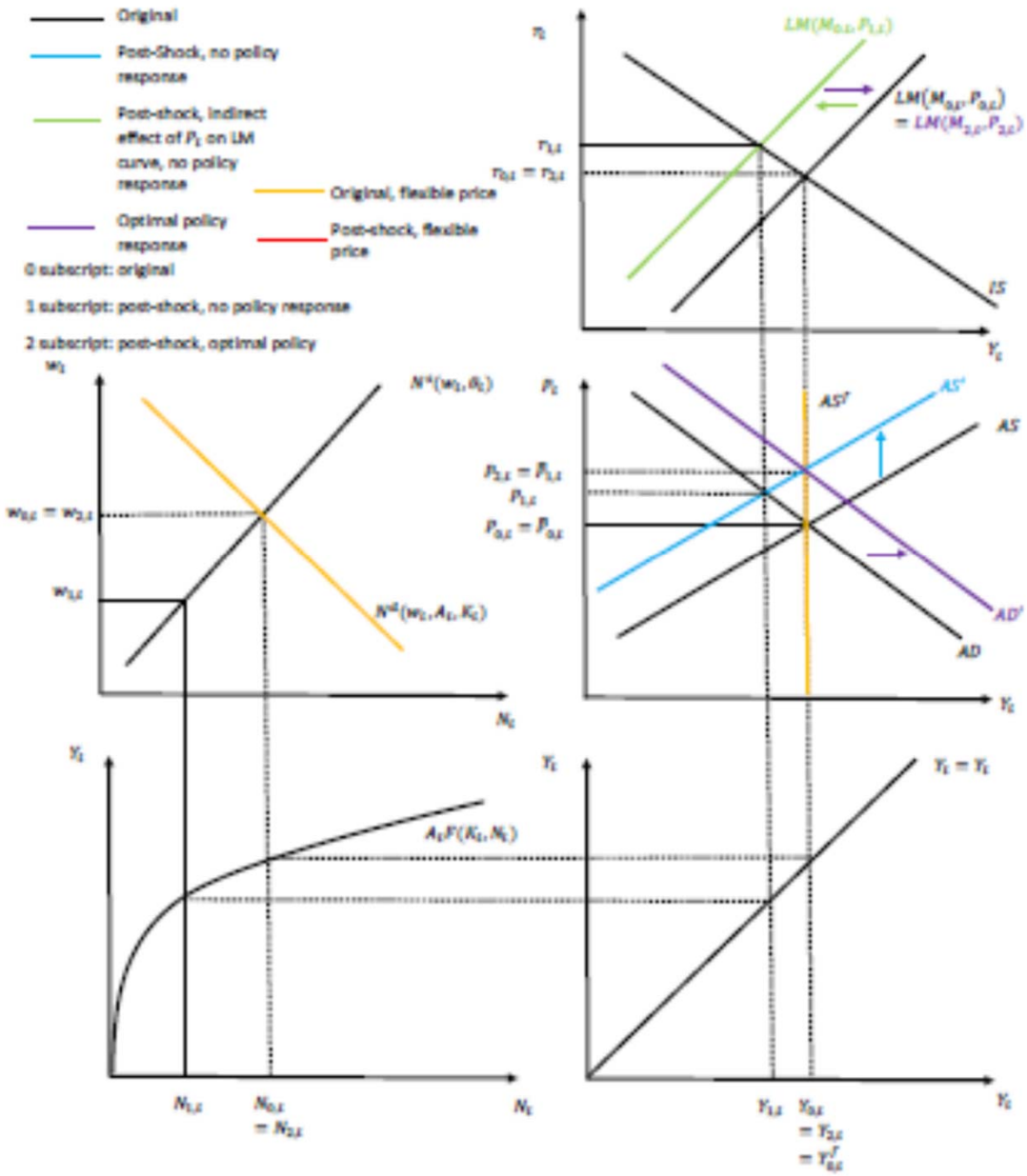


Figure 27.4: Optimal Monetary Response to Increase in $\bar{P}_t$



Optimal Policy

Table 27.1: Optimal Monetary Policy Reaction to Different Shocks

	Exogenous Shock		
Variable	$\uparrow$ IS curve	$\uparrow A_t$	$\uparrow \bar{P}_t$
M_t	-	+	+
r_t	+	-	-
i_t	+	-	-

In summary

- Counteracts positive IS shocks (works in opposite direction)
- Accommodates positive supply shocks (moves in same direction)
- Counteracts (in output terms) exogenous price shocks

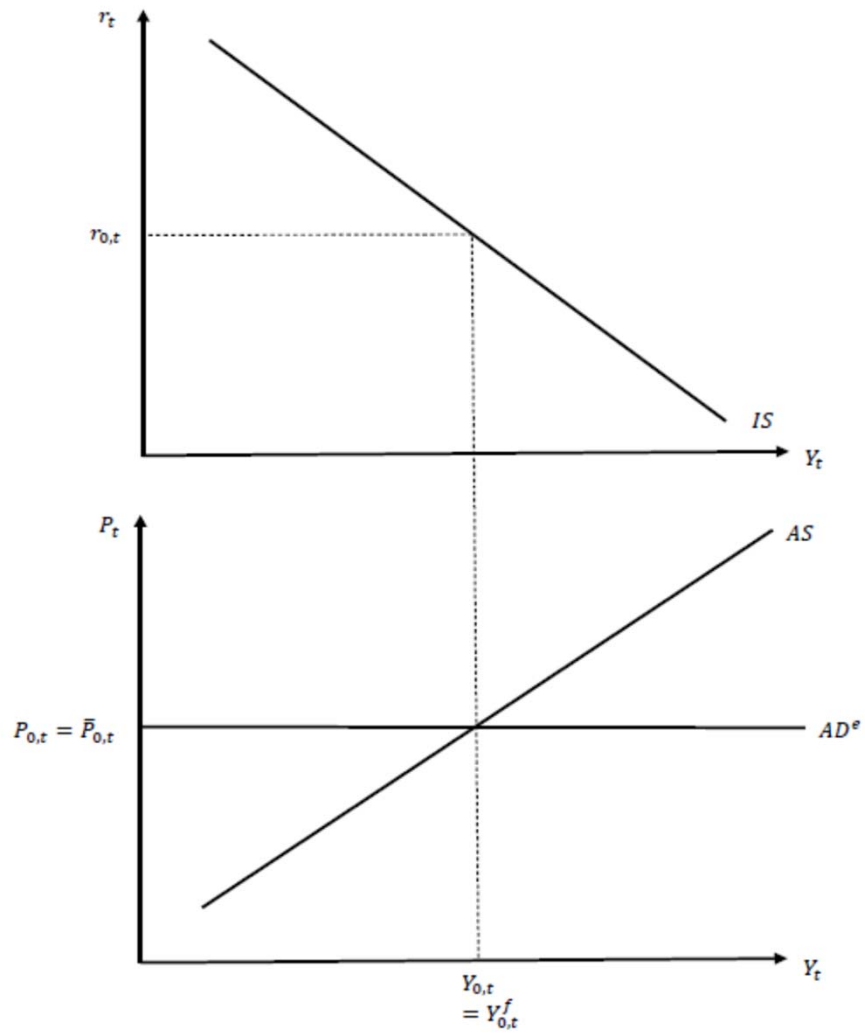
Isn't Price Stability the Optimal Policy?

- Having price stability as a goal is sometimes termed an "inflation target"
- This can mean one goal, or the only goal
- In US, one goal is 2% inflation (Personal Consumption Expenditure deflator)
- Price stability could be optimal goal if exogenous shocks to price level are not too important
- Price stability is optimal by virtue of optimally reacting to IS or supply shocks

Interpreting Strict Price Stability

Money supply is adjusted constantly to keep price level constant, so "effective AD" is flat

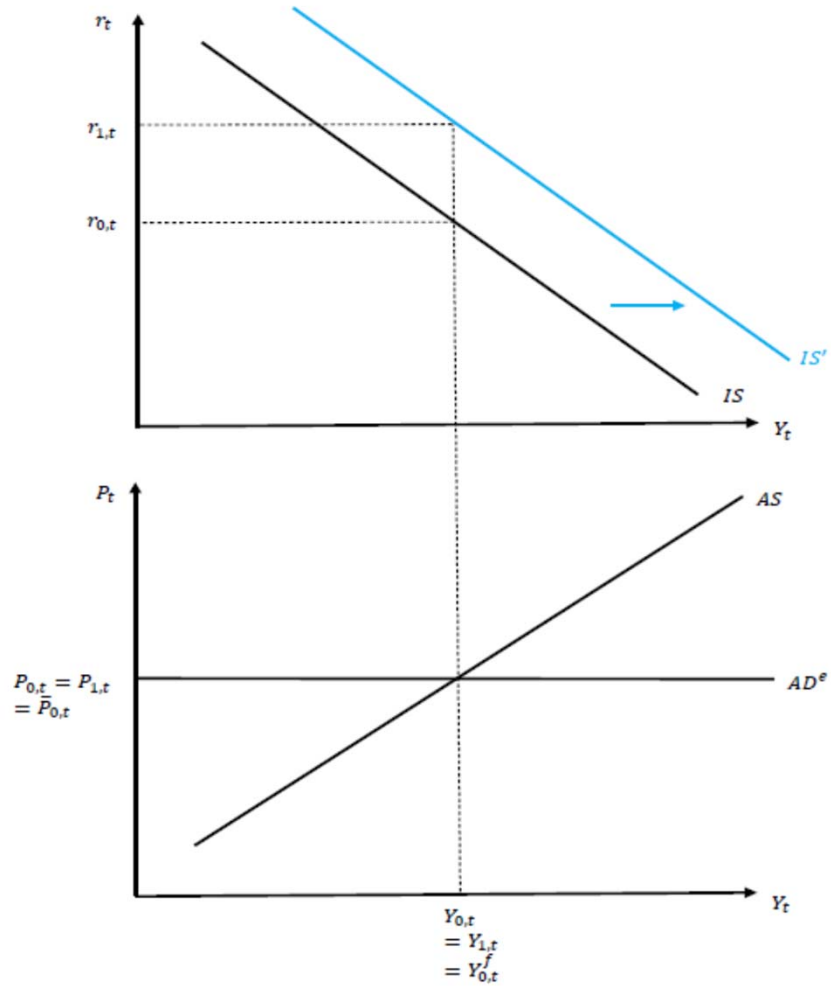
Figure 27.5: A Strict Inflation (Price Level) Target and the Effective AD Curve



Interpreting Strict Price Stability

If there is an IS shock, central bank must raise real rate to keep price level constant

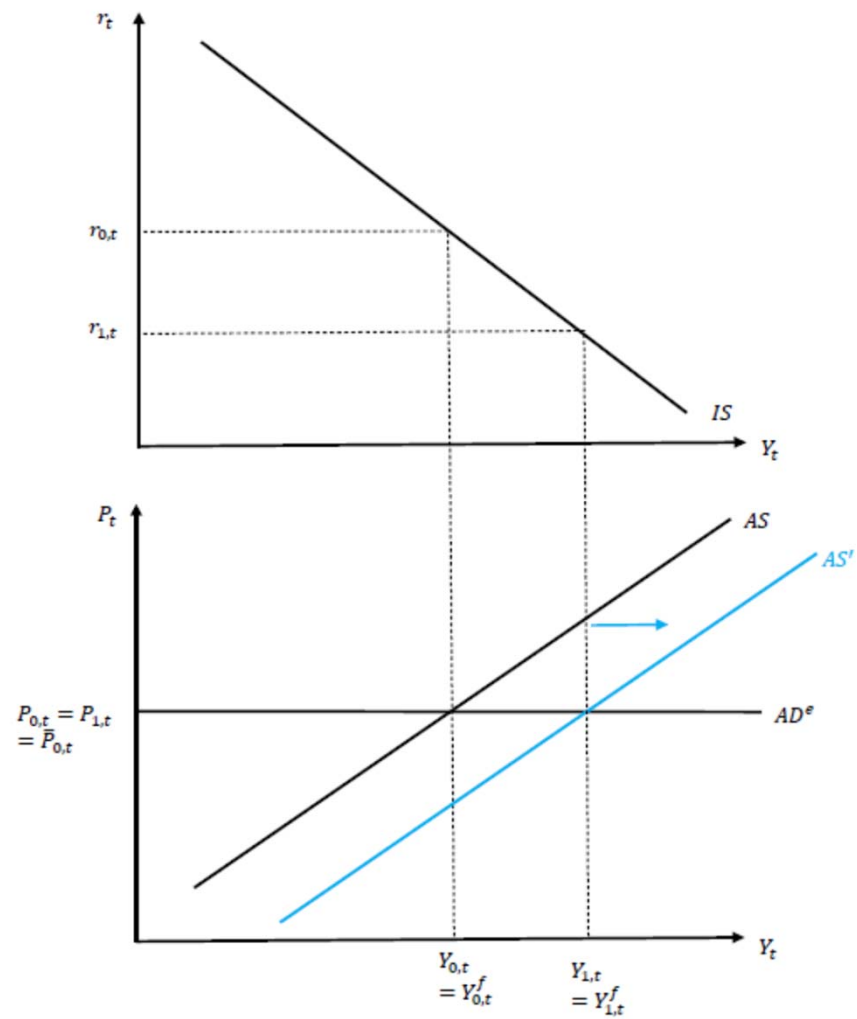
Figure 27.6: A Strict Inflation (Price Level) Target: Response to Positive IS Shock



Interpreting Strict Price Stability

If there is a positive supply shock, then central bank has to lower real rate to keep price level constant

Figure 27.7: A Strict Inflation (Price Level) Target: Response to $\uparrow A_t$ or $\downarrow \theta_t$



“Divine Coincidence” (Blanchard, Gali, 2007)

- Strict price stabilization means the optimal equilibrium is achieved.
- Remarkably, one does not need to know full employment output (potential GDP) in order to achieve optimal equilibrium
- All one needs to observe is the price level (which is much easier to observe than full employment output)

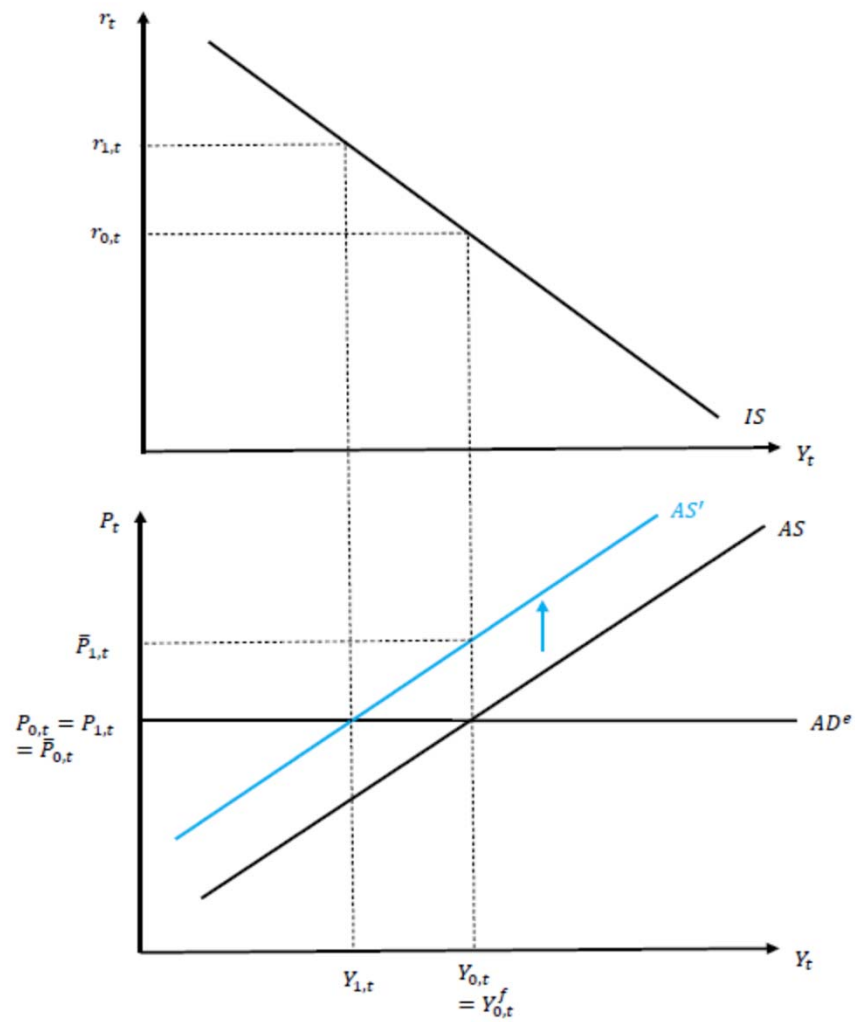
“Divine Coincidence” (Blanchard, Gali, 2007)

- More generally, does the “Divine Coincidence” hold?
- Or, is it likely to hold in the “real world”?
- The answer to the first question is “No”
- And to the second question is likely “No”

Interpreting Strict Price Stability

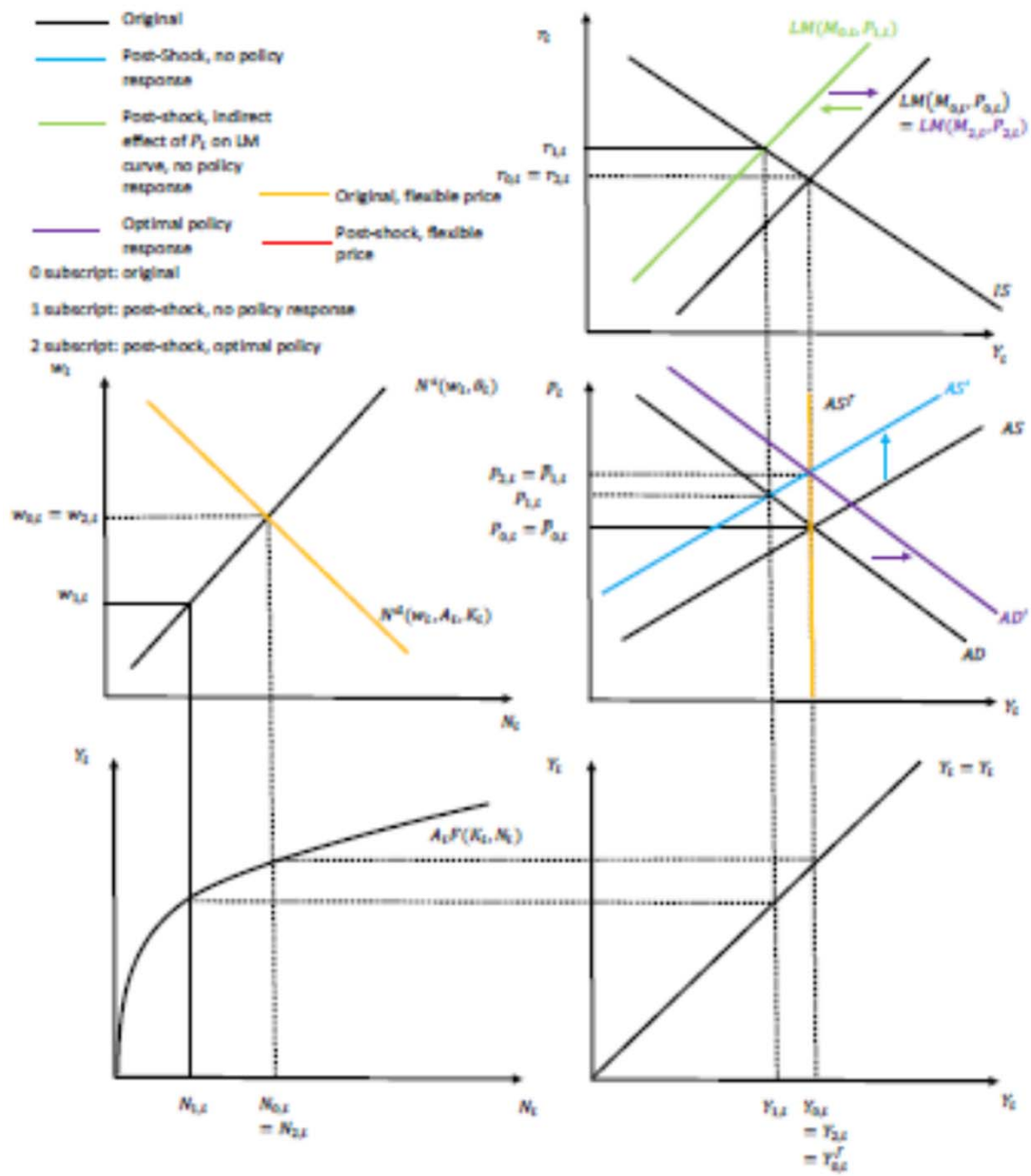
If there is an increase in the exogenous component of P-bar (say materials price increase), then AS shifts up, output falls below potential

Figure 27.8: A Strict Inflation (Price Level) Target: Response to $\uparrow \bar{P}_t$



Trade-off in Price Stability, Output when Price Shocks

Keeping output constant in face of shock inevitably leads to price level increase



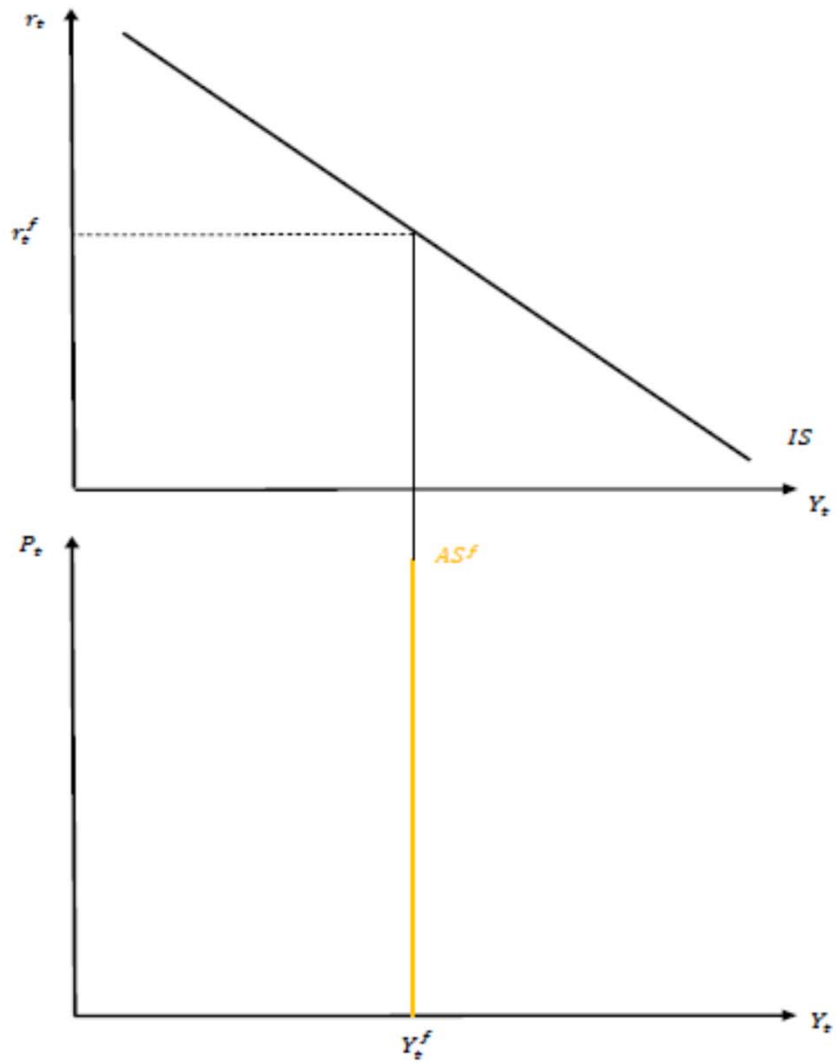
The Natural Rate of Interest

- The real interest rate that sets output equal to full employment output
- The real rate that would be delivered in equilibrium in a neoclassical model
- Also known as “the neutral rate”
- Attributed to Wicksell (1898) and Woodford (2003).
- This concept is useful when monetary policy is couched in terms of interest rates
- (changing nominal rate = changing real rate when expected inflation is constant)

Def'n

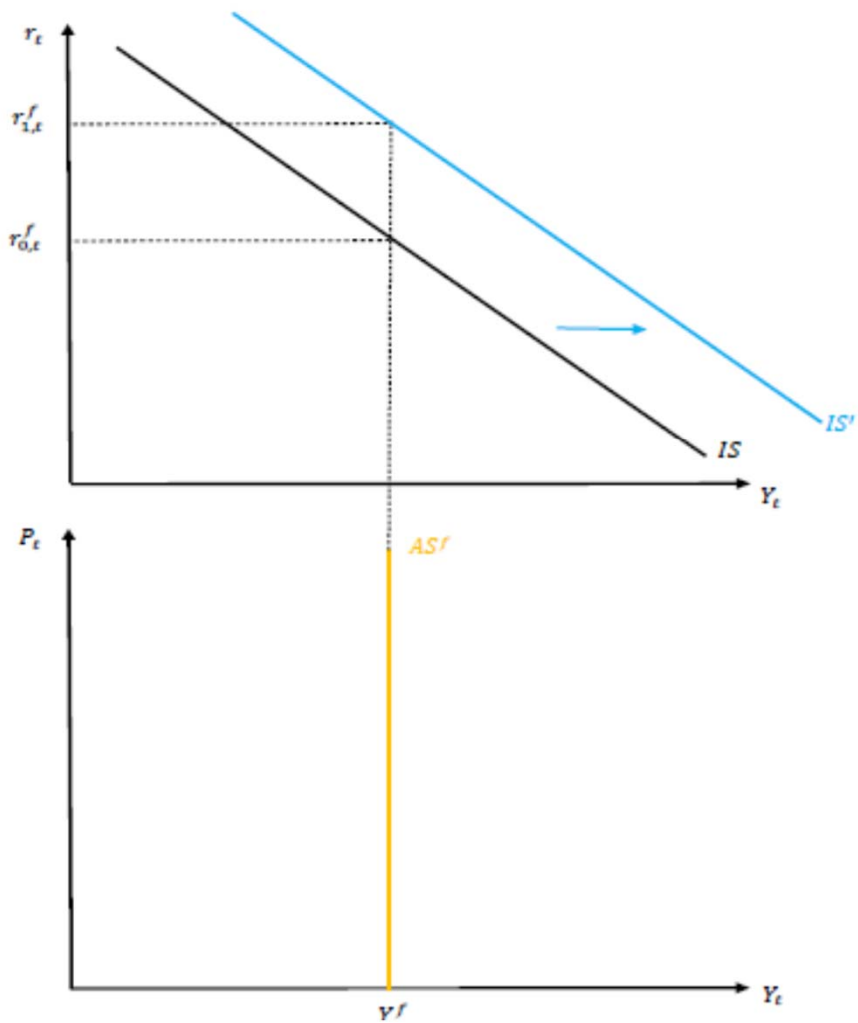
$$Y_t^f = C(Y_t^f - G_t, Y_{t+1} - G_{t+1}, r_t^f) + I^d(r_t^f, A_{t+1}, K_t) + G_t \tag{27.9}$$

Figure 27.9: The Natural Rate of Interest



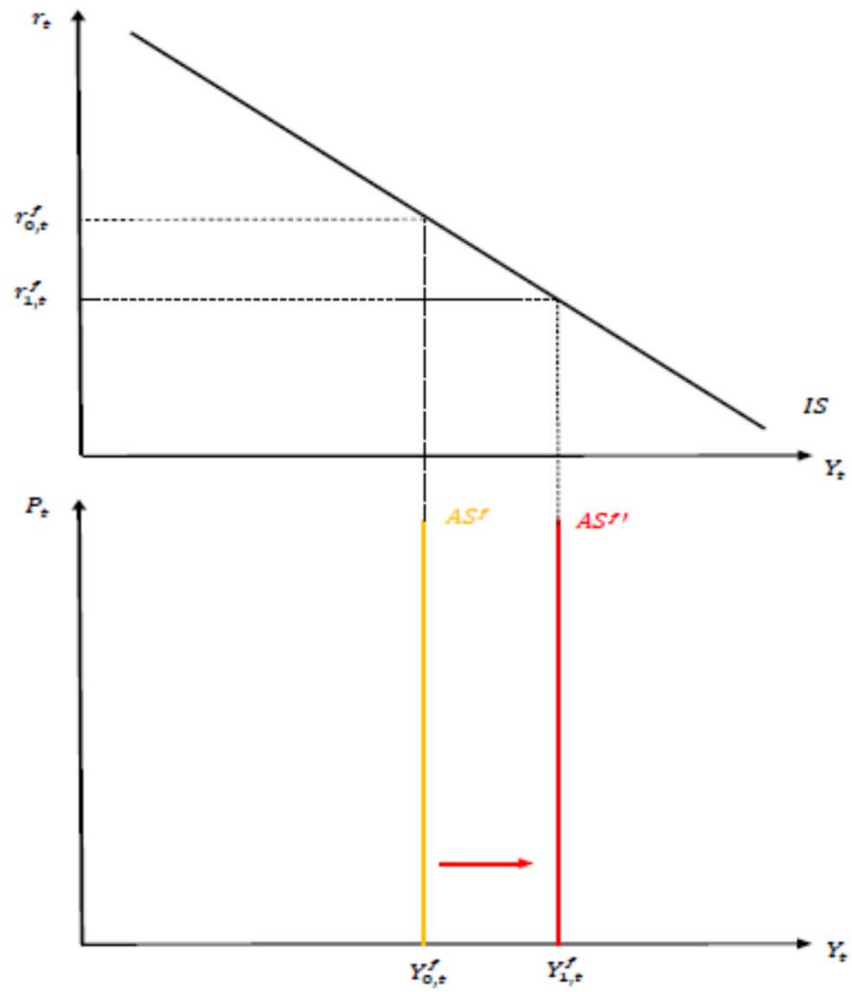
Fiscal Policy Affects the Natural Rate

Figure 27.10: IS Shocks and the Natural Rate of Interest



Supply Shocks Affect the Natural Rate

Figure 27.11: Y_t^f Shocks and the Natural Rate of Interest



So Move Interest Rates Instead of Money Supply to Hit Full Employment Output

$$\frac{M_t}{P_t} = M^d(r_t^f + \pi_{t+1}^e, Y_t^f) \tag{27.10}$$

By choosing M in order to make (27.10) hold

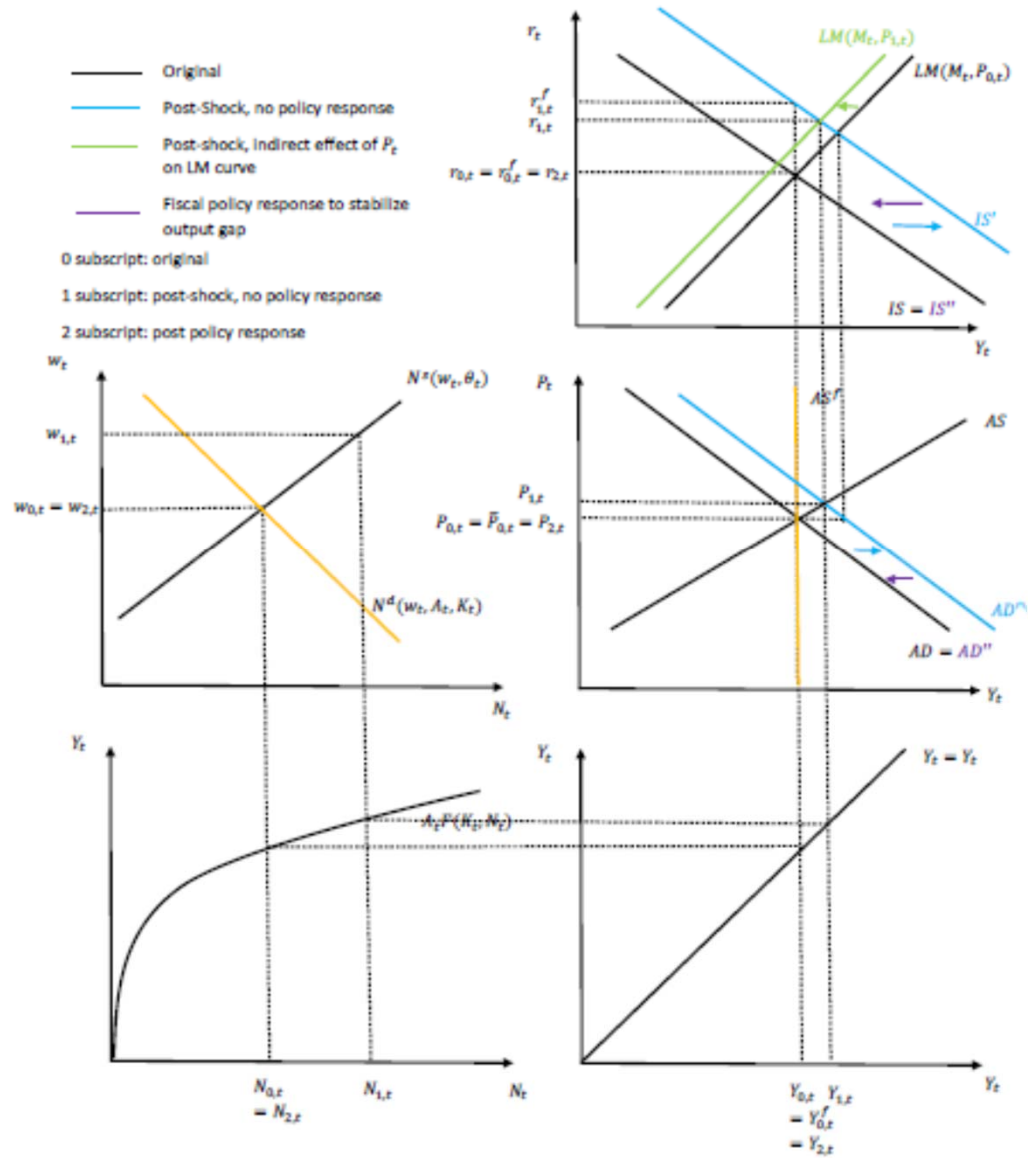
Fiscal or Monetary Preferred?

- Fiscal affects the natural rate
- Monetary does not
- Fiscal has long inside lag (proposal, legislation, implementation)
- But monetary has a long outside lag (interest rates affect investment, consumption)

Example Why Monetary to Be Preferred

Keeping output constant by reducing G in face of positive IS shock results in $r_{2,t} < r^f_{1,t}$ => Changes composition of output at $Y = Y^f$

Figure 27.12: Using Fiscal Policy to Combat an IS Shock



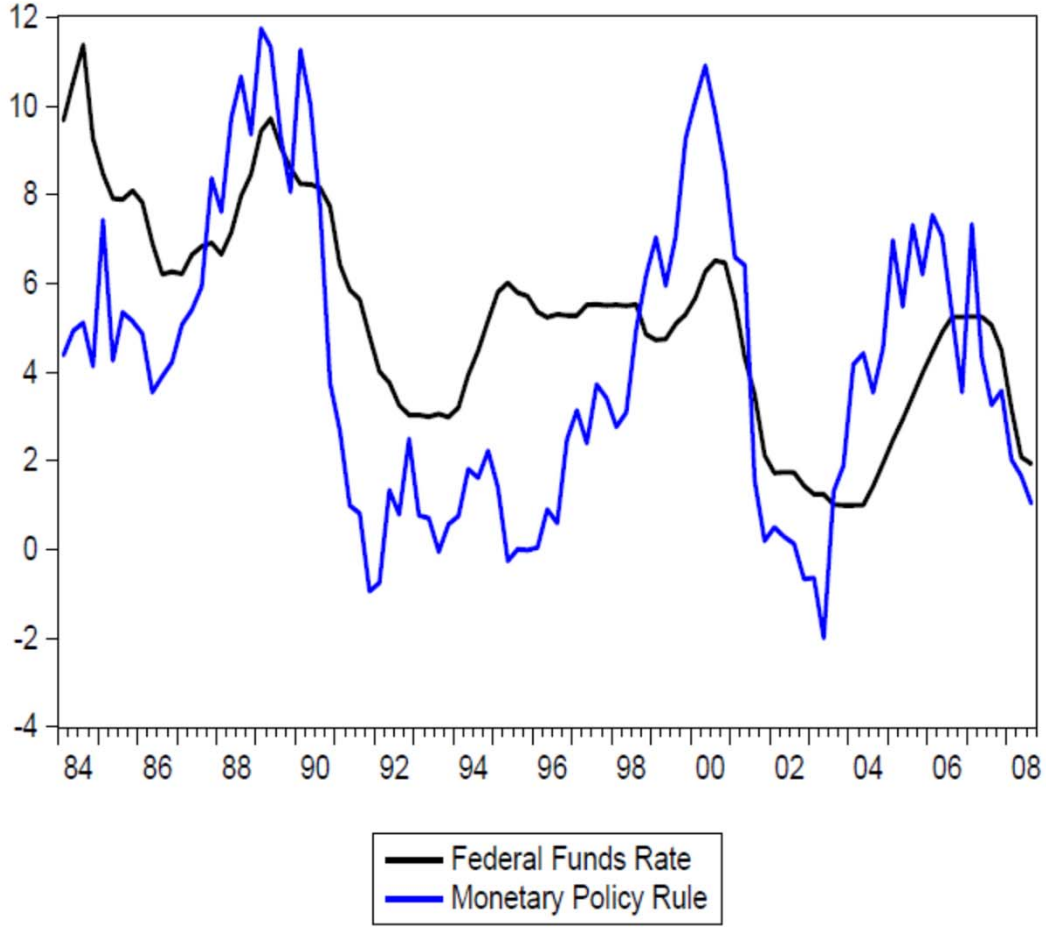
Taylor Rules (Taylor, 1993)

$$i_t = r^* + \pi^* + \phi_\pi(\pi_t - \pi^*) + \phi_y(Y_t - Y_t^f) \qquad (27.11)$$

Textbook uses some standard assumptions

- r^* (assumed) at 2.5%
- π^* at 2%
- $\phi\pi = 1.5$
- $\phi y = 0.5$

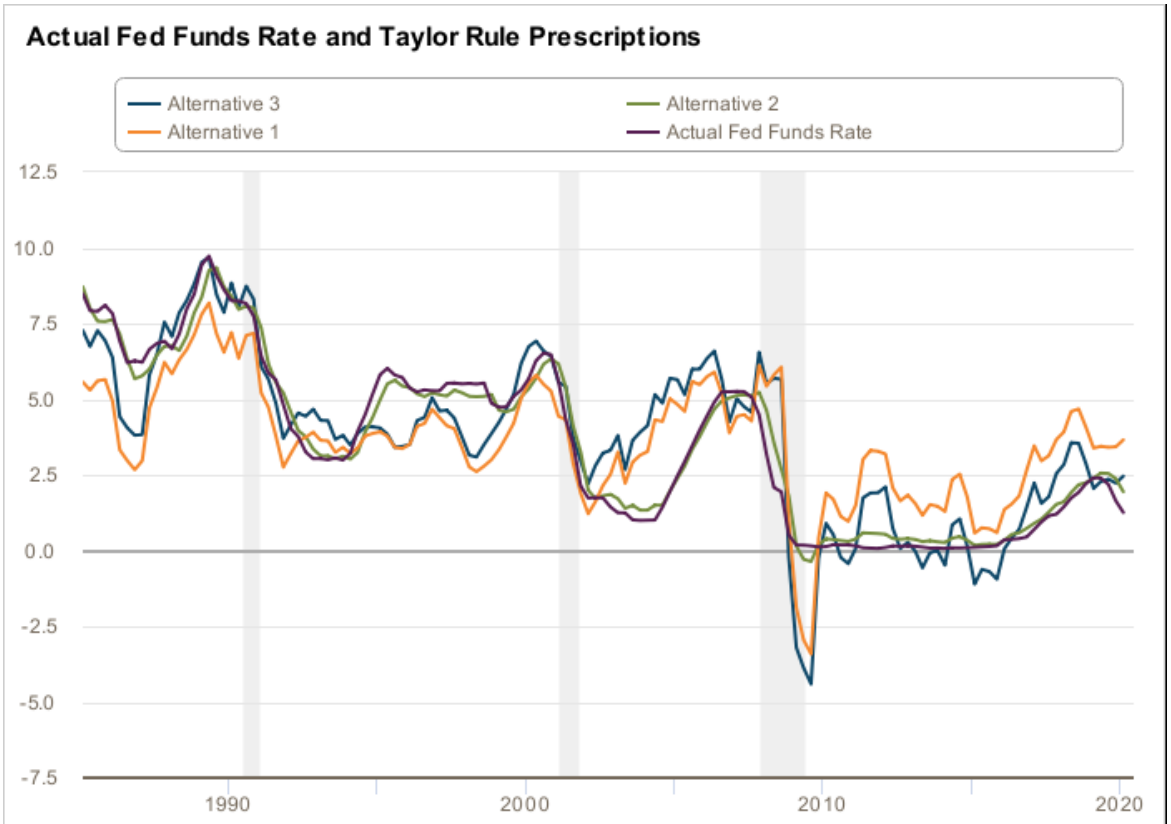
Figure 27.13: Actual and Monetary Policy Rule Implied Fed Funds Rate



In Reality, Central Banks "Smooth"

- One can add an autoregressive feature, letting current policy rate depend on lagged policy rate in eqn (27.11)
- This will produce a better fit to the actual data
- Show this using Atlanta Fed Taylor Rule app https://www.frbatlanta.org/cqer/research/taylor-rule

- Alt 1: Eqn 27.11 except r* = 2%
- Alt 2:Eqn 27.11, but w/smoothing parameter = 0.85
- Alt 3: Eqn 27.11, except r* *estimated*



	Alternative 1	Alternative 2	Alternative 3
Inflation Target Measures:	2PercentInflation	2PercentInflation	2PercentInflation
Natural Real Interest Rate Measures:	TwoPercentNatural	TwoPercentNatural	LWRstar1side
Resource Gap Measures:	CBOGDPgap	CBOGDPgap	CBOGDPgap
Inflation Measures:	PCEInflation	PCEInflation	PCEInflation
Weight on Gap:	0.5	.5	0.5
Interest Rate Smoothing:	0	.85	0

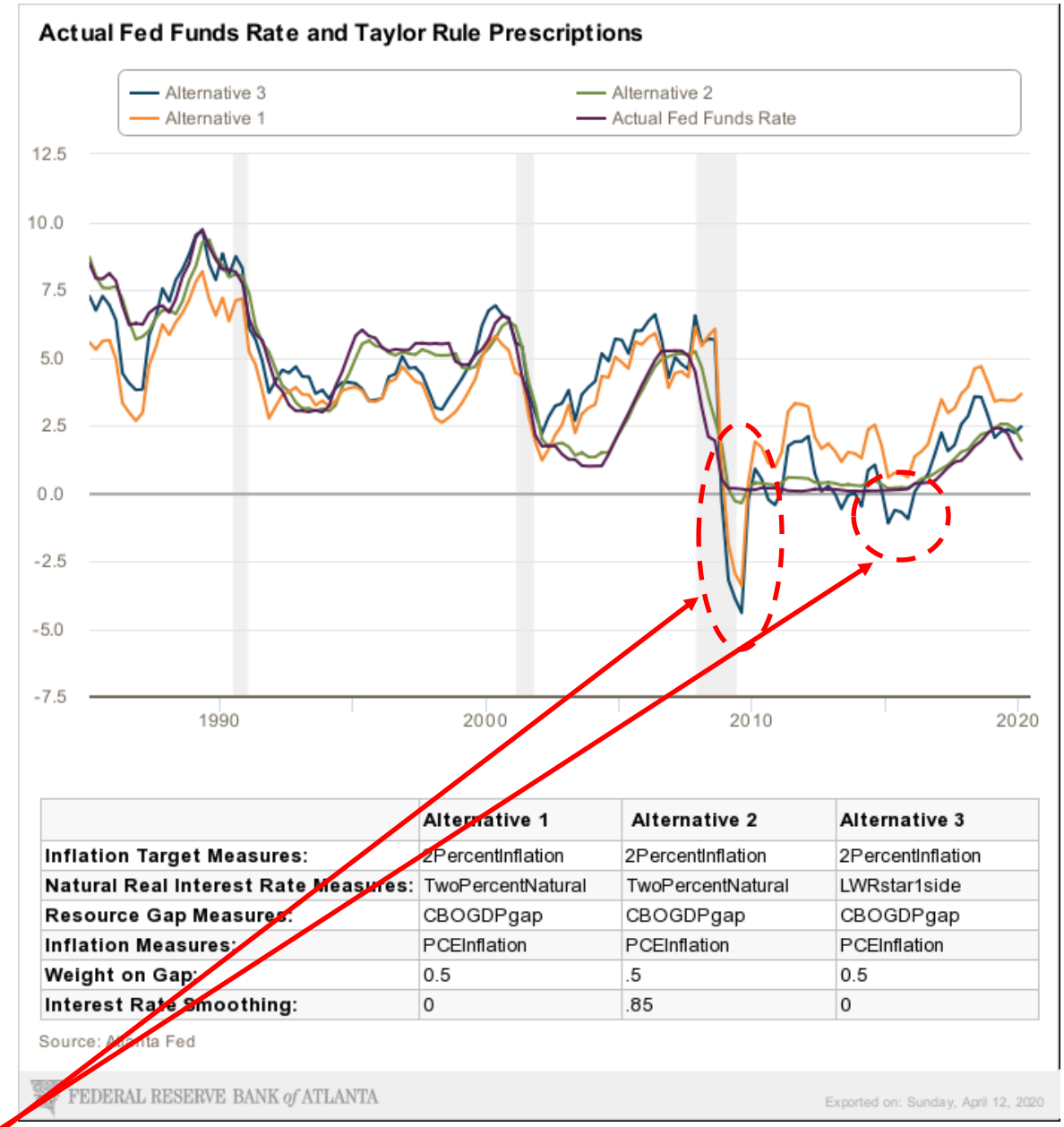
Source: Atlanta Fed

FEDERAL RESERVE BANK of ATLANTA

Exported on: Sunday, April 12, 2020

- Alt 1: Eqn 27.11 except r* = 2%
- Alt 2:Eqn 27.11, but w/smoothing parameter = 0.85
- Alt 3: Eqn 27.11, except r* *estimated*

Notice that at certain points, during the Great Recession and 2015, implied rate under Alt 1 and Alt 3 was below 0%



	Alternative 1	Alternative 2	Alternative 3
Inflation Target Measures:	2PercentInflation	2PercentInflation	2PercentInflation
Natural Real Interest Rate Measures:	TwoPercentNatural	TwoPercentNatural	LWRstar1side
Resource Gap Measures:	CBOGDPgap	CBOGDPgap	CBOGDPgap
Inflation Measures:	PCEInflation	PCEInflation	PCEInflation
Weight on Gap:	0.5	.5	0.5
Interest Rate Smoothing:	0	.85	0

Next Steps

- Discuss formally monetary policy with Taylor rule imbedded New Keynesian model
- Empirical estimation of real rate
- More on policy at the zero lower bound (Chapter 28, next Monday)