

Econ 702 Macroeconomics I

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Spring 2020

Lecture 18: Shocks & Dynamics
in the New Keynesian Model (I)

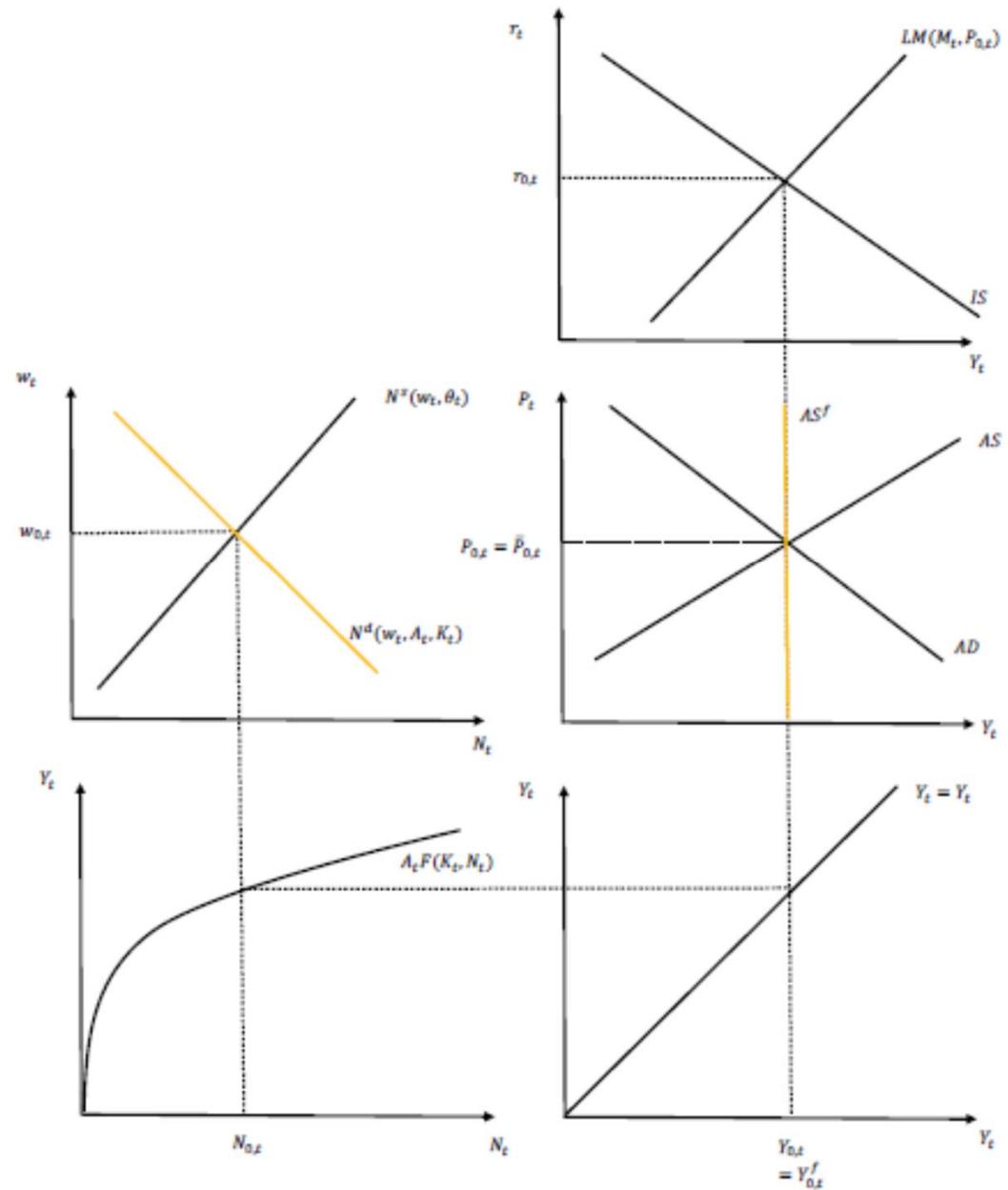
Outline

- Review
- Adjustment in the New Keynesian model
- Shocks in the New Keynesian model

Where we are headed

IS-LM-AD-AS, combines Keynesian and New Classical attributes w/forward looking expectations

Figure 25.11: Equilibrium in the Partial Sticky Price Model



Review

Review: Aggregate Demand

$$C_t = C^d(Y_t - G_t, Y_{t+1} - G_{t+1}, r_t) \quad (23.1)$$

$$I_t = I^d(r_t, A_{t+1}, K_t) \quad (23.2)$$

$$Y_t = C_t + I_t + G_t \quad (23.3)$$

$$M_t = P_t M^d(r_t + \pi_{t+1}^e, Y_t) \quad (23.4)$$

$$r_t = \dot{i}_t - \pi_{t+1}^e \quad (23.5)$$

Review: New Keynesian Aggregate Supply

$$N_t = N^s(w_t, \theta_t) \quad (24.7)$$

$$P_t = \bar{P}_t + \gamma(Y_t - Y_t^f) \quad (24.8)$$

$$Y_t = A_t F(K_t, N_t) \quad (24.9)$$

$$N_t^f = N^s(w_t^f, \theta_t) \quad (24.10)$$

$$N_t^f = N^d(w_t^f, A_t, K_t) \quad (24.11)$$

$$Y_t^f = A_t F(K_t, N_t^f) \quad (24.12)$$

Preview: New Keynesian Aggregate Supply

$$N_t = N^s(w_t, \theta_t) \quad (24.7)$$

$$P_t = \bar{P}_t + \gamma(Y_t - Y_t^f) \quad (24.8)$$

$$Y_t = A_t F(K_t, N_t) \quad (24.9)$$

$$N_t^f = N^s(w_t^f, \theta_t) \quad (24.10)$$

$$N_t^f = N^d(w_t^f, A_t, K_t) \quad (24.11)$$

$$Y_t^f = A_t F(K_t, N_t^f) \quad (24.12)$$

New Keynesian Aggregate Supply vs. Others

$$N_t = N^s(w_t, \theta_t) \quad (24.7)$$

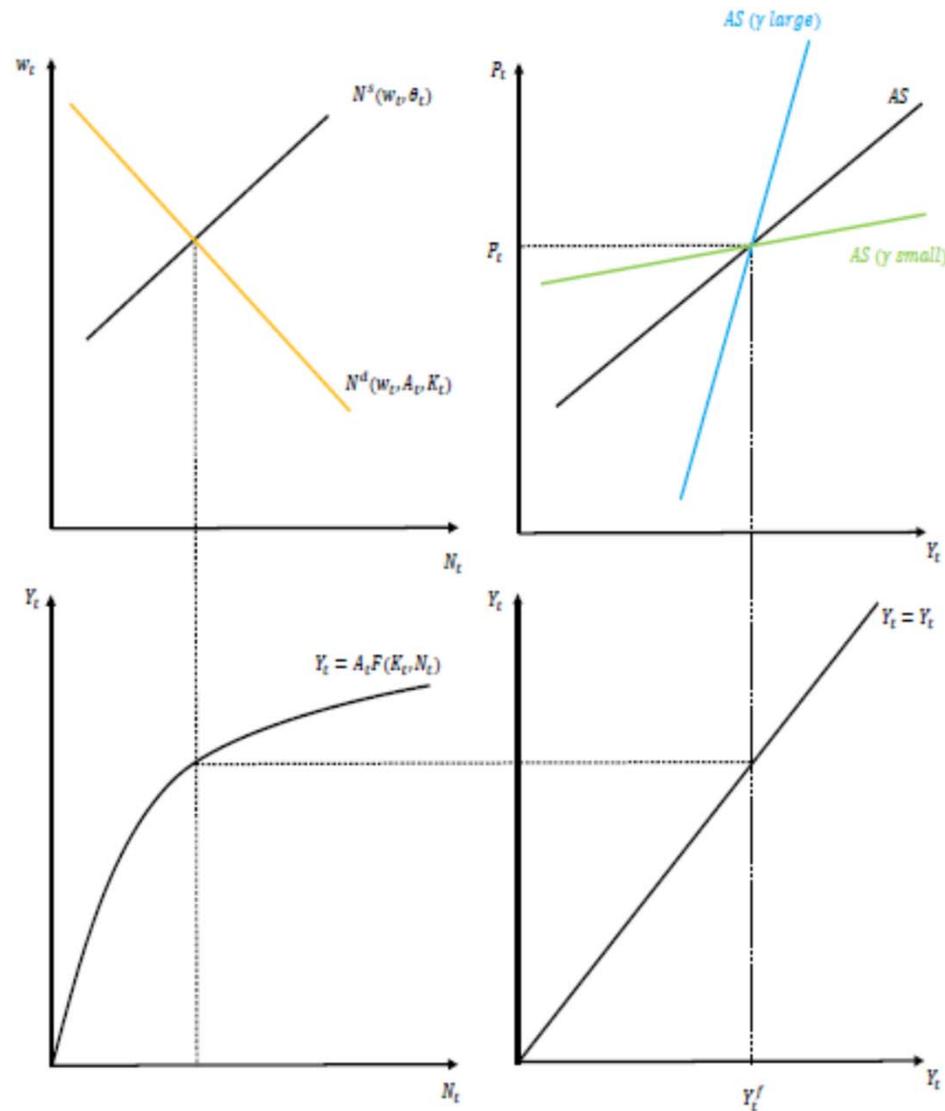
$$P_t = \bar{P}_t + \gamma(Y_t - Y_t^f) \quad (24.8)$$

$$Y_t = A_t F(K_t, N_t) \quad (24.9)$$

- If $\gamma = 0$, then we have the “Keynesian” model, i.e., price level exogenous, flat AS
- If $\gamma = \infty$, then we have the Classical model

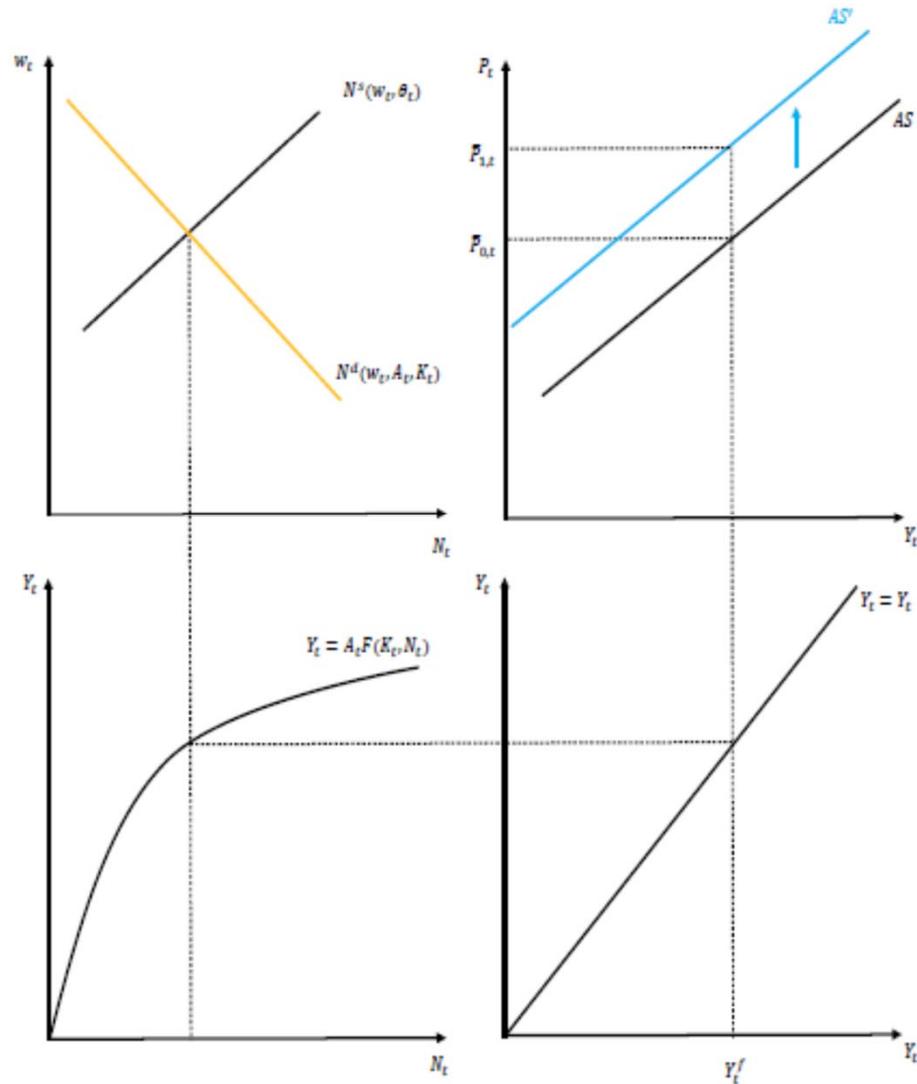
NK AS: Different intermediate γ 's

Figure 24.7: The Partial Sticky Price AS Curve: Role of γ



Exogenous Changes in \bar{p}

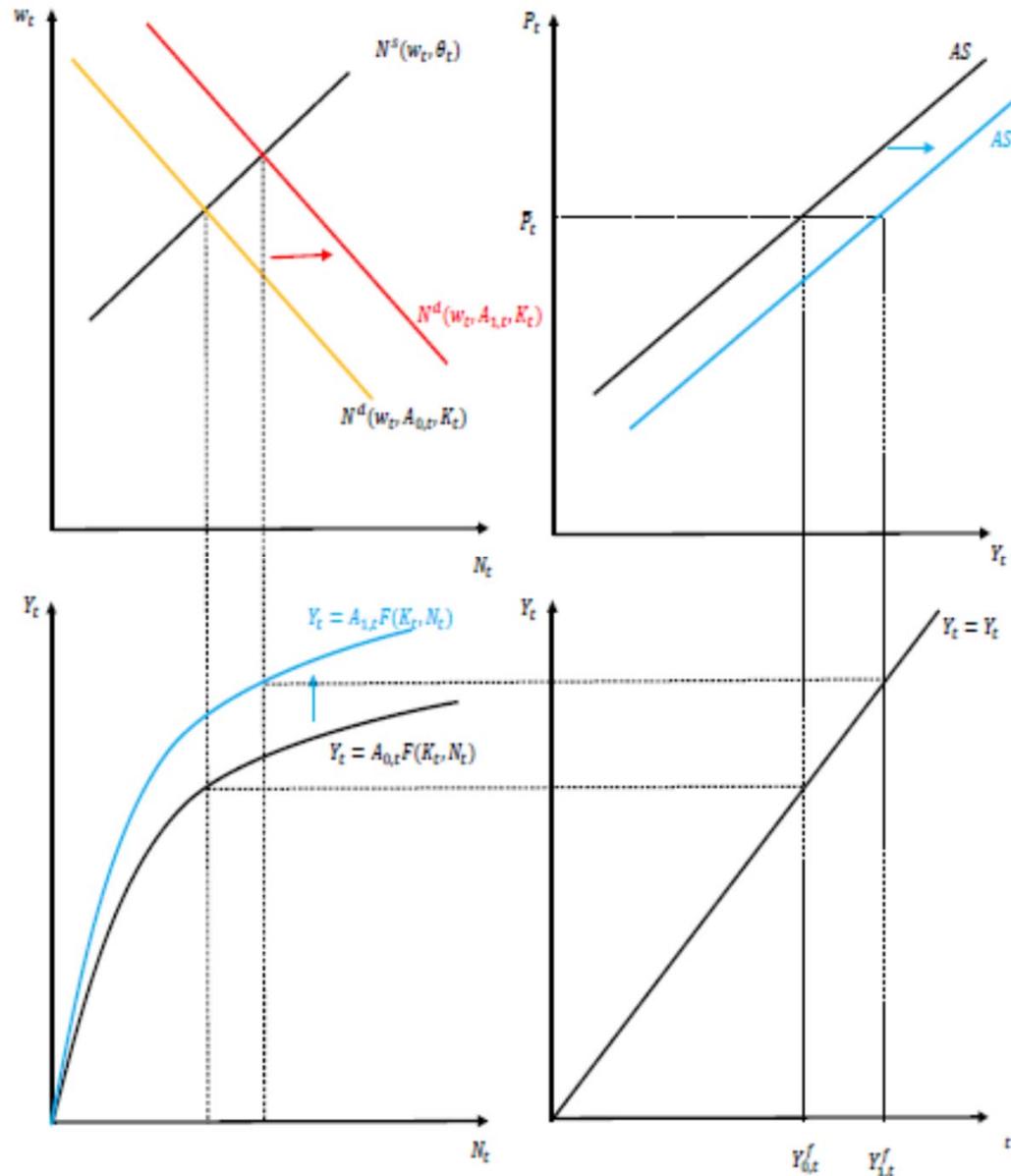
Figure 24.8: Shift of the Partial Sticky Price AS Curve: $\uparrow \bar{p}_t$



Shifts in Y^f

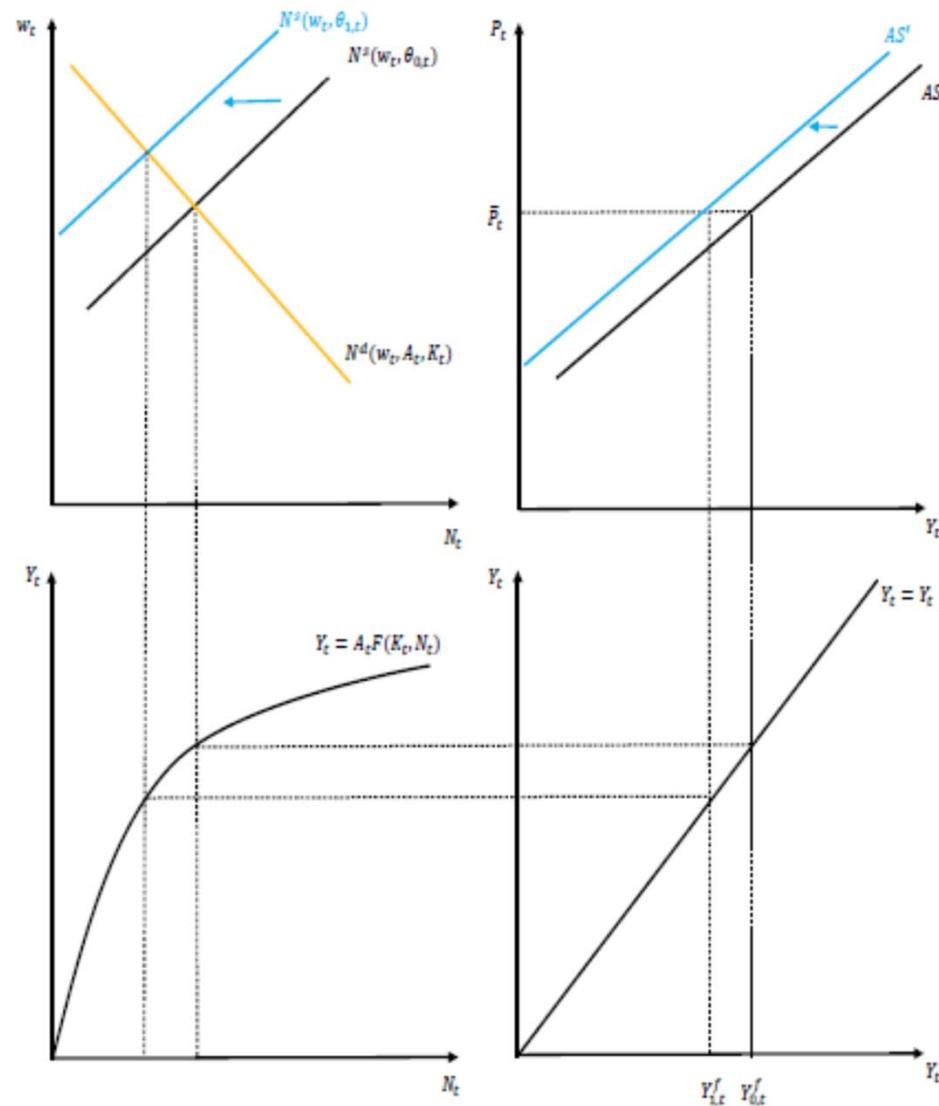
Note that “Supply Side Economics” in America (Arthur Laffer, etc.) pertains to shifts in Y^f , due increases in N (decr θ), incr K , A ...

Figure 24.9: Shift of the Partial Sticky Price AS Curve: $\uparrow A_t$



Why Supply Siders Hate UI, SNAP, etc.

Figure 24.10: Shift of the Partial Sticky Price AS Curve: $\uparrow \theta_t$



Summary: Shifts to the NK AS Curve

Table 24.3: Partial Sticky Price AS Curve Shifts

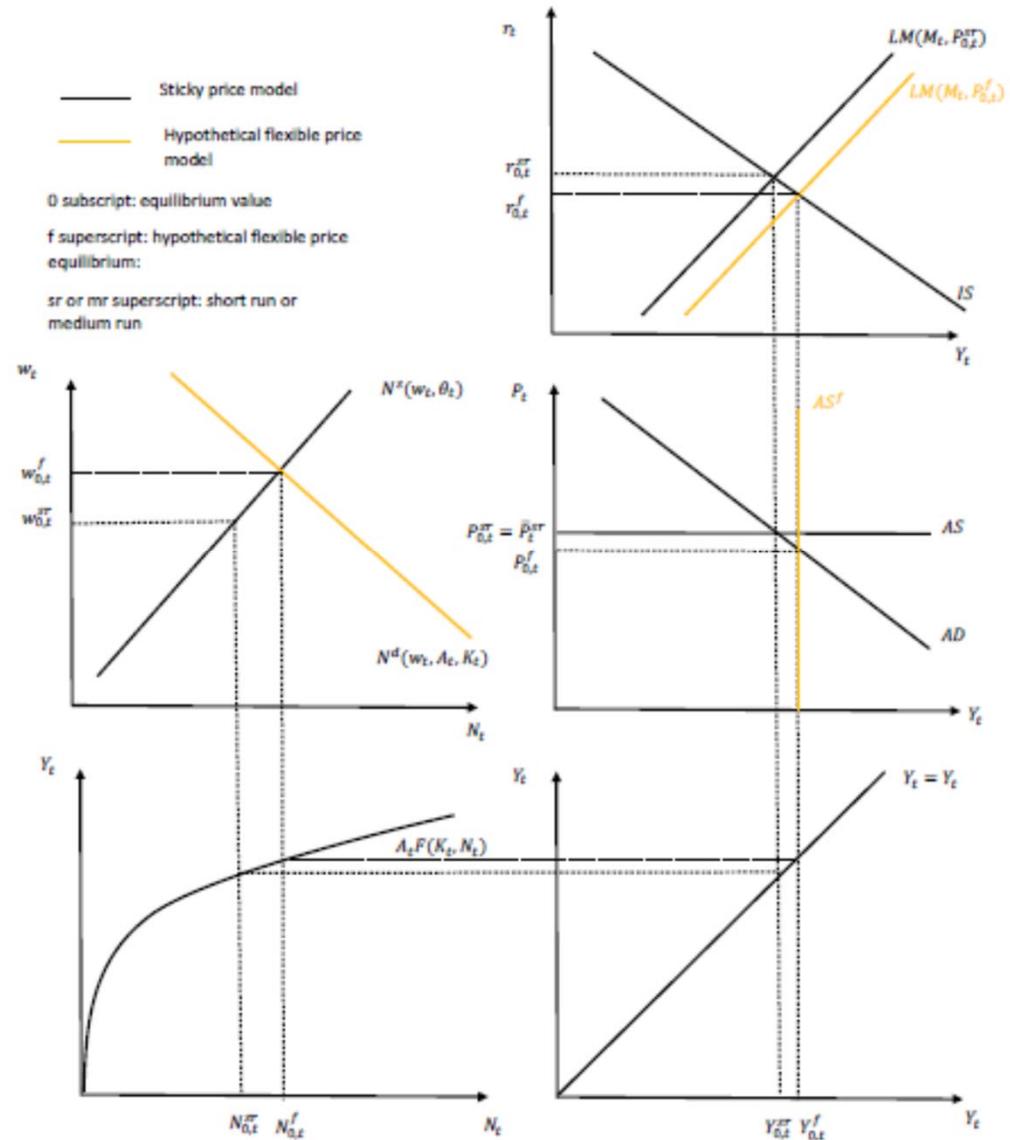
Change in Variable	Direction of Shift of AS
$\uparrow A_t$	Right
$\uparrow \theta_t$	Left
$\uparrow \bar{P}_t$	Up

Simple Sticky Price Model

Prologue: Simple Sticky Price

- Consider period “t”
3 years
- “short run”: 2 years (sr)
- “medium run” 3rd year (mr)
- 0 subscript denotes equilibrium
- f superscript denotes flexible price equilibrium

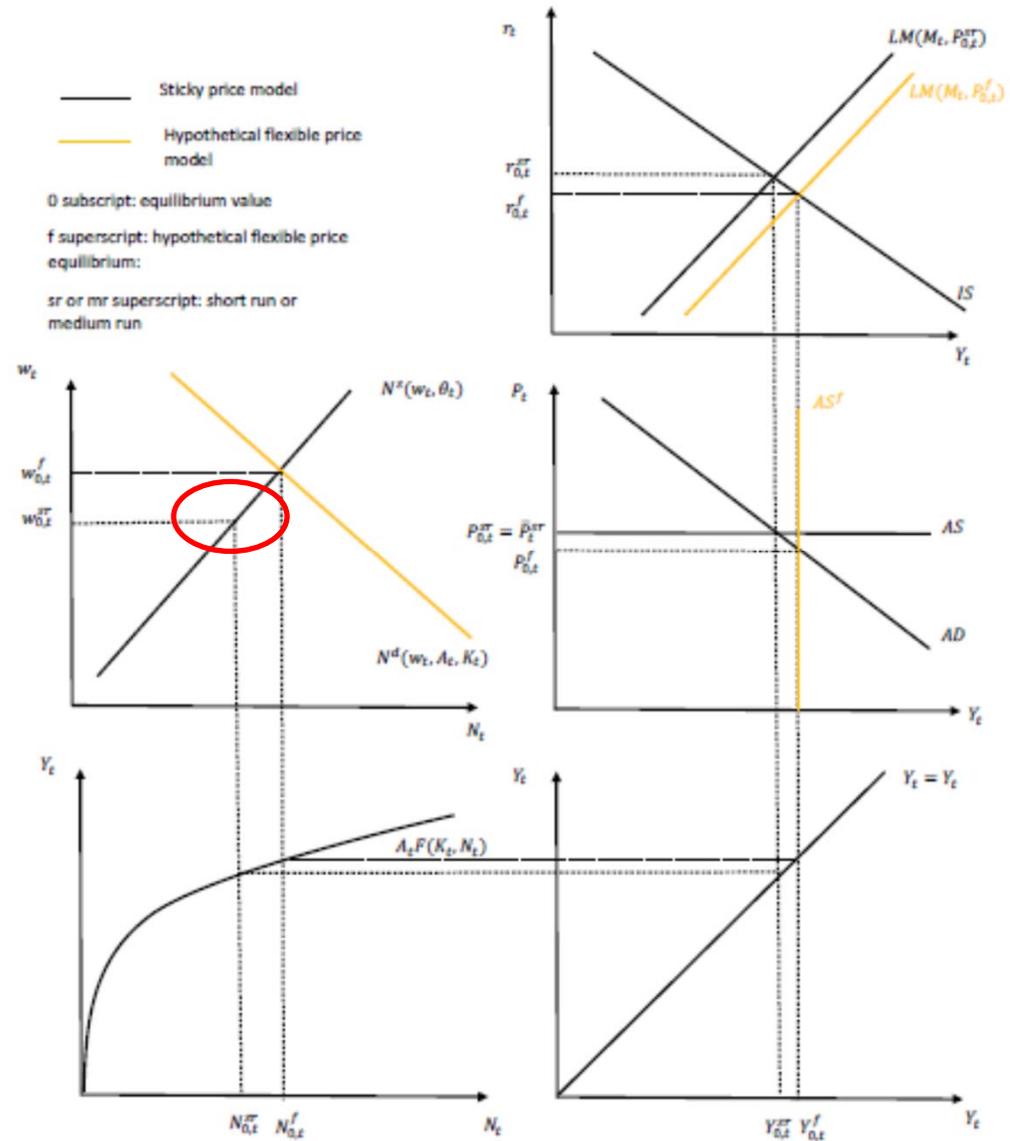
Figure 26.1: Sticky Price Model: $Y_{0,t}^{sr} < Y_{0,t}^f$



Prologue: Simple Sticky Price

- In the short run output deviates from flex price equilibrium output
- Notice economy is off labor demand curve
- But on labor supply curve

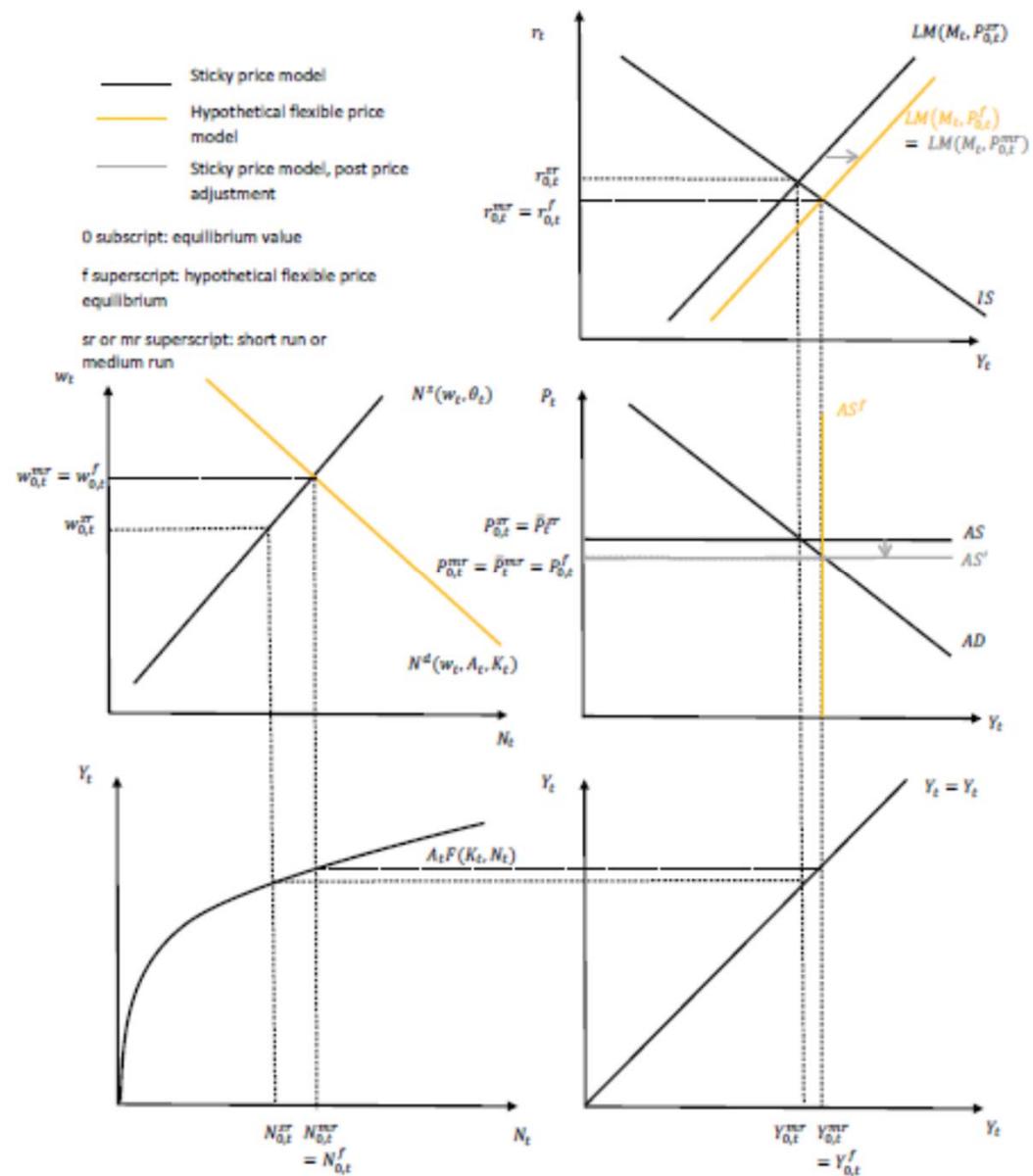
Figure 26.1: Sticky Price Model: $Y_{0,t}^{sr} < Y_{0,t}^f$



Adjustment over time

- Firms face deficient demand
- Over time, firms drop prices,
- Shows up in gray arrow

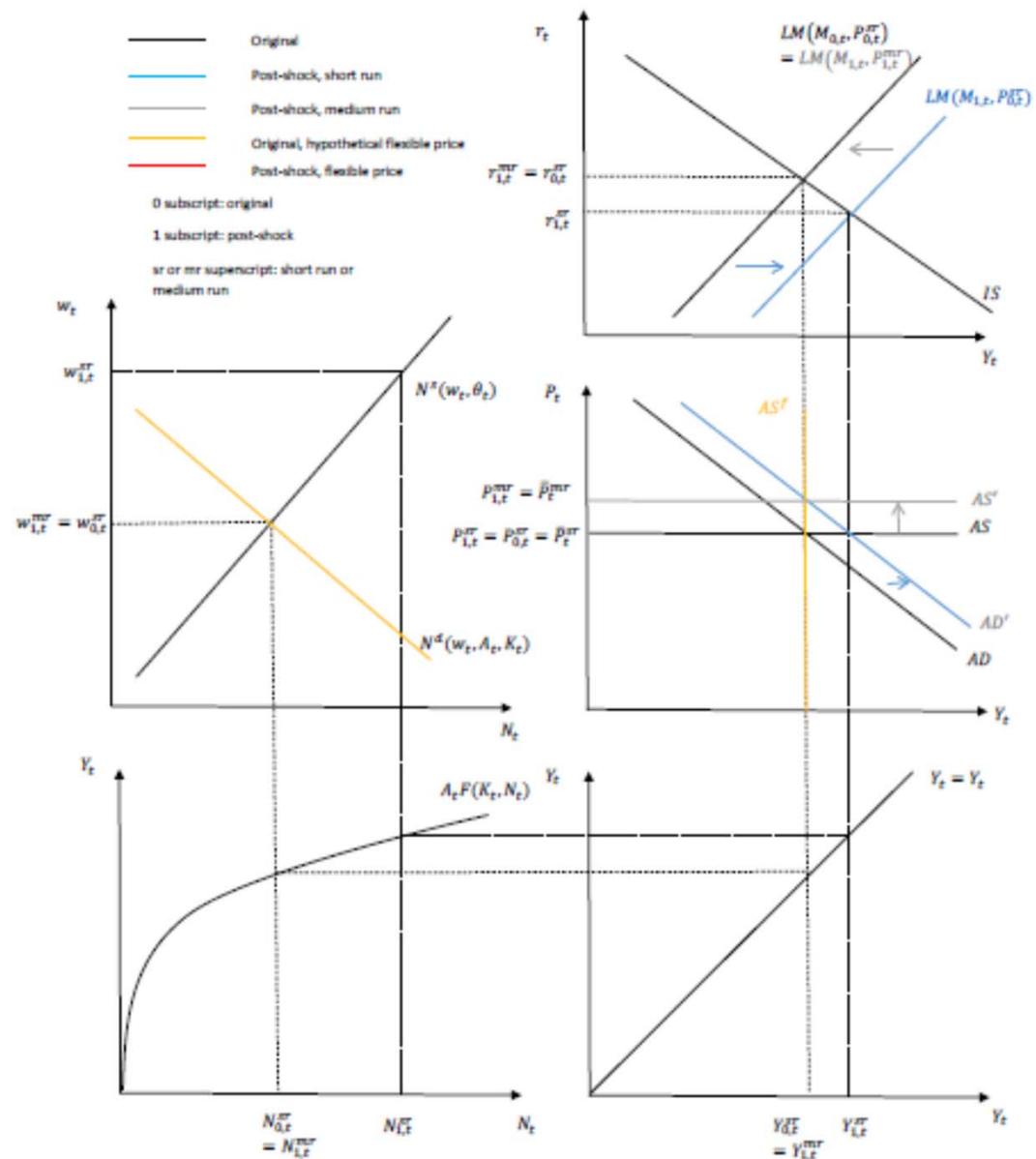
Figure 26.2: Sticky Price Model: $Y_{0,t}^{sr} < Y_{0,t}^f$, Short Run to Medium Run Price Adjustment



Dynamic Response to Shock to Neoclassical Eq'm: Money

- Monetary shock
- Blue arrow – short run
- Gray arrow – medium run

Figure 26.3: Simple Sticky Price Model: Increase in M_t , Short Run to Medium Run



Dynamics in Response to a Monetary Shock

Figure 26.4: Short Run and Medium Responses: Increase in M_t

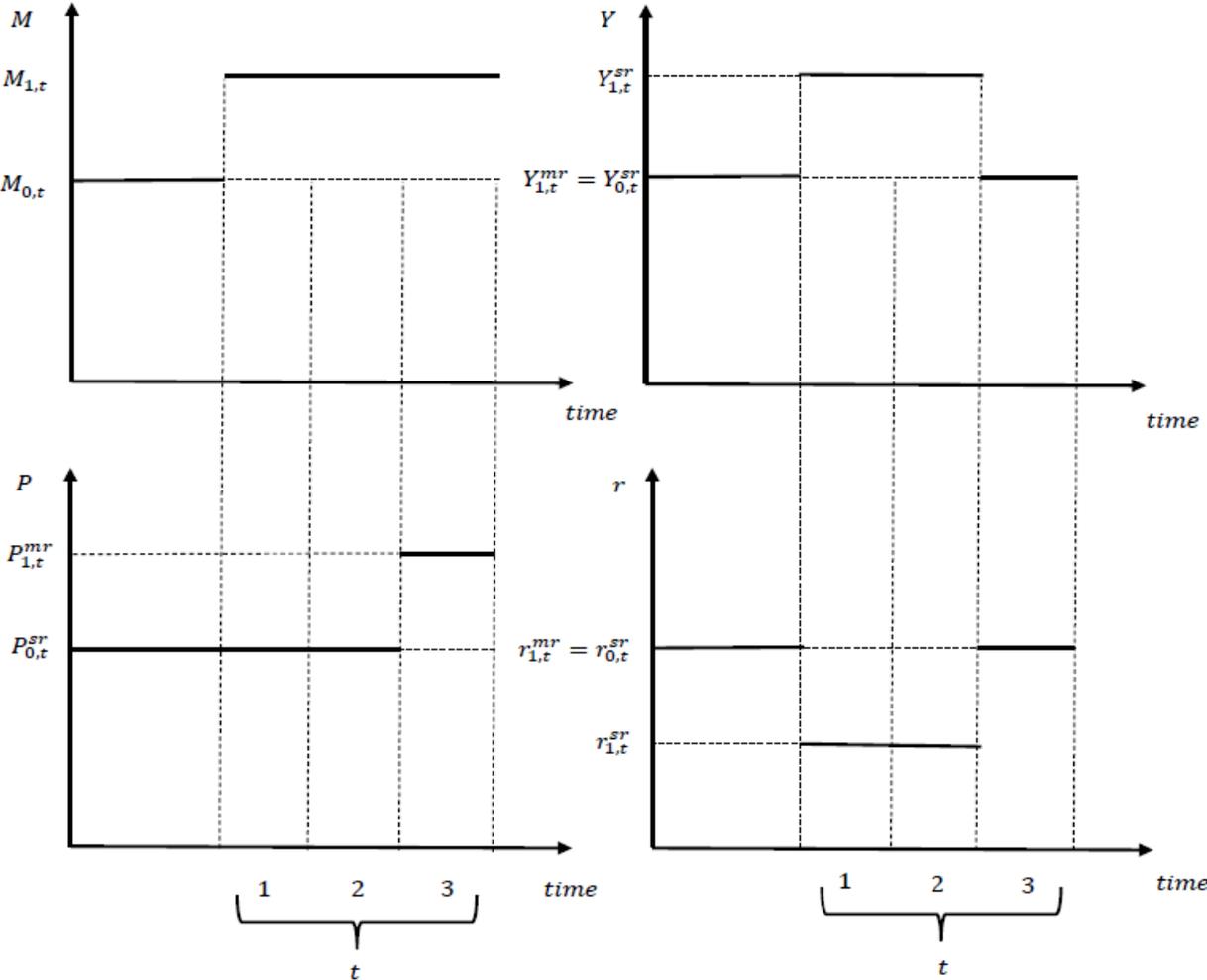
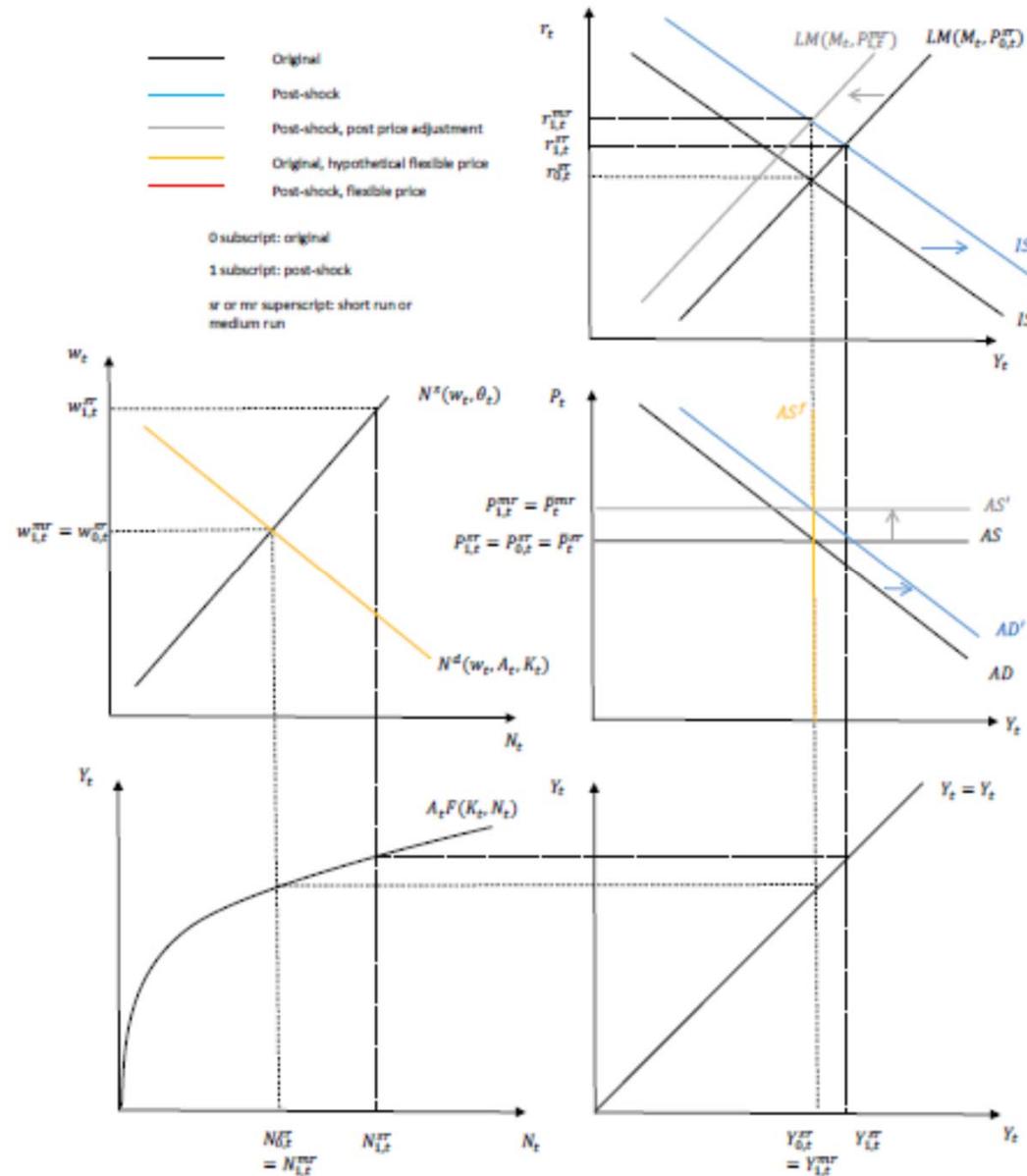


Figure 26.5: Simple Sticky Price Model: Positive IS Shock, Short Run to Medium Run

Dynamic Response to Shock to Neoclassical Eq'm: IS

- $\uparrow A_{t+1}, \uparrow G_t,$
 $\downarrow G_{t+1}$
- Blue arrow – short run
- Gray arrow – medium run



Dynamics in Response to an IS Shock

Figure 26.6: Short Run and Medium Responses: Positive IS Shock

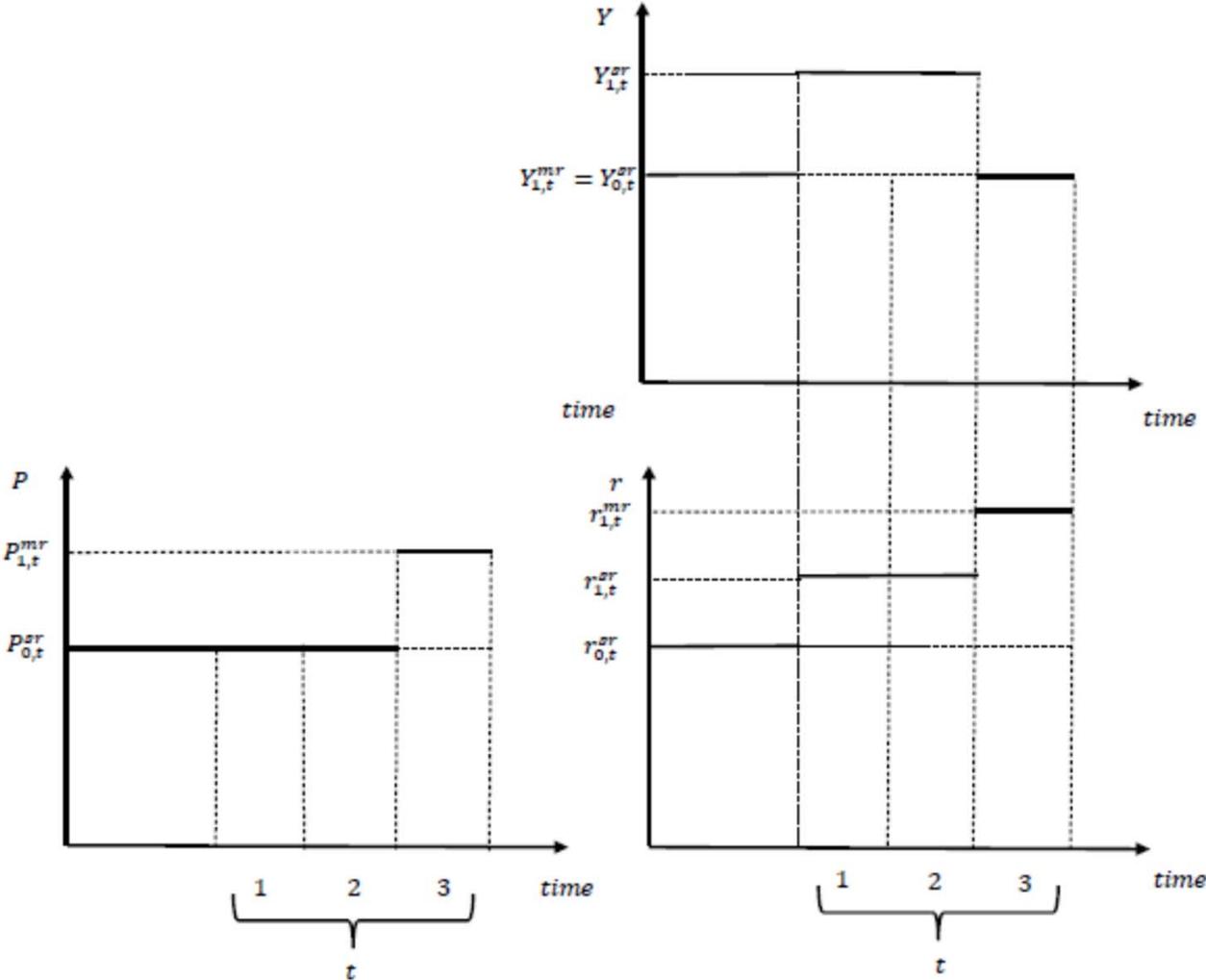
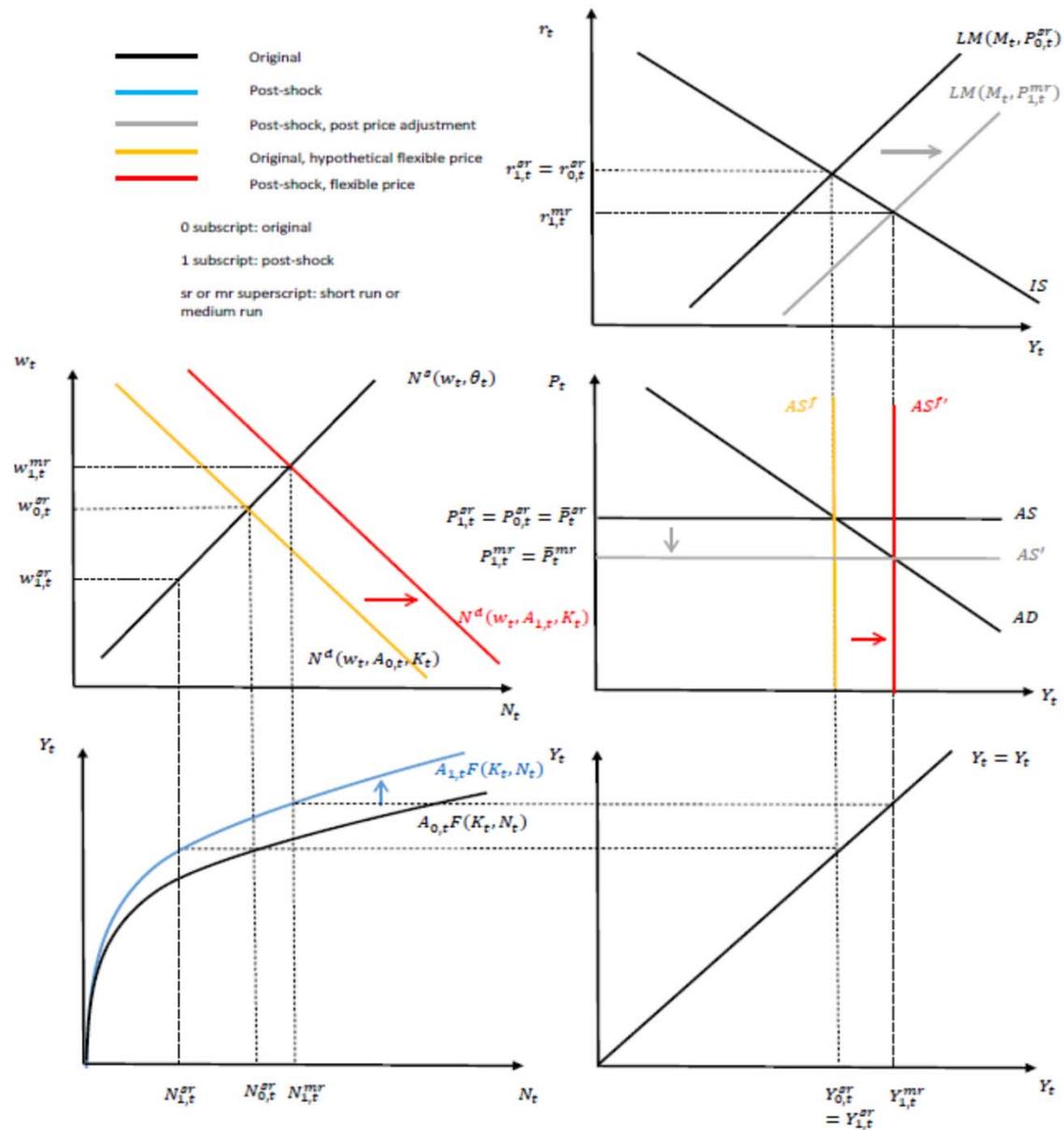


Figure 26.7: Sticky Price Model: Increase in A_t , Short Run to Medium Run

Dynamic Response to Shock to Neoclassical Eq'm: Prod'y

- $\uparrow A_t$
- Blue arrow – short run
- Gray arrow – medium run



Dynamics in Response to a Current Productivity Shock

Figure 26.8: Short Run and Medium Responses: Increase in A_t

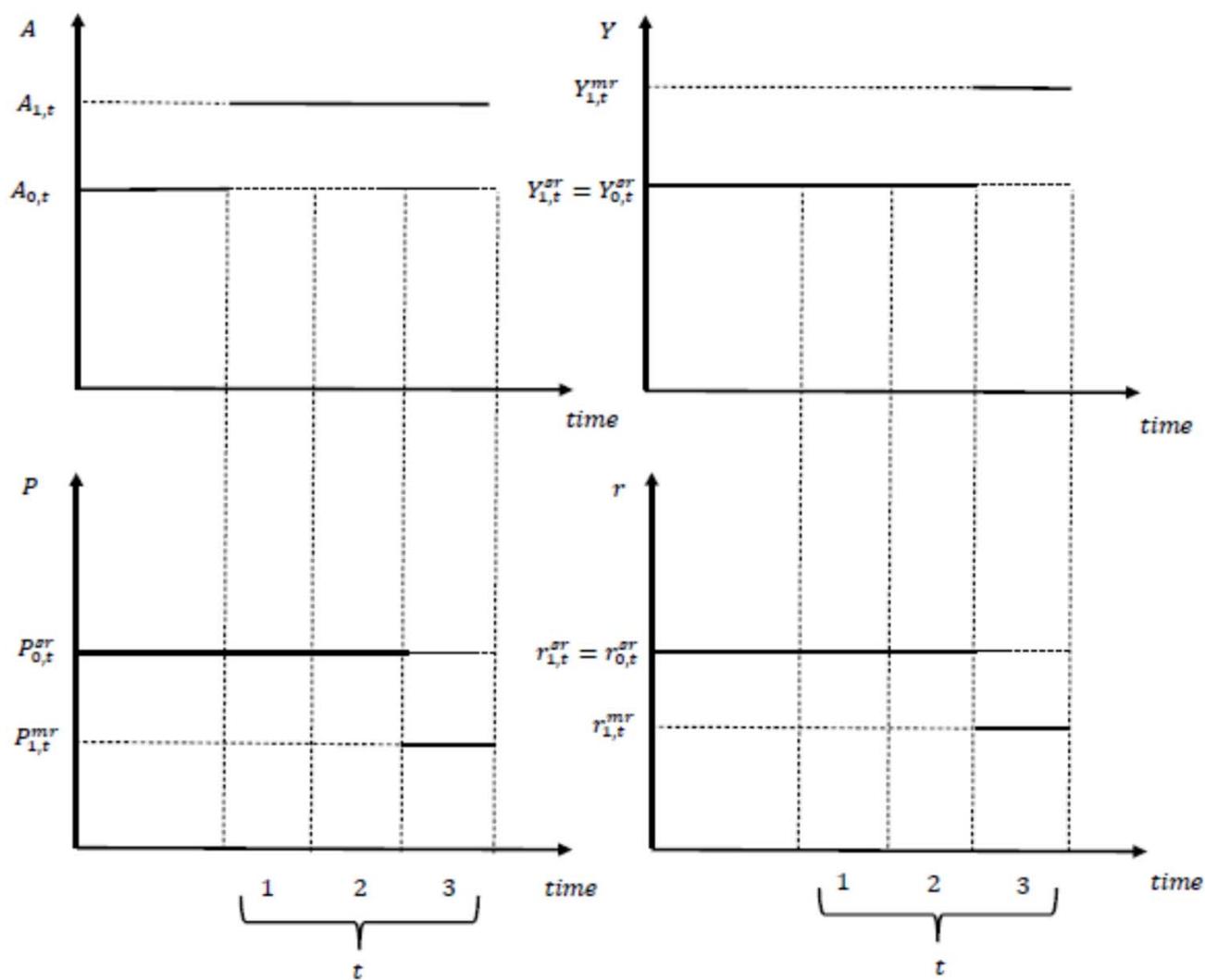


Table 26.1: Qualitative Effects of Exogenous Shocks on Endogenous Variables in the Sticky Price Model, Transition from Short Run to Medium Run

Variable	Exogenous Shock		
	$\uparrow M_t$	\uparrow IS curve	$\uparrow A_t$
Y_t	-	-	+
N_t	-	-	+
w_t	-	-	+
r_t	+	+	-
P_t	+	+	-

Partial Sticky Price Model

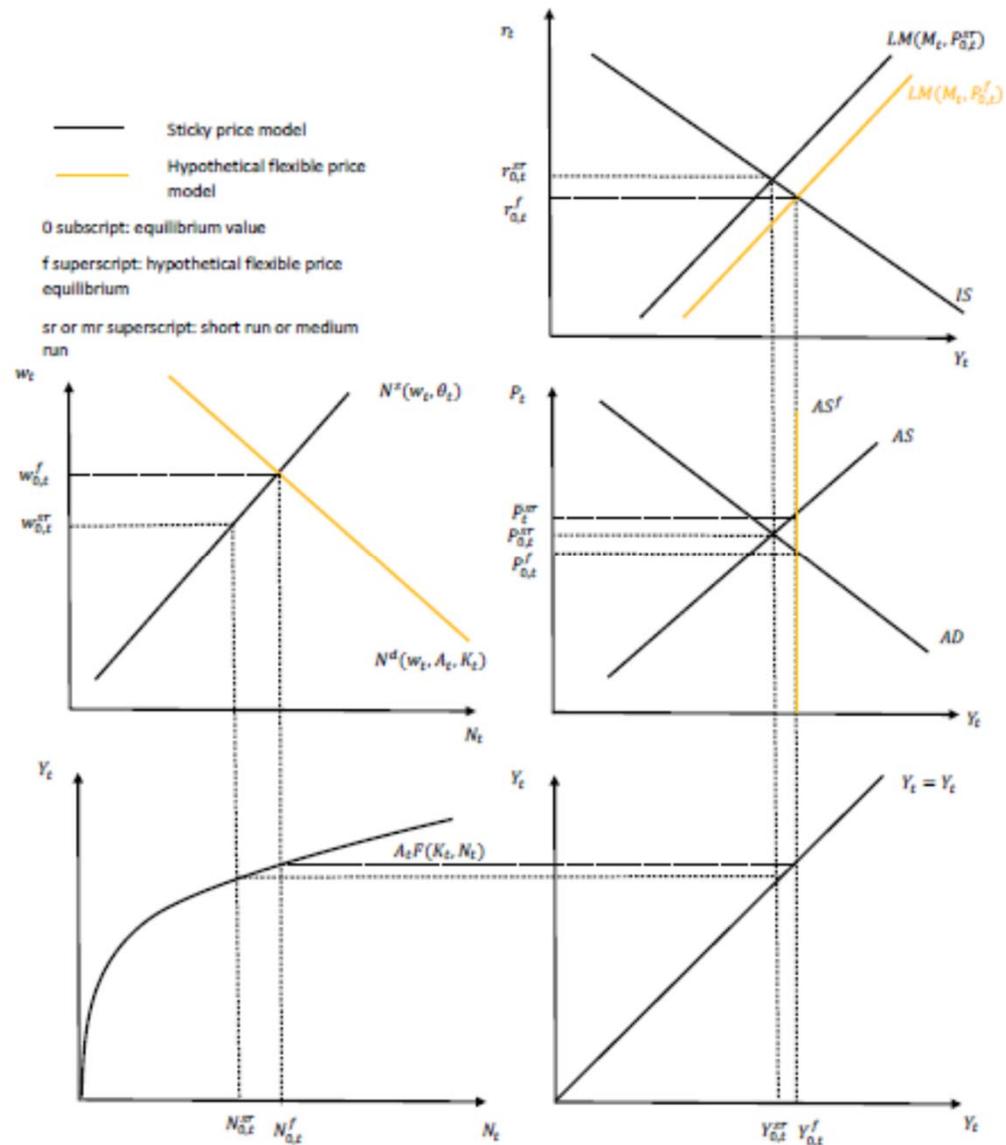
Partial Sticky Price Model

- Here $\gamma > 0$ instead of $\gamma = 0$ (Simple sticky price model)
- We follow the same sequence as for the simple sticky
- First we examine adjustment from disequilibrium (relative to flexible price equilibrium)
- Then we examine shocks starting from flexible price equilibrium

Partial Sticky Price

- Consider period “t” 3 years
- “short run”: 2 years (sr)
- “medium run” 3rd year (mr)
- 0 subscript denotes equilibrium
- f superscript denotes flexible price equilibrium

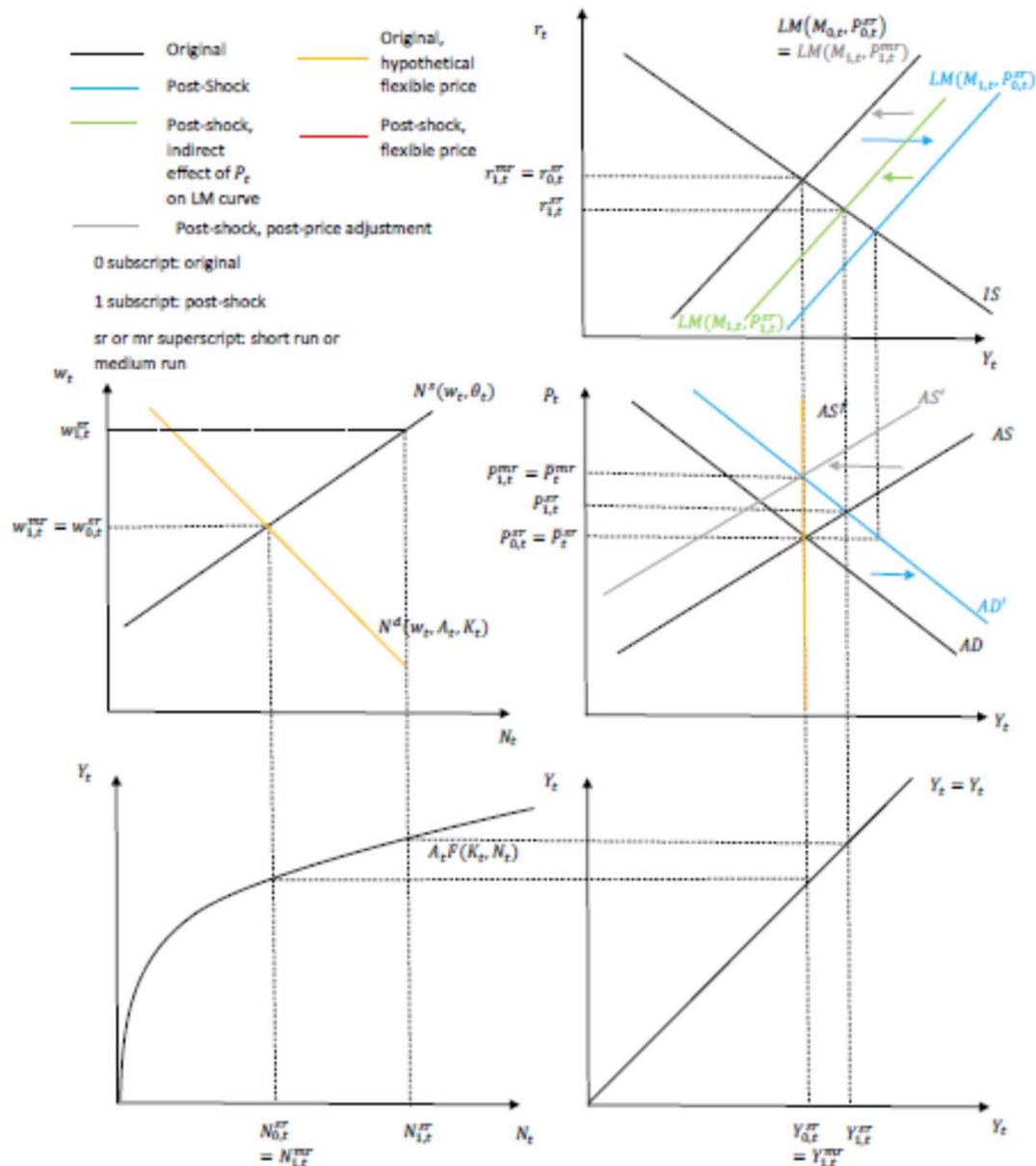
Figure 26.9: Partial Sticky Price Model: $Y_{0,t} < Y_{0,t}^f$



Dynamic Response to Shock to Neoclassical Eq'm: Money

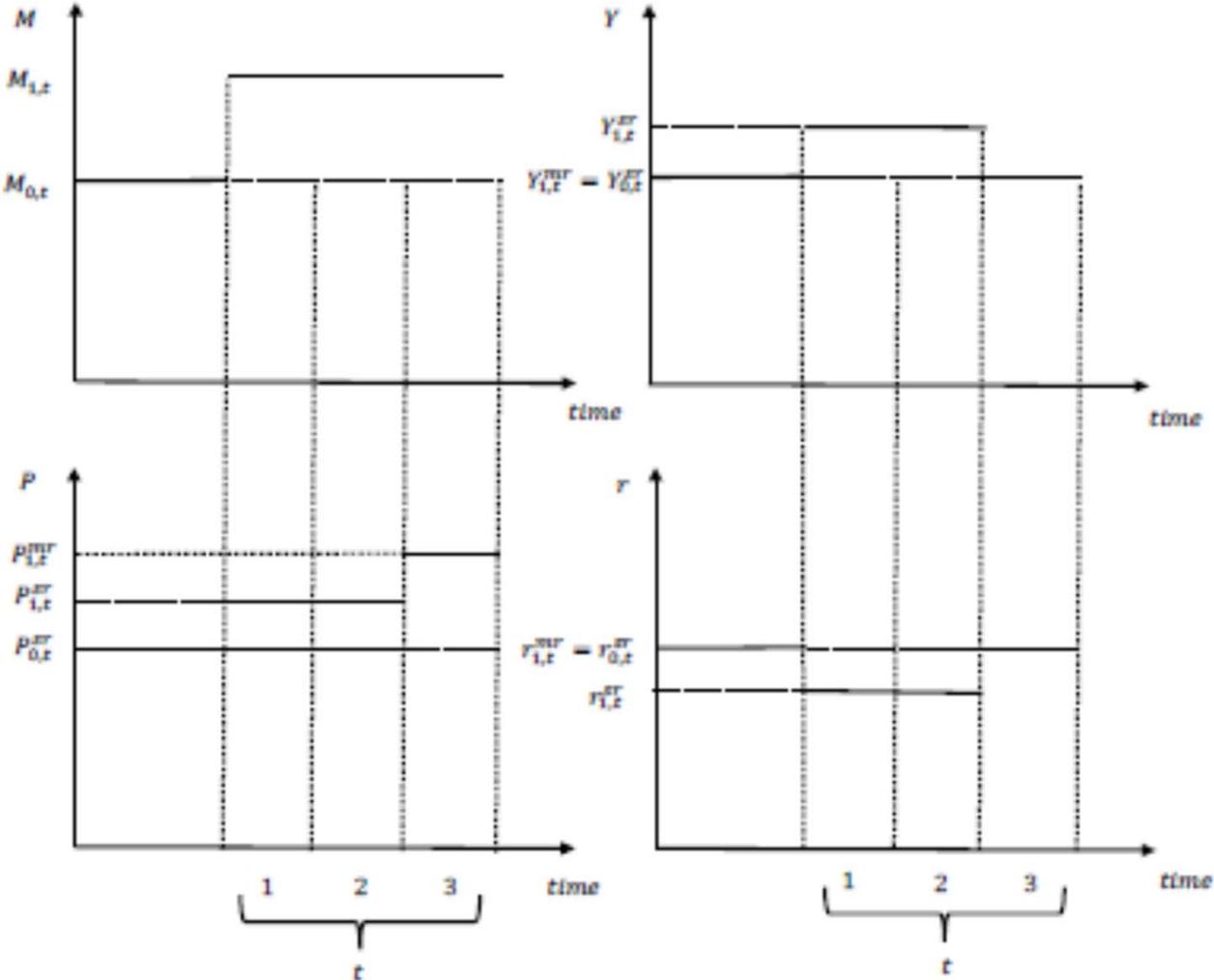
- Monetary shock
- Blue arrow – short run
- Gray arrow – medium run

Figure 26.11: Partial Sticky Price: Increase in M_t , Short Run to Medium Run



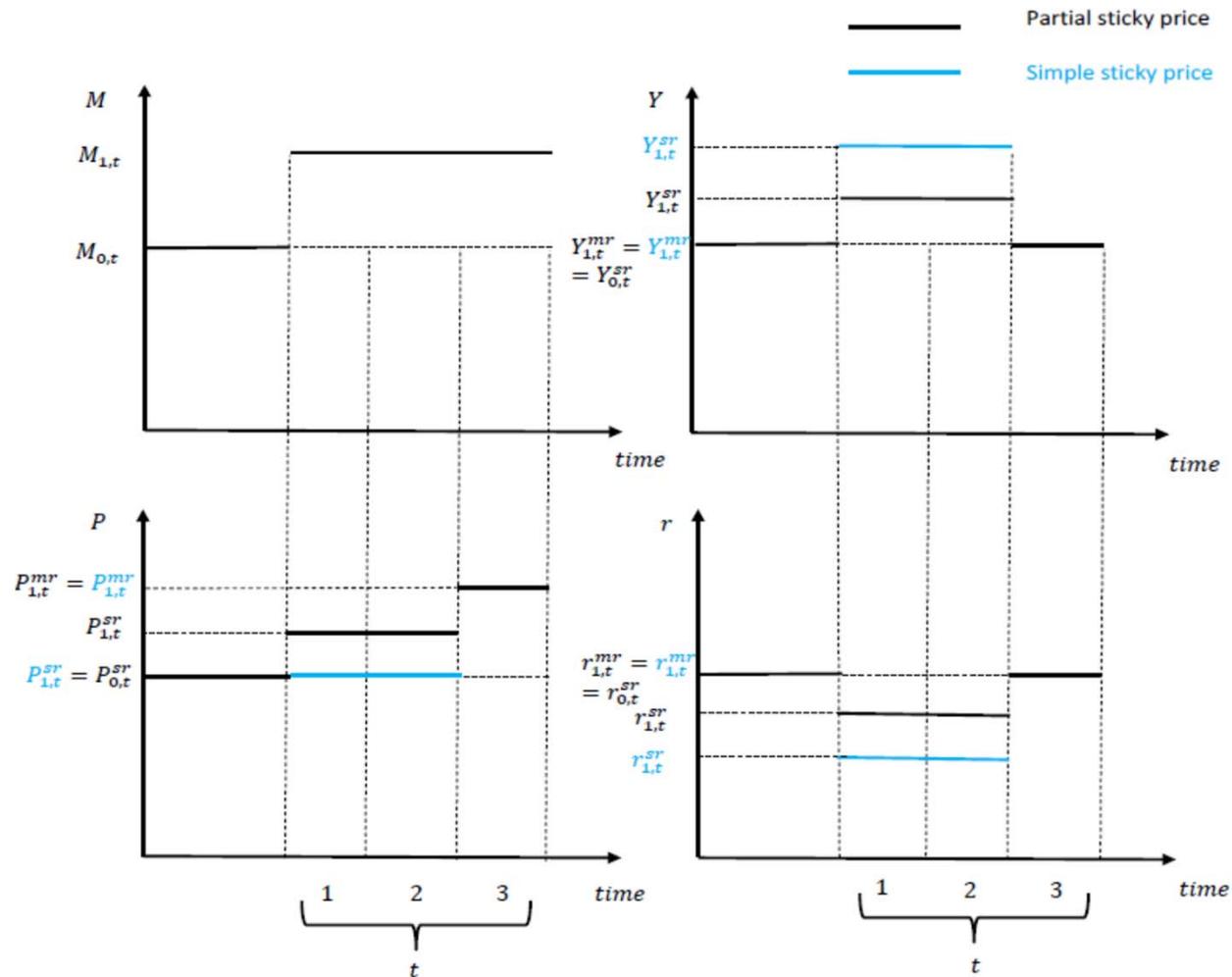
Dynamics in Response to a Monetary Shock

Figure 26.12: Short Run and Medium Responses: Increase in M_t



Comparing Dynamics

Figure 26.13: Short Run and Medium Responses: Increase in M_t
Comparing Simple Sticky Price to Partial Sticky Price Model



Summing Up

- When prices are partially sticky, monetary and fiscal policies can have temporary effects
- In the absence of active policies, output will adjust to the flexible price (neoclassical) equilibrium, over time
- How fast adjustment to neoclassical equilibrium occurs depends on γ
- How long monetary and fiscal shocks can push output away from neoclassical equilibrium depends on γ

Next Time

- More shocks in the partial sticky price model
- The Phillips Curve
- How are expectations formed?