The New Keynesian Model: Dynamics and Optimal Policy

ECON 30020: Intermediate Macroeconomics

Prof. Eric Sims

University of Notre Dame

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Readings

GLS Ch. 27

GLS Ch. 28

Dynamics

The New Keynesian model is a special case of the neoclassical model – we simply swap labor demand with an AS curve, most general form of which is:

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

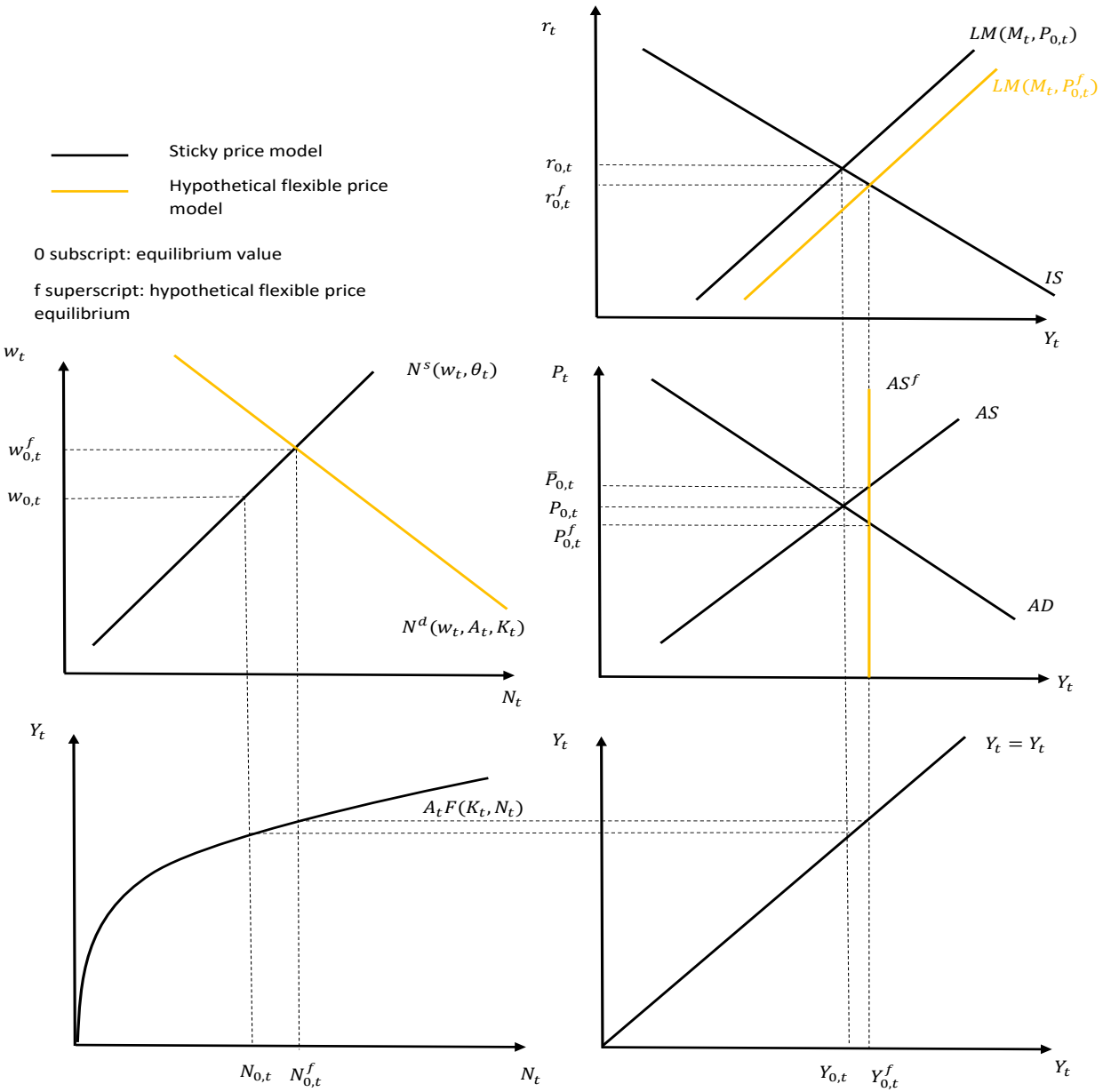
Y_t^f: the "flexible price" level of output – the level of output which would emerge in the neoclassical model

If firm could freely adjust price, it would do so such that it is on its labor demand curve, which would entail $Y_t = Y_t^f$

Refer to $Y_t - Y_t^f$ as the output gap – the gap between actual output and what it would be in the absence of price stickiness

To see this graphically, draw in a hypothetical AS curve for the neoclassical model – call this AS^f

A Negative Output Gap



Transition from Short Run to Medium Run

With a negative output gap, the firm is producing less than it would like

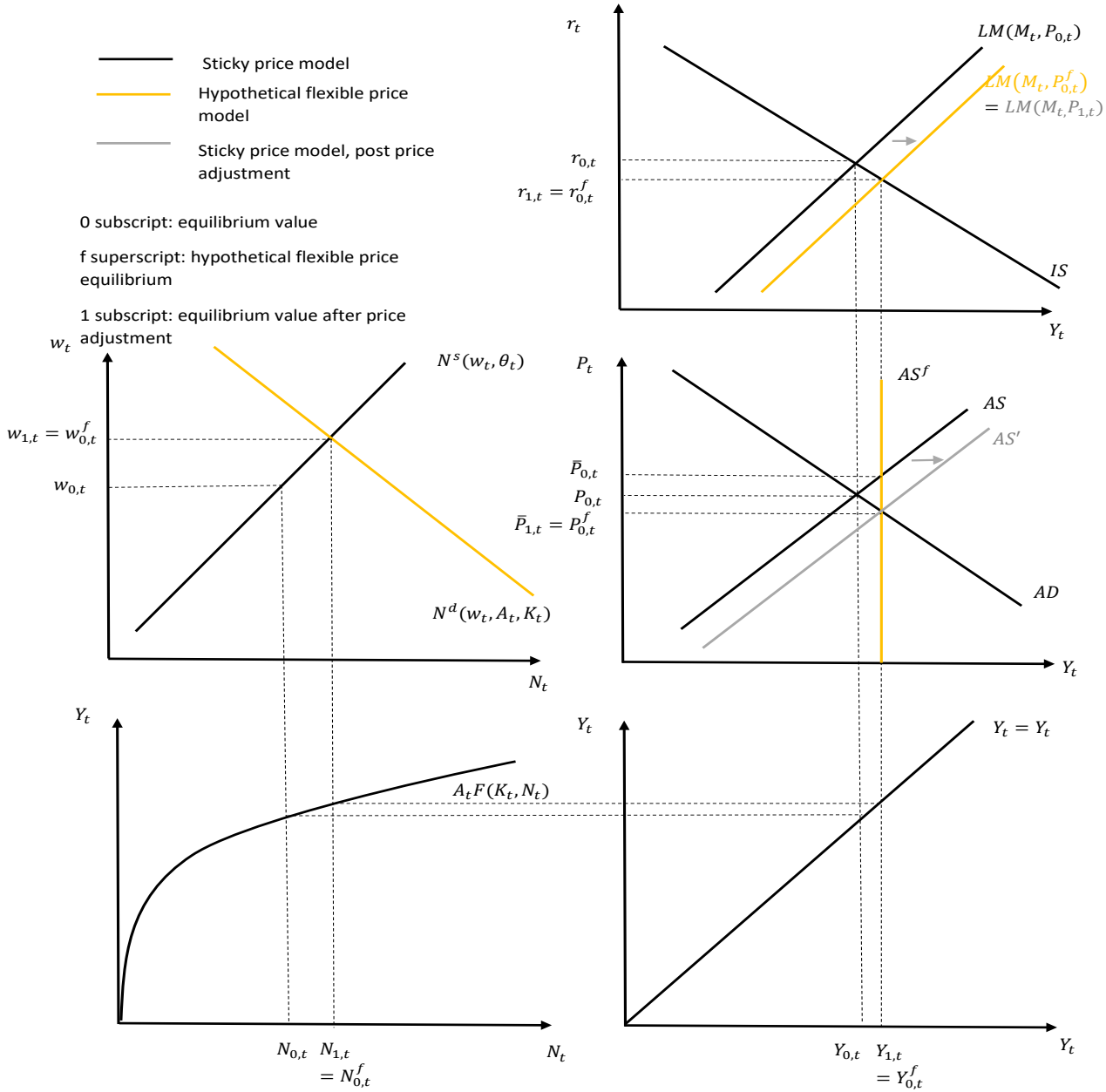
Given equilibrium real wage, firm would like to hire more labor. But only way to put more labor to use is to have more demand for output, which would require a drop in P_t

Once it is given the opportunity to do so, the firm will change $\bar{P}_t$ in such a way that the AS curve intersects the AD curve at Y_t^f

Hence, as we transition from short run (price sticky) to medium run (price flexible), the exogenous component of the price level, $\bar{P}_t$, will adjust so as to shift the AS curve and "close the gap"

We will not use different time subscripts: adjust happens within period t

Closing a Negative Output Gap



Dynamic Response to Shocks

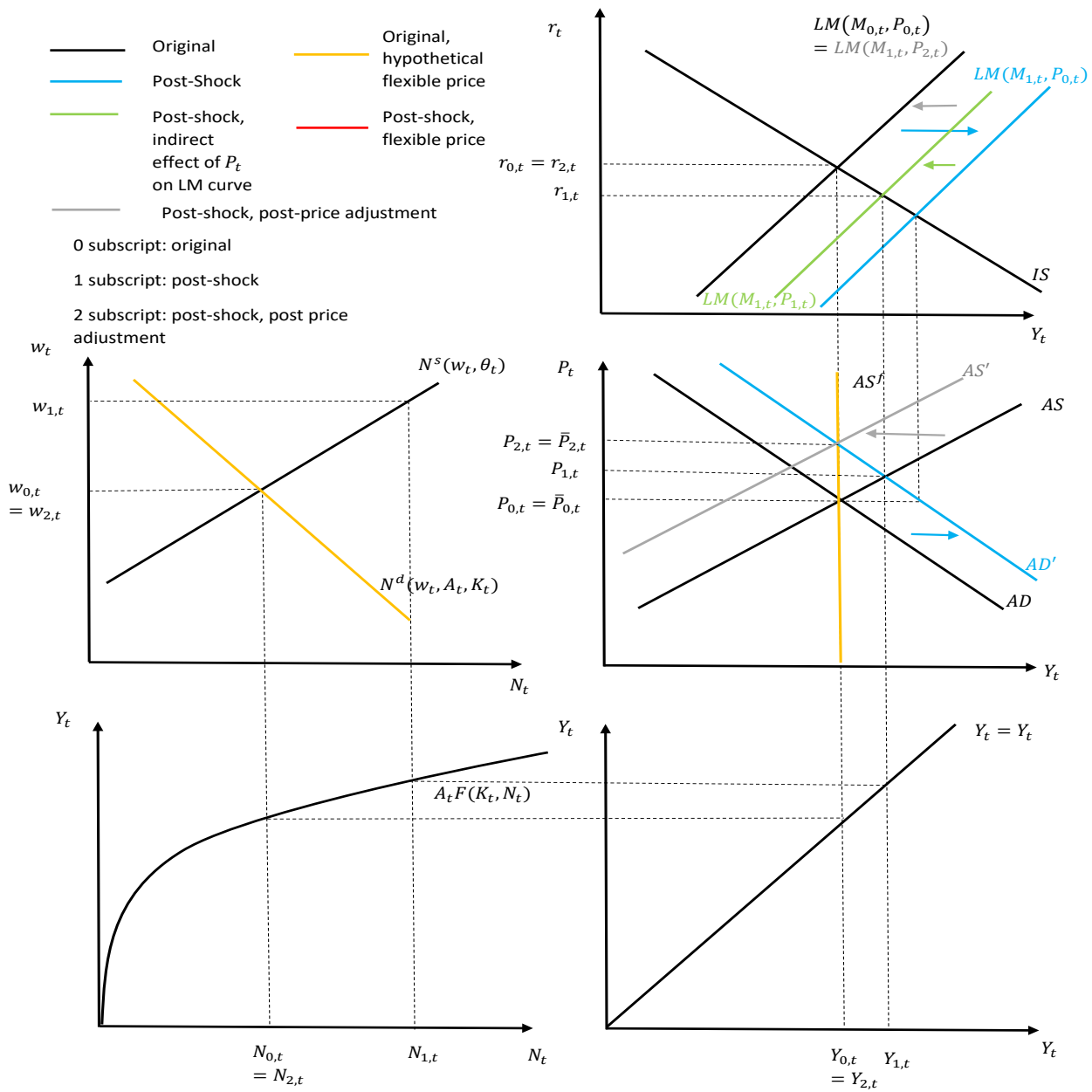
We shall assume that the economy initially sits in the neoclassical, no output gap equilibrium

Then something exogenous changes and causes either the AD or AS to shift

This will in general result in a non-zero output gap in the short run

This will put pressure on $\bar{P}_t$ to adjust to shift the AS curve to close the gap

Monetary Shock, $\uparrow M_t$



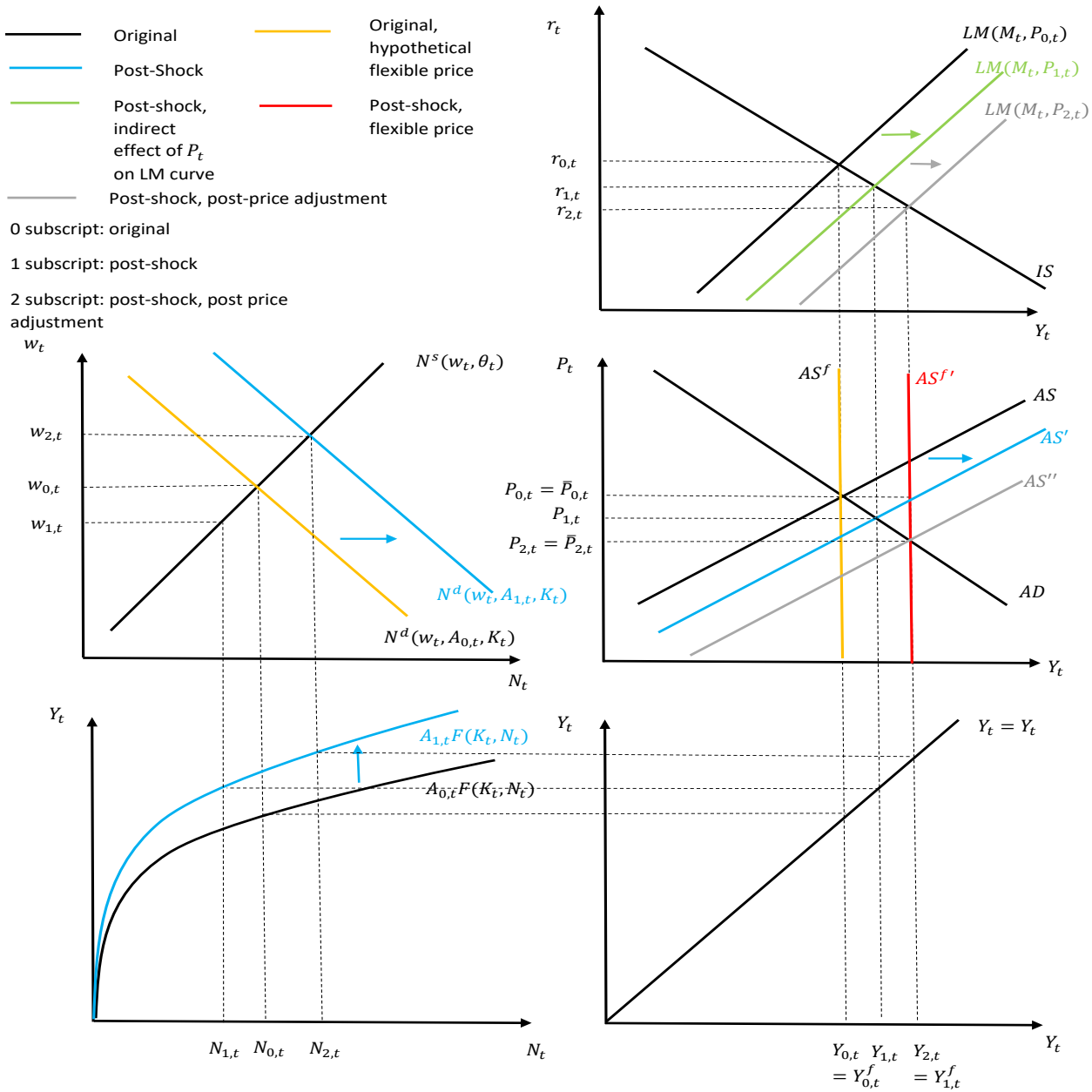
Monetary Neutrality, Short Run vs. Medium Run

Money is non-neutral in the short run – AD shifts when M_t changes which causes Y_t (and r_t and other real variables) to change

But this puts pressure on $\bar{P}_t$

As economy transitions to medium run, $\bar{P}_t$ adjusts in such a way as to close the output gap, and the neoclassical equilibrium emerges – money is neutral and the classical dichotomy holds

Supply Shock, $\uparrow A_t$



Supply Shock Dynamics

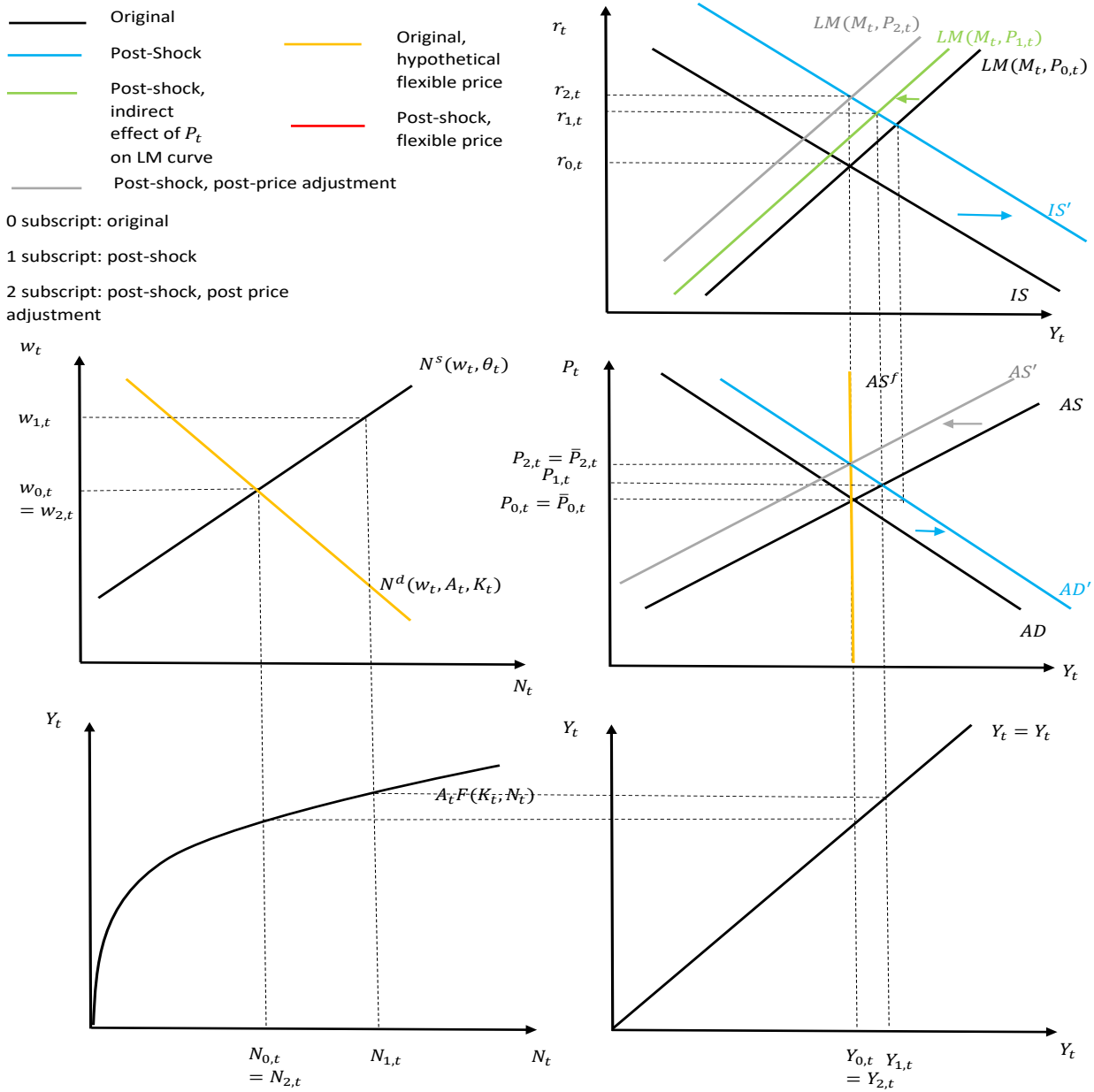
Output under-reacts to A_t in the short run (the more so the flatter is the AS curve, i.e. the smaller is γ)

The price level falls, but not enough to implement the neoclassical equilibrium

At new short-run equilibrium, firm would like to produce more. Must lower price in order to do this. So downward pressure on $\bar{P}_t$

AS shifts as economy transitions through time to restore neoclassical equilibrium

IS Shock, e.g., $\uparrow A_{t+1}$



IS Shock Dynamics

After a positive IS shock, Y_t and P_t both rise. Output "over-reacts" relative to neoclassical equilibrium

At new equilibrium, firm is producing more output than it would find optimal (i.e., labor input exceeds quantity of labor firm would demand at equilibrium real wage)

Firm wants to reduce labor, which requires increasing P_t to reduce demand

This results in $\bar{P}_t$ rising, AS shifting in, and neoclassical equilibrium being restored

Phillips Curve

Our discussion about dynamics above suggests there ought to exist some kind of relationship between the output gap and the change in prices (i.e. inflation).

Subtract previous period's price level from both sides of AS relationship:

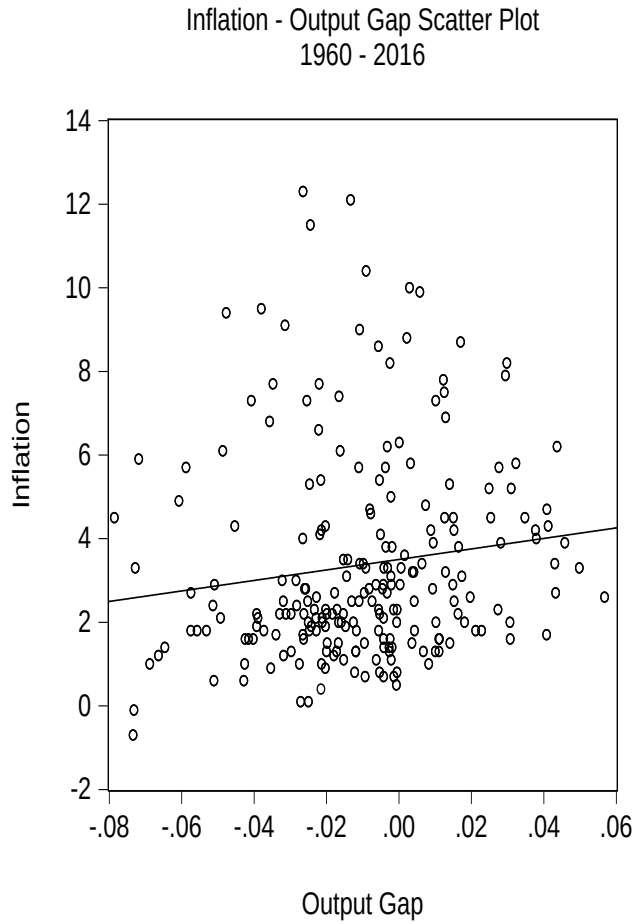
$$P_t - P_{t-1} = \bar{P}_t - P_{t-1} + \gamma(Y_t - Y_t^f)$$

Normalize previous period's price level to $P_{t-1} = 1$, which means we can re-interpret changes as percentage changes. Call $\pi_t^e = \frac{\bar{P}_t - P_{t-1}}{P_{t-1}}$ the inflation rate expected to obtain between $t-1$ and t. Firm sets $\bar{P}_t$ where if it guesses inflation correctly it will produce $Y_t = Y_t^f$. Then:

$$\pi_t = \pi_t^e + \gamma(Y_t - Y_t^f)$$

An equation like this is called a Phillips Curve after Phillips (1958)

Empirical Relationship Between Inflation and the Output Gap



Pretty weak – more of a "blob" than a clear positive relationship

Can Monetary Policy Permanently Engineer Higher Output?

No

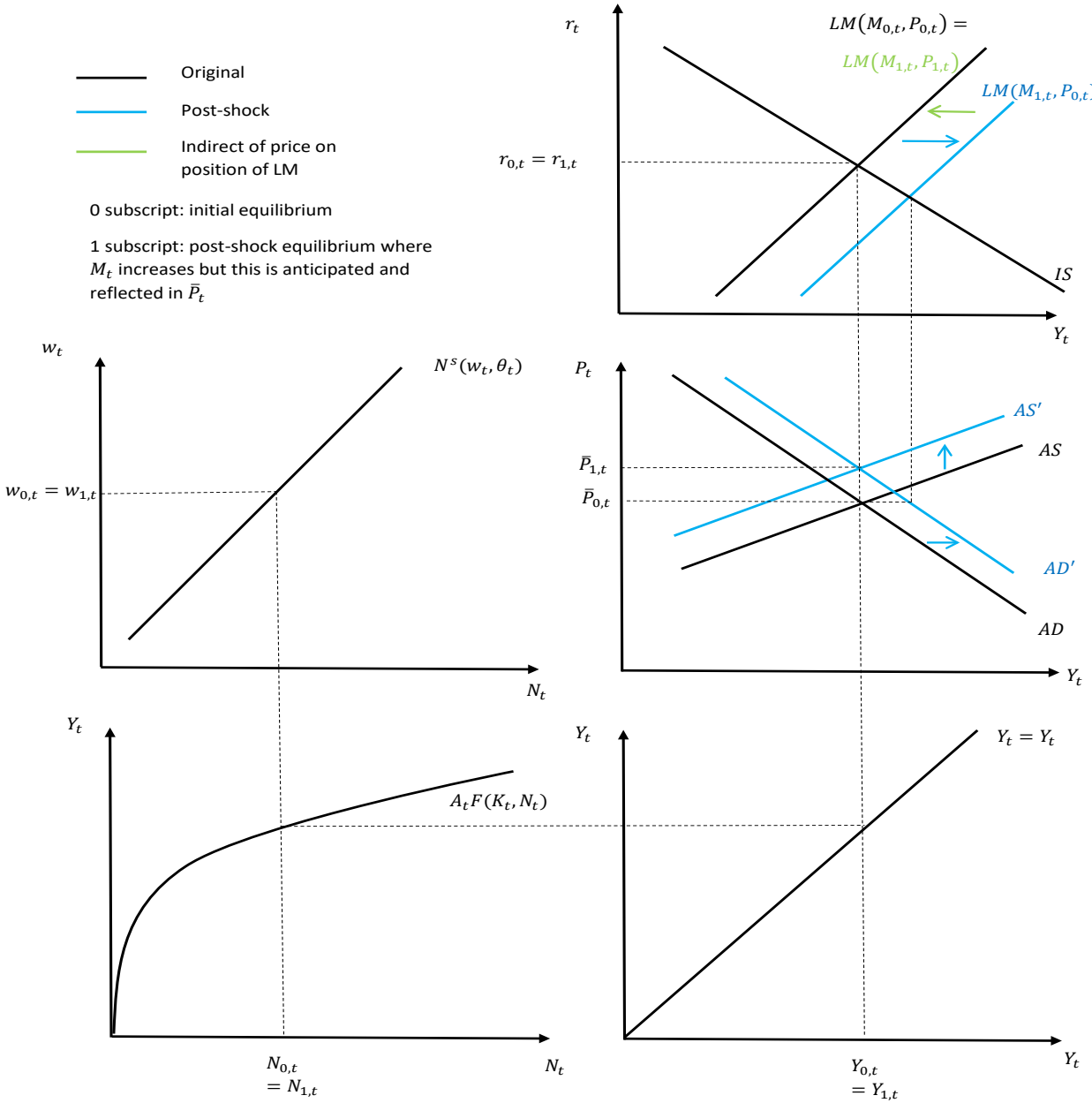
Can temporarily raise output by increasing M_t, but in medium run this puts upward pressure on prices and the effect goes away

Continually trying to raise output will only result in more inflation

Further, it may cause the firm to anticipate the change in M_t, which could cause the AS curve to shift simultaneously with the AD shift, resulting in no effect of monetary expansion on output

It is really only unanticipated monetary expansion that can stimulate output, and even then only for a while

Fully Anticipated Increase in M_t, so that $\bar{P}_t$ also rises



Costless Disinflation

Can central bank lower prices (disinflation) without incurring an output loss (i.e., what is the "sacrifice ratio")?

Conventional wisdom for 1980-1982 recession was that it was caused by Fed trying to get inflation under control (negative monetary shock)

Suppose that the Fed announces in advance that it is going to reduce M_t. If people believe this, prices may adjust down in anticipation, causing AS curve to shift down at same time the AD shifts in

In principle, this allows for a reduction in P_t with no change in Y_t – i.e., costless disinflation

Underscores importance of central bank credibility and communication: for this to work, people must believe the central bank, and the central bank must clearly communicate its objectives

Optimal Monetary Policy

We have looked at exogenous changes in monetary policy and studied their real effects

But optimal policy isn't about randomly changing policy

It's about endogenously reacting to other shocks

Dual Mandate and the Case for Price Stability

In the US, the Fed has a dual mandate: promote "stable prices" and "full employment"

In model, think of full employment as $Y_t = Y_t^f$

In New Keynesian model, the "Divine Coincidence" (Blanchard and Gali, 2007) holds: stabilizing prices stabilizes output gap (and vice-versa)

This underscores the desirability of price stability (aka inflation targeting)

Optimal Policy in a Nutshell

Whenever an exogenous shock hits, adjust policy (i.e., M_t) so that $Y_t = Y_t^f$

Don't wait for the internal model dynamics to take over!

This results in no change in price level: this "undoes" the underlying friction

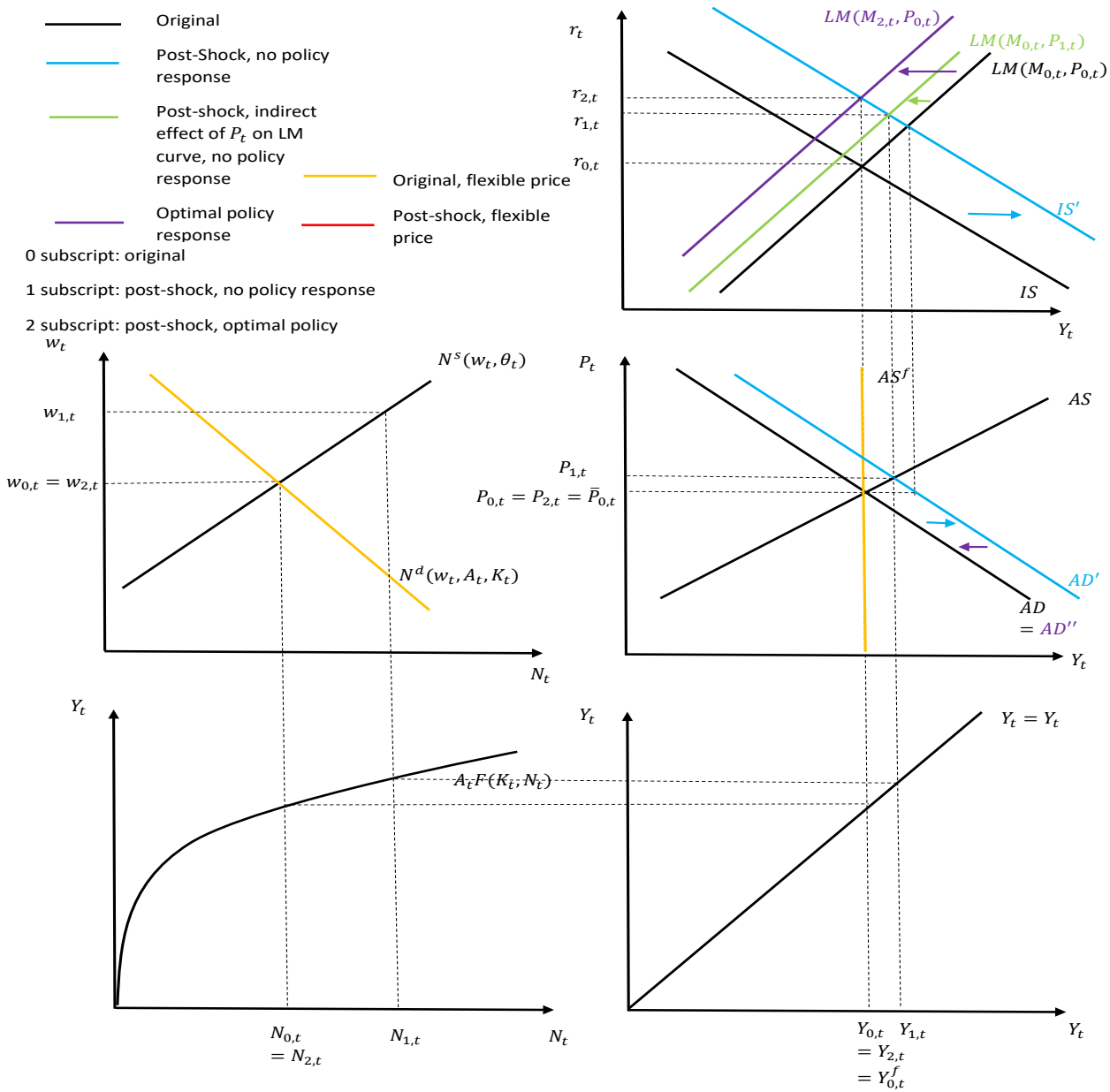
Both parts of the dual mandate are satisfied

Also implies that, in equilibrium, $r_t = r_t^f$ (i.e., underscores importance of "r-star")

Involves:

- Accommodate supply shocks
- Counteract demand shocks

Optimal Policy Response to IS Shock



Optimal Policy Response to Supply Shock (A_t)