

Lecture 20: Dynamics and Optimal Policy

ECON 30020: Intermediate Macroeconomics

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Readings

GLS Ch. 27

GLS Ch. 28

The New Keynesian Model

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 $Y_t = Y_t^f$

Vertical “ AS^f ” at Y_t^f (sometimes called long-run aggregate supply, LRAS)

The Output Gap and Dynamics

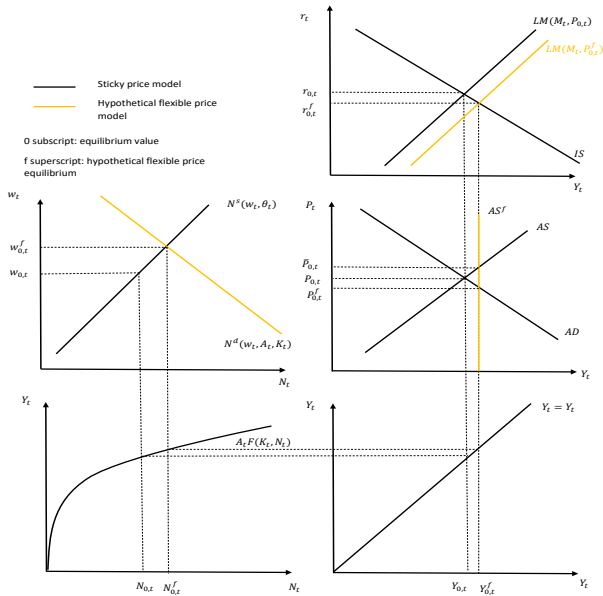
Refer to $Y_t - Y_t^f$ as the output gap – the gap between actual output and what it would be in the absence of price stickiness

What is the friction that allows the output gap to be non-zero?
The stickiness of prices

Think about $\bar{P}_t$ as the price level firms expected to prevail in period t

$$Y_t \neq Y_t^f \Leftrightarrow P_t \neq \bar{P}_t$$

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

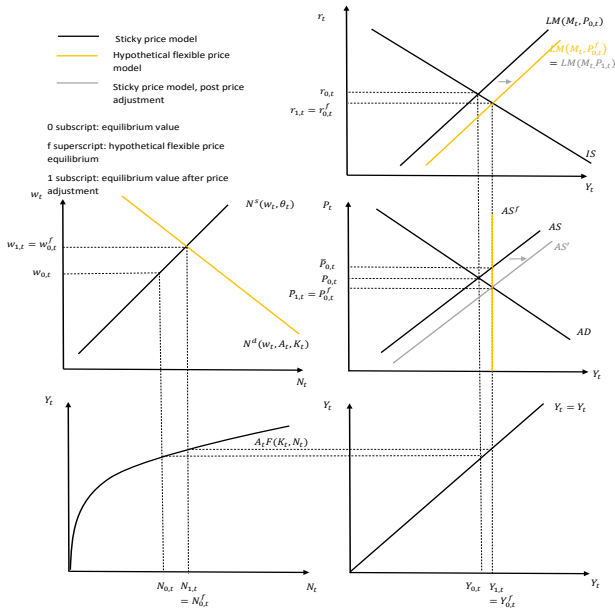
Given equilibrium real wage, firm would like to hire more labor. But only way to put more labor to use is to have more demand for output, which would require a drop in P_t

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 (prices 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: adjustment happens within period t

Closing a Negative Output Gap



“Dynamic” Response to Shocks

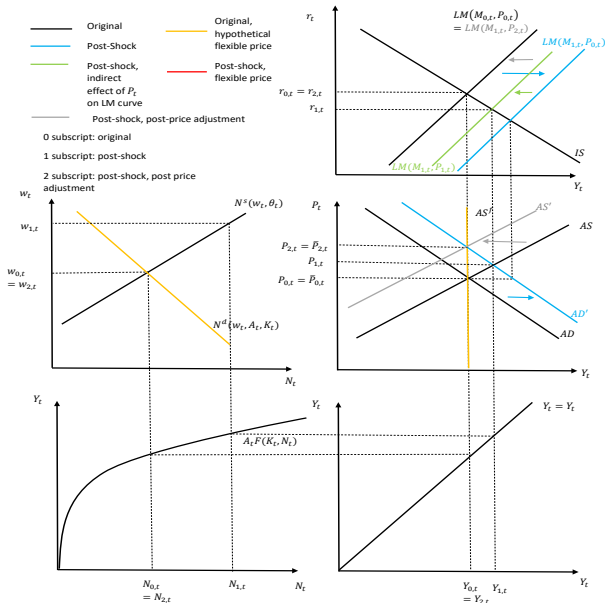
We shall assume that the economy initially sits in the neoclassical, no output gap equilibrium

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, $\uparrow M_t$



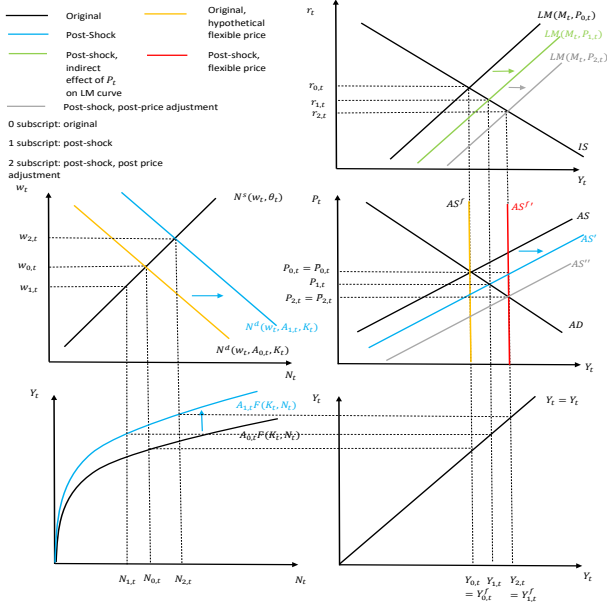
Monetary Neutrality, Short Run vs. Medium Run

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

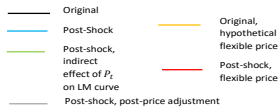
Output under-reacts to A_t in the short run (the more so the flatter is the AS curve, i.e. the smaller is γ)

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

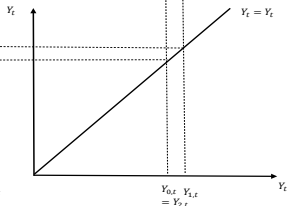
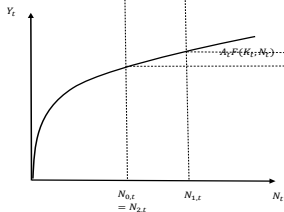
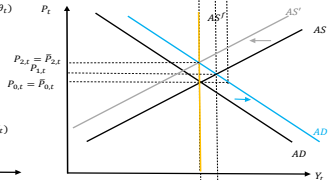
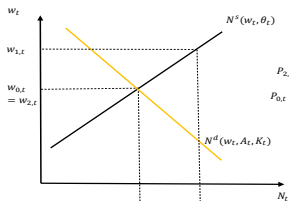
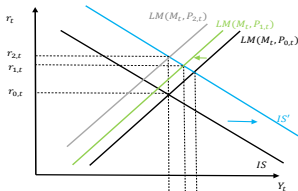
IS Shock, e.g., $\uparrow A_{t+1}$



0 subscript: original

1 subscript: post-shock

2 subscript: post-shock, post price adjustment



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

Monetary Policy

We have talked about exogenous changes in the money supply

In reality, central banks don't want to go around randomly altering policy

Monetary policy is about the endogenous adjustment of the money supply (or short-term interest rate) to achieve some stated goals

Can Monetary Policy Permanently Engineer Higher Output?

No

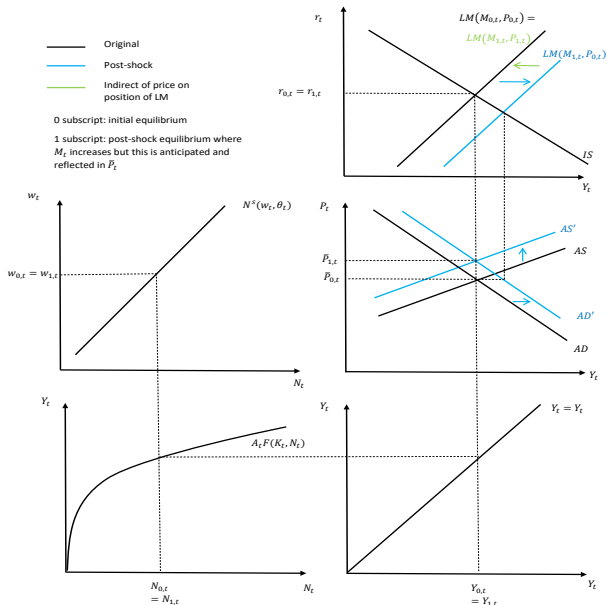
Can temporarily raise output by increasing M_t , but in medium run this puts upward pressure on prices and the effect goes away

Continually trying to raise output will only result in more inflation

Further, it may cause agents to anticipate changes in M_t , triggering movements in $\bar{P}_t$, 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

- Perhaps a plausible explanation of post-COVID disinflation

Underscores importance of central bank credibility and communication

Central Bank Objectives

Central bank cannot permanently impact output

In US, the Fed has a “dual mandate”: price stability and “maximum employment”

Many other central banks (e.g., ECB) just have a price stability mandate

Think of dual mandate as:

- P_t close to constant (or, more accurately, π_t close to constant)
- $Y_t - Y_t^f$ close to zero (i.e., no output gap)
 - Okun's Law: $Y_t - Y_t^f \approx -2(u_t - u^*)$

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 price-setting friction

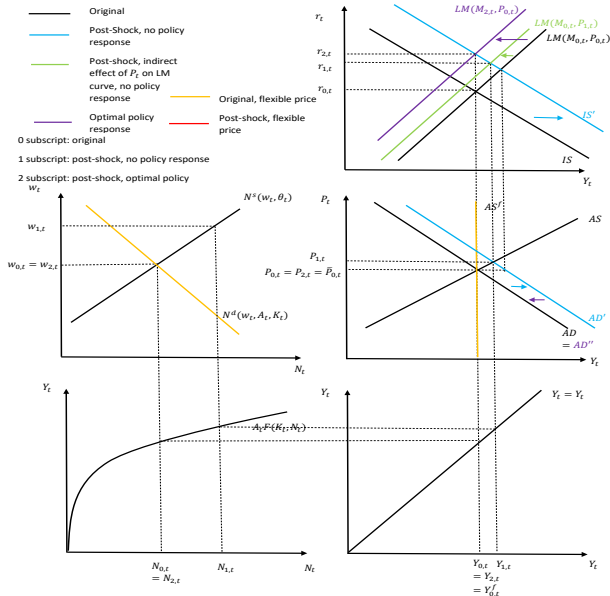
Both parts of the dual mandate are satisfied: Divine Coincidence

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)

