Integrating Inflation into IS-LM to Create a Dynamic Equilibrium Model of the Economy

Lecture 13

The Final Form Model of Price Inflation

If we assume the three key coefficients actually equal 1(if we had perfect measures of the concepts):

◆ price inflation affecting wages
◆ wage inflation affecting prices)
◆ And productivity affecting both wages (positively) and price(negatively),

then:

(1) RP = RW-RQ+Supply Shocks

AND, EARLIER,

(2) RW=RP\1+ RQ+ A0-A1*(U-U@VOL)

Substituting (2) into (1) yields:

RP=RP\1+ RQ+ A0-A1*(U-U@VOL) -RQ+Supply Shocks

=RP\1+ A0-A1*(U-U@VOL) +Supply Shocks

(Note: Productivity is neutral in this formulation)

OR, RP-RP\1 =THE CHANGE IN INFLATION (i.e the acceleration in prices)
= A0-A1*(U-U@VOL) +Supply Shocks

The Link Between Unemployment and Real Output

◆ **The cyclical relationship between unemployment and real growth is known as Okun's Law:**

– **the _change_ in Unemployment Rate=**

about _half the growth rate difference_ between potential and actual GDP growth

– **or, the _level_ of the Unemployment Rate=**

about _half the % gap_ between potential and actual GDP

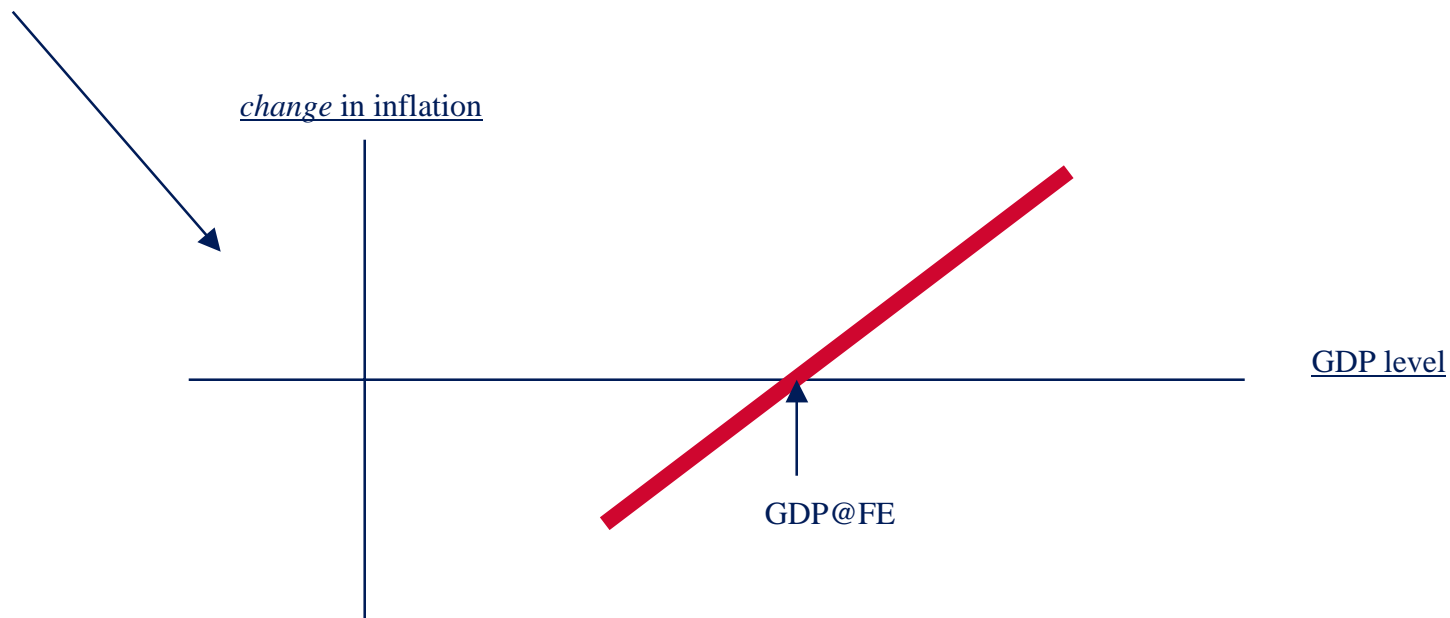# The Full Links Among:
Inflation, Unemployment and Real Output

The critical relationships are:

1. The *change* in inflation responds (with a negative derivative) to the <u>unemployment rate</u>

2. The unemployment rate responds (with a negative derivative) to the GDP level, given GDP@FE
Therefore,

3. The *change* in inflation responds (with a positive derivative) to the GDP level, given GDP@FE

The Full Links Among:
Inflation, Unemployment and Real Output

The *change* in inflation responds (with a positive derivative) to the GDP level, given GDP@FE.

A favorable external shock, such as a drop in oil prices or imported goods prices, effective reduces the NAIRU (the unemployment rate required to keep inflation unchanged), and thereby raises GDP@FE.

change in inflation

GDP level

GDP@FE
with NAIRU (1)
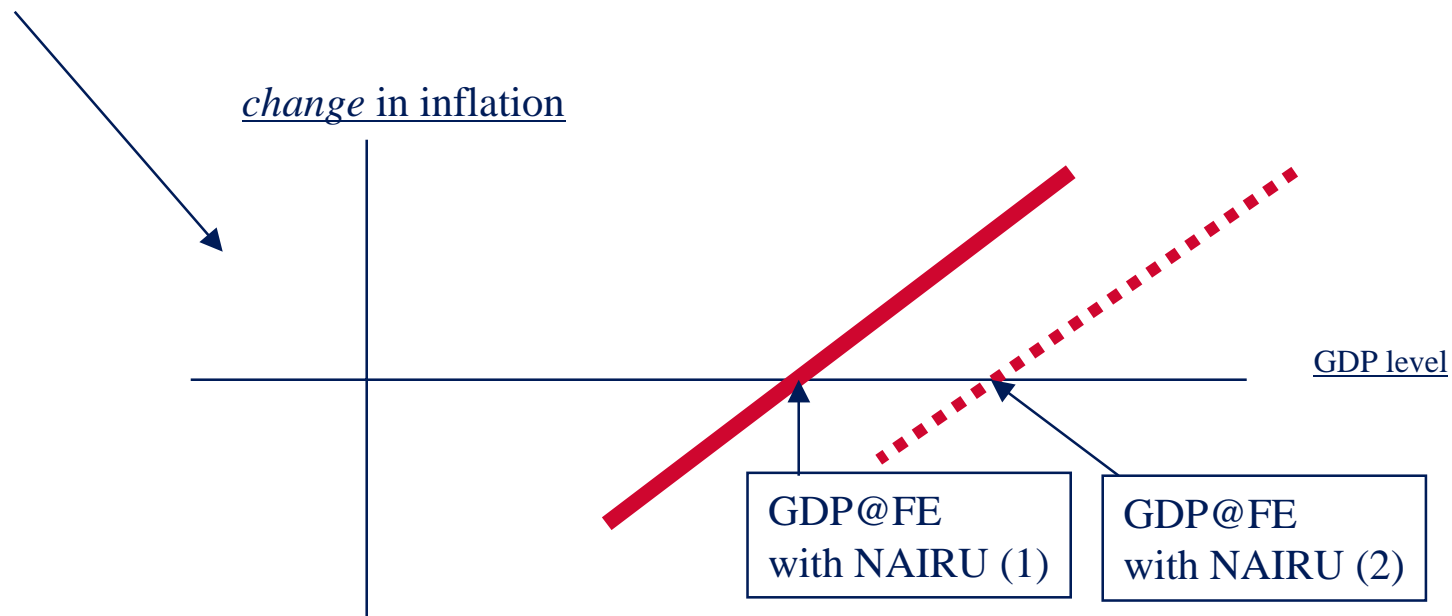
GDP@FE
with NAIRU (2)

The Accelerationist Phillips Curve Adds a Crucial Dynamic Dimension to IS-LM

◆ **Imagine an initial IS-LM "equilibrium"**

◆ **Any GDP indicated by such an "equilibrium" that is greater than GDP@FE will push unemployment lower than NAIRU**

◆ **This will increase inflation, raising the price level**

◆ **Higher prices effectively reduce the real money supply, and probably reduce consumer spending**
  – **both IS and LM curves shift leftward**
  – **In other words, the initial "IS-LM equilibrium" was only temporary if GDP wasn't consistent with NAIRU**

◆ **Therefore, the fiscal or monetary "multipliers" analysis and conclusions we reached earlier need to be rethought**
  – **These policy changes are temporary stimulants, not permanent influences on GDP**
  – **Long-run GDP multipliers are <u>zero</u> unless the stimuli sufficiently boost investment so as to boost the level of GDP consistent with NAIRU**

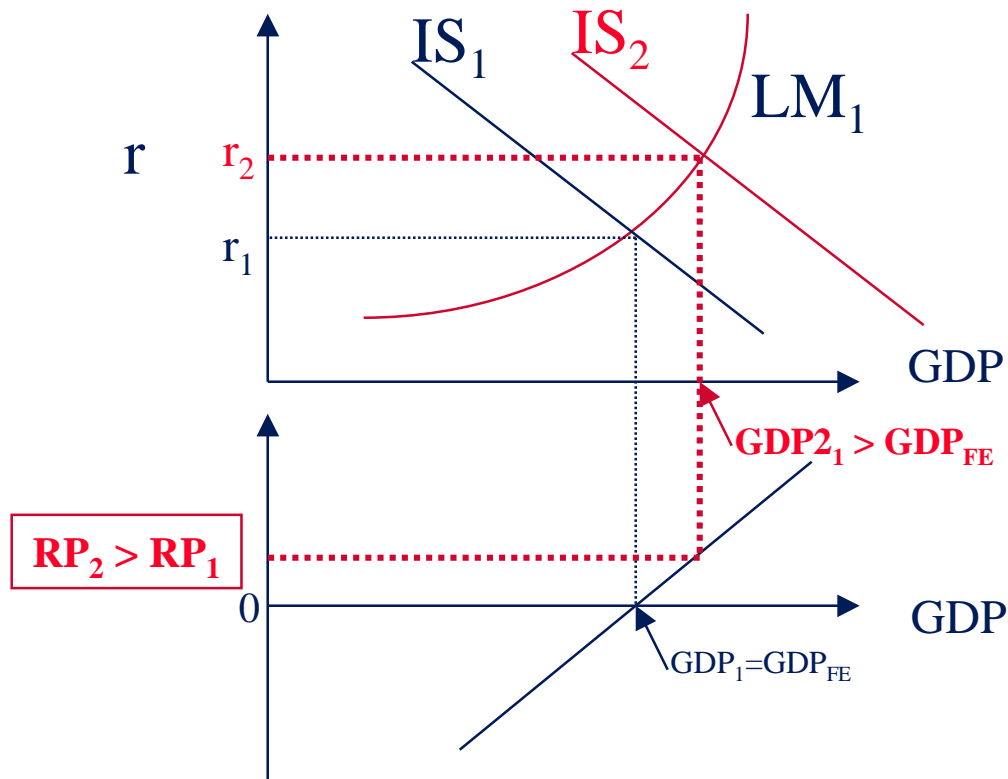# The Accelerationist Phillips Curve Adds a Crucial Dynamic Dimension to IS-LM
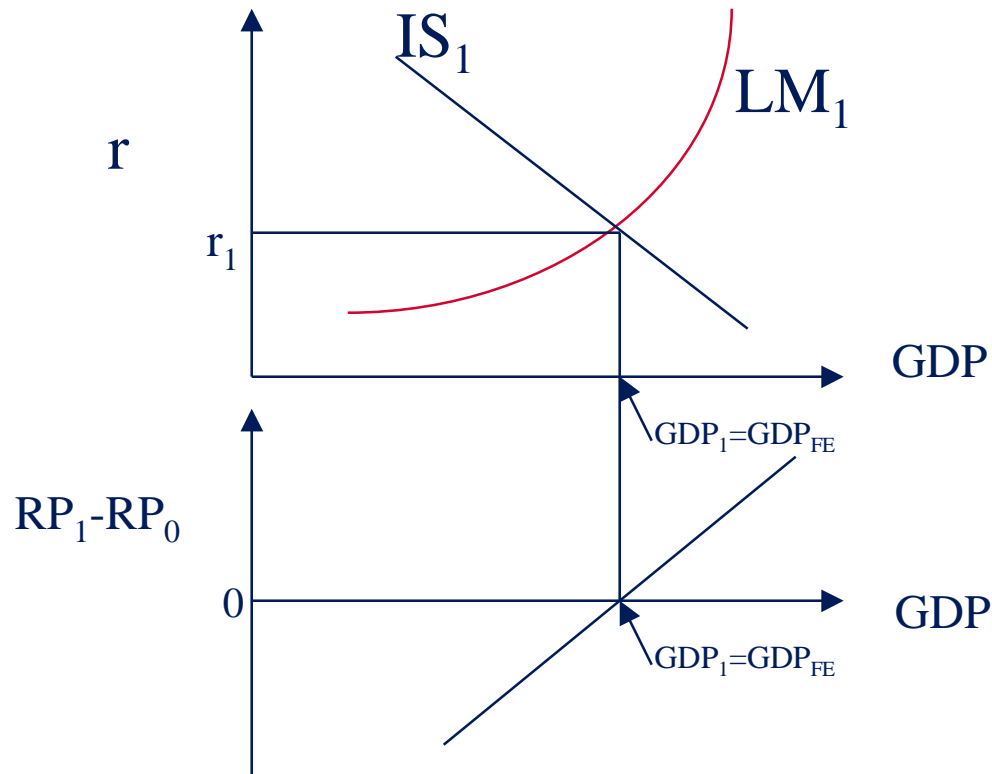
A sustainable equilibrium:
- IS=LM
- $GDP=GDP_{FE}$
- Thus inflation is stable (presumably equal to nominal money supply growth thus the real money supply is constant)

Assume the equilibrium is disturbed by a tax cut

IS_1 IS_2 LM_1

r r_2 r_1

GDP

$GDP2_1 > GDP_{FE}$

$RP_2 > RP_1$

0

GDP

$GDP_1 = GDP_{FE}$

The new IS-LM "equilibrium" is not sustainable:

•IS=LM but

•GDP>GDP$_{FE}$

•Thus inflation is rising (presumably faster than nominal money supply growth thus the real money supply will be reduced)
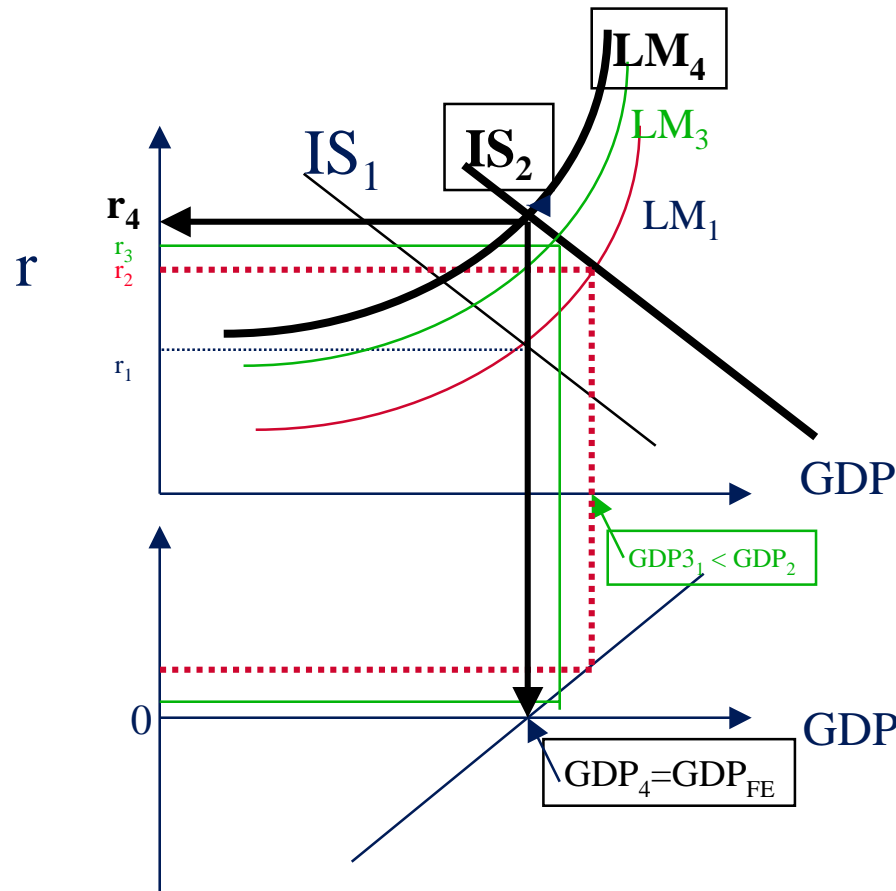
The real money supply is reduced, shifting LM
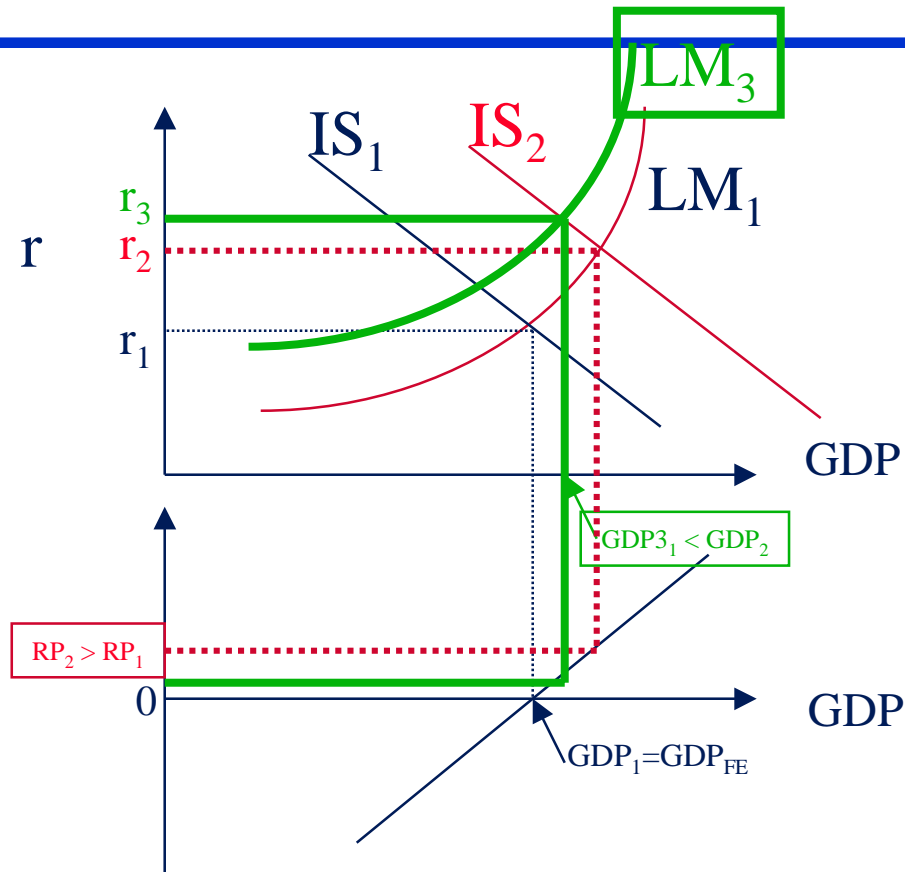
This diagrammed, new IS-LM "equilibrium" is still not yet sustainable:
• IS=LM with higher "r" and lower "GDP"
• But GDP is still $>GDP_{FE}$
• Thus inflation is rising (presumably faster than nominal money supply growth thus the real money supply will be reduced)

The real money supply is reduced, shifting LM until the IS-LM equilibrium matches the NAIRU equilibrium of the Accel. Phillips Curve

This diagrammed, new IS-LM "equilibrium" is once again sustainable:

• IS=LM with higher "r" and lower "GDP"

• GDP = GDP_{FE}

• Thus inflation is stable, matching desired money supply growth

The real money supply is reduced, shifting LM until the IS-LM equilibrium matches the NAIRU equilibrium of the Accel. Phillips Curve

LM_4

LM_3

IS_1 IS_3 IS_2

r_4

r

r_3

r_2

LM_1

r_1

GDP

$GDP3_1 < GDP_2$

0

GDP

$GDP_4 = GDP_{FE}$
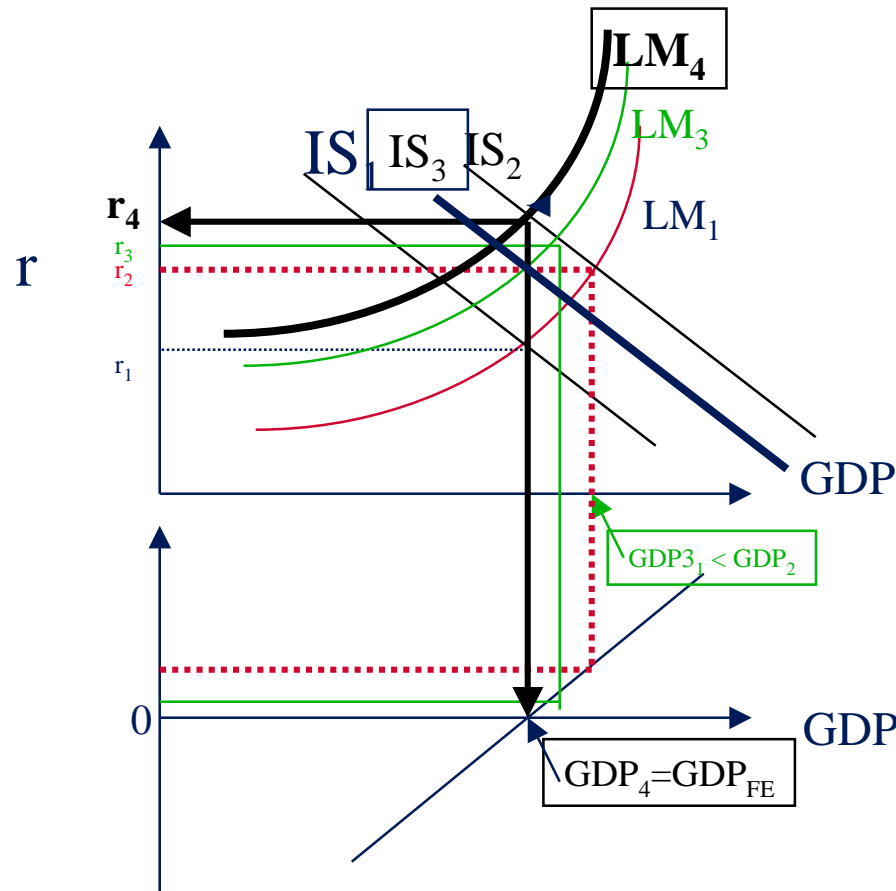
Note: If the IS curve shifts to the left with each increase in the price level, this accelerates the convergence to the equilibrum output and requires less of a shift in the LM curve. Thus, the equilibrium with both IS and LM curves moving in the same direction is achieved at a lower interest rate. (As shown with IS3 and LM3) This may be important for the composition of GDP: it could mean higher investment than otherwise, for example.