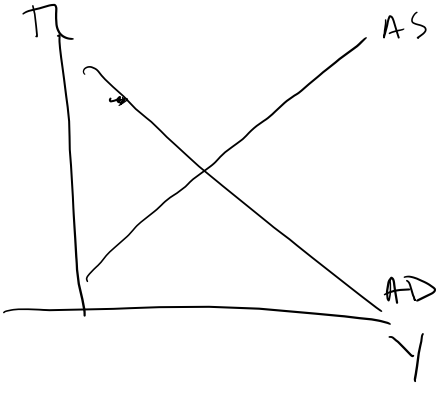
# ECON10003
## INTRODUCTORY MACROECONOMICS
## SEMESTER 1, 2021

## REVIEW SESSION 3

Nahid Khan

**Monetary Policy and AD-AS model**




- Aggregate Demand and Aggregate Supply
- RBA and Policy Reaction Function

$\uparrow \pi \rightarrow \uparrow r \rightarrow \downarrow Y$

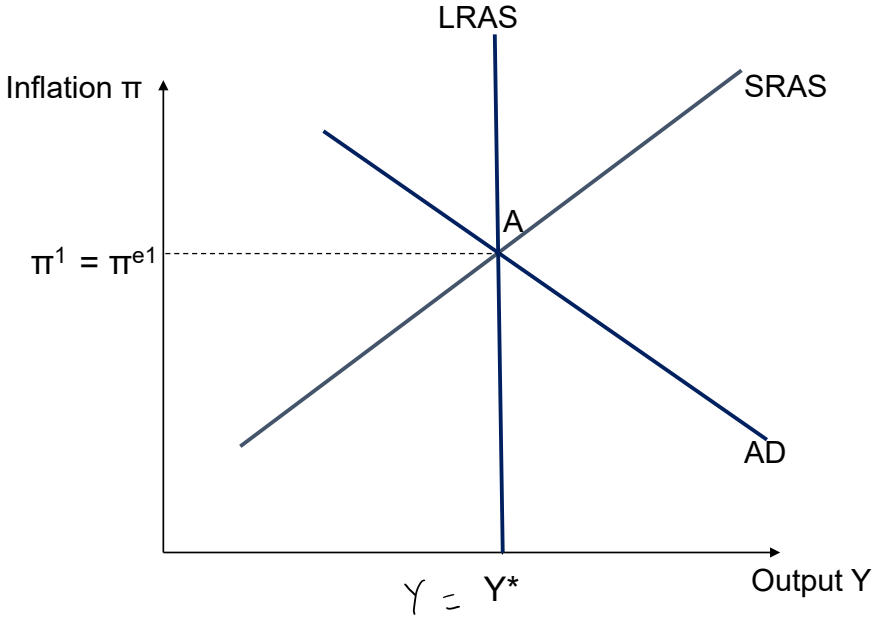
- Definition, determinant, diagram, (movement along and the shift of the curve)

- $Y - Y^* = -\alpha\gamma(\pi - \pi^*) + \varepsilon_D$ AD
- $\pi = \pi^e + \emptyset\beta(Y - Y^*) + \varepsilon_S$ AS

# The Aggregate Demand - Aggregate Supply Framework

- The aggregate demand – aggregate supply curve diagram, and the economic model that it represents, to examine both short and long-run consequences of a series of changes in both aggregate demand and aggregate supply.
- The aggregate supply curve shows the actual rate of inflation that will occur at different levels of output (and output gap).
- The aggregate demand curve shows the demand for goods and services in total at each rate of inflation.
- A short run equilibrium occurs at a point of intersection between an AD curve and an AS curve.
- However, long run equilibrium only occurs when the level of output is equal to potential output and therefore firms have no reason to adjust the rate of inflation.
- So then the actual rate of inflation will be equal to expected inflation.

# Short and Long run equilibrium



1. Monetary Policy in Keynesian Models of the Macroeconomy

a) Recall that the Keynesian consumption function is:

$$C^d = \bar{C} + c(Y - T) - \gamma_c r.$$

$r \uparrow \Rightarrow C \downarrow$ by $\gamma_c$

Provide an intuitive explanation for this equation. Define all terms.

*Answer:* The equation states that demand for domestic consumption depends upon three components:

- An exogenous component given by $\bar{C}$.
- A component that depends upon disposable income $(Y\ T)$ with $c$ being the marginal propensity to consume out of disposable income.
- A component that depends upon the real interest rate. The term $\gamma_c$ measures the responsiveness of consumption to changes in the real interest rate.

b) Consider the simple Keynesian model studied in lectures with fixed prices. Suppose consumption demand is given by the function described in part a) above, and investment demand is given by

$$I^P = \bar{I} - \gamma_I r$$

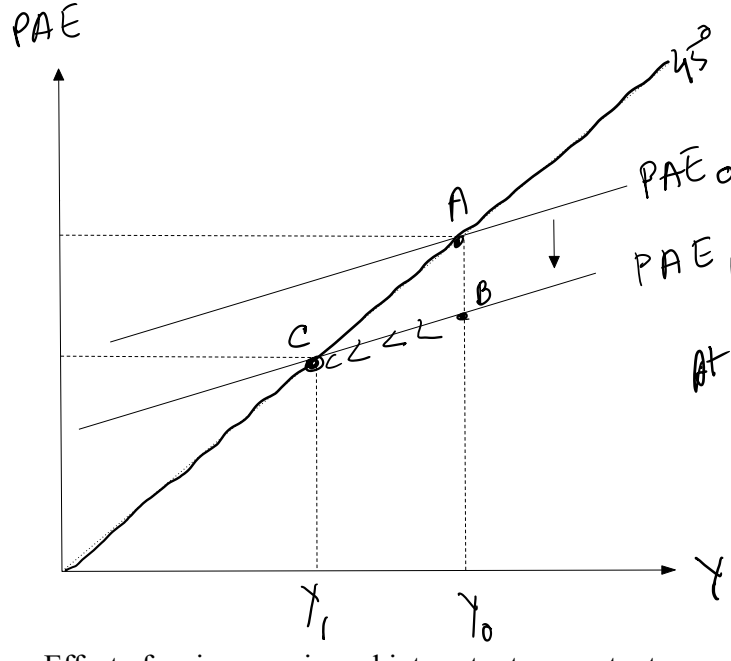
What is the effect of an increase in the real interest rate on economic activity? Use a diagram to help explain your answer.

*Answer:*

- An increase in the real interest rate leads to a decline in equilibrium output.
- The rise in the real interest rate leads to a decline in consumption and investment expenditure.

(a) inventories accumulating after the increase in real interest rates

(b) At $Y_0$ there is an excess of output above PAE. This excess implies that firms will reduce output until an equilibrium is restored with $Y = PAE$.




$r_1 \Rightarrow C\downarrow, I\downarrow$

At B: $Y_0 > PAE$

$\Rightarrow \uparrow$ inventories

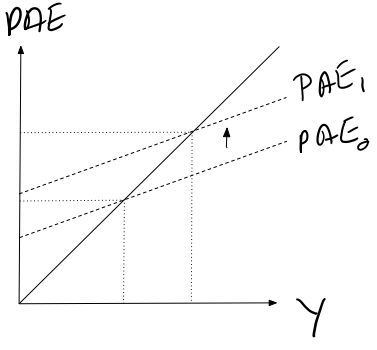
$\Rightarrow \downarrow$ production

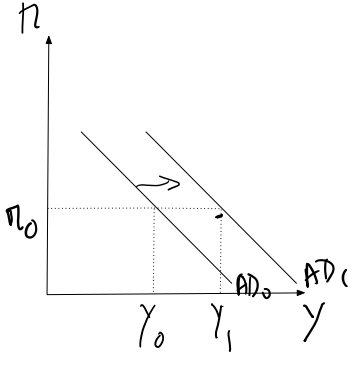
Effect of an increase in real interest rate on output

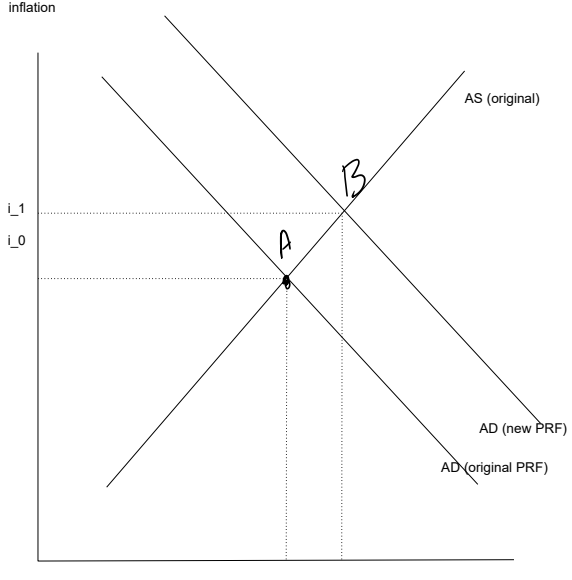
c) Consider the AD-AS model with flexible prices. Assume that an economy is initially in an equilibrium with output equal to potential output. Then suppose the central bank alters its policy reaction function so that for any given inflation rate and output gap it sets a lower real interest rate. Explain what effect this change in policy will have upon the short run in the AD-AS model.

***Answer:*** The shift down in the policy reaction function implies that at any given level of output and inflation the central bank sets a lower real interest rate. This leads to an increase in consumption and investment demand at any given inflation and level of output.

- the change in consumption and investment behaviour leads to a shift out in the AD curve.
- suppose we start at a level of inflation and output on our original AD curve. This change in policy will lead to a lower real interest rate that raises consumption and investment expenditure. At the same output and inflation rate it will be the case that $PAE > Y$. To return to equilibrium where $Y = PAE$ we need to increase the level of output. Hence, the AD curve shifts to the right.
- in the short run the equilibrium in the model moves to our new intersection of the AD-AS curves with a higher level of output and a higher level of inflation.

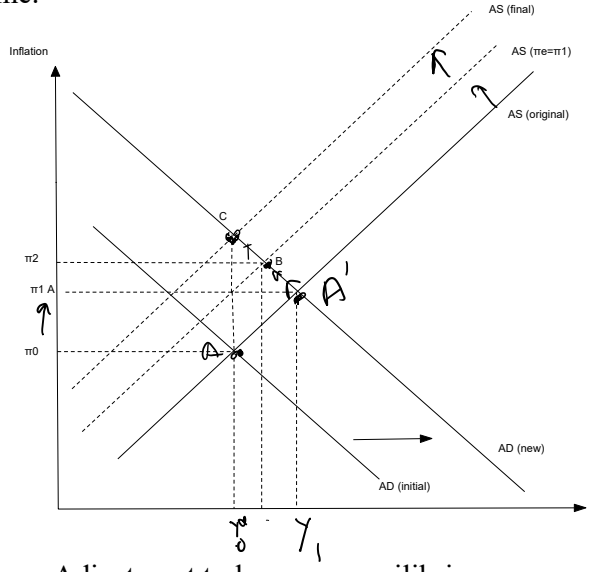

PAE
PAE1
PAE0
Y


π
π0
AD0
AD1
Y0
Y1
Y


inflation
AS (original)
i_1
i_0
A
B
AD (new PRF)
AD (original PRF)
Y↑
π↑

d) Explain the impact of the policy change considered in part c) above, on the long run behaviour of the economy. Describe how inflation and output change over time.

***Answer:*** Inflation is not equal to expectations and that over time inflation expectations will adjust. This leads to a rise in inflationary expectation. This rise in inflationary expectations leads to the AS curve to shift out over time.




Adjustment to long run equilibrium

- Output and inflation changes over time from the short run to the long run equilibrium.
- From the short run equilibrium, there is a decline in output from $Y_1$ back to potential output over time.
- Looking at inflation, it continues to rise to the level consistent with Point C

$$Y = Y^*$$

$$\Rightarrow \pi = \pi^e$$

e) Part of the challenge of monetary policy is that the level of potential output is not observed. Assume that the economy is in an equilibrium with output equal to potential output. Suppose the latest economic news leads the central bank to incorrectly raise their estimate of potential output. Use the AD-AS model to describe what will happen to output and inflation in both the short run and long run as a result of this mistake. Explain your reasoning in full.

***Answer:*** If the central bank believes that potential output has risen, then for any level output, the perceived output gap is smaller (or more negative) than the true or actual output gap.

This smaller perceived output gap will result in a lower level of the real interest rate. This lower level of the real interest rate will lead to a shift out in the AD curve.

The long run implications of this policy mistake:

In the short run inflation exceeds expectations so inflation expectations rise over time.

This leads to a shift up in the AS curve until we reach a new equilibrium with higher inflation and output equal to potential output.

$Y = PAE$

$= C + I + G + X - M$

2. $C = 3{,}600 + 0.75(Y - T) - 10{,}000r$

$I^P = 2{,}000 - 5{,}000r$

$G = 1{,}800$

$X = 8{,}000$

$M = 1{,}000 + 0.25(Y - T)$

$T = 3{,}000.$

$$\text{multiplier} = \frac{1}{1 - c + m} = 2$$

$c \rightarrow mpc$, $m \rightarrow mpm$

So $Y = 3600 + 0.75Y - 0.75(3000) - 10{,}000(0.10) + 1500 + 1800 + 8000 - 1000 - 0.25Y + 0.25T$

⇨ $Y = 11400 + 0.5Y$

So $Y = 21300$

The real interest rate is expressed as a decimal and has a value of 0.10.

The multiplier for G will be 2

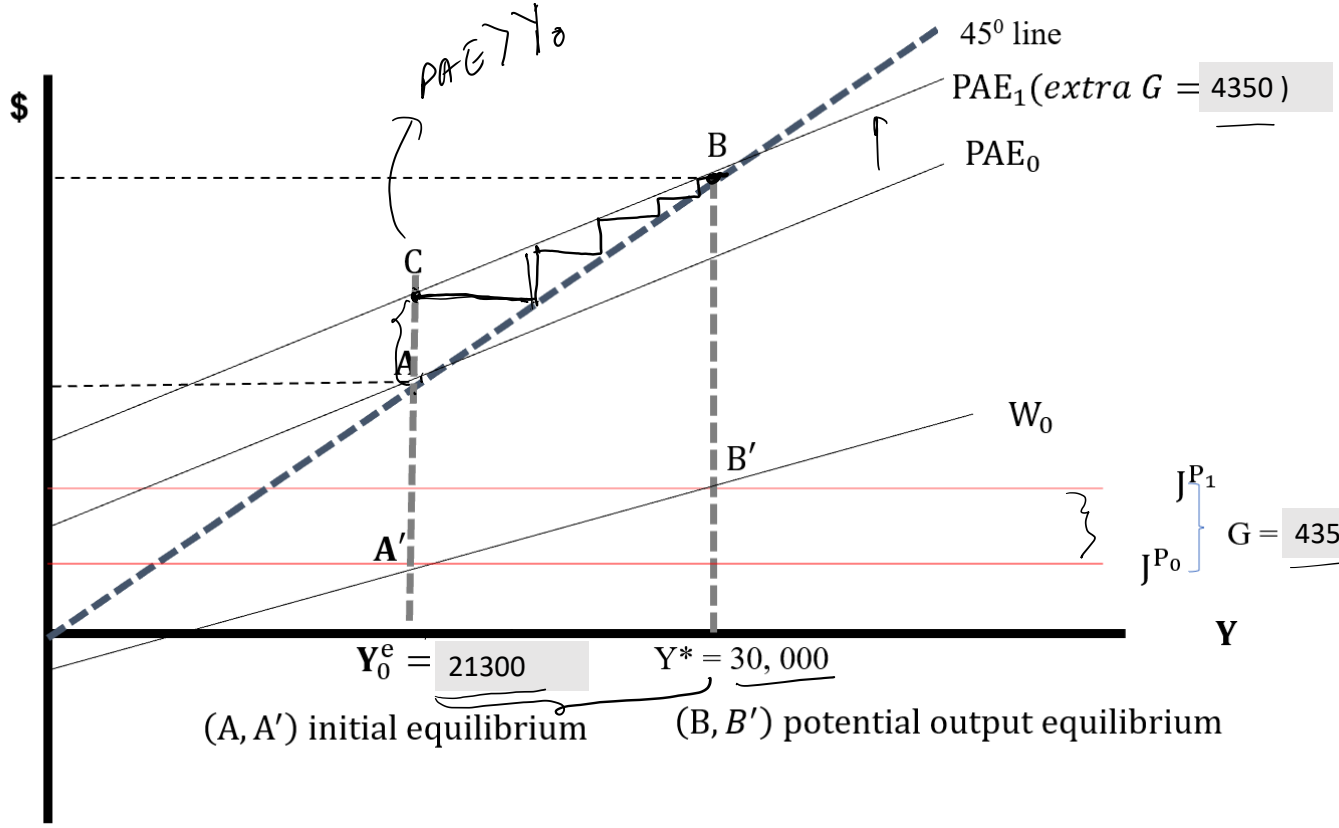
If Y* is 30,000 then G would have to rise by (30000 – 21300)/ 2 = **4350**

$\Delta Y = \text{multiplier} \times \Delta G$

**Answer:** Figure below shows an initial equilibrium; planned aggregate expenditure and output are equal and planned injections equal withdrawals. The initial equilibrium is consistent with points A and A' on, respectively, the initial planned aggregate expenditure schedule, $PAE_0$, and the initial withdrawals schedule, $W_0$. The corresponding initial equilibrium level of GDP is $Y_0^e$.

At point A, there is a contractionary output gap of 8700. If government increases it expenditure by 4350, it will shift the planned injection line upwards and hence PAE curve upwards too. Now PAE is greater than output produced, point C on PAE curve, which will result in an unplanned decline in inventories, giving signal to firm to produce more. As firms produce more output increase will be followed by more increments due to marginal propensity to consume as a ripple effect.

The economy will move towards a new equilibrium point B moving along the PAE curve. Which is the multiplier effect in the numerical findings that shows multiplier is equal to 2 and tells us how much an exogenous component of PAE, in this case G = 4350, has to increase to eliminate the contractionary gap. The multiplier effect continues to raise output until it reaches the equilibrium at the potential level of output Y*. Moving from A to B also means from Okun's Law that unemployment will decrease and will be equal to the natural rate.


$
45⁰ line
PAE₁(extra G = 4350)
PAE₀
B
C
A
W₀
B′
A′
J^P1
J^P0
G = 4350
Y
Y₀^e = 21300
Y* = 30, 000
(A, A′) initial equilibrium
(B, B′) potential output equilibrium

(b) Monetary policy can be described by as follows:

$$r = r^* + \alpha(\pi - \pi^*)$$

Consider the following diagram to show how monetary policy can be used as a stabilisation policy for the above economy, to achieve closer to potential output and natural rate of unemployment, where we have a recessionary gap. Using the AD-AS model, we have a short run equilibrium at point 'a' by the intersection between $AD_0$ and $SRAS_0$ at a lower than potential level of output where we have contractionary output gap and unemployment rate is higher than natural rate. Monetary policy implemented by the central bank would mean that it will reduce interest rate at all level of inflation using its policy reaction function to stimulate the economy. This can be represented by a diagram showing prf shifting down. Since the central bank is credible and hence able to anchor the inflation target it will shift the AD to the right without much fear of initiating any higher expected inflation. Also we know that currently the inflation rate is well below the target rate. So a lower interest rate will stimulate consumption, enhance investment as borrowing cost will go down. We will have a rightward shift of the AD while AS curve remains the same as expected inflation remains the same.

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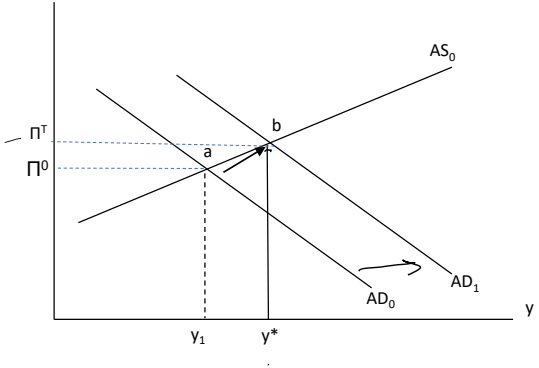



From the diagram we can see that if there is no stabilisation policy initiative then through self-correction economy will move to the potential output moving along the $AD_0$ curve lowering expected inflation and driving the AS down.

But this process can take a very long time specially when the output gap is large. If government recognises that the inflation is well below the target then monetary policy can achieve long run equilibrium at y* without increasing inflation.

Following the rightward shift of AD the economy moves from point a to b achieving exactly what is desired.

3. In the AD-AS model, a temporary shock to the aggregate supply function that leads to an increase in inflation, with other things equal, will have

a) a negative effect on output in the short run but no long term impact on inflation or output

b) a positive effect on output in the short run but no long term impact on inflation or output

c) a negative effect on output in the short run and long run

d) a positive effect on output in the short run and long run

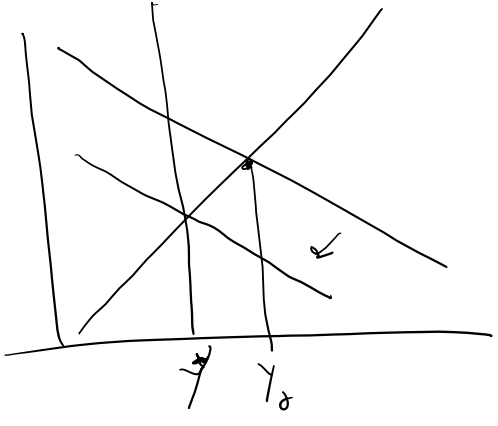
3. Suppose the government wishes to reduce output to eliminate an expansionary output gap. To do so, it could _____ government spending or shift the monetary policy reaction function _____ .

a) increase, upwards

b) decrease, upwards

c) increase, downwards

d) decrease, downwards




FP: G↓

MP: PRF↑

⇒ r↑

5. In the context of the aggregate demand and aggregate supply model, if the central bank shifts it's policy reaction function down by lowering $r^*$ the aggregate demand curve will _____ and in the long run the rate of inflation will _____ it was before the change made by the central bank.

a) shift to the right; be higher or lower than

b) be unchanged; be the same as

c) shift to the left; be higher or lower than

d) shift to the right; be lower than