

Exercise 7

AD-AS Model

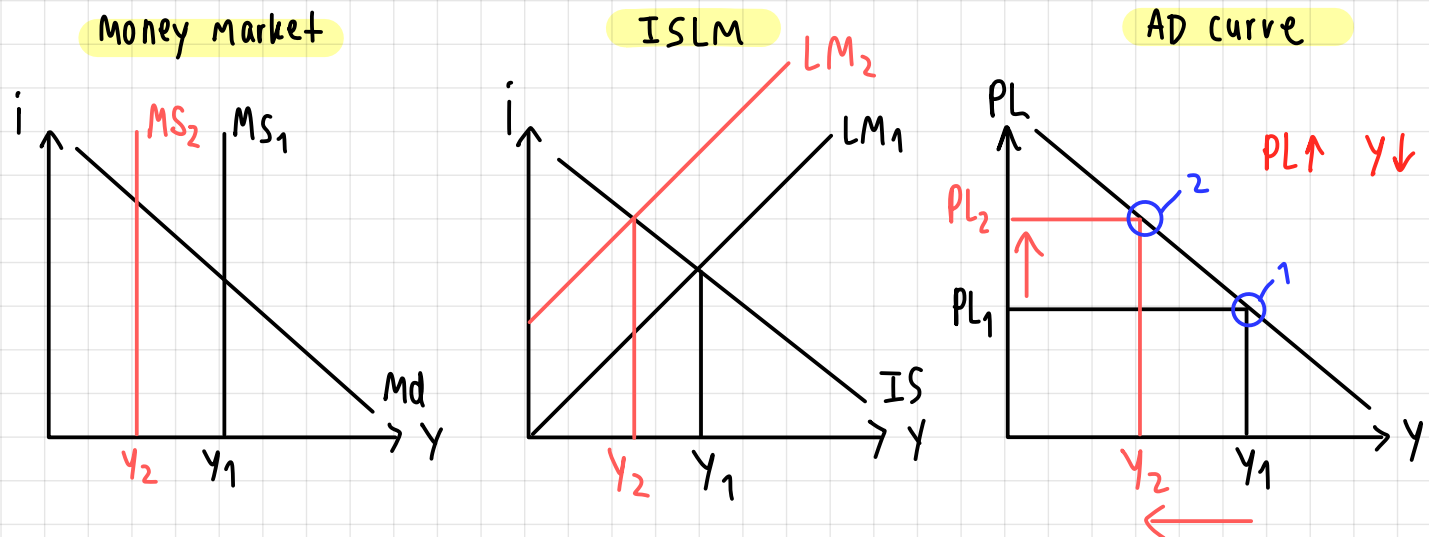
1. Explain why AD is downward-sloping (that is, how AD is derived), using the money market diagram and the IS-LM.
2. What is Sticky Wage Theory? Explain why SRAS is upward-sloping (that is, how SRAS is derived), using the sticky wage theory, labor demand diagram, and production function.
3. Explain why LRAS is vertical.
4. **Ceteris Paribus** (other things equal), how will each variable/event affect each curve – shift (to which direction?) or movement?

Variable/Event	AD	SRAS	LRAS
$P \uparrow$	movement	movement	movement
$G \downarrow$	shift left	no effect	no effect
$T \downarrow$	shift right	no effect	no effect
Autonomous $C \uparrow$	shift right	no effect	no effect
Autonomous $I \downarrow$	shift left	no effect	no effect
$M \downarrow$	shift left	no effect	no effect
$i \uparrow$	shift left	no effect	no effect
Temporary epidemic (assuming AD unchanged)	No effect	shift left	no effect
Permanent increase in population growth rate (assuming AD unchanged)	No effect	shift right	shift right
$W \uparrow$	no effect	shift left	no effect
Bad seasonal weather	no effect	shift left	shift left
Permanent loss in agricultural land due to climate change	no effect	shift left	shift left
Discovery of new technology	no effect	shift right	shift right
Short-term worker training	no effect	shift right	shift right
Permanent education reform	no effect	shift right	shift right

5. Suppose the economy faces a negative AD shock (e.g. loss in consumers' confidence).
 - What output gap do we have? Draw the AD-AS diagram to show the output gap at the new short-run equilibrium.

- If the government wants to correct such output gap, what policies can it implement? Give examples.
 - If there is no government intervention, explain with the AD-AS diagram how the economy will return to the long-run equilibrium.
6. Suppose the economy faces a temporary, positive AS shock.
- Give one example of a temporary, positive AS shock.
 - If there is no government intervention, explain with the AD-AS diagram how the economy will return to the long-run equilibrium.
7. Suppose the economy faces a permanent, negative AS shock.
- Give one example of a permanent, negative AS shock.
 - If there is no government intervention, explain with the AD-AS diagram how the economy will return to the long-run equilibrium.
8. In macroeconomics, **Money Neutrality** is the idea that a change in the stock of money (M) does not affect real variables, like employment and real GDP. Is this true in the AD-AS model?
(**Hint:** When the central bank changes money supply, M , does this affect output in the long run, i.e. full-employment Y ?)
9. Based on Question 8 above, what can the government do to change output in the long run?
(**Hint:** Monetary and Fiscal Policies are demand-side policies, but do we have other alternatives?)
10. Economists usually have macroeconomic goals of low employment and low inflation. It is also believed that economists face the trade-off between these goals, especially in short run. Use relevant diagrams to explain the trade-off. Why does the trade-off no longer exist in long run?
11. *** The IS-LM is for short-run analysis, while the AD-AS is for long-run analysis. Now, let's link them together. Suppose the government implements expansionary fiscal policy. Use the IS-LM and AD-AS models to show the policy effect in both short run and long run.
(**Hint:** In long run, what happens to P in the AD-AS model? How will this change in P affect the IS-LM model?)

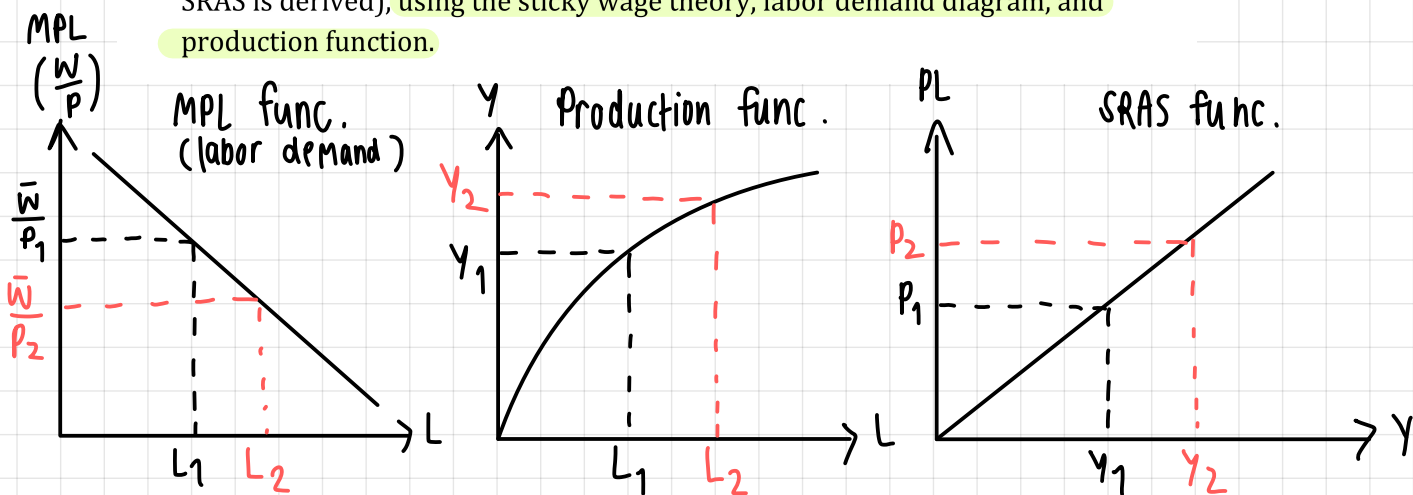
1. Explain why AD is downward-sloping (that is, how AD is derived), using the money market diagram and the IS-LM. : negative relationship bw PL and Y



AD curve shows negative relationship between Price level (PL) and output (Y). When price increase, real money supply decrease. This causes M_s to shift left from $(M_{s1} \rightarrow M_{s2})$. From money market curve, it affects LM curve to shift left with higher interest rate but lower output.

This causes a movement along AD curve ($1 \rightarrow 2$) with higher price level and lower output. As a result, AD is downward sloping

2. What is Sticky Wage Theory? Explain why SRAS is upward-sloping (that is, how SRAS is derived), using the sticky wage theory, labor demand diagram, and production function.



From labor demand function, when price level increase but because wages are sticky in short run therefore, wages remain the same. This causes real wages to decrease which mean we have less purchasing power but it causes firm want to hire more due to low cost of production. More labor produce more output.

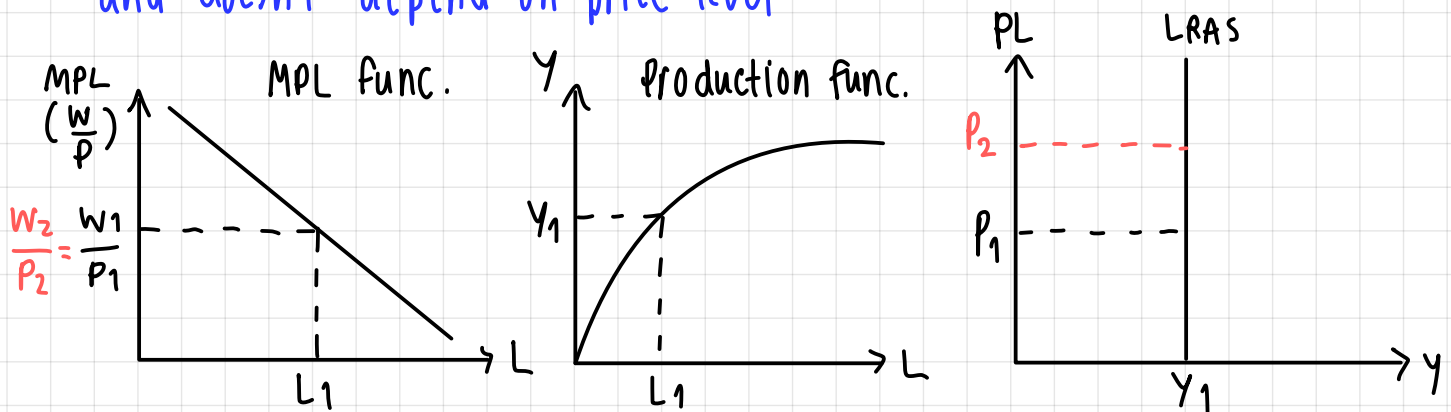
$\therefore$ SRAS is upward-sloping because it shows $\oplus$ relationship between P and Y

Sticky wage theory [$P \uparrow \rightarrow Y \downarrow$]
in SR, wages are fixed so when P increase, real wage decrease. Workers are not happy but can't do anything b/c of contract. But Firms are happy b/c of lower cost of production (profit $\uparrow$) $\therefore$ Firms produce more ($Y \uparrow$) in short run to get profit

$$P \uparrow \rightarrow \frac{\bar{W}}{P} \downarrow \rightarrow Y \uparrow$$

3. Explain why LRAS is vertical.

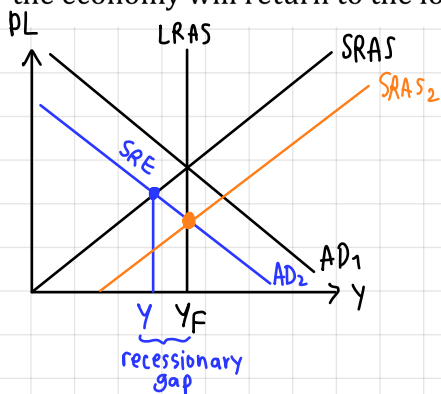
In long run, output is at full employment level and doesn't depend on price level



in this case even $P \uparrow (P_1 \text{ to } P_2)$ but because wage is flexible in long run. workers can ask for higher wage so wage will adjust (W_1 to W_2). Therefore, wage and price adjust at the same portion. So real wage remains the same. Firms hire the same amount of labor $\rightarrow$ same amount of output $\therefore$ LRAS is vertical.

5. Suppose the economy faces a negative AD shock (e.g. loss in consumers' confidence).

- What output gap do we have? Draw the AD-AS diagram to show the output gap at the new short-run equilibrium.
- If the government wants to correct such output gap, what policies can it implement? Give examples.
- If there is no government intervention, explain with the AD-AS diagram how the economy will return to the long-run equilibrium.



a) Negative AD shock shifts AD to the left. Output (Y) will decrease. So now $Y < Y_F$ which means you produce too low. This causes a 'recessionary gap'

b) To reduce the gap, Gov. can use the expansionary fiscal or expansionary monetary policies to increase output (to boost econ.)

c) Self-correcting mechanism
 $\rightarrow$ the economy slowly adjusts itself. Lower P means the cost of production decreases. This causes SRAS to shift right because firms want to hire more labor.

expansionary fiscal ($G \uparrow, T \downarrow$)

$G \uparrow \rightarrow AE \uparrow \rightarrow Y \uparrow$

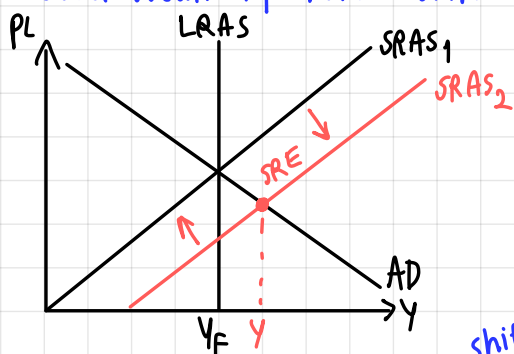
expansionary monetary ($M_s \uparrow, i \downarrow$)

$M_s \uparrow \rightarrow LM \text{ shifts right} \rightarrow AD \text{ shifts right} \rightarrow Y \uparrow$

$\therefore$ Firms hire more and produce more at lower price level and return to long run equilibrium.

6. Suppose the economy faces a temporary, positive AS shock. → SRAS shift right
- Give one example of a temporary, positive AS shock.
 - If there is no government intervention, explain with the AD-AS diagram how the economy will return to the long-run equilibrium.

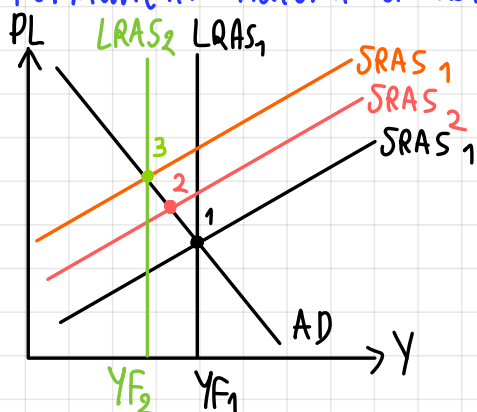
• Good weather, short-term regulations change



The positive temporary AS shocks shift AS to the right at lower price level, but higher output. And because it is just a 'temporary' shock, when the shock is gone, everything returns to normal at original point (SRAS shifts back)

7. Suppose the economy faces a permanent, negative AS shock. → shift both LRAS, SRAS to the left
- Give one example of a permanent, negative AS shock.
 - If there is no government intervention, explain with the AD-AS diagram how the economy will return to the long-run equilibrium.

• Permanent change in amount of population → affect work force.
Permanent natural disaster → global warming

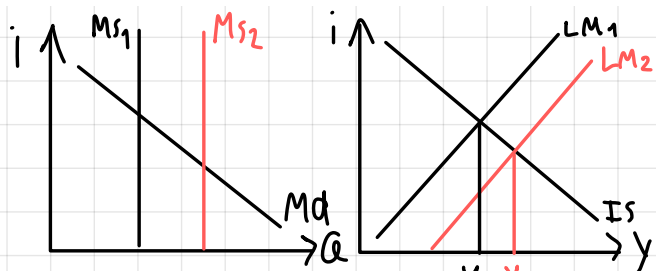


Because of a permanent negative AS shock, it shifts both LRAS and SRAS to the left. Now SRE at ②. As a result of permanent negative shock, output (Y) will be permanently decrease. So now we will be in LRE at ③ with lower Y and higher PL. Lead to inflation.

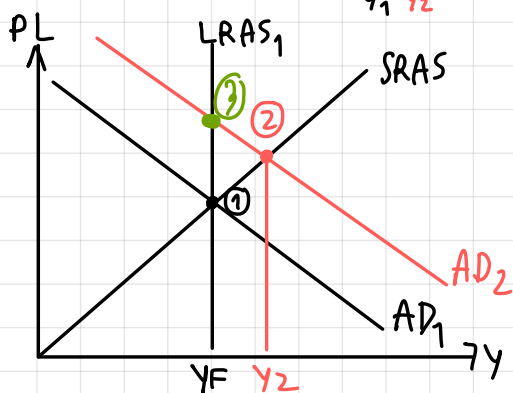
8. In macroeconomics, Money Neutrality is the idea that a change in the stock of money (M) does not affect real variables, like employment and real GDP. Is this true in the AD-AS model?

(Hint: When the central bank changes money supply, M, does this affect output in the long run, i.e. full-employment Y?)

NOTE non-price factors shift AD



CB increases M → MS shifts right → LM shifts right this causes AD shifts right (AD1 to AD2) At SRE ② with higher price level but sticky wage, cost of production is lower. Firms produce more output at Y2.



Now in long run, wage is flexible so workers can ask for higher nominal wage. This causes real wage to increase same as cost of production. Firms unemploy workers which cause SRAS to shift left b/c less labor producing less output. Now back at LRE ③ with higher price level but same Y.

∴ change in M doesn't affect YF.

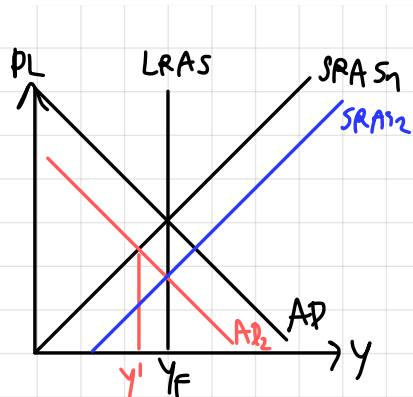
9. Based on Question 8 above, what can the government do to change output in the long run?

(Hint: Monetary and Fiscal Policies are demand-side policies, but do we have other alternatives?)

Using Supply side policy is to make change in what affect factors of production To change output in long run or to shift LRAS can be from these factors.

- Amount of population & labor
- Capital Stock (human capital included)
- natural resource
- technology

10. Economists usually have macroeconomic goals of low employment and low inflation. It is also believed that economists face the trade-off between these goals, especially in short run. Use relevant diagrams to explain the trade-off. Why does the trade-off no longer exist in long run?



low inflation rate = $P \downarrow \rightarrow \frac{w}{P} \uparrow$ (real wage), firms hire less so employment rate is low. So $AD_1 \rightarrow AD_2$ b/c low demand

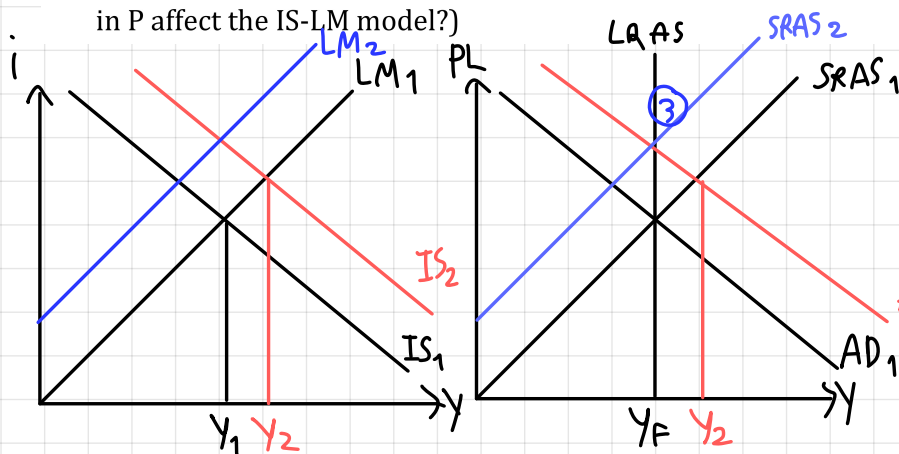
In SR low inflation lead to low employment but in LR, wage is flexible so wage can adjust and firms can hire more and produce more.

As a result SRAS shift right and return to LRE with lower price level but same output. In conclusion, Trade off is no longer exist in long run.

11. *** The IS-LM is for short-run analysis, while the AD-AS is for long-run analysis. Now, let's link them together. Suppose the government implements expansionary fiscal policy. Use the IS-LM and AD-AS models to show the policy effect in both short run and long run.

$G \uparrow$
 $T \downarrow$

(Hint: In long run, what happens to P in the AD-AS model? How will this change in P affect the IS-LM model?)



$AE \uparrow \rightarrow AD \uparrow$

Expansionary policy $\rightarrow G \uparrow, T \downarrow \rightarrow$ right this lead to shift in AD to the right therefore in long run wage adjust so firm hire less and SRAS shift left and produce less. Now back at LRE (3) price level is higher $\rightarrow \frac{M}{P} \rightarrow \frac{M}{P} \downarrow$ So M_s decrease $\rightarrow LM$ shifts left with the same amount of Y .