

6. The IS-LM, AD-AS Model and Its Application

EE212 2/2016 Section 464001

Case & Fair, ch. 10-11; LCR, ch. 27-29, Froyen p.335-339

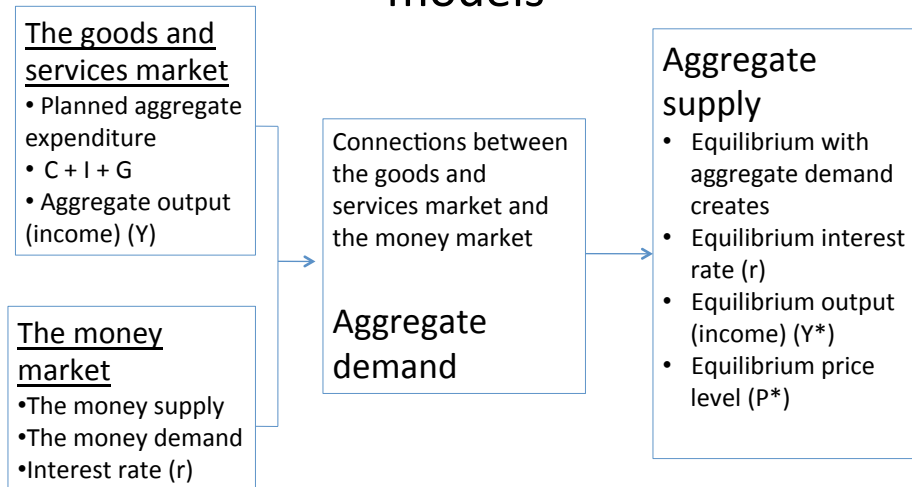
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1 Introduction

The overview of basic macroeconomic models



- Remember our earlier depiction of the interactions between goods and money markets.
- In fact, we can depict the interaction between the two markets via mapping their equilibriums.
- And this is what led to the IS (goods market equilibrium) and LM (money market equilibrium) model
- The “interest rate” provides the link between the money market (what its equilibrium determines) and the goods market (interest rate determines investment).
 - The “interest rate”, therefore, will be the key variable in IS-LM model. We want to plot the relationship between “interest rate” and “output” that arises from the equilibriums in each of the market.

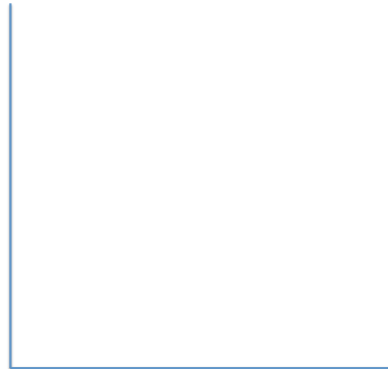
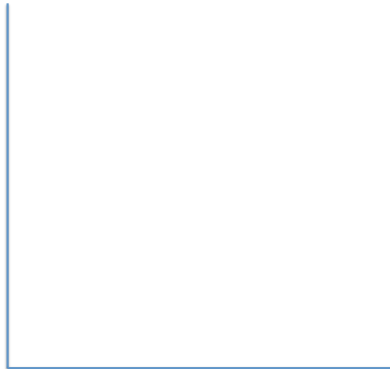
2 The Goods Market and the IS Curve

2.1 IS (Investment and Saving) curve : meaning

- Represents what is going on in the market for goods and services.
 - Remember our “Keynesian Cross” model (DAE and Output equilibrium)
- IS (Investment and Saving) curve

2.2 Plotting the IS curve

- We will be plotting the IS curve from the relationship between the interest rate and equilibrium output in the goods market.
- The derivation can be achieved through plotting what happens to the DAE & Y equilibrium when the interest rate changes.

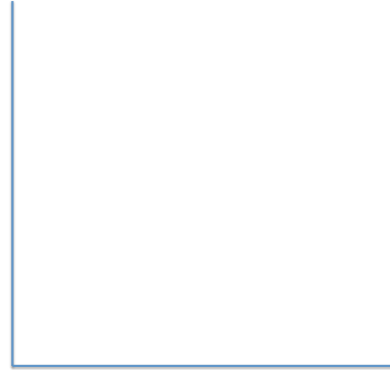
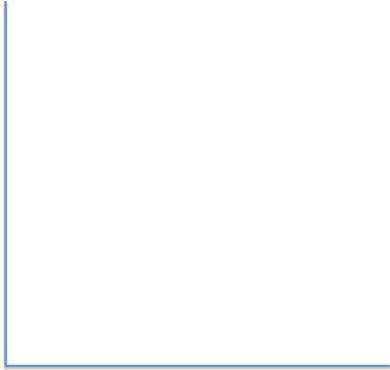


2.3 Slope of the IS curve

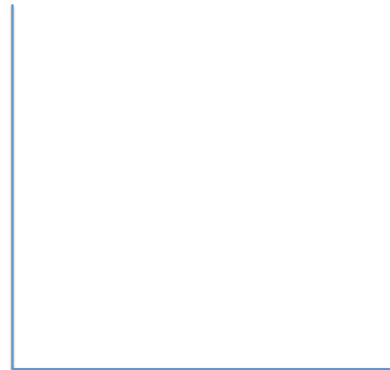
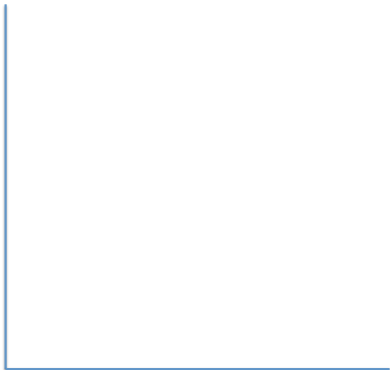
- $r \uparrow \Rightarrow I \downarrow \Rightarrow DAE \downarrow \Rightarrow Y \downarrow$
- slope of the IS curve depends on MPC and interest elasticity of investment
 - IS is steep ; $\left| \frac{\Delta r}{\Delta Y} \right|$ is high. Big change in interest rate, small change in Y in the opposite direction
 - IS is flat ; $\left| \frac{\Delta r}{\Delta Y} \right|$ is low. change in interest rate, change in Y in the opposite direction
- 1. MPC ;
 - high MPC ; DAE is ; income multiplier
 - $r \uparrow \Rightarrow I \downarrow \Rightarrow DAE \downarrow \Rightarrow Y \downarrow$
 - high MPC, IS is
- 2. Interest elasticity of investment
 - high interest elasticity of investment (investment is very sensitive to change in interest rate) ; interest rate increases by a little, investment decreases a lot.
 - $r \uparrow \Rightarrow I \downarrow$ $\Rightarrow DAE \downarrow \Rightarrow Y \downarrow$
 - high interest elasticity of investment, IS is

2.4 How fiscal policy shifts the IS curve

- Expansionary Fiscal Policy :



- Contratcionary Fiscal Policy :

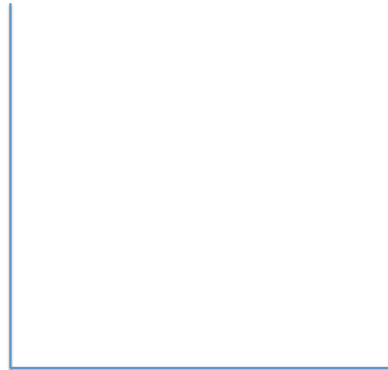
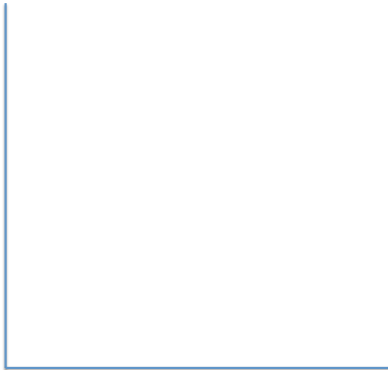


3 The Money Market and the LM Curve

3.1 LM curve : meaning

- LM (Liquidity and Money) Curve
- Remember the equilibrium between money supply and money demand
- Hold the price constant.
- With there's a change in output, money demand will shift, and the equilibrium interest rate will change accordingly.
- The LM curve simply summarizes what happen.

3.2 Plotting the LM curve



3.3 Slope of the LM curve

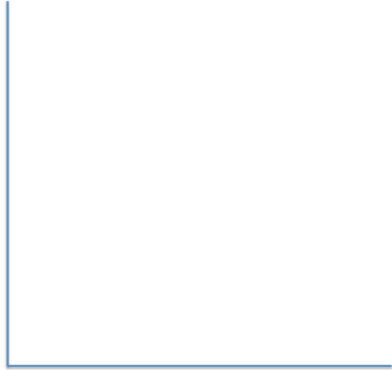
- slope of the LM curve depends on money demand elasticity of income
 - LM is steep ; $\frac{\Delta r}{\Delta Y}$ is high, small change in Y, big change in r ; in the same direction
 - LM is flat ; $\frac{\Delta r}{\Delta Y}$ is low, change in Y, change in r ; in the same direction
- $Y \uparrow \Rightarrow M^d \uparrow \Rightarrow r \uparrow$

- Money demand is highly sensitive to income change
 - $Y \uparrow$ a little $\Rightarrow M^d \uparrow$ $\Rightarrow r \uparrow$
 - LM is

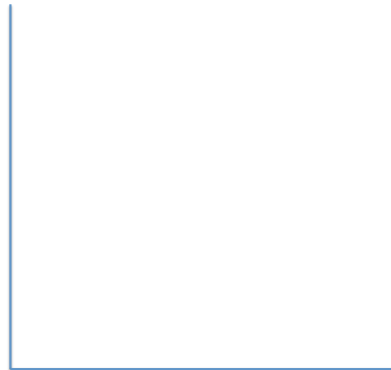
- Money demand is lowly sensitive to income change
 - $Y \uparrow$ a lot $\Rightarrow M^d \uparrow$ $\Rightarrow r \uparrow$
 - LM is

3.4 How monetary policy shifting the LM curve

- Expansionary Monetary Policy



- Contractionary Monetary Policy



IS	LM
<p>Derivation equilibrium in the goods market $r \uparrow \Rightarrow I \dots \Rightarrow DAE \dots \Rightarrow Y \dots$</p> <p>$r$ and Y has relationship</p> <p>IS has slope</p>	<p>Derivation equilibrium in the money market $Y \uparrow \Rightarrow M^d \dots \Rightarrow r \dots$</p> <p>$r$ and Y has relationship</p> <p>LM has slope</p>
<p>Slope of IS depends on</p> <ol style="list-style-type: none"> 1. MPC 2. Interest elasticity of investment <p>flat IS ; MPC Interest rate elasticity of investment</p>	<p>Slope of LM depends on money demand elasticity of income</p> <p>flat LM money demand elasticity of income</p>
<p>Shift in IS</p> <p>$G \uparrow \Rightarrow IS$ shifts to the</p> <p>$T \uparrow \Rightarrow IS$ shifts to the</p> <p>$G \uparrow$ by equal amount as $T \uparrow \Rightarrow IS$ shifts to the.....</p> <p>C or $I \uparrow$ for all levels of r and Y $\Rightarrow IS$ shifts to the</p>	<p>Shift in LM</p> <p>$M^S \uparrow \Rightarrow LM$ shifts to the</p> <p>$M^S \downarrow \Rightarrow LM$ shifts to the</p> <p>$M^d \uparrow$ for all levels of r and Y $\Rightarrow LM$ shifts to the</p>

4 The Equilibrium between IS-LM

4.1 Simultaneous Equilibrium

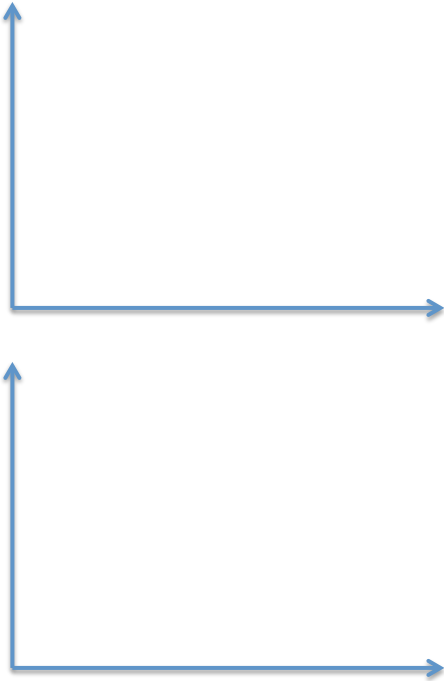
- Putting the IS curve and LM curve together, we get the simultaneous equilibrium of the goods market and the money market.
- Note that what we will know will be the equilibrium interest rate and the equilibrium output.
- And also note that this is the short-run depiction.



At the equilibrium,

- (Y^E, r^E) is on both IS and LM ; both goods market and money market are in equilibrium
- other points is not on both IS and LM ; either of the two markets is not in equilibrium or both market is not in equilibrium
- there will be adjustment to equilibrium

4.2 Adjustment to IS curve;



adjustment to IS curve in the goods market

1. A point above IS curve ; Y DAE

- Actual Δ inventory.....
Planned Δ inventory
- inventory
- producers will produce
- Y

2. A point below IS curve ; Y DAE

- Actual Δ inventory.....
Planned Δ inventory
- inventory
- producers will produce
- Y

4.3 Adjustment to LM curve

adjustment to IS curve in the goods market

1. A point above LM curve ;

- for the level of interest rate, Y is too
- Money demand is too
- There is excess money
- People will bonds , bond price
- interest rate

2. A point below LM curve ;

- for the level of interest rate, Y is too
- Money demand is too
- There is excess money
- People will bonds , bond price
- interest rate

4.4 Adjustment to equilibrium

- any point not on IS or LM or both will adjust until it falls to both IS and LM
- adjustment will take place in goods market or money market or both
- equilibrium is at the interesection between IS and LM

5 Application of IS-LM to explain policies

5.1 How fiscal policy shifts the IS curve and the equilibrium in the IS-LM model.

5.1.1 Expansionary Fiscal Policy

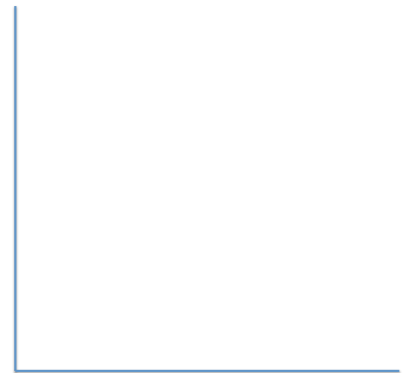
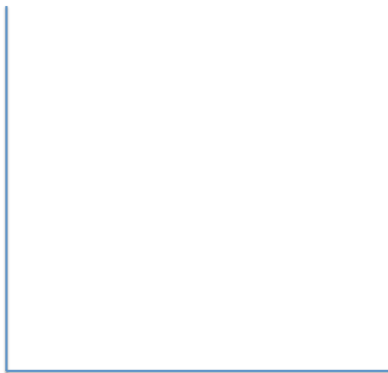


- G.....
- T.....
- Balance budget change ; G..... T..... by equal amount

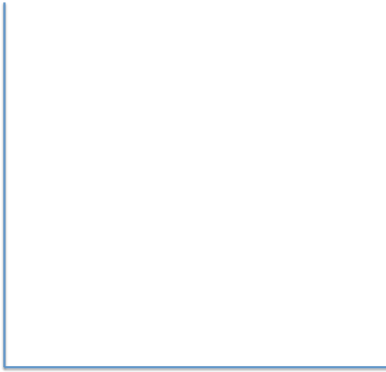
Expansionary Fiscal Policy $\Rightarrow DAE \uparrow \Rightarrow Y.....$

$Y \uparrow \Rightarrow M^d..... \Rightarrow r..... \Rightarrow I..... \Rightarrow DAE..... \Rightarrow Y.....$ from to

For the case $G \uparrow ; G \uparrow \Rightarrow r \uparrow \Rightarrow I \downarrow$ is called “**crowding out effect**”.



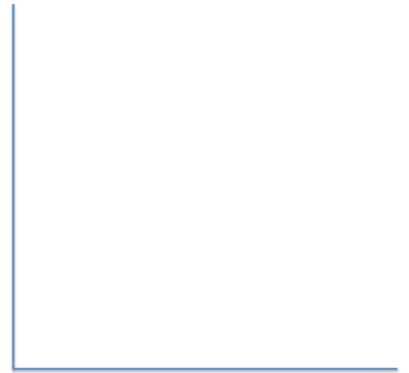
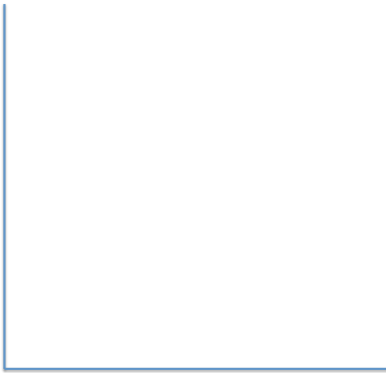
5.1.2 Contractionary Fiscal Policy



- G.....
- T.....
- Balance budget change ; G..... T..... by equal amount

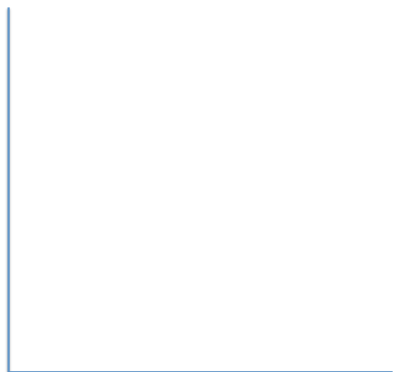
Contractionary Fiscal Policy \Rightarrow $DAE \downarrow \Rightarrow Y$

$Y \downarrow \Rightarrow M^d$ $\Rightarrow r$ $\Rightarrow I$ $\Rightarrow DAE$ $\Rightarrow Y$ from to

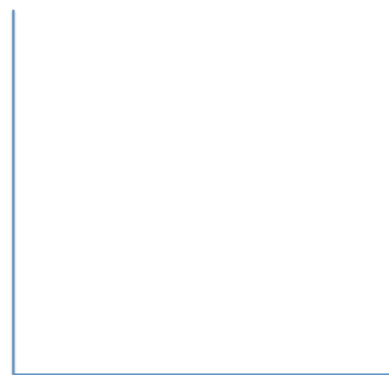
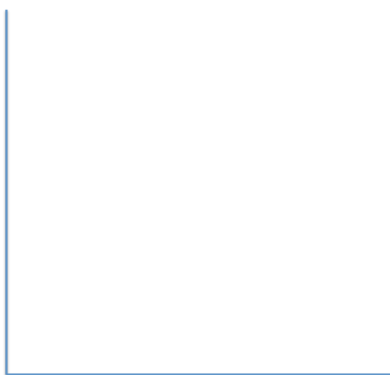


5.2 How monetary policy shifts the LM curve and the equilibrium in the IS-LM model.

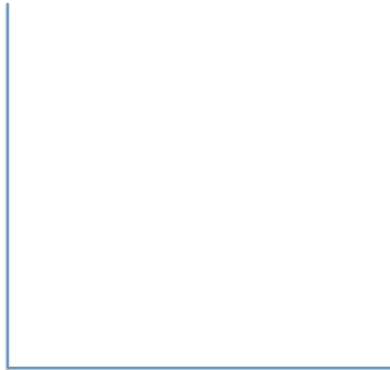
5.2.1 Expansionary Monetary Policy



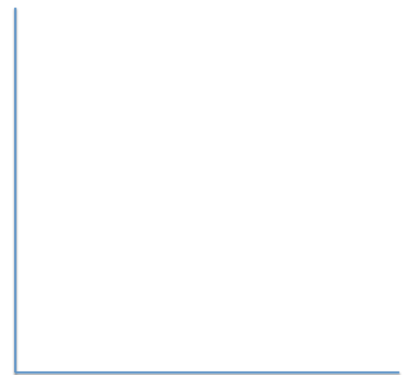
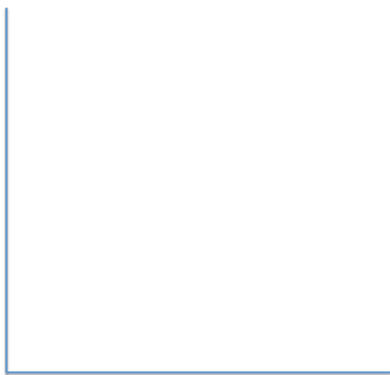
- M^S ;
 - OMO ; central bank bonds
 - Bank rate
 - legal reserve ratio
- $M^S \uparrow \Rightarrow r \dots\dots$
- $r \downarrow \Rightarrow I \dots\dots \Rightarrow DAE \dots\dots \Rightarrow Y \dots\dots$



5.2.2 Contractionary Monetary Policy



- M^S ;
- $M^S \downarrow \Rightarrow r \dots\dots$
- $r \uparrow \Rightarrow I \dots\dots \Rightarrow DAE \dots\dots \Rightarrow Y \dots\dots$



5.2.3 Other Analysis

- the IS-LM model can be used to explain the simultaneous use of fiscal and monetary policies.
- the IS-LM model can be used to explain shocks to consumption, investment, and money demand.

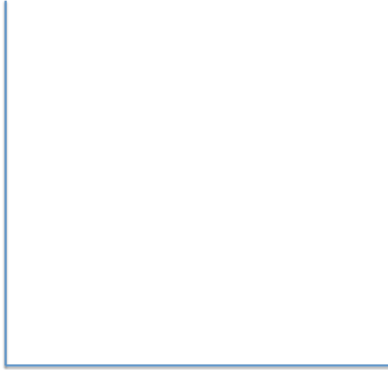
6 Understanding policy effectiveness

- IS-LM model can be used to understand how policy can be effective or not.
- Policy effectiveness : size of the change in Y when there is a change in an economic policy
- small change in economic policy \rightarrow change in Y \rightarrow . the policy is effective.
- The key is to understand when **IS or LM curve is flat or steep**.

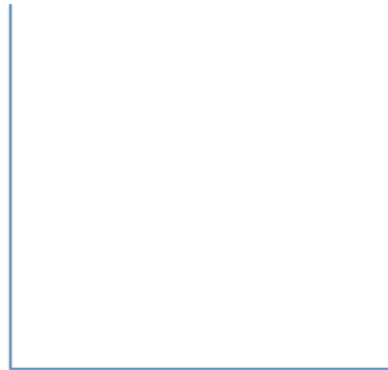
IS will be flat when	LM will be flat when
1. MPC is	money demand elasticity of income is
2. Interest elasticity of investment is	
<p>When the IS curve is flat, monetary policy will be effective. And when the LM curve is flat, fiscal policy will be effective.</p>	

6.1 Fiscal Policy Effectiveness

- IS flat

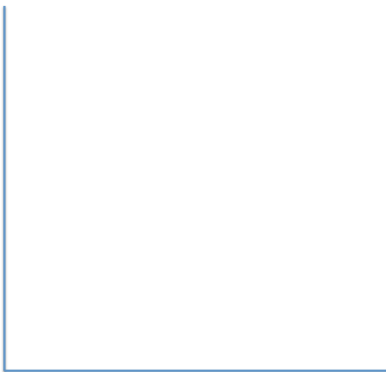


- IS steep



the steeper the IS, the effectiveness fiscal policy is.

- LM flat



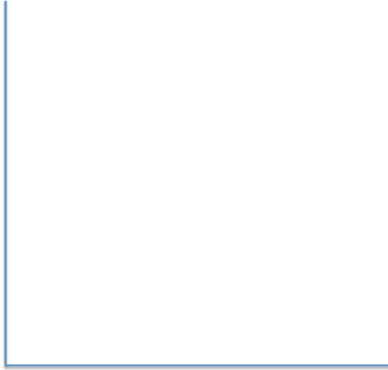
- LM steep



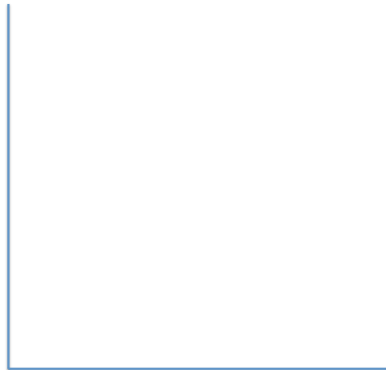
the steeper the LM, the effectiveness fiscal policy is.

6.2 Monetary Policy Effectiveness

- IS flat

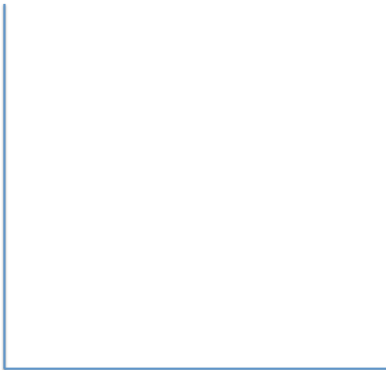


- IS steep



the steeper the IS, the effectiveness monetary policy is.

- LM flat



- LM steep

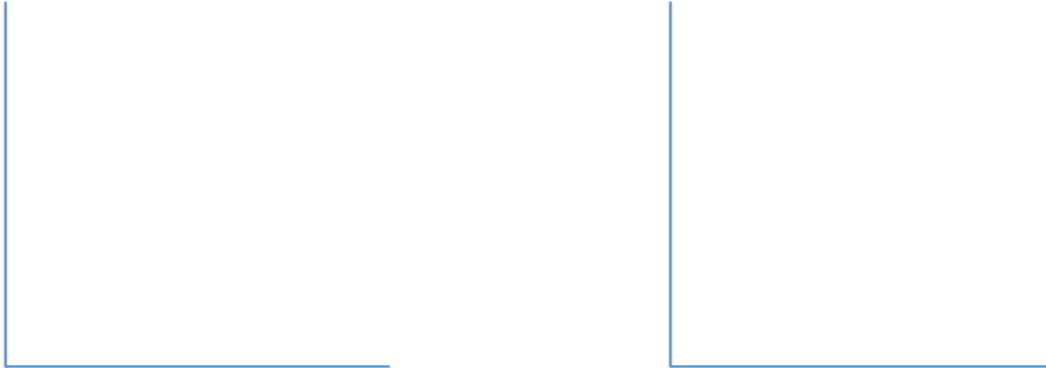


the steeper the LM, the effectiveness fiscal policy is.

7 Linking IS-LM to Aggregate Demand

7.1 Derivation of AD curve

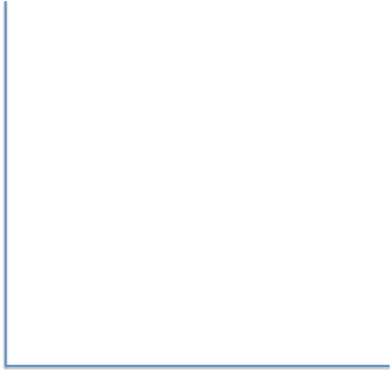
- We can use IS-LM to plot the relationship that underpinned the AD curve.
 - Why, as price level rises, output falls.



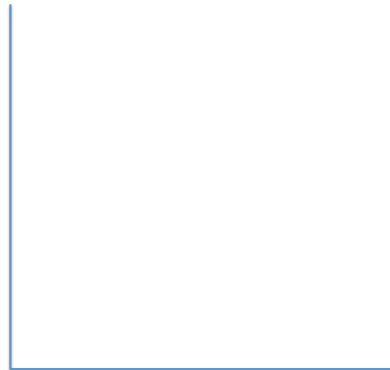
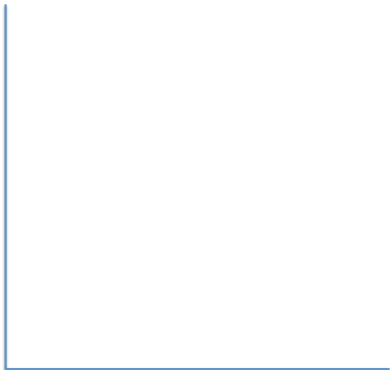
- A change in price level shifts the LM curve, resulting in the new equilibrium output.
- The change in output resulting from the change in price represents a movement along the AD curve.

7.2 Shift in AD curve

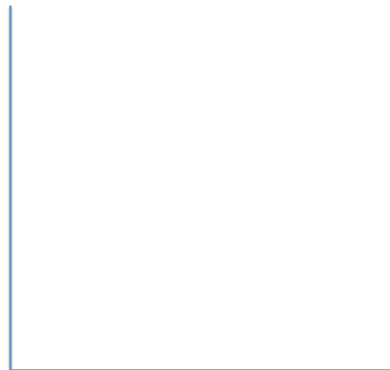
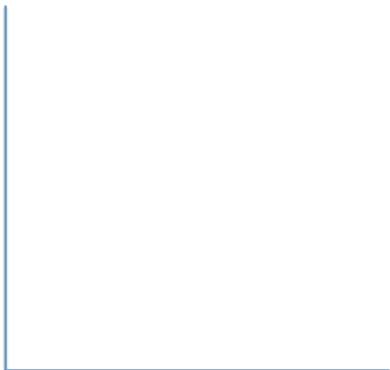
- Suppose the government uses expansionary fiscal policy



- Suppose the government uses contractionary fiscal policy



- Suppose the government uses expansionary monetary policy



- Suppose the government uses contractionary monetary policy

