Applying the IS-LM Model

Rodrigo Pacheco

Columbia University

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Roadmap

- Applying the IS-LM model.
  - Fiscal Policy.
  - Monetary Policy.

- The Aggregate Demand Curve.

- Short $\times$ Long Run and the IS-LM model.

Introduction

The IS-LM describes what happens to the economy in the very short run when the price level is fixed.

We will analyze what happens to the economy when there are:

- Changes in Fiscal Policy
- Changes in Monetary Policy

Let's start by analyzing the effects of changes in fiscal policy.

Fiscal Policy

Fiscal policy is the use of government spending and taxes to influence the economy.

We will analyze the effects of an increase in government spending of ΔG on the economy.

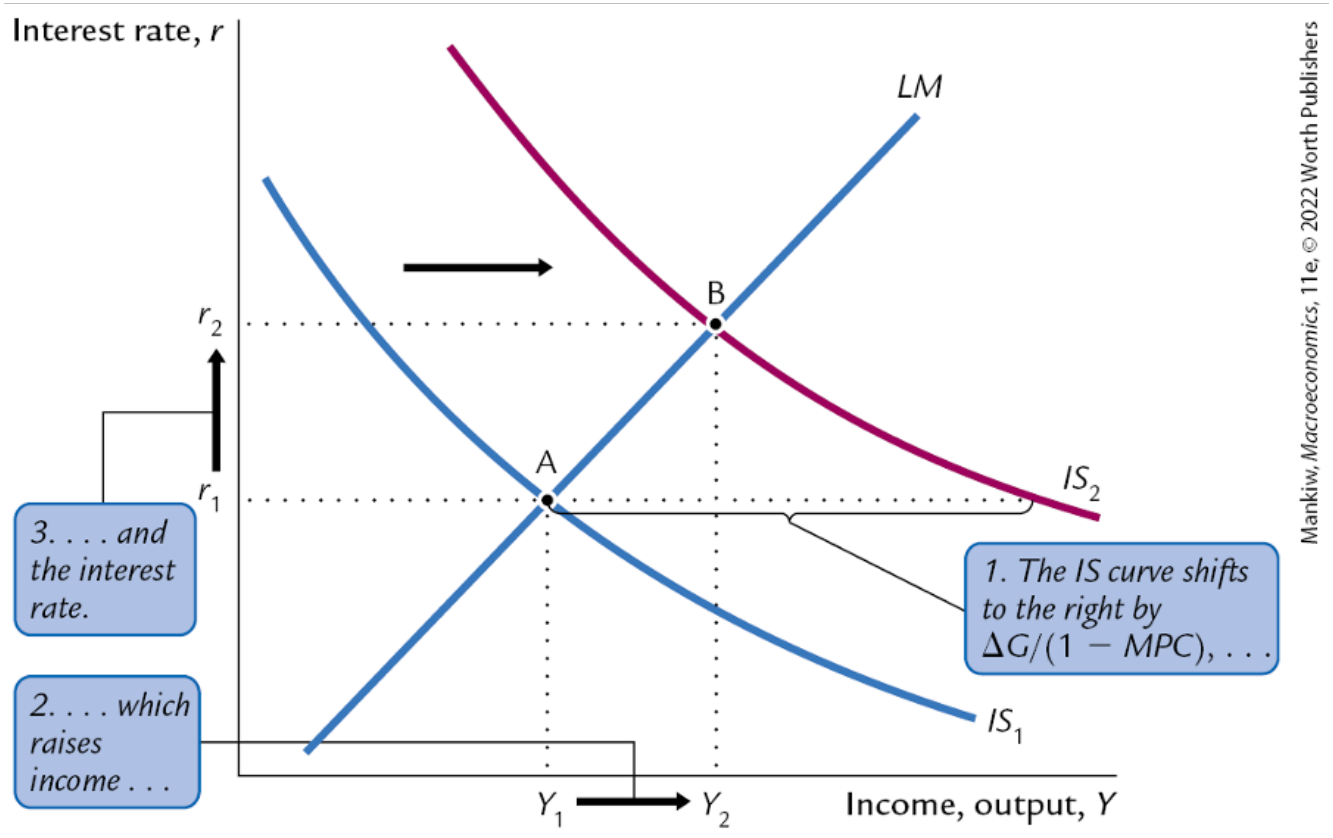
Let's assume that consumption is a linear function of disposable income, and the marginal propensity to consume is MPC.

What happens to the IS and LM curves?

- The LM curve does not shift!
  - Remember that the LM is set by a given money supply $\bar{M}$ and a given price level $\bar{P}$.
- The IS curve shifts to the right!
  - Recall we found that the size of the shift is $\frac{\Delta G}{1-MPC}$.

What is the effect on the interest rate and output?

Fiscal Policy



Increase in G causes both Y and r to rise.

The final impact on Y is less than the shift in the IS curve of $\frac{\Delta G}{1-MPC}$! Why?

Fiscal Policy

When the government increases spending, it stimulates the production of goods and services, raising income.

The raise in income also affects the money market.

The increase in income raises the demand for money.

But, the money supply and the price level are fixed. The only way to equilibrate the money market is by raising the interest rate.

$$\frac{\bar{M}}{\bar{P}} = L(\uparrow r, \uparrow Y)$$

This increase in the interest rate reduces investment, partially offsetting the effect of the increase in G.

⚠ The effect on the money market is not a shift in the LM curve! It is a movement along the LM curve.

Monetary Policy

We will now analyze the effects of a change in Monetary Policy.

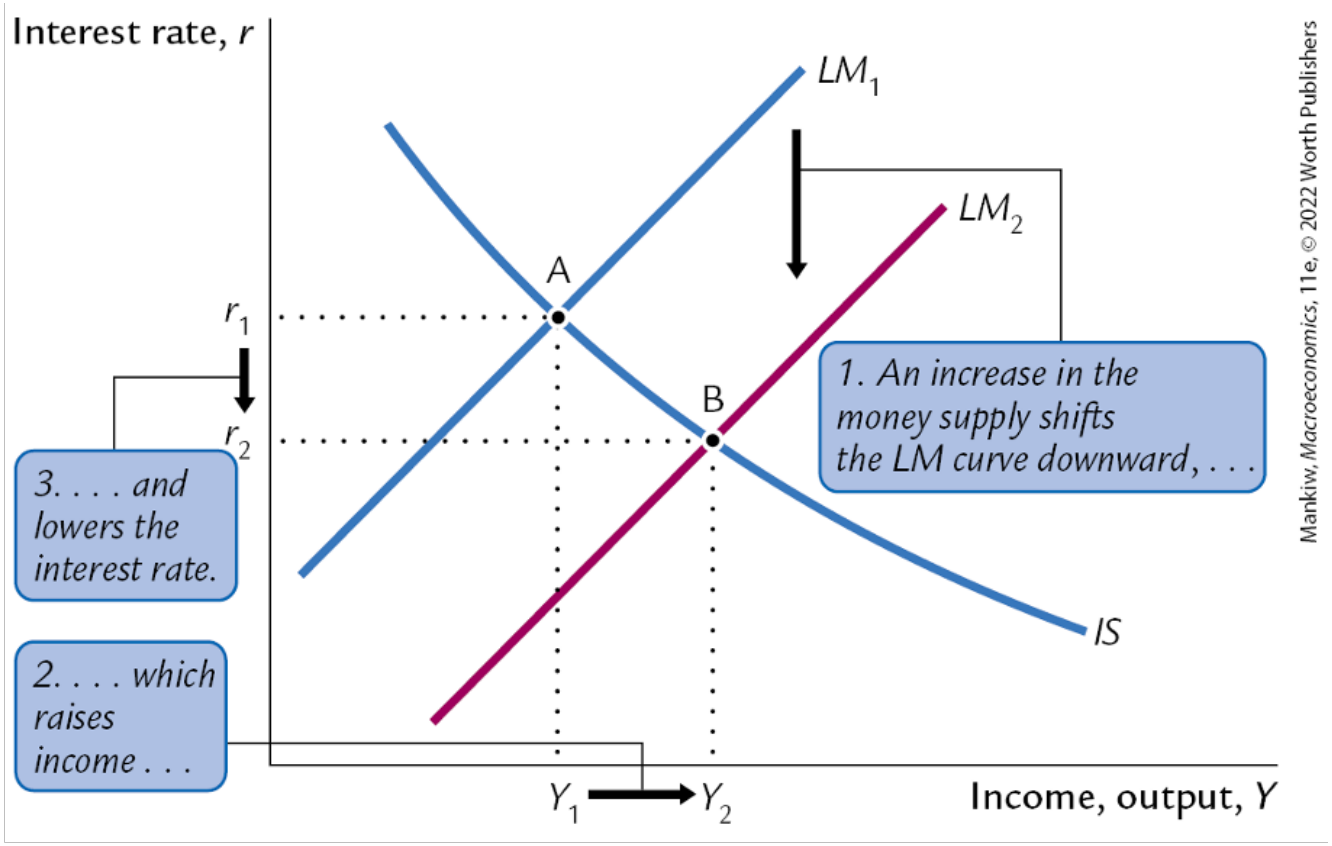
Suppose the central bank increases the money supply by ΔM.

What happens to the IS and LM curves?

- The IS curve does not shift!
  - Remember that the IS curve is drawn by a given level of government spending and taxes.

- The LM curve shifts downward!
  - For a fixed level of income, the interest rate is lower!

Monetary Policy



Increase in M causes r to fall and Y to rise.

Money is not neutral in the short run!

Monetary Policy

The mechanism behind the effect of the change in M:

- An increase in money supply means people now have more money than they want to hold at the current interest rate.
- People will try to buy bonds or deposit the extra money in the bank.
- There must be a decrease in the opportunity cost of holding money, so that people want to hold the extra money.
- The interest rate decreases until people are willing to hold the extra money the Fed created.
- Lower interest rate $\Longrightarrow$ higher investment $\Longrightarrow$ higher income.
  - This effect is a movement along the IS curve, not a shift on it!

Monetary transmission mechanism: Monetary expansion induces greater spending on goods and services.

Shocks

Economists love shocks!

A shock is an unexpected event that affects the economy.

In our context, it is an exogenous event that shifts the IS or LM curve.

Let's see some examples.

Shocks to the IS curve:

- Unexpected changes in government spending or taxes.
- Changes in investment due to changes in business confidence.
  - Firms become more optimistic about the future.
  - For any given interest rate, firms are willing to invest more.
  - That is, the investment function changes.
  - The IS curve shifts to the right!
- Consumer confidence.
  - Consumers become more optimistic about the future.
  - For the same level of disposable income, they are willing to consume more.
  - A change in the consumption function.

Shocks

Shocks to the LM curve:

- Changes in the money demand: credit card invention.
  - People now hold less money than before.
  - For the same level of income and interest rate, people are willing to hold less money.
  - The money demand function changes!
  - The LM curve shifts downward: lower interest rate and higher output.

Stabilization:

- Policymakers can use fiscal and monetary policy to reduce the impact of shocks.
- We refer to policies that reduce the impact of shocks as stabilization policies.
- If policymakers are extremely good at their jobs, shocks to the economy will not cause economic fluctuations.

Aggregate Demand

We want a theory to explain the economy not in the very very short run, where prices are completely fixed.

We could refer to it as a theory of the medium run.

In the medium run, prices can adjust!

This theory is called the aggregate demand model.

- It describes a relationship between the price level and the quantity of goods and services demanded.
- We will use the IS-LM model to derive the aggregate demand curve.
- We will see that the aggregate demand curve is downward-sloping, which should not be surprising.
    - The higher the price level, the lower the quantity of goods and services you want to buy.

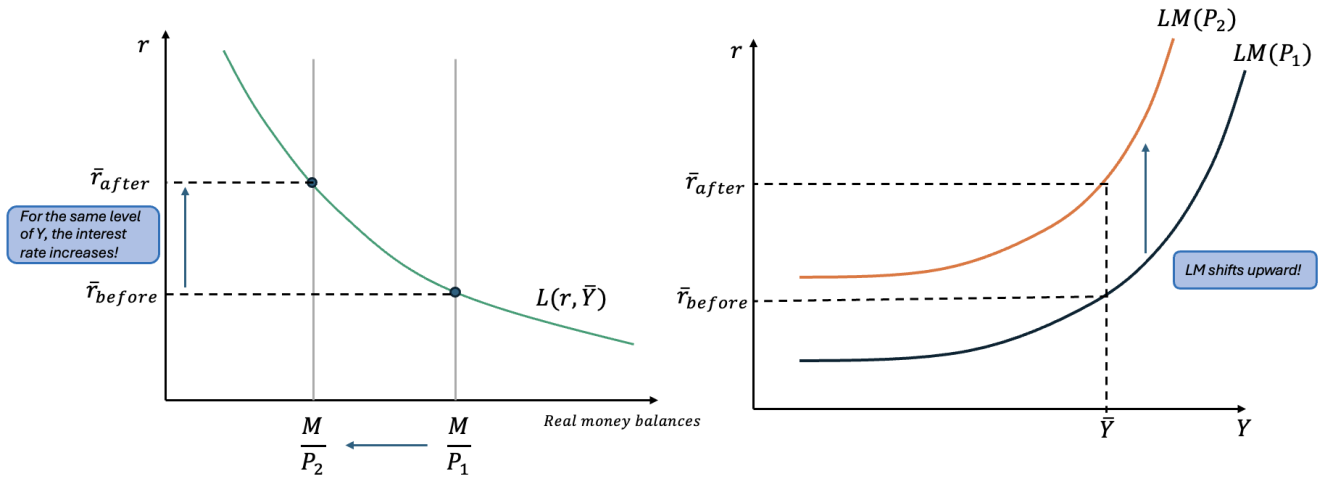
Aggregate Demand

What happens to Y when the price level increases from P_1 to P_2?

The effect is quantitatively the same as a decrease in the money supply!

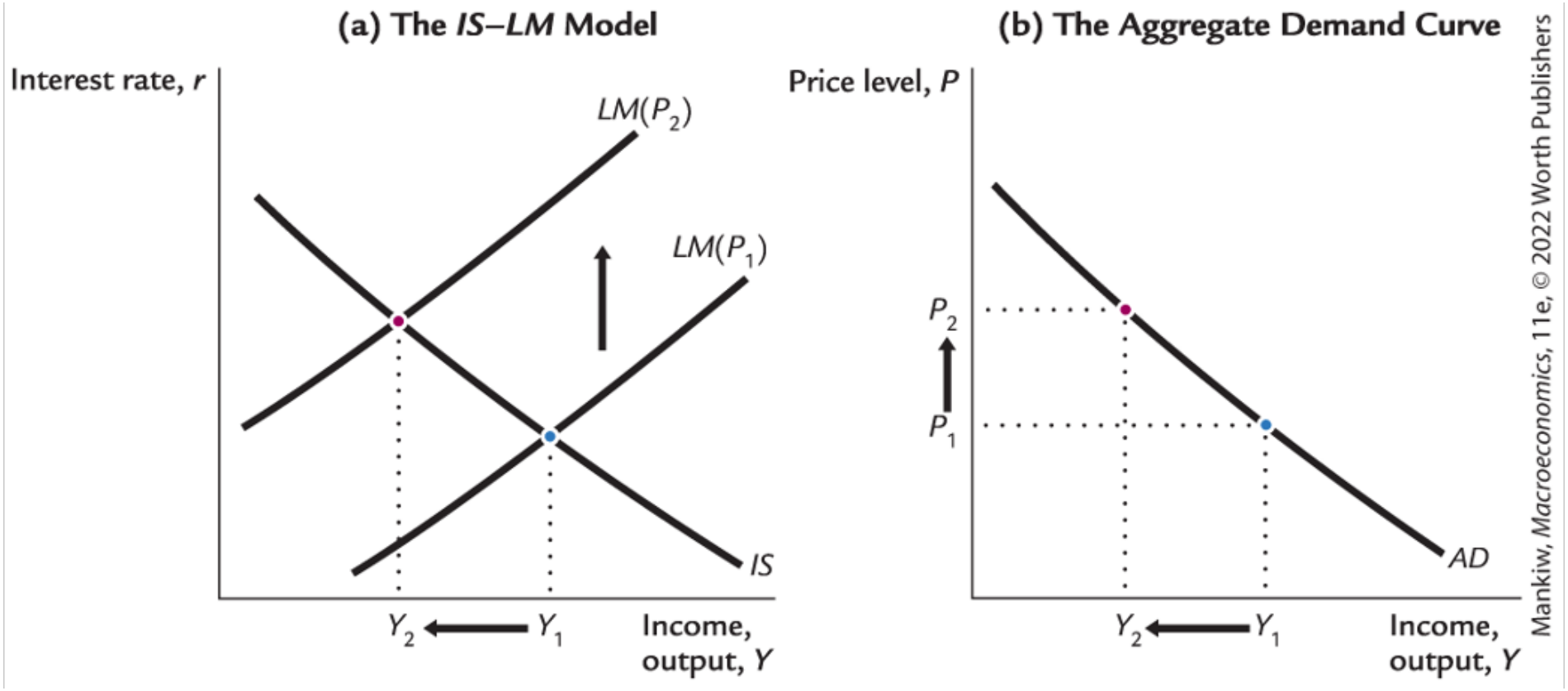
It is a shift in the LM curve. To where?

- To figure out where the LM curve shifts, fix an income level, say $\bar{Y}$, and ask yourself what happens to the interest rate.



Now we just add the IS curve to the graph to find the new intersection!

Ladies and gentlemen, the aggregate demand curve!



The aggregate demand shows the negative relationship between Y and P

Shifts in the Aggregate Demand Curve

What can cause the aggregate demand curve to shift?

Any event that, for a given price level, shifts the LM or IS curve.

- Shift originating from the IS curve:
  - Changes in government spending or taxes.
  - Changes in the investment function (e.g. optimism/pessimism from firms).
  - Changes in the consumption function (e.g. consumer confidence).

- Shift originating from the LM curve:
  - Changes in the money supply.
  - Changes in the money demand function (e.g. credit card invention).

Try to convince yourself that: a decrease in M, a decrease in G or increase in T will shift the aggregate demand curve to the left!

It is important to distinguish between shifts and movements along the aggregate demand curve.

Shifts × Movements in the Aggregate Demand Curve

A shift in the aggregate demand curve means a new curve!

- This happens if the income level changes for a given price level.

On the other hand, a movement along the aggregate demand curve means a change in Y due to a change in the price level!

- You still have the same curve!

Figure: Movement along the curve

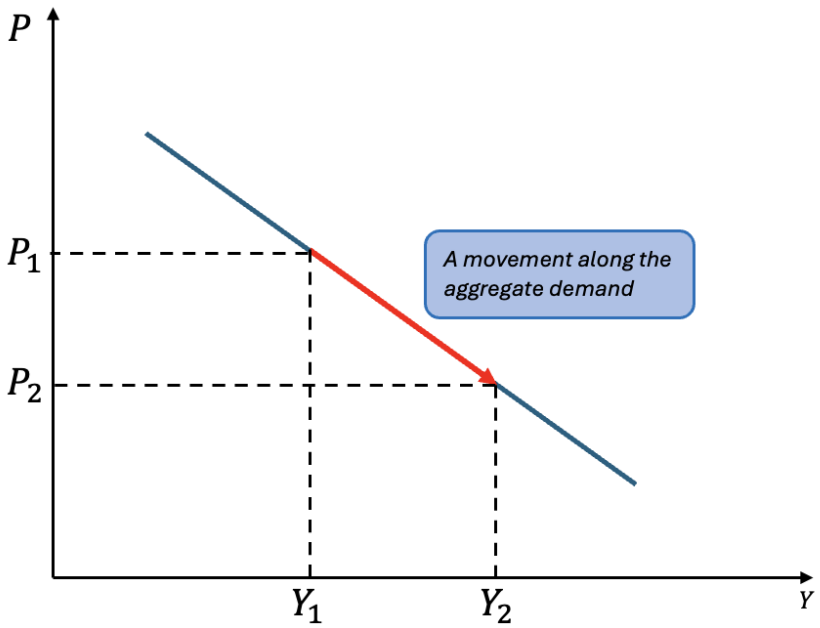
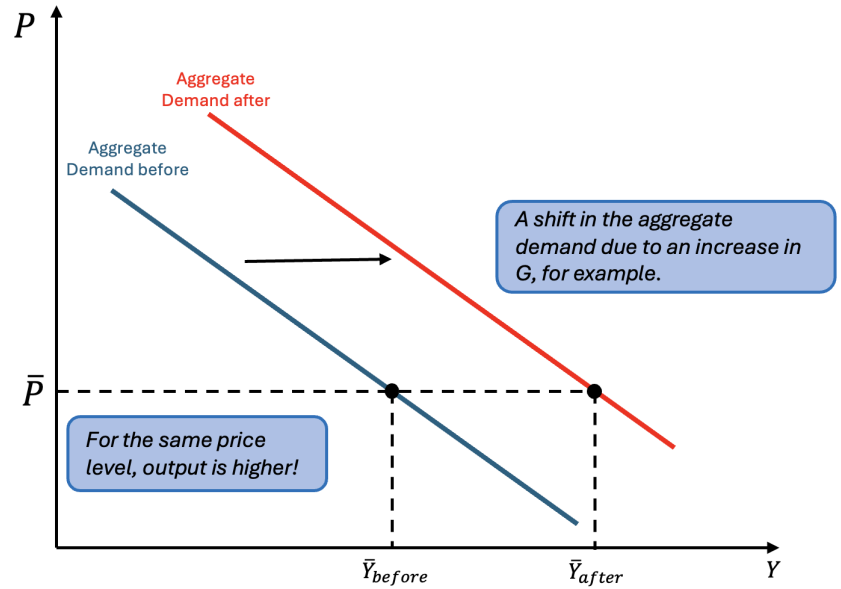


Figure: Shift in the curve



The IS-LM in the Short Run and in the Long Run

Let's take a look at the IS-LM equations one more time:

$$Y = C(Y - \bar{T}) + I(r) + \bar{G} \quad \text{(IS)}$$

$$\frac{\bar{M}}{P} = L(r, Y) \quad \text{(LM)}$$

This is a system of two equations and three endogenous (unknown) variables: Y, r, and P.

We need a third equation to solve for the three unknowns.

This third equation is the key distinction between the short run (Keynesian) and the long run (classical).

The IS-LM in the Short Run and in the Long Run

The Keynesian approach:

- It completes the model with the assumption that prices are fixed.
- This assumption means that r and Y will adjust to satisfy the IS and LM equations.
- The third equation is:

$$\boxed{P = \bar{P}}$$

- We refer to this equation as the Short Run Aggregate Supply (SRAS) curve.

The Classical approach:

- It assumes that prices are flexible and output is always equal to its natural level $\bar{Y}$, given by the production function and supply of inputs.
- This assumption means that r and P will adjust to satisfy the IS and LM equations.
- The third equation is:

$$\boxed{Y = \bar{Y}}$$

- We refer to this equation as the Long Run Aggregate Supply (LRAS) curve.

The IS-LM in the Short Run and in the Long Run

How the economy move from the short run to the long run?

- Suppose the economy is in equilibrium in the short run, with $Y < \bar{Y}$, and price is stuck at P_1.
- The short run equilibrium is the point K.
- At K, the output demanded is less than the natural level of output.
- Eventually, the low demand for goods will lead to a decrease in prices.
- Prices will successively fall until the economy reaches the long run equilibrium at point C, where $Y = \bar{Y}$.