UNIT-V

IS-LM Model

What Is the IS-LM Model?

The IS-LM model, which stands for "investment-savings" (IS) and "liquidity preference-money supply" (LM) is a Keynesian macroeconomic model that shows how the market for economic goods (IS) interacts with the loanable funds market (LM) or money market. It is represented as a graph in which the IS and LM curves intersect to show the short-run equilibrium between interest rates and output.

KEY TAKEAWAYS

- The IS-LM model describes how aggregate markets for real goods and financial markets interact to balance the rate of interest and total output in the macroeconomy.
- IS-LM stands for "investment savings-liquidity preference-money supply."
- The model was devised as a formal graphic representation of a principle of Keynesian economic theory.
- On the IS-LM graph, "IS" represents one curve while "LM" represents another curve.
- IS-LM can be used to describe how changes in market preferences alter the equilibrium levels of gross domestic product (GDP) and market interest rates.
- The IS-LM model lacks the precision and realism to be a useful prescription tool for economic policy.

Understanding the IS-LM Model

British economist John Hicks first introduced the IS-LM model in 1936,[1] just a few months after fellow British economist John Maynard Keynes published "The General Theory of Employment, Interest, and Money."[2] Hicks's model served as a formalized graphical representation of Keynes's theories, though it is used mainly as a heuristic device today.

The three critical exogenous, i.e. external, variables in the IS-LM model are liquidity, investment, and consumption. According to the theory, liquidity is determined by the size and velocity of the money supply. The levels of investment and consumption are determined by the marginal decisions of individual actors.

The IS-LM graph examines the relationship between output, or gross domestic product (GDP), and interest rates. The entire economy is boiled down to just two markets, output and money; and their respective supply and demand characteristics push the economy towards an equilibrium point.

Characteristics of the IS-LM Graph

The IS-LM graph consists of two curves, IS and LM. Gross domestic product (GDP), or (Y), is placed on the horizontal axis, increasing to the right. The interest rate, or (i or R), makes up the vertical axis.

The IS curve depicts the set of all levels of interest rates and output (GDP) at which total investment (I) equals total saving (S). At lower interest rates, investment is higher, which translates into more total output (GDP), so the IS curve slopes downward and to the right.

The LM curve depicts the set of all levels of income (GDP) and interest rates at which money supply equals money (liquidity) demand. The LM curve slopes upward because higher levels of income (GDP) induce increased demand to hold money balances for transactions, which requires a higher interest rate to keep money supply and liquidity demand in equilibrium.

The intersection of the IS and LM curves shows the equilibrium point of interest rates and output when money markets and the real economy are in balance. Multiple scenarios or points in time may be represented by adding additional IS and LM curves.

In some versions of the graph, curves display limited convexity or concavity. Shifts in the position and shape of the IS and LM curves, representing changing preferences for liquidity, investment, and consumption, alter the equilibrium levels of income and interest rates.

Limitations of the IS-LM Model

Many economists, including many Keynesians, object to the IS-LM model for its simplistic and unrealistic assumptions about the macroeconomy. In fact, Hicks later admitted that the model's flaws were fatal, and it was probably best used as "a classroom gadget, to be superseded, later on, by something better."[3] Subsequent revisions have taken place for so-called "new" or "optimized" IS-LM frameworks.

The model is a limited policy tool, as it cannot explain how tax or spending policies should be formulated with any specificity. This significantly limits its functional appeal. It has very little to say about inflation, rational expectations, or international markets, although later models do attempt to incorporate these ideas. The model also ignores the formation of capital and labor productivity.

GENERAL EQUILIBRIUM, THE IS-LM MODEL, AND INTERNATIONAL INFLUENCES

The IS Curve:

- Aggregate expenditure depends on real income and the real interest rate, as well as other autonomous influences (including the price level)
- The combination of real interest rates and real income levels that result in equilibrium in the goods market is called the IS curve

The LM Curve

- The demand for real money balances depends on real income and the real interest rate
- The real money supply depends on the nominal money supply and the price level
- The combination of real interest rates and real income levels that result in equilibrium in the money market is called the LM curve

IS-LM Equilibrium

- Equilibrium income and the real interest rate is determined by simultaneous equilibrium in the goods market and the money market
- Change in autonomous forces and the price level will lead to a shift in the IS or LM curve leading to a change in equilibrium income

Fiscal Policy and the IS Curve

- Higher expenditure or lower taxes shift the IS curve and AD curve to the right
- The impact of the shift depends in part on the slope of the LM curve

Monetary policy and the LM Curve

- More money shifts the LM curve and the AD curve to the right
- The impact of the shift depends in part on the slope of the IS curve

The IS-LM Model and International Payments

The Determinants of Net Exports

- Effect of real income
- Effect of the real foreign exchange rate
- $NX = NX_0 - b_1 Y - b_2 e$

The Real Exchange Rate and the Interest Rate Differential

- The mechanism by which a real interest rate differential affects the real exchange rate involves the flow of capital between countries
- If perfect capital mobility the flow of capital will soon eliminate the real interest rate differential
- Free capital mobility is most relevant for a small open economy

The IS-LM Model in a Small Open Economy with Perfect Capital Mobility

- The differential between domestic and foreign interest rates ($r - r^f$) must remain at zero
- Any shift in the domestic IS or LM curve will generate capital flows that will quickly bring the domestic interest rate into line with the unchanged foreign interest rate.

The IS-LM Analysis of a Change in Policy in a Small Open Economy with Fixed Exchange Rates

- Monetary expansion shifts the LM curve outward, initially lowering interest rates, but this generates huge capital outflows and losses of international reserves. To prevent this the central bank must boost the interest rate to its original level by reducing the money supply. Hence, monetary policy is completely ineffective.
- Fiscal expansion shifts the IS curve outward, initially increasing the real interest rate, generating capital inflows, swamping the central bank with reserves. Under a fixed system, the central bank must respond by increasing the money supply, shifting the LM curve outward, until interest rates return to their original level. This makes fiscal policy even more effective.
- *Perfect capital mobility with fixed exchange rates forces monetary policy to be accommodative; in effect fiscal policy gains control of monetary policy.*

The IS-LM Analysis of a Change in Policy in a Small Open Economy with Flexible Exchange Rates

- When exchange rates are flexible, the central bank does nothing to prevent an exchange rate appreciation or depreciation
- A change in the real interest rate differential will cause a change in the real exchange rate
- Monetary expansion shifts the LM curve to the right, lowering the real interest rate and depreciating the real exchange rate as capital leaves the country. The lower real exchange rate increases net exports and shifts the IS curve to the right until the economy reaches equilibrium at the former real interest rate. At that point the currency stops depreciating and the economy reaches full equilibrium with a boost in real income and net exports.
- If real income is beyond the economy's potential, then the combination of higher income that increases net imports and higher prices that lower net exports results in no permanent change in real income.
- Fiscal expansion shifts the IS curve to the right, increasing the real interest rate and appreciating the real exchange rate as capital enters the country. The higher exchange rate (and initially higher domestic income) causes net exports to fall until the IS curve shifts back to its original position and equilibrium income is unchanged.
  Domestic crowding out is replaced by international crowding out unless there is a change in the LM curve.
- *In a small open economy with flexible exchange rates, monetary policy is highly effective. The central bank can control the money supply and can stimulate the economy by causing the exchange rate to depreciate. But, with flexible exchange rates fiscal policy is impotent and international crowding out is complete.*

Capital Mobility and Exchange Rates in a Large Open Economy

- A large open economy (like the U.S.), unlike a small open economy has substantial control over its domestic interest rate.
- The reason is that its large size compared to the rest of the world means that capital flows are not sufficiently powerful to push its domestic interest rate into exact equality with the world interest rate.

TOP 3 THEORIES OF INFLATION (WITH DIAGRAM)

Different economists have presented different theories on inflation. The economists who have provided the theories of inflation are broadly categorized into two labels, namely, monetarists and structuralists.

Monetarists associated inflation to the monetary causes and suggested monetary measures to control it.

On the other hand, structuralists believed that the inflation occurs because of the unbalanced economic system and they used both monetary and fiscal measures together for sorting out economic problems.

There are three main theories of inflation, which are shown in Figure-3:

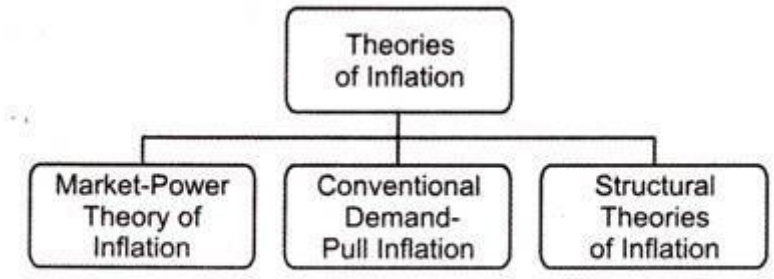


Figure-3: Different Theories of Inflation

Let us learn about the different theories of inflation (as shown in Figure-3) in detail.

Market-Power Theory of Inflation:

In an economy, when a single or a group of sellers together decide a new price that is different from the competitive price, then the price is termed as market-power price. Such groups keep prices at the level at which they can earn maximum profit without any concern for the purchasing power of consumers.

For example, in the past few years, the prices of onion were very- high in India. The soaring price of onions was the result of the group action of onion producers. In such a situation, people in middle and low income groups reduced the consumption of onions. However, onion producers earned high profits from higher income group.

According to the advanced version of market power theory of inflation, oligopolists can increase the price to any level even if the demand does not rise. This hike in price levels occurs due to increase in wages (because of trade unions) in the oligopolistic industry.

The increase in wages is compensated with the hike in prices of products. With increase in the income of individuals, their purchasing power also increases, which further results in inflation.

Apart from this, some economists concluded that fiscal and monetary policies are not applicable in practical situations as these policies are not able to control rise in prices levels. These policies would work only when prices rise due to an increase in demand.

Moreover, these policies cannot be applied to oligopolistic rise in prices, which is due to increase in the cost of production. Monetary policy can reduce the rate of inflation by raising the interest rate and regulating the credit flow in the market. However, it would have no effect on the oligopolistic price as the cost is transferred to the prices of goods and services.

Conventional Demand-Pull Inflation:

The market power theory of inflation represents one extreme end of inflation. According to this theory inflation exists even when there is no excess in demand. On the other end, the conventional demand-pull theorists believed that the only cause of inflation is the excess of aggregate demand over aggregate supply.

In full employment equilibrium condition, when demand increases, inflation becomes unavoidable. In addition in full employment condition, the economy reaches to its maximum production capacity.

At this point, the supply of goods and services cannot be increased further while the demand of products and services increases rapidly. Due to this imbalance between demand and supply, inflation takes place in the economy.

Structural Theories of Inflation:

Apart from the two extreme ends mentioned in the above, there is a middle group of economists called structural economists. According to structural theory of inflation, market power is one of the factors that cause inflation, but it is not the only factor. The supporters of structural theories believed that the inflation arises due to structural maladjustments in the county or some of the institutional features of business environment.

They have provided two types of theories to explain the causes of inflation, which are shown in Figure-4:

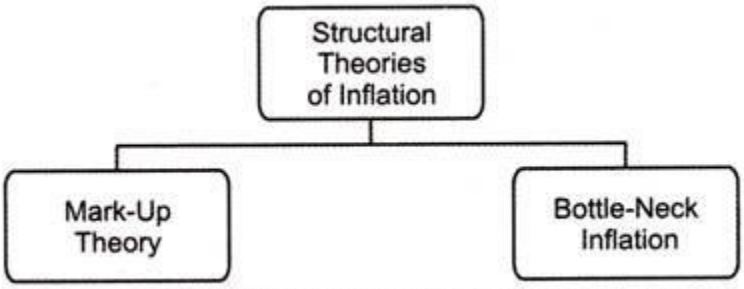


Figure-4: Different Types of Structural Theories of Inflation

Let us study the different types of structural theories of inflation (as shown in Figure-4) in detail in the next sections.

Mark-up Theory:

Mark-up theory of inflation was proposed by Prof Gardner Ackley. According to him, inflation cannot occur alone by demand and cost factors, but it is the cumulative effect of demand-pull and cost-push activities. Demand-pull inflation refers to the inflation that occurs due to excess of aggregate demand, which further results in the increases in price level. The increase in prices levels stimulates production, but increases demand for factors of production. Consequently, the cost and price both increases.

In some cases, wages also increase without rise in the excess demand of products. This results in fall in supply at increased level of prices as to compensate the increase in wages with the prices of products. The shortage of products in the market would result in the further increase of prices.

Therefore, Prof. Gardner has provided a model of mark-up inflation in which both the factors, demand cost, are determined. Increase in demand results in the increase of prices of products as the customers spend more on products.

On the other the goods are sold to businesses instead of customers, then the cost of production increases. As a result, the prices of products also increase. Similarly, a rise in wages results in increase in cost of production, which would further increase the prices of products.

So according to Prof Gardner, inflation occurs due to excess of demand or increases in wage rates; therefore, both monetary and fiscal policies should be used to control inflation. Though, these two policies are not adequate to control inflation.

Bottle-Neck Inflation:

Bottle-neck inflation was introduced by Prof Otto Eckstein. According to him, the direct relationship between wages and prices of products is the main cause of inflation. In other words, inflation takes place when there is a simultaneous increase in wages and prices of products. However, he believed that wage push or market-power theories alone are not able to provide a clear explanation of inflation.

After analysis of inflationary situation, Prof Eckstein says that the inflation occurs due to the boom in capital goods and wage-price spiral. In addition, he also advocated that during inflation prices in every industry is higher, but few industries show a very high price hike than rest of the industries.

These industries are termed as bottle-neck industries, which are responsible for increase in prices of goods and services. In addition, Prof. Eckstein advocated that concentration of demand for products of bottle industries results in inflation.

Phillips Curve

Summary of Phillips Curve

The Phillips curve suggests there is an inverse relationship between inflation and unemployment.

This suggests policymakers have a choice between prioritising inflation or unemployment. During the 1950s and 1960s, Phillips curve analysis suggested there was a trade-off, and policymakers could use demand management (fiscal and monetary policy) to try and influence the rate of economic growth and inflation. For example, if unemployment was high and inflation low, policymakers could stimulate aggregate demand. This would help to reduce unemployment, but cause a higher rate of inflation.

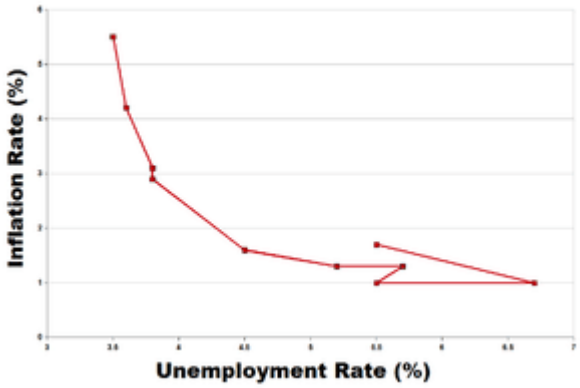
In the 1970s, there seemed to be a breakdown in the Phillips curve as we experienced stagflation (higher unemployment and higher inflation). The Phillips Curve was

criticised by monetarist economists who argued there was no trade-off between unemployment and inflation in the long run.
However, some feel that the Phillips Curve has still some relevance and policymakers still need to consider the potential trade-off between unemployment and inflation.

Origins of the Phillips Curve

The Phillips curve originated out of analysis comparing money wage growth with unemployment. The findings of A.W. Phillips in *The Relationship between Unemployment and the Rate of Change of Money Wages in the United Kingdom 1861–1957* suggested there was an inverse correlation between the rate of change in money wages and unemployment. For example, a rise in unemployment was associated with declining wage growth and vice versa.

Original Phillips Curve Diagram

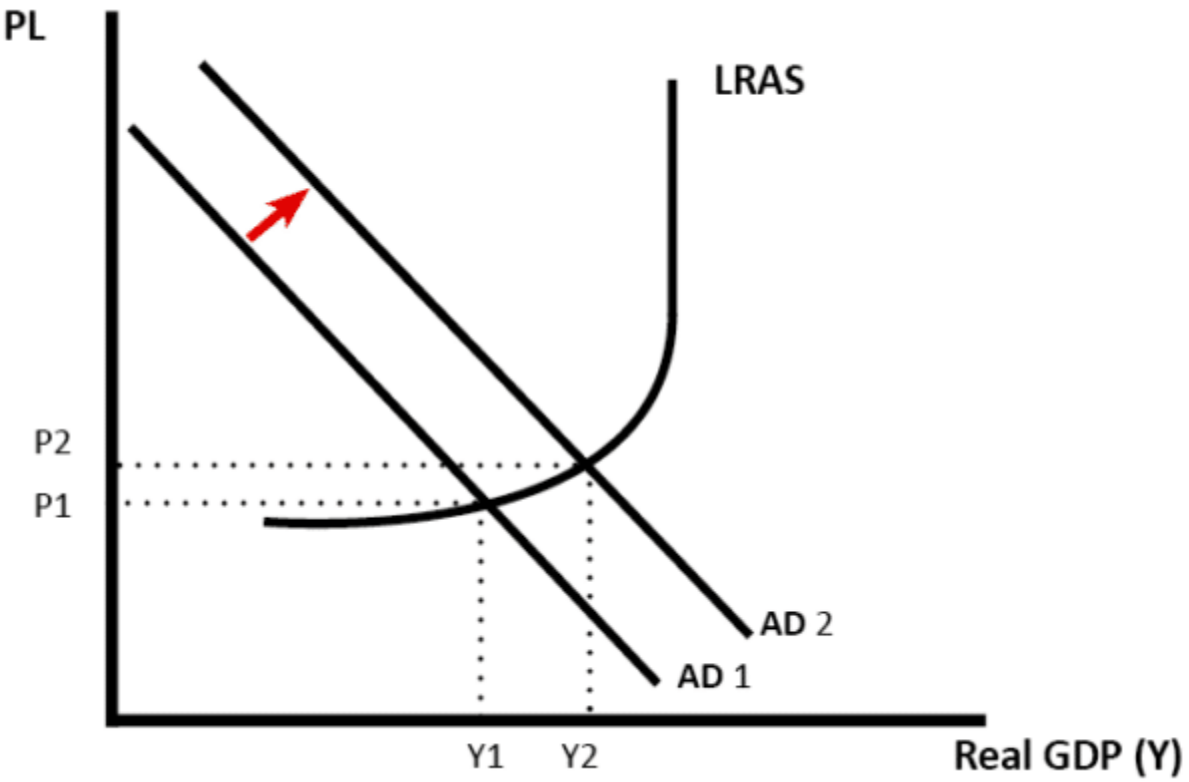


This analysis was later extended to look at the relationship between inflation and unemployment. Again the 1950s and 1960s showed there was evidence of this inverse trade-off between unemployment and inflation.

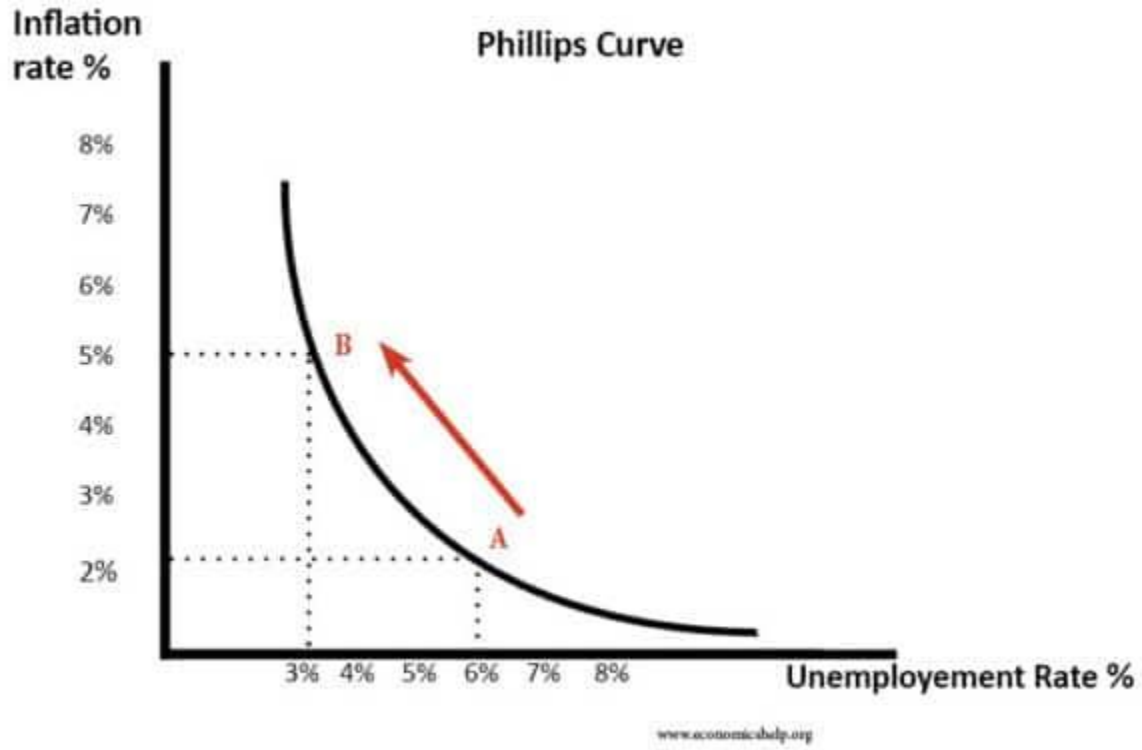
US Unemployment and Inflation

There are occasions when you can see a trade-off between unemployment and inflation. For example, between 1979 and 1983, inflation (CPI) fell from 15% to 2.5%. During this period, we see a rise in unemployment from 5% to 11%. In 2008, the recession caused a sharp rise in unemployment and inflation became negative.

Why is there a trade-off between unemployment and inflation?



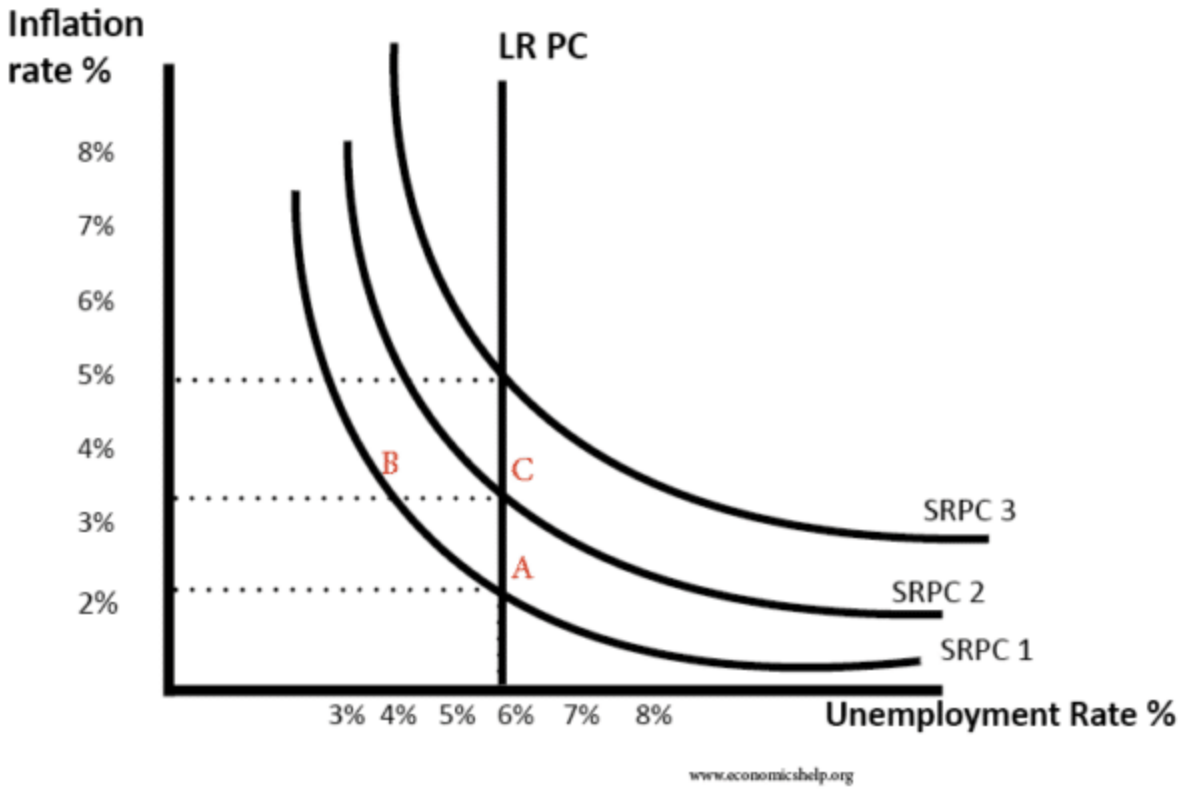
- An increase in aggregate demand (AD to AD2) causes higher real GDP (Y1 to Y2). Therefore firms employ more workers and unemployment falls.
- However, as the economy gets closer to full capacity, we see an increase in inflationary pressures. With lower unemployment, workers can demand higher money wages, which causes wage inflation. Also, firms can put up prices due to rising demand.
- Therefore, in this situation, we see falling unemployment, but higher inflation.



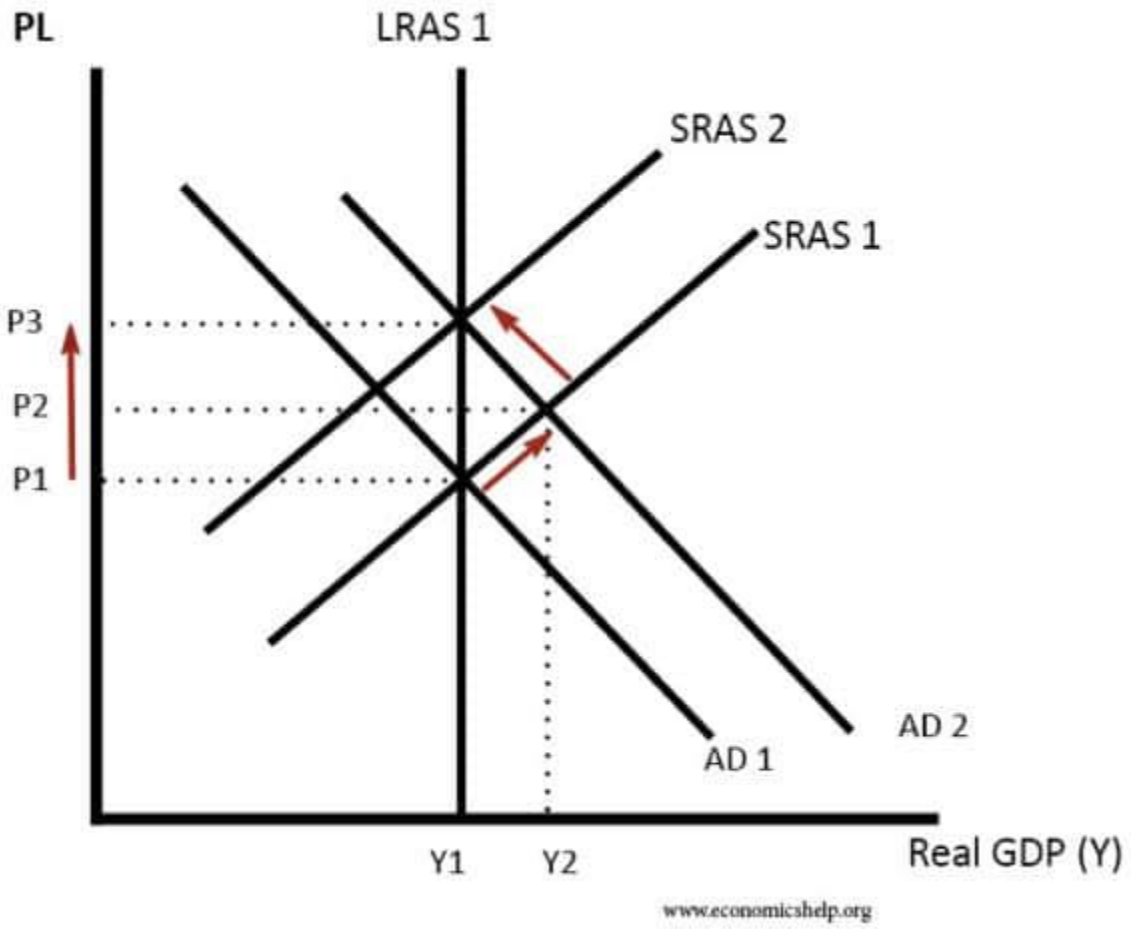
Monetarist View of Phillips Curve

However, Monetarists have always been critical of this Phillips curve trade-off. They argue that in the long run there is no trade-off as Long Run AS is inelastic. Monetarists argue that if there is an increase in aggregate demand, then workers demand higher nominal wages. When they receive higher nominal wages, they work longer hours because they feel real wages have increased. (their price expectations are based on last year)

However, this increase in AD causes inflation, and therefore, real wages stay the same. When they realise real wages are the same as last year, they change their price expectations, and no longer supply extra labour and the real output returns to its original level. Therefore, unemployment remains unchanged, but we have a higher inflation rate. The short-run Phillips curve shifts upwards to SRPC 2


Inflation rate %
LR PC
8%
7%
6%
5%
4%
3%
2%
B
C
A
SRPC 3
SRPC 2
SRPC 1
3% 4% 5% 6% 7% 8%
Unemployment Rate %
www.economicshelp.org

Monetarist view of AD / AS



The increase in AD only causes a temporary increase in real output to Y1. After inflation expectations increase, SRAS shifts to left (SRAS2), and we end up with higher inflation (P3) and output of Y1. This AD/AS model explains why we only get a temporary fall in unemployment.

- Adaptive expectation monetarists argue there is only a short-term trade-off between unemployment and inflation.
- Rational expectation monetarists argue there is no trade-off, even in the short term. The rational expectation model suggests that workers see an increase in AD as inflationary and so predict real wages will stay the same.

Summary of Monetarist v Keynesian view

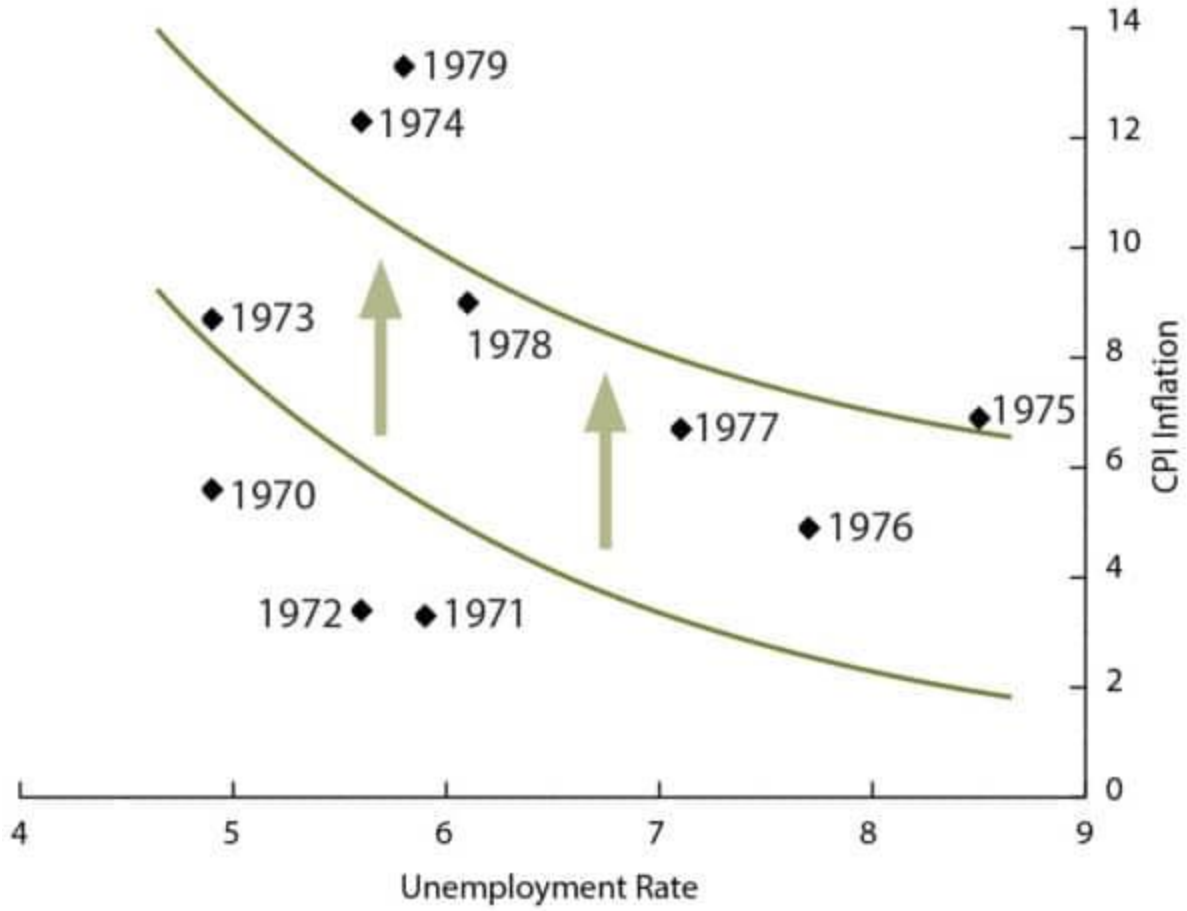
A monetarist would argue unemployment is a supply side phenomena. Monetarists argue using demand-side policies can only temporarily reduce unemployment by an ever-accelerating inflation rate. Monetarists argue that unemployment is determined by the natural rate of unemployment

Keynesians argue there can be demand deficient unemployment, and during a recession, demand-side policies can reduce unemployment in the long term (with perhaps some inflation)

The Phillips Curve Breakdown

Evidence from the 1970s suggested the trade-off between unemployment and inflation had broken down. The 1970s witnessed a rise in stagflation – rising unemployment and inflation. Monetarists argued that increasing the money supply just led to a wage inflation spiral and did not help to reduce unemployment. They advocated reducing the money supply and achieving low inflation – any unemployment would just prove temporary.

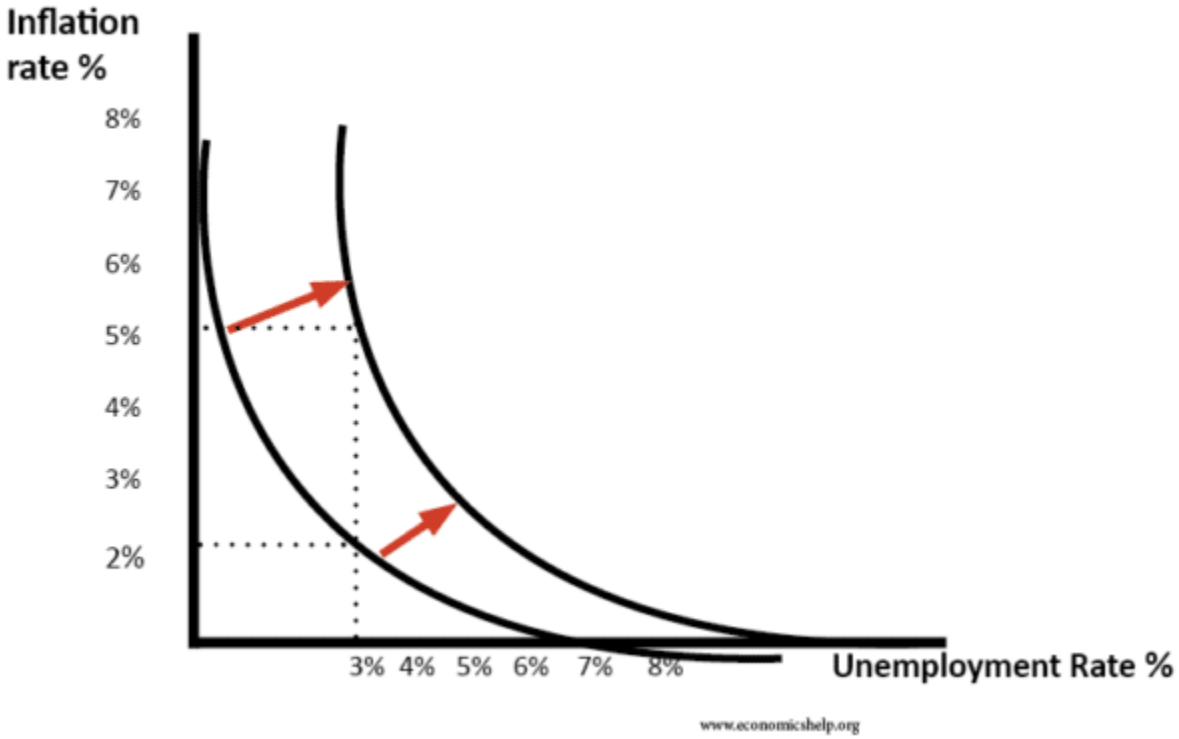
Chart 5: **The Phillips Curve Shifts, 1970-79**



Source: U.S. Bureau of Labor Statistics

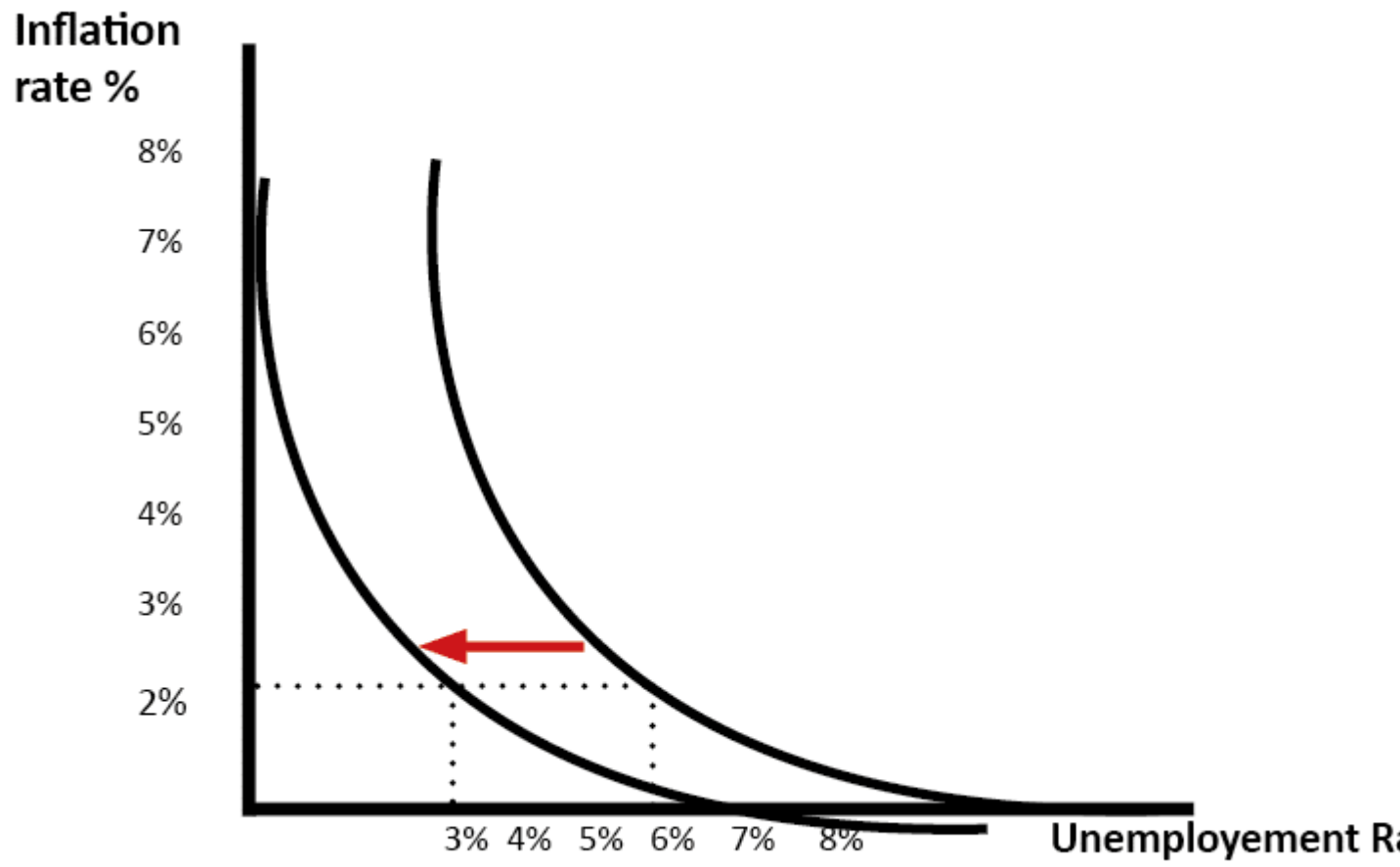
However, others argued there was still a trade-off – the Phillips curve had just shifted to the right giving a worse trade-off because of cost-push inflation.

Shift in Phillips Curve to the right (the 1970s)



In the early 2000s, the trade-off seemed to improve. Helped by low global inflation, unemployment in the UK fell without any rise in inflation. Some argued this period of stability had ended the boom and bust cycles with the classic trade-off between inflation and unemployment. See: great moderation

Shift in Phillips Curve to the left



In late 2008 we saw a rise in the unemployment rate and a fall in inflation. This was due to the recession and falling oil prices.

However, in 2010-11, the UK experienced higher unemployment and higher inflation because of cost-push inflationary pressures. This was another period of stagflation

Conclusion on Phillips Curve

If the economy is operating below full capacity, a significant increase in aggregate demand is likely to cause a reduction in unemployment and higher inflation. Most economists would agree that in the short term, there can be a trade-off between unemployment and inflation. However, there is a disagreement whether this policy is valid for the long-term.

Monetarists would tend to argue the trade-off will prove short-term, and we will just get inflation. Monetarists place greater stress on the supply side of the economy.

However, Keynesians argue that demand deficient unemployment could persist in the long-term. If there is a significant negative output gap, boosting AD could lead to lower unemployment and a modest increase in inflation. In a deep recession, this fall in unemployment will not just be temporary because there will be no crowding out.

In an ideal wopolicymakersakers will aim for low inflation and low unemployment. To achieve this, we need economic growth that is sustainable (close to long-run trend rate) and supply-side policies to reduce cost-push inflation and structural unemployment. If these criteria are met then it becomes easier to achieve this goal of lower inflation and lower unemployment.

Relevance of Phillips Curve Today

In the current economic climate, many Central Banks and policymakers are weighing up how much importance they should give to reducing unemployment and inflation. For example, the Federal Reserve is considering using monetary policy to achieve an unemployment target and a willingness to accept higher inflation.

During 2009-13, the Bank of England has been willing to tolerate inflation above the government's target of 2% because they feel to reduce inflation would have caused serious problems for unemployment and economic growth.

This willingness to consider a higher inflation rate, suggest policy makers feel that the trade off of higher inflation is worth the benefit of lower unemployment. However, not all economists agree we should be allowing the inflation target to increase. If we allow inflation to increase, inflationary pressures will become engrained, and monetary policy will lose credibility. The ECB would be unwilling to tolerate higher inflation – even as a measure to reduce unemployment in Europe.