RAFFLES INSTITUTION
YEAR 6 H2 ECONOMICS 2023

MACROECONOMIC POLICIES: MONETARY POLICY

Contents

References
Abel, Andrew B., & Bernanke, Ben S., *Macroeconomics*, 8th Edition, Addison-Wesley
A.J. Makin, International *Macroeconomics*, Financial Times Prentice Hall
Slavin, Stephen L., *Macroeconomics*, 11th Edition, McGraw-Hill
Sloman, J., *Economics*, 8th Edition, Hertfordshire: Prentice Hall
Singapore Department of Statistics www.singstat.gov.sg
Monetary Authority of Singapore www.mas.gov.sg
The Federal Reserve http://www.federalreserve.gov/
The Bank of England http://www.bankofengland.co.uk/monetarypolicy/

Lecture Objectives (Monetary Policy):

- Explain how governments use monetary policy to achieve the macroeconomic objectives.
- Analyse the impact of monetary policy using the AD/AS model.
- Justify Singapore's choice of exchange rate rather than interest rate as the choice of monetary policy instrument.
- Discuss the factors limiting the effectiveness of monetary policy.

1 Introduction - Monetary Policy Around the world

The financial news is always full of reports about interest rates and exchange ratess. Below are some examples of such reports.

> Federal Reserve Governor Michelle Bowman suggested that a half percentage-point increase in interest rates could be on the table next month if incoming readings on inflation come in too high.
>
> *(Bloomberg, 21 Feb 2022)*

> In a widely expected move, the central bank reduced the Singapore dollar's rate of appreciation to zero per cent. The last time MAS lowered the band's centre was during the global financial crisis in 2009. (TNP, 31 Mar, 2020)
>
> *(The Guardian, 16 Dec 2016)*

From the above excerpts, it is evident that the interest rate and exchange rate are important tools in managing the the economy. You will understand how monetary policy works and variations in the way it is implemented in different economies from completing this set of lecture materials.

1.1 What is Money?

Economists define money as anything that is generally accepted in payment for goods and services or in the repayment of debt. The payments system has been evolving over the centuries and with it the form of money. Some examples include paper money, checks and E-money.

Central Banks (see below) measure money using two commonly used aggregates (M1 or M2):

i. **M1 (narrow money):**
This comprises of currency in circulation + demand (checkable) deposits.

ii. **M2:**
This comprises of **M1**+ savings deposits + small-denomination time deposits.

1.2 Definition of Monetary Policy

Monetary policy (MP) refers to a Central Bank's actions to influence the availability and cost of money and credit, so as to achieve macroeconomic goals of sustained rate of economic growth, low inflation, full employment and favourable balance of payments. The Central Bank can do this either through influencing the interest rate or money supply in the economy.

Note:
There are 2 commonly used instruments of monetary policy:
1. Interest-rate
2. Exchange rate

In large economies like the United States, where consumption and investment expenditure make up a large part of aggregate demand, interest rate or money supply is used as a tool of monetary policy. This is conventional MP.

However, in small and open economies like Singapore, where the value of its total trade (i.e. X+M) is close to 4 times its GDP value, the Central Bank may choose to anchor its monetary policy to the exchange rate. This is also known as Exchange Rate Policy. The Monetary Authority of Singapore manages the value of the Singapore dollar within a desired range in relation to a basket of foreign currencies[6]. *This will be explained in*

[6] Adopting the managed float system, the Singapore dollar is allowed to fluctuate within an undisclosed band against a trade-weighted basket of currencies of Singapore's major trading partners and competitors.

Section 3 under The Exchange Rate Centred Monetary Policy in Singapore.

The **Central Bank** is the principal monetary authority of a nation, which performs several key functions, including being the bankers' bank, issuing currency and regulating the supply of credit in the economy. Refer to Appendix 1 for the functions of the central bank.

Central Banks around the world: US - Federal Reserve (Fed), UK - Bank of England, Japan - Bank of Japan, Singapore – Monetary Authority of Singapore, etc.

2 Monetary Policy Using the Interest Rate as the Policy Instrument

2.1 The Rate of Interest

Interest rate is the "price of money". From a lender's perspective, it is the cost (expressed as percentage of the principal) of using borrowed money. From a saver's perspective, it is the reward (expressed as a percentage of the principal) of putting aside money, hence postponing consumption in the current period (also the opportunity cost of consumption). There are two models of interest rate determination: the *Liquidity Preference Theory* and the *Loanable Funds Theory*.

2.2 Interest Rate Determination in the Money Market: Liquidity Preference Theory

In the General Theory of Employment, Interest and Income, J.M. Keynes introduced the concept of liquidity preference to denote the demand to hold "liquid" money, known also as cash balances. He pointed out that money was demanded not just for the purpose of conducting transactions but also as a store of wealth. He defined 'interest as the reward for parting with liquidity for a specified period'.

Note:
Interest rate determination is **NOT** in the syllabus. The syllabus focuses on the effects of interest rate changes on the macroeconomy.

The equilibrium rate of interest is determined by the demand for and supply of money as shown in Figure 1. MD is the demand curve for money and MS is the supply curve for a given quantity of money in the economy. The money market reaches equilibrium at point E, with the equilibrium rate of interest, r_e.

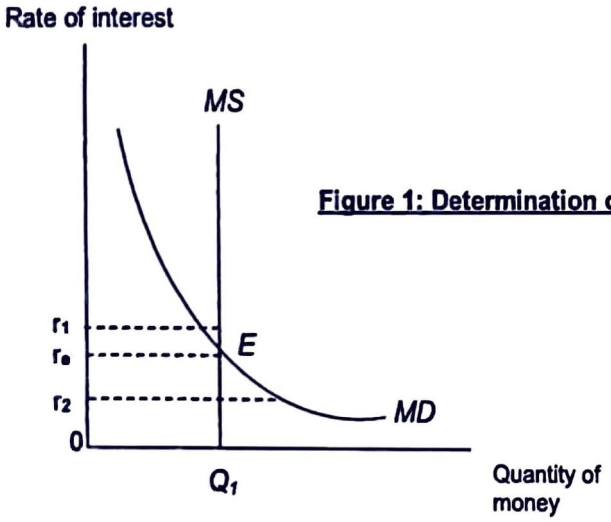


Figure 1: Determination of Interest Rate

Adjustment to equilibrium:
At interest rates above r_e, such as at r_1, the quantity demanded for money is less than the quantity supplied. This surplus of money pushes the interest rate (i.e. the price of money) down. As the rate of interest falls from r_1, the quantity of money demanded

increases, shown by a movement down the MD curve. The process continues until equilibrium is attained at r_e.

Conversely, at interest rates below r_e, such as at r_2, the quantity demanded for money is more than the quantity supplied. This shortage of money pushes the interest rate up. As the rate of interest rises from r_2, the quantity of money demanded decreases, shown by a movement up the MD curve. The process continues until equilibrium is attained at interest rate r_e where the quantity of money demanded is equal to the quantity supplied.

Any change in demand and supply of money will impact the interest rate. Specifically, when Money Supply increases, interest rate will decrease, and vice versa

The Liquidity Preference Theory is typically used to explain how Central Banks influence interest rate through its management of money supply in an economy.

a. The Demand for Money

The demand for money is the desire to hold cash balances, i.e. the desire to keep wealth in the form of money (which is assumed to not earn interest) rather than in interest-earning assets such as bonds. According to Keynes, there are three motives for holding money, namely the i) transactions motive, ii) the precautionary motive and iii) the speculative motive.

(i) <u>The Transactions Motive</u>

This refers to the desire to hold cash balances to pay for current expenditure. The amount of money held for transactionary purposes depends on:

- The level of income - The higher the level of income, the higher the amount of cash held for transactions as people spend more due to the higher standard of living.
- The interval and the frequency at which income is received (e.g., weekly vs monthly) - The longer the interval and the lower the frequency at which income is received, the greater the amount of cash held for the transactions motive.
- The movements in prices of goods and services - If prices rise, people would need more cash balances to pay for the same amount of goods and services as they are now more expensive.

According to Keynes, the transactions demand for money is interest inelastic, i.e., not very sensitive to changes in the rate of interest.

(ii) <u>The Precautionary Motive</u>

This refers to the desire to hold cash balances in order to meet expenditures that may arise due to unforeseen circumstances such as illness and accidents. The demand to hold cash for precautionary motive could depend on the nature of the individual. The more cautious the individual, the more cash he is likely to hold for this purpose.

The demand for money for precautionary motives is also fairly stable and interest inelastic.

(iii) <u>The Speculative Motive</u>

The demand for money for speculative motive refers to any money balances held in excess of the transactionary and precautionary motives. It is therefore also known as the demand for idle balances.

In Keynes' definition, the speculative demand for money is the desire to hold cash balances in anticipation of making gains through the purchase of bonds.

Such demand for money is interest-elastic since the opportunity cost of holding cash balances is the interest received from bonds i.e., when interest rates are low, the opportunity cost of holding cash balances is low and people prefer to hold larger cash balances than invest in bonds. Conversely, when interest rates are high, the opportunity cost of holding cash balance is also high. People prefer to invest in bonds rather than hold cash balances. In other words, the quantity demanded of money for speculative purposes would be lower.

The total demand for money or the **liquidity preference** is the **sum of the transactionary, precautionary and speculative demand for money.**

While the transactionary and precautionary demands for money are insensitive to interest rate changes, there is an inverse relationship between speculative demand and the rate of interest. As a result, the total demand for money is also inversely related to the rate of interest, as shown in the diagram below. When interest rate rises, the quantity demanded for money falls and when the rate of interest falls, the quantity demanded for money rises, ceteris paribus.

Reminder: Liquidity Preference Theory is NOT in the syllabus.

b. The Supply Of Money

According to Keynes, the supply of money is determined by the monetary authorities and is thus independent of the rate of interest. Thus, the supply of money is represented by a perfectly inelastic supply curve in figure 1.

When money supply increases, interest rate decreases and vice versa. The Central Bank influences money supply to induce changes to interest rate so as to achieve macroeconomic aims.

2.3 Interest Rate Determination in the Goods Market: Loanable Funds Theory

In the market for loanable funds, it is the interaction of borrowers (demand for loanable funds) and lenders (supply of loanable funds) that determines the equilibrium interest rate. The determination of the interest rate in the loanable funds market is not relevant to monetary policy.

2.4 Type of Monetary Policy Stance

Depending on the circumstances facing each economy, the Central Bank can choose to adopt either:

a. Expansionary Monetary Policy (Cheap or Loose Monetary Policy)

The Central Bank increases money supply to lower interest rate to make credit more easily available and borrowing cheaper. This is shown in Figure 2.

Expansionary monetary policy is typically implemented during economic slowdown/recession to increase real national income and lower cyclical unemployment.

Refer to Appendix 2 for Loanable Funds Theory. It is useful in explaining how expansionary Fiscal Policy crowds out private investments.

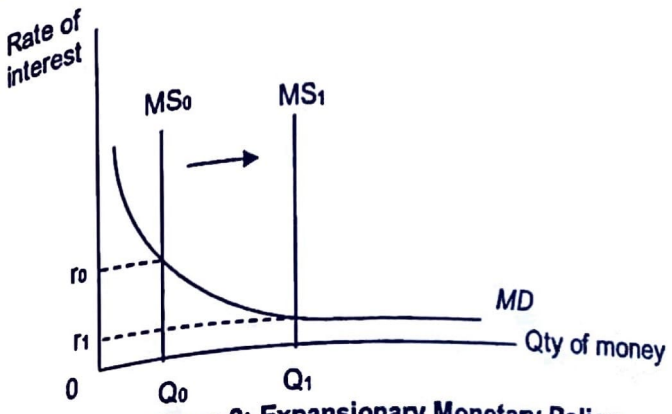


Figure 2: Expansionary Monetary Policy

b. A Contractionary Monetary Policy (Restrictive or Tight Monetary Policy)

The central bank reduces money supply to increase interest rate to limit the availability of credit and make borrowing more costly.

Contractionary monetary policy is typically implemented in an economy experiencing inflation to lower the rate of inflation.

2.5 Monetary Policy Using the Interest Rate

Recall that in a 4-sector economy, AD = C + I + G + (X-M). Interest rate changes will affect consumption spending by households and firms' investment on capital goods and inventories, as well as net exports by the foreign sector. These components of AD will then have an impact on the level of national output, employment, general price levels and the balance of trade.

Key effect of MP:
Changes in interest rate (money supply) will affect C, I, and NX, and thus AD. This will impact EG, UE, inflation and BOT.

2.5.1 Expansionary Monetary Policy

Macroeconomic Problem: Recession and Cyclical Unemployment

Expansionary monetary policy seeks to boost the rate of economic growth and reduce cyclical unemployment. It is typically implemented in an economy experiencing slow or negative real national income growth and high/rising unemployment.

a. How It Works

Internal Effects (Primary Effect):

Recall:
Interest rate is a determinant of consumption and investment.

A fall in interest rate lowers the cost of financing a loan, making it cheaper to borrow. Households are more likely to borrow to purchase big-ticket items or consumer durables such as cars, furniture and washing machines. Households are also less incentivized to save as the rewards from saving has decreased. As a result, consumption spending rises. For firms, there will be more projects which will now be profitable due to the lower cost of borrowed funds used to finance these projects. With more projects, there will be increased investment in plants and machines as well as inventories. The increase in C and I will lead to an increase in aggregate demand in the economy.

External Effects (Secondary Effect):

When the central bank adopts an expansionary monetary policy and lowers the domestic interest rate, ceteris paribus, the interest rate in the country falls relative to that of other countries. In an open economy where capital (financial) flows are unrestricted across

countries, there will be an outflow of hot money from the country in search for higher interest rates in other countries. This increases the supply of the country's currency in the foreign exchange market. In a free/managed float exchange rate regime, the result is a depreciation of the country's currency.

The fall in the exchange rate makes a country's exports more price-competitive in the international market (i.e., price of exports in foreign currency falls) resulting in an increase in amount of exports. At the same time, imports become more expensive (i.e., price of imports in local currency increases), resulting in a fall in amount of imports. An increase in the amount of exports and a fall in the amount of imports results in an increase in net exports, contributing to an increase in aggregate demand.

b. Impact on Real National Income, Employment and Inflation

When the central bank adopts an expansionary monetary policy and lowers the domestic interest rate, there will be an increase in C, I and NX. This autonomous increase in spending will cause a more than proportionate increase in the equilibrium level of real national income via the multiplier effect (assuming spare capacity), ceteris paribus.

Figure 3 shows the initial and final position of the AD curve and the initial and new equilibrium level of real national income. With the economy is operating at less than full employment at Y_1, the increase in AD due to the rise in C, I and NX causes multiple rightward shifts of the AD curve from AD_1 to AD_2. Equilibrium level of real national income rises more than proportionately from Y_1 to Y_2.

As the increase in output to $0Y_2$ requires the employment of more factors of production, including labour, the level of cyclical unemployment is reduced.

However, the rise in AD may lead to demand-pull inflation if there is limited/no spare capacity, with an overall increase in the general price level from P_1 to P_2.

Think:
How will BOT be affected by MP?

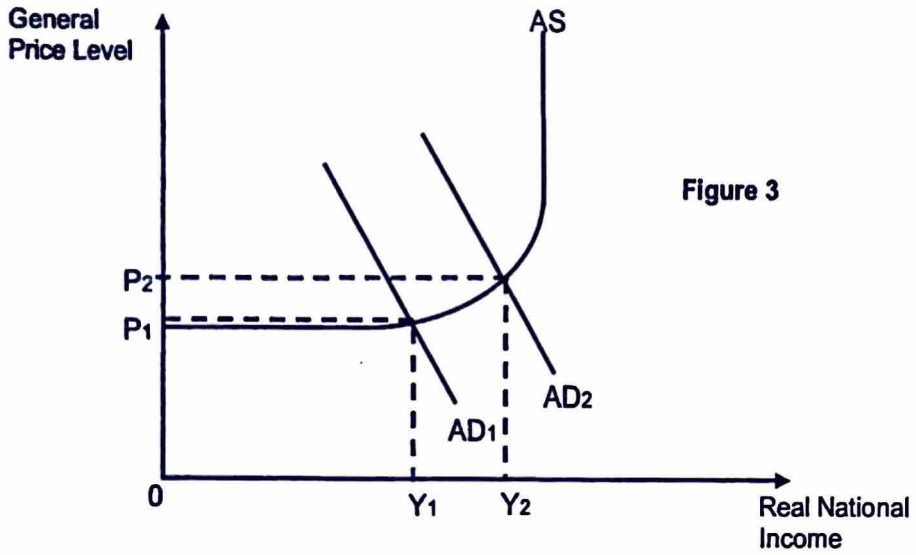


Figure 3

Note:
The increase in real national income has been dampened by the increase in the general price level from P_1 to P_2. This is because as production increases, resources become scarcer and each additional unit of output becomes more costly to produce. A higher price is required to ensure that production remains profitable so that producers have the incentive to increase production. As the general price level rises, quantity demanded for goods and services falls due to the wealth, interest rate and international trade effects. The general price level continues to rise until the disequilibrium is eliminated at P_2 and equilibrium real national income is achieved at Y_2. The effects of the multiplier are thus

dampened by the higher price.

2.5.1.1 Limitations of Expansionary Monetary Policy Using the Interest Rate

Monetary policy has its merits but cannot be relied upon solely to manage the economy. How effective monetary policy is as a demand-management tool depends on certain factors such as those listed below. These factors may **limit the effectiveness of the policy**

a. Interest Elasticity of Demand for Investment

The demand for investment is inversely related to the rate of interest. This inverse relationship between the demand for investment and the rate of interest is known as the Marginal Efficiency of Investment (MEI) Theory.

If the MEI curve is relatively interest-elastic, level of I will be responsive to changes in interest rate. Specifically, when interest rate decreases, I increases, and vice versa.

Monetarists argued that investment is interest-elastic and it is possible to use reductions in interest rates to effectively increase investment. This can be seen in Figure 4 when the MEI has a gentle slope as in MEI_e. A similar fall in interest rate from r_0 to r_1 will lead to a more than proportionate increase in investment from I_1 to I_e and thus effectively raising the level of Aggregate Demand in the economy.

However, Keynesians argue that demand for investment is interest-inelastic (MEI_I in Figure 4). A fall in interest rate from r_0 to r_1 will be met by a less than proportionate increase in investment (I_0 to I_1). Thus, a decrease in interest rate will not be as effective in stimulating I and hence Aggregate Demand.

The MEI curve could be interest-inelastic if a large proportion of an economy's investments is funded by foreign direct investment (FDI). FDI is the flow of funds from external sources into a country for the purpose of acquiring capital goods (i.e., equipment and factories). As foreign MNCs have their own sources of funds and may not borrow from the local banks, a fall in the host country's interest rate have little bearing on these foreign MNCs decision to bring their funds into the host country for investment purpose. In this instance, the impact of the interest rate may be limited. Thus, expanding the money supply to lower the interest rate may not have as significant an impact on investment if the demand for investment is interest-inelastic.

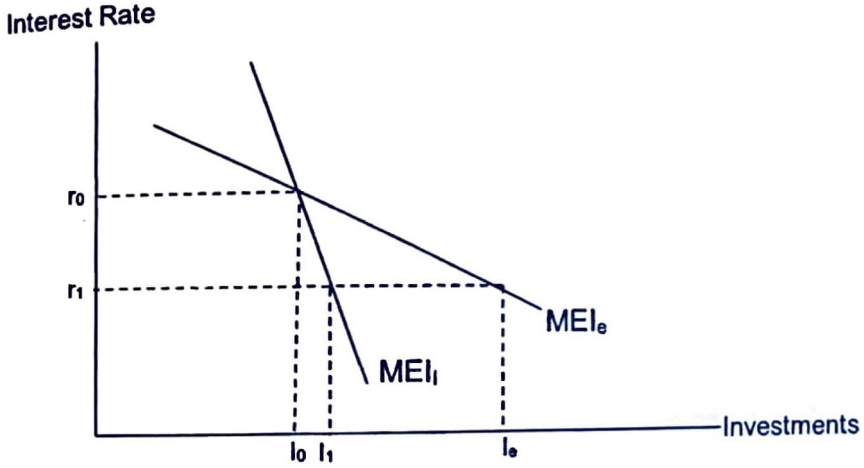


Figure 4: Interest Elasticity of Demand for Investments

b. Expectations of the Future State of the Economy

The effectiveness of monetary policy may be affected by businesses' expectations of the

future state of the economy. In a period of business pessimism, the adoption of an expansionary monetary policy to combat a sluggish economy may not be effective if businessmen are pessimistic about the future. Lowering of interest rates will not induce them to undertake more investments (Keynesian belief). Diagrammatically, this is shown in Figure 5 where the MEI curve has shifted to the left due to increasing business pessimism. As a result, a fall in interest rate may not cause I to increase. When interest rate falls from r_0 to r_1, I should rise from I_1 to I_2 along MEI_0. However, due to the MEI curve shifting to the left to MEI_1, the level of investment at r_1 has instead fallen to I_3, rendering monetary policy to be ineffective in stimulating the economy.

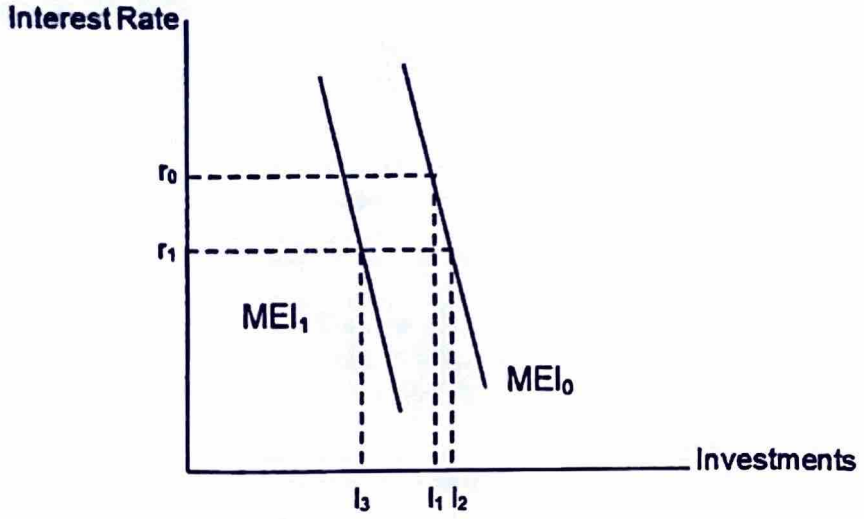


Figure 5: Effect of pessimism on investment

c. Liquidity Trap

At very low levels interest rates, the demand for money becomes **perfectly interest elastic.** This extreme region is known as a liquidity trap where an increase in the supply of money from MS_0 to MS_1 will not have any effect on the rate of interest because it is difficult for the interest to fall below zero. Thus, the level of aggregate demand and real national output will remain the same. Under such circumstances, monetary policy of increasing money supply to decrease interest rate will be ineffective.

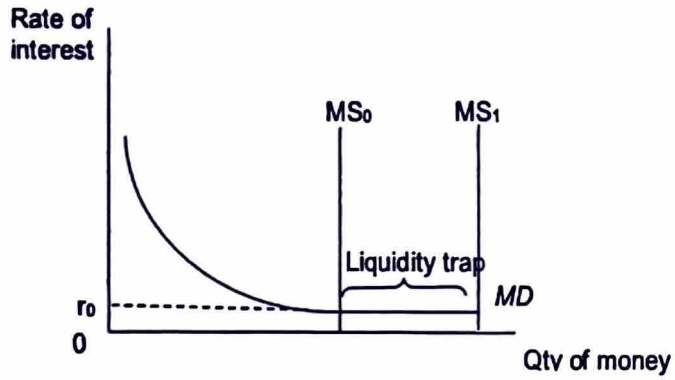


Figure 6: The Liquidity Trap

d. Time Lags between Implementation and Impact on The Economy

Due to time lags of the multiplier effect, it can take a fairly long time for a monetary policy to affect the economy. For example, the multiplied effect on real national output can take

anywhere from three months to two years to be completed. As a result, an interest rate cut may be less effective in increasing real national income and decreasing unemployment in the near term. Instead, it may take effect at the time (over the longer term) when economic recovery is already underway. In such an instance, the expansionary monetary policy may cause unintended demand-pull inflation.

e. Inability to Achieve Specific Macroeconomic Objectives

Monetary policy is primarily a demand management policy directed at influencing Aggregate Demand. It is ineffective in tackling supply-side macroeconomic problems such as structural unemployment. For such problems, specific supply-side policies, such as retraining of workers who are out of jobs, are required.

f. Unintended Consequences: Conflicts with Other Macroeconomic Aims

Expansionary monetary policy aims to increase level of real national income and lower unemployment level. However, it can also bring about higher rates of inflation when it is implemented in an economy operating in the intermediate range of the AS curve (i.e. limited spare capacity.

The use of quantitative easing (see appendix 4) had been responsible for recent asset price inflation. Through the widespread purchases of financial assets, the US Federal Reserve and Bank of England had injected massive amount of funds into the financial sector causing stock prices to increase over time. Moreover, the long-term commitment to low interest rates also fuelled increases in property prices worldwide since it reduced the cost of borrowing significantly. Since assets are usually held by the wealthier segments of the population, quantitative easing had also played a part in widening income inequality.

2.5.2 Contractionary Monetary Policy (i.e., tight money policy)

Macroeconomic problem: High inflation

Contractionary monetary policy refers to the raising of interest rates by the Central Bank. It is typically implemented when an economy is near or at full employment level of national income and yet AD continues to increase. It seeks to reduce the level of inflation caused by a high and increasing AD when the economy is already near or at full employment.

a. How It Works

Internal effects:

With the higher interest rates, households now find it more costly to obtain loans from the banks to finance the purchase of big-ticket items and consumer durables. At the same time, firms are left with fewer investment projects with expected rate of return (i.e., profits) high enough to cover the higher cost of borrowing. Thus, raising interest rates leads to a reduction in both consumption and investment spending.

External Effects:

When a country's interest rate increases, in an open economy where financial flows are unrestricted across countries, 'hot money' will flow into the country to take advantage of the higher interest returns. This increases the demand for the country's currency, thus causing an appreciation of its exchange rate.
The appreciation of a country's currency makes its exports less price competitive in the international market (i.e., price of exports in foreign currency increases) resulting in a fall in amount of exports. At the same time, imports become cheaper (i.e., price of imports in local currency decreases), resulting in an increase in amount of imports. A decrease

in the amount of exports and an increase in the amount of imports result in a fall in net exports, contributing to a fall in aggregate demand.

b. Impact on Real National Income, Employment and Inflation

When the central bank adopts an expansionary monetary policy and lowers the domestic interest rate, there will be a fall in C, I and NX. The decrease in AD will shift the AD curve from AD_1 to AD_2, as shown in Figure 7. The general price level is now at $0P_2$. Thus, inflationary pressures have been dampened. As output produced falls, fewer workers are demanded, resulting in higher cyclical (demand deficient) unemployment and lower real national income.

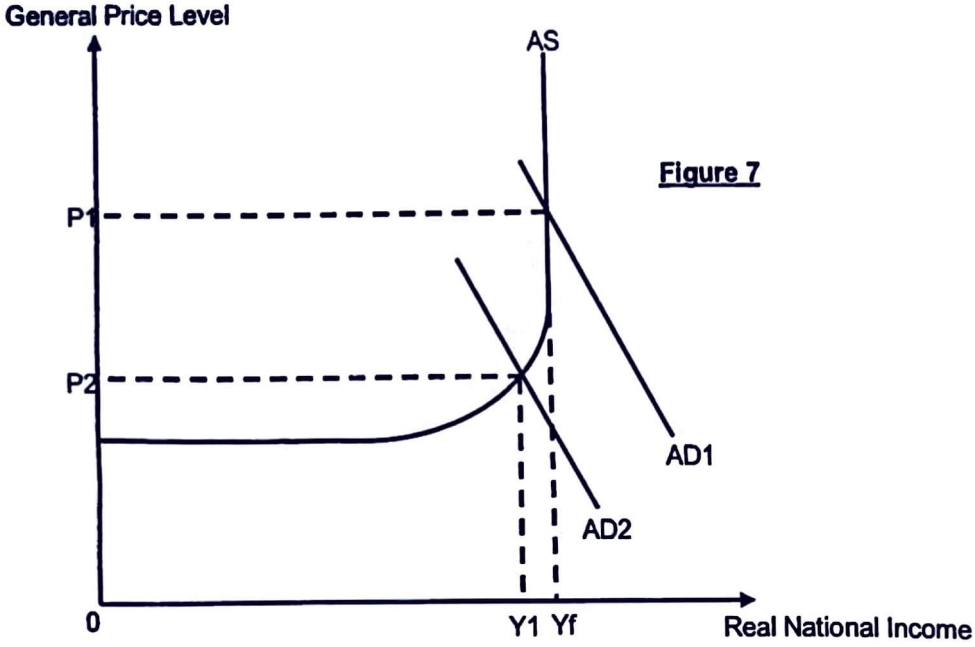


Figure 7

2.5.2.1 Limitations of Contractionary Monetary Policy

As with an expansionary monetary policy, the effectiveness of a restrictive monetary policy in dampening the level of economic activity in an economy will depend on factors such as the interest elasticity of demand for investments/availability of alternative sources of funding, and the presence of time lags. Further factors include:

a. Short / long term basis of projects

A higher level of interest rate may not reduce aggregate demand as firms' long-term projects cannot be abandoned easily without incurring greater losses. Investment continues to be high due to committed long term investment projects which cannot be easily reversed.

b. Conflicts with other macroeconomic goals

Conflicts between macroeconomic goals often occur. One classic example is the inflation-unemployment trade-off. When the Central Banks raise interest rate to dampen the demand for goods and services in their attempt to control inflation, it often results in lower national income and higher unemployment. Central Banks therefore have to decide whether to prioritise inflation or actual growth/unemployment aims.

2.5.3 Limitations Monetary Policy Using the Interest Rate

In addition to the specific limitations of expansionary and contractionary monetary policies, the conduct of monetary policy in general is limited by the following factors:

a. Time Lag

It will take some time before any macroeconomic problem is fully recognised (recognition lag) and for the Central Bank to implement the appropriate monetary policy (implementation lag). In addition, it can take a long time for the policy action to affect the economy (impact lag).

However, it could be argued that the implementation lag for monetary policy is a lot shorter compared to fiscal policy since decisions to increase or decrease the interest rate do not require parliamentary approval and are not subjected to time consuming budget debates.

Because of the time lags in exchange rate policy, Central Banks have to formulate and conducts the interest rate policy in a ***forward-looking manner***. This is accomplished by evaluating the impact of the policy over the medium term based on reasonable assumptions of economic outlook.

b. Imperfect Information

Despite the best effort of the national account statisticians, the Central Bank does not have up-to-the-minute information about the state of the economy. Latest economic data is limited by the time taken to collect and compile this information.

Secondly, the Central Bank does not have perfect knowledge of how the economy works. This includes its multitude of linkages, causes and effects. Constant changes in the conditions of domestic and international economies compound the problem of imperfect information.

Lastly, predictions of the future are always fraught with difficulties due to the lack of information and uncertainties associated with the future. The need for interest rate policy to be formulated in a forward-looking manner (see previous Section, 'b. Time Lag') compounds the difficulties of planning and implementing interest rate policy.

Summary:

- Expansionary monetary policy is primarily used to stimulate economic growth and reduce unemployment.
- Contractionary monetary policy is primarily used to reduce inflationary pressures.
- A change in interest rates also impacts the balance of payments position of a country due to "hot" money flow.
- The effectiveness of monetary policy depends on the responsiveness of households and firms to interest rate changes and its desirability depends on the extent of conflict with other macroeconomic goals.

3 EXCHANGE RATE CENTRED MONETARY POLICY IN SINGAPORE

3.1 Singapore's Central Bank

The Monetary Authority of Singapore (MAS) is the Central Bank of Singapore. Like other Central Banks in the world, one of its primary responsibilities is the conduct of monetary policy. However, unlike many countries, Singapore's monetary policy is centred on the management of its Singapore dollar exchange rate. **The primary objective of such an exchange rate centred monetary policy in Singapore is to promote price stability (i.e. low and stable inflation) as a sound basis for sustained economic growth in the long run.**

Over the long run, the Singapore dollar exchange rate has been on an appreciating path. For most of the time, the MAS has adopted the policy stance of a **gradual and modest appreciation of the Singapore dollar.** However, other policy stances can be and have been adopted in response to changes in international and domestic conditions. For example, in Oct 2008, the policy stance was shifted to a zero-percentage appreciation of the Nominal Effective Exchange Rate policy band. This decision was taken amidst easing external and domestic inflationary pressures and a weakening global economic environment.

3.2 Reasons for Choice of Policy Tool - The Use of Exchange Rate Instead of Interest Rate

Since 1981, monetary policy in Singapore has been centred on the exchange rate. The choice of exchange rate, rather than money supply or interest rate, as the principal tool of monetary policy has been influenced by its ***small size*** and the high degree of ***openness*** to trade and capital flows.

The use of exchange rates allows Singapore to best achieve the stated objective of promoting price stability as a sound basis for sustained economic growth in the long run:

a. Susceptible to Imported Inflation

Singapore's lack of natural resources means that it has to import even the most basic daily requirements, such as food items including eggs and vegetable. This implies that Singapore's cost of living is significantly affected by the prices of imported final goods and services.

In addition, Singapore also relies significantly on importing raw material and intermediate goods to produce final goods and services. For example, we import natural gas to generate electricity. Due to the high import content of its output, cost of production of Singapore firms are significantly affected by the prices of imported raw material and intermediate goods. Changes in world prices or in the exchange rate have a significant and direct influence on costs of production and general price levels in the economy. Given that Singapore is a small economy and hence a price -taker in the global market, it cannot affect the foreign prices of its imports. However, it can manage its exchange rate to influence the domestic price of it imports which in turn affects the cost of production of Singapore firms. The exchange rate is thus a powerful tool to moderate imported inflation.

b. High dependence on external sector

Imports and Exports each amount to more than 100% of Singapore's GDP, and total trade (i.e. X+M) is around 400% of its GDP.

Singapore's economic development strategy has always focused on producing exports

for the rest of the world, where exports or external demand makes up about three-quarters of total demand in Singapore. Singapore's exchange rate affects the foreign price of Singapore's exports which in turn affects its price competitiveness and the amount of exports sold (i.e. X in AD). The importance of exports means that the exchange rate can have an important influence on its aggregate demand, equilibrium real national income and the derived demand for domestic resources, especially the demand for labour.

Hence, the exchange rate is the policy of choice as it directly affects the largest component of Singapore's aggregate demand, X.

c. Inability to control the interest rate due to openness to international capital flows

In addition to a large external trade sector, a vast network of international financial linkages exists as a pre-requisite for Singapore's role as a financial centre. It is important that Singapore maintains relatively free movement of financial capital to enable it to function as an international financial centre. The result is an ***open*** economy with free capital mobility into and out of Singapore. Small differences between domestic and foreign interest rates can lead to large and quick movements of funds. This makes it difficult to target interest rates in Singapore. Any attempt by the MAS to raise or lower domestic interest rates will be thwarted by a movement of funds into or out of Singapore. Due to the free movement of financial capital, interest rates in Singapore are largely determined by foreign interest rates.

For the above reasons, Singapore has chosen to focus on managing its exchange rate as its monetary policy tool. As it also prioritises financial capital mobility due to its international financial hub status, Singapore must relinquish its control over interest rates. The ability of economies to only achieve only 2 of the following 3 targets – managing interest rate, managing exchange rate and maintaining international financial capital, is known as the Open Economy Trilemma.

Refer to Appendix 7 for more information about the Open Economy Trilemma.

3.3 Conduct of Monetary Policy in Singapore

The Singapore dollar (S$) is managed against a trade-weighted basket of currencies of her major trading partners and competitors. The various currencies are given different degrees of importance, or weights, depending on the extent of her trade dependence with that particular country. The composition of this basket of foreign currencies is reviewed and revised periodically to take into account changes in Singapore's trade patterns.

The value of the Singapore dollar against this trade weighted basket of foreign currencies is known as the Trade Weighted Exchange Rate or the Nominal Effective Exchange Rate (S$NEER). Real Effective Exchange Rates (S$REER) refers to the trade-weighted exchange rate with effects of inflation taken into account.

The Monetary Policy Statements are issued twice a year, in April and October, to communicate MAS' monetary policy decision. In each review, changes can be made to the following parameters:

Recall: there are different types of exchange rate regimes under 'Macroeconomic Aims and Issues'.

- the slope of the policy band (i.e. its rate of appreciation),
- the width of the policy band (i.e. the lower and upper exchange rate limits within which the S$NEER is permitted to fluctuate, and
- the level at which the policy band is centred (i.e. the "mid-point" exchange rate between the lower and upper exchange rate limits of the policy band).

Given the nature of the foreign exchange market, it is impossible to keep the trade-weighted S$ exactly at a fixed exchange rate minute-by-minute or even day-by-day. For this reason, the Singapore dollar is allowed **to fluctuate within an undisclosed band.**

As long as the dollar remains within this band, the MAS does not intervene. If, however, the exchange rate moves out of the band, the MAS steps in, either buying or selling foreign exchange so as to prevent excessive fluctuations in the exchange rate. This is known as a **managed floating exchange rate.**

Figure 8 shows how the Monetary Authority in Singapore (MAS) can manage the price of Singapore Dollar (S$). Suppose MAS allows its exchange rate to float freely within the range of E_U to E_L. Assume that there is an increase in demand for S$ due to an increase in preference for Singapore's goods by the foreign consumers. This means that foreign consumers will demand more S$. The demand for S$ will shift to right (DD_1). There will be an upward pressure on the value of the S$.

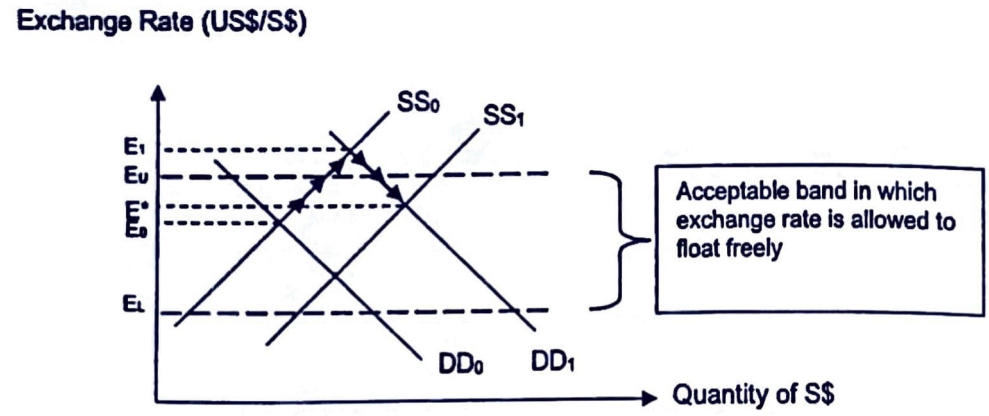


Figure 8: MAS Intervention to maintain the value of Singapore Dollar within the acceptable band (E_U to E_L)

If left to free market forces, the value of S$ will rise beyond the upper limit (E_u) of the band that is, at E_1. However, since the MAS is committed to keeping the value within the band, they will hence sell more S$ in the foreign exchange market, shifting the supply of S$ to SS_1. The resultant effect is that there will be more S$ transacted in the foreign exchange market as well as a slight revaluation of the Singapore dollar from E_0 to E^* but the value of S$ remains within the band.

3.4 Exchange Rate Policy

The exchange rate policy affects the macroeconomy through its impact on export and import prices. These in turn affect Aggregate Demand and Aggregate Supply.

3.4.1 Appreciation of S$

The use of the term 'appreciation' is more general and common than 'revaluation' which is the specific outcome of action undertaken by the central bank/monetary authority. See note below for more details.

As a default, the MAS typically adopts a modest and gradual appreciation of the S$ policy to help achieve low and stable inflation which provides the conducive condition for sustained economic growth of the Singapore economy.

a. Effects of a appreciation on Aggregate Supply

A appreciation of the Singapore dollar will mean that the prices of foreign goods and services (denominated in S$) which Singapore imports will be lower. This has the ***direct*** effect of lowering prices that an average Singaporean household has to pay for imported goods and services that are consumed. Cost of living in Singapore decreases. Imported inflation is reduced as a result of the appreciation of the S$.

Prices of imported raw materials (in S$) used by Singapore firms in the production of goods and services will decrease as a result of the appreciation of the S$. This causes

the per unit costs of production of Singapore firms to fall, resulting in an increase in aggregate supply represented by a downward shift of the AS curve from AS_0 to AS_1 as seen in Figure 9.

b. Effects of Appreciation on Aggregate Demand

When MAS revalues the S$, goods and services produced in Singapore will be less competitively priced in international markets in the short term. Price of Singapore exports (in foreign currency) increases. The amount of Singapore goods and services exported to the rest of the world falls. Price of imports to Singapore (denominated in S$) decreases. The amount of goods and services imported increases as Singapore households and firms will switch to relatively cheaper imported goods, away from relatively more expensive domestically produced goods and services.

As seen from above, a appreciation of the S$ results in a decrease in the amount of Singapore exports and an increase in the amount of Singapore imports. This results in a decrease in the amount of net exports which contributes to a decrease in Singapore's AD in the short run, causing AD curve to shift to the left in Figure 9.

c. Effects of a appreciation on Economic Growth, Employment and Inflation

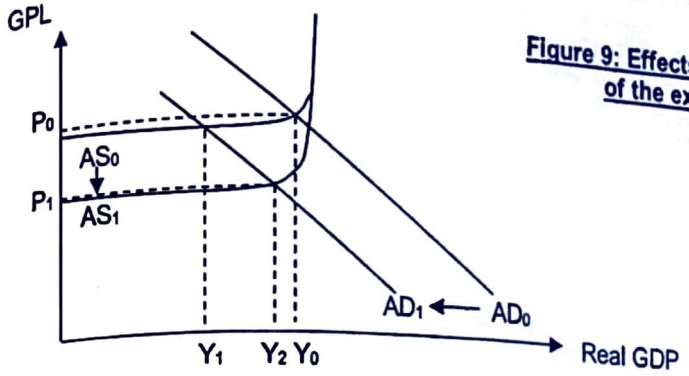


Figure 9: Effects of an appreciation of the exchange rate

An appreciation of the Singapore dollar rate will lead to a leftward shift in the aggregate demand curve due to the decrease in net exports from AD_0 to AD_1. Singapore firms will reduce production level due to the fall in (X-M). As a result, real national income decreases from Y_0 to Y_1.

At the same time, the per unit costs of production decreases due to the lower prices of imported raw materials (in S$) used by Singapore firms. As such, the aggregate supply curve will fall from AS_0 to AS_1 in Figure 11. This helps to dampen the decrease in real national income (arising from the increase in aggregate demand) from Y_1 to Y_2.

Overall, an appreciation of the S$ will lead to an increase in AS and a fall in AD, thus resulting in a lower rate of inflation. However, real national income will fall from Y_0 to Y_2. As demand for labour is a derived demand from the production of goods and services, cyclical unemployment will also increase due to the fall in real national income.

d. Effects of Appreciation on Balance of Trade

Appreciating the S$ will cause exports to be relatively more expensive in foreign currency terms and imports to be relatively cheaper in local currency terms. This will cause quantity demanded of exports to fall and quantity demanded of imports to rise. The extent of change in quantity of exports and imports depends on PEDx and PEDm. Assuming that the **Marshall Lerner Condition holds** where [$PED_X + PED_M > 1$], the monetary value of net exports will fall, hence worsening Singapore's Balance of Trade.

3.4.1.1 Limitations of Appreciation of S$ Policy

(I) Conflicts in The Short-Term Arising from Appreciating the S$

Allowing the Singapore dollar to appreciate is most desirable during a period of economic boom where increases in AD can be dampened to prevent excessive demand-pull inflation. However, there is a **short-term trade-off** between macroeconomic goals. For instance, the BOT will deteriorate (assuming that the Marshall-Lerner Condition holds), leading to a worsening of the balance of trade, ceteris paribus.

A fall in the (X-M) component of Singapore's AD falls due to an appreciation of S$ lead to a more than proportionate fall in real national income via the multiplier process. As demand for labour is a derived demand, the fall in aggregate demand for goods and services may in turn cause an increase in unemployment as fewer factors of production are required to produce the reduced level of national output. Hence, policymakers in deciding the timing and extent of inflation reduction have to weigh the benefits of lower inflation against the costs of a fall in real national income and higher cyclical unemployment.

[IMPORTANT TO NOTE: HOWEVER, in the LONGER TERM, there will not be a conflict of aims from appreciating the S$ because by targeting low and stable inflation (using the exchange rate policy), Singapore can **gain export competitiveness** over its competitors. By maintaining a low and stable inflation environment, the dangers of a wage-price spiral are minimized. Keeping inflation low relative to other countries' inflation will help ensure Singapore's export competitiveness in the longer term. As Singapore's exports become relatively cheaper (due to relatively lower rates of inflation achieved through sound exchange rate policy management), demand for Singapore's exports increases. This contributes to an increasing aggregate demand which helps to achieve sustained actual growth in the economy in the longer term.]

b. Availability of foreign currency reserves

Intervention in the foreign exchange market to keep the country's external value of the currency **above** the market equilibrium exchange rate level (i.e. an appreciating exchange rate policy which results in an over-valued currency) is possible only if the country has sufficient foreign currency reserves. A country with insufficient reserves loses its ability to support the high external value of its currency. Speculators, expecting an eventual devaluation, will begin to aggressively sell the currency. This is likely to trigger the eventual depreciation of the currency once a country exhausts its foreign reserves.

Revision Tip:
This explains the problem of loss in foreign currency reserves associated with a BOP deficit.

[Note: This limitation of reserves availability pertains only to the Central Bank attempting to keep the currency over-valued. The pursuit of an under-valued currency results in the accumulation of foreign reserves. Hence, the constraint of reserves availability is not applicable in the latter case].

3.4.2 Depreciation of S$

The MAS could adopt a once-off devaluation of the S$ exchange rate policy in times of deep economic recession with high/rising rates of unemployment. This effectively 'lowers' the band of exchange rates within which the S$ is permitted to fluctuate.

The MAS has also been observed to announce a switch from a modest and gradual appreciation to a zero-appreciation policy. The announcement of such a switch typically brings about a deprecation of the S$.

a. Effects of Depreciation on Aggregate Supply

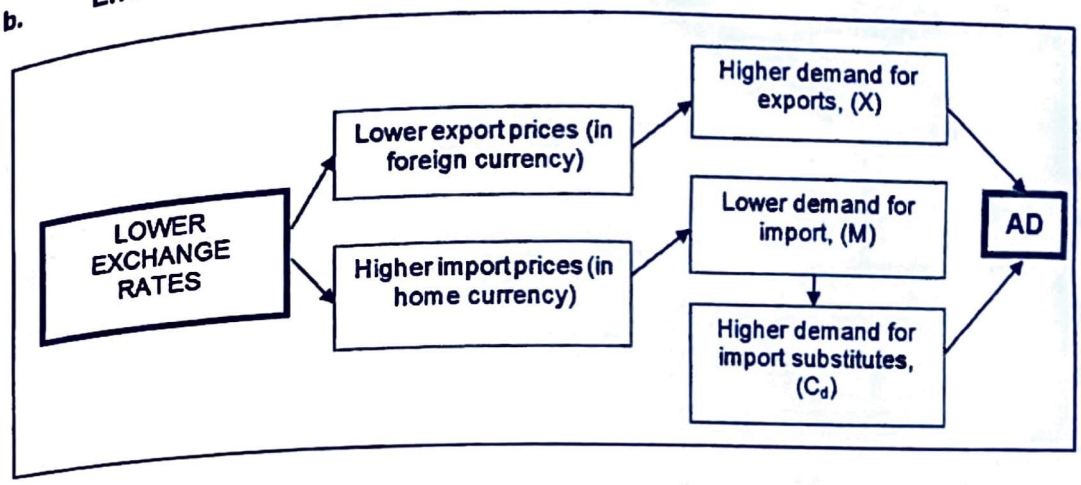
The most direct channel through which exchange rate policy affects the Singapore macroeconomy is via its effects on import prices.

A depreciation of the S$ means that the prices (in S$) of Singapore imports will be higher. This has the ***direct*** effect of raising prices that an average Singaporean household has to pay for imported goods and services that are consumed. Cost of Living increases as indicated by CPI increasing. Imported inflation is 'directly' experienced by the Singapore economy as a result of the depreciation of the S$.

Prices of imported raw materials and intermediate goods (in S$) used by Singapore firms in the production of goods and services will also increase as a result of the depreciation of the S$. This causes per unit costs of production to increase, resulting in a fall in aggregate supply represented by an upward shift of the aggregate supply (AS) curve in Figure 10.

[Note: Compared to a larger and less import-reliant economy, the impact of currency devaluation on import prices is more significant in a small, open economy such as Singapore where most factor inputs are imported from abroad.]

b. Effects of Depreciation on Aggregate Demand



The second important channel through which exchange rate policy affects the economy is its effect on the aggregate demand in the economy.

Continuing with the previous example, when the S$ depreciates, goods and services produced in Singapore will be more competitively priced in world markets in the short term. Price of Singapore exports (in foreign currency) falls. The amount of Singapore goods and services exported to the rest of the world increases. At the same time, imports will become more expensive. Price of Singapore imports (in S$) increases. The amount of goods and services imported into Singapore falls. As a result of the relatively more expensive imported goods and services, Singapore households and firms will switch to relatively cheaper domestically produced goods and services.

As seen from above, a depreciation of the S$ results in an increase in the amount of Singapore exports and a decrease in the amount of Singapore imports. This results in an increase in the amount of net exports which contributes to an increase in Singapore's AD in the short run, causing AD curve to shift to the right in Figure 10.

Food for Thought:

A weaker exchange rate for more competitive exports?

At first glance, it appears tempting to devalue the nominal exchange rate so as to raise the competitiveness of our exports and boost export growth. Upon closer inspection, however, we find that because of the transmission mechanisms mentioned earlier, the export competitiveness gained from weakening the exchange rate is actually much lower than expected. A weaker exchange rate would indeed cause exports to rise in the short term as predicted.

However, a weaker exchange rate would also directly result in the higher cost of imported inputs for manufacturers. In addition, this high export growth could cause the economy to overheat, pushing up the demand for domestic resources like labour, and lead to higher wages and eventually prices [via an increase in aggregate demand in the intermediate range of AS]. Both these effects would significantly offset the gains in export competitiveness provided by a depreciation of the S$.

c. Effects of Depreciation on Economic Growth, Employment and Inflation

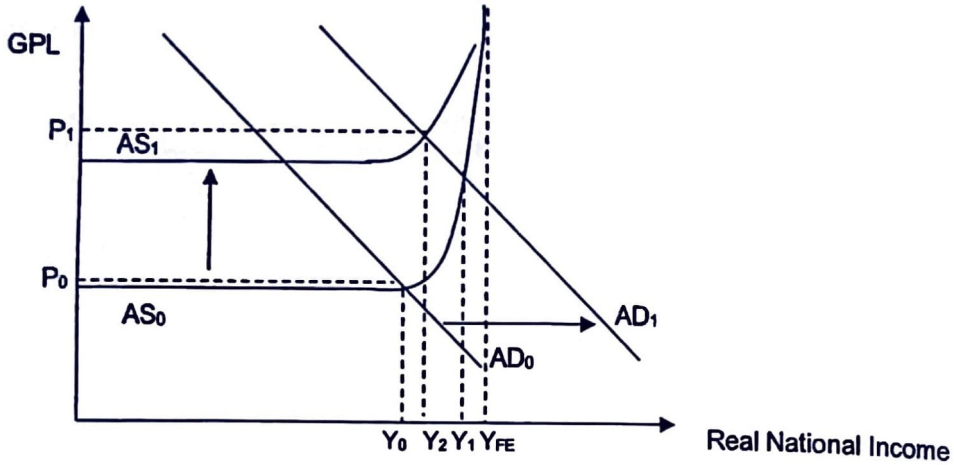


Figure 10: Effects of a depreciation of the exchange rate

As explained earlier, a depreciation of the Singapore dollar rate will lead to a rightward shift in the aggregate demand curve due to the increase in net exports. To meet the increase in export orders, companies in Singapore would increase their production levels as there will be a rundown of stocks and inventories. To do so, they would require more production workers. If there exists spare capacity in the Singapore economy, more workers can and will be hired as demand for labour is a derived demand and production will increase (real national income increases from Y_0 to Y_1 in Figure 10). The economy will experience actual economic growth and lower cyclical unemployment.

At the same time, the costs of production increases due to the higher prices of imported raw materials used by Singapore firms. As such, the aggregate supply curve will fall from AS_0 to AS_1 in Figure 4. This dampens the increase in real national income (arising from the increase in aggregate demand) from Y_1 to Y_2.

The overall effects of a depreciation of the Singapore dollar are a 'dampened' increase in real national output (Y_0 to Y_2), lower unemployment, and a higher general price level (P_0 to P_1).

d. Effects of Depreciation on Balance of Trade

The management of exchange rates affects a country's export competitiveness and in turn its balance of trade position. The effects of changes in the exchange rate on Balance of Trade depend on the Price Elasticity of Demand of Exports and Price Elasticity of Demand of Imports values.

(i) Depreciation of currency to correct a Balance of Trade Deficit

Firstly, a depreciation of the domestic currency will cause the price of the country's exports in terms of foreign currencies to fall. The extent of an increase in quantity demanded of exports depends on the price elasticity of demand for exports. Secondly, a depreciation of the domestic currency will cause the price of imports in terms of domestic currency to rise. The extent of the fall in quantity demanded of imports depends on the price elasticity of demand for imports.

The Marshall-Lerner condition states that as long as the sum of the price elasticities of demand for exports and imports is greater than one [$PED_X + PED_M > 1$], a depreciation of a country's currency can lead to an improvement in the balance of trade, and hence the balance of payments, ceteris paribus.

Note:
The M-L condition is an important assumption to make when explaining the changes in ER on current account.

While depreciating the currency improves export competitiveness in the short term, depreciating the exchange rates may not be the best policy if it does not address the root cause of the balance of trade deficit. For instance, if the deficit on the balance of trade account is due to a loss in competitiveness in the international markets due to the emergence of technologically more advanced producers, then depreciation is only a temporary solution. The long-term solution is restructuring of the economy and implementing policies which will boost productivity.

NOTE:

- The terms 'devaluation' and 'depreciation' both describe a fall in the external value a country's currency but the contexts/circumstances leading to the fall are different. 'Depreciation' is used when market forces lower the external value of a currency, which occurs under a freely floating exchange rate system whereas 'devaluation' is used when there is a policy action undertaken by the monetary authority to weaken the external value of the currency, which could occur in either a fixed or managed float exchange rate system.
- Likewise, 'appreciation' and 'revaluation' both describe a rise/strengthening in the external value of a currency with the former occurring naturally from market forces whereas the latter is the result of intervention by the monetary authority.
- When answering questions where the context isn't clearly specified, the use of the term 'appreciation' or 'depreciation' could describe the change in the currency value due to either market forces or government intervention, since 'appreciation' and 'depreciation' are used more generally and commonly than revaluation or devaluation.

(ii) The J-curve Effect

In the short run, the price elasticities of demand for exports and imports may be low and the Marshall-Lerner Condition may not be satisfied in the initial period following a depreciation of the currency.

When a Central Bank brings about a devaluation of the country's currency, ceteris paribus, its exports become cheaper in terms of foreign currencies while its imports more expensive in terms of the domestic currency. In the initial period, changes in the quantity

demanded for exports and imports may be insignificant as consumers may take time to change their consumption pattern and preference from imported goods to domestically produced substitutes. It also takes time to find substitutes. On top of that, producers may also have to fulfil the terms of prevailing contracts with respect to the volume and price of imports/exports.

This implies that the demand for exports and imports can be relatively price inelastic in the initial period. If Marshall-Lerner Condition does not hold (i.e. the sum of the values of price elasticities of demand of exports and imports is less than one), a depreciation of the exchange rates will cause the monetary value of net exports (i.e. Balance of Trade in BOP) to decrease, worsening the balance of trade position in the initial period.

However, over a longer time period, changes in consumption pattern will take place and substitutes can be found. Contracts binding importers and exporters will expire. As a result, the demand for exports and imports can become less price inelastic. When this happens, it is more likely that the Marshall-Lerner Condition is fulfilled, resulting in an improvement of the Balance of Trade arising from a depreciation of the country's currency.

Figure 11 shows the initial effect of a depreciation of the currency on the balance of payments on current account. In the short run, the balance of trade worsens as the deficit grows. This is followed by an improvement over time. This is called the J curve effect.

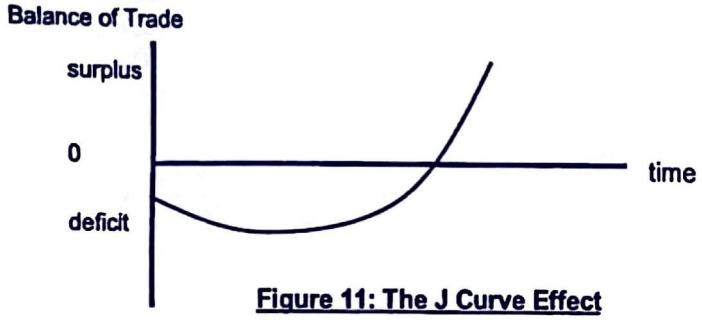


Figure 11: The J Curve Effect

To conclude, the price elasticities of demand for imports and exports are crucial in determining the impact of a depreciation of a country's currency on the balance of trade.

3.4.2.1 Limitations of Devaluation of S$ Policy

a. Conflicts Arising from Depreciating S$

Depreciating the S$ can help increase real national income and lower unemployment. However, there is a macroeconomic objective trade-off of higher imported inflation which arises from the depreciation of the S$.

In the longer term, poor management of inflation (arising from the depreciation of S$ policy) is likely to result in a wage-price spiral which can cause Singapore to lose its export competitiveness. Wage-price spiral refers to the vicious cycle where inflation further escalates due to workers demanding higher nominal wages in anticipation of higher inflation in the future. This is detrimental to the Singapore economy in the long run.

As a matter of policy, devaluation of the S$ is a last resort and once-off policy option for the purpose of stabilizing its economy in times of severe economic recession caused by weakened global demand for Singapore's exports. It is never used as a long term strategy for the reason explained in the previous paragraph.

3.5 Limitations of Exchange Rate Policy

In addition to the specific limitations associated with the policies of appreciating and depreciating the S$, the effectiveness of exchange rate policy in general are further limited by the following factors:

a. Time Lag

It will take some time before any macroeconomic problem is fully recognised (recognition lag) and for the Central Bank to implement the appropriate exchange rate policy (implementation lag). In addition, it can take a fairly long time for the policy action to affect the economy (impact lag).

However, as in the case of monetary policy using the interest rate, the implementation lag for exchange rate monetary policy is a lot shorter compared to fiscal policy for reasons explained earlier.

Because of the time lags in exchange rate policy, MAS has to formulate and conducts the exchange rate policy in a ***forward-looking manner***. This is accomplished by evaluating the impact of the policy over the medium term based on reasonable assumptions of economic outlook and possible negative shocks.

b. Imperfect Information

Despite the best effort of the national account statisticians, the Central Bank does not have up-to-the-minute information about the state of the economy. Latest economic data is limited by the time taken to collect and compile this information.

Secondly, the Central Bank does not have perfect knowledge of how the economy works. This includes its multitude of linkages, causes and effects. Constant changes in the conditions of domestic and international economies compound the problem of imperfect information.

Lastly, predictions of the future are always fraught with difficulties due to the lack of information and uncertainties associated with the future. The need for exchange rate policy to be formulated in a forward looking manner (see previous Section, 'b. Time Lag') compounds the difficulties of planning and implementing exchange rate policy.

3.6 Coordination of Macroeconomic Policies

It is important to appreciate that exchange rate policy does not work alone in Singapore.

A well formulated exchange rate policy is critical in promoting price stability (with the limitations highlighted in Section 3.5) which in turn provides the foundation for sustained economic growth. However, it must be complemented by other appropriate macroeconomic policies.

In the long run, the growth of an economy is also determined by supply-side factors such as technological progress, capital accumulation and the size and quality of the labour force. In addition to sound demand management policies, governments must be able to influence these supply-side factors through supply-side policies.

There must be efficient co-ordination of fiscal, monetary and supply-side policies to bring about sustained economic growth over the long term. This idea is consistent with the *Tinbergen-Theil* theory of economic policy which states that *one policy instrument should be optimally used to achieve one macroeconomic target at one time*. Hence, if a government wishes to achieve multiple macroeconomic targets simultaneously within the economy, it should possess as many policy tools.

Refer to the following link for an excellent FAQ on Singapore's Exchange Rate Policy published by the MAS.

Summary:

- Singapore monetary policy's emphasis on the exchange rate instead of manipulating interest rates stems from the ***small*** size and ***openness*** of the Singapore economy.
- The aim of Singapore's exchange rate policy is to achieve low and stable inflation which provides the basis for sustained economic growth.
- Singapore's default exchange rate policy is modest and gradual appreciation of the S$.
- Policy of once-off depreciation of S$ is considered during a deep recession.
- The exchange rate policy affects the macroeconomy through its impact on export and import prices. These, in turn, affect Aggregate Demand and Aggregate Supply.

******END******

Appendix 1: Functions of the Central Bank

a. It possesses the monopoly of issue of currency

Notes and coins are issued through the agency of the Central Bank. It is intended to secure control over currency so as to maintain the stability of internal price level.

b. The Central Bank serves as a banker to the government

Central Banks everywhere fulfil the functions of banker, agent and advisor of the government. As the government's banker, the Central Bank:

- Conducts the banking amount of government departments, boards and enterprises
- It makes temporary advances to the government in anticipation of the collection of taxes or the raising of loans from the public and extra ordinary advances during a depression or war.
- It carries out the government transactions involving purchases or sales of foreign currencies.

The Central Bank is also called upon to perform various services as the government's financial agent and financial advisor. It assumes all the duties connected with the administration and management of the national debt. It also undertakes the payment of stockholders of interests on the national debt. It also gives advice and information regarding the state and trend of the money and capital market, the terms and other conditions on which new government loans can be issued or old loans converted. It also grants advances to the government.

c. Lender of last resort

In times of financial crisis, commercial banks call in their loans to the money market, thus, compelling the discount houses and bill brokers to borrow from the Central Bank. At such times, the Central Bank provides the commercial banks and other credit institutions with additional or alternative means for the conversion of certain of their earning assets into cash. The Central Bank is always prepared to lend although it normally charges higher rates of interest.

d. It acts as a banker's bank

The commercial banks hold their cash reserves at the Central Bank and they use the Central Bank very much as a private customer uses his bank. In particular, they:

- Draw notes and coins from their balances at the Central Bank as required.
- Set off the net payment which has to be made to other banks as a result of the day's clearing by drawing on the balance held at the Central Bank
- Take advice on financial matters from the bank.

e. Controller of Credit

The controller of credit can be considered as the main function of Central Bank. It can adopt any of the weapons for credit control which it can act at its disposal. It may bring about a change in the bank rate, adopt open market operations or it may vary the reserve ratio of the other banks. Other methods used are special deposits, moral suasion and margin requirements.

f. A bank of central clearance, settlement and transfer

As the commercial banks keep their surplus cash on deposit with the Central Bank, this allows for settlements between the banks easily and conveniently, with proper records

being kept by the Central Bank. It offers facilities for clearing of cheques and other inter-bank obligations among the commercial banks.

g. Maintain exchange stability of the currency of the country

It has to adopt measures which may result in the stabilization of the foreign exchange of a country. By buying and selling foreign currencies on the foreign exchange market, the Central Bank can affect the exchange rate. For example, if there is a sudden selling of Sing Dollars, the Central Bank can help to prevent the currency from depreciating by using its reserves to buy Sing Dollars on the foreign exchange market.

Appendix 2: Determination of Interest in the Loanable Funds Market or Goods Market

Demand for Loanable Funds

The demand for loanable funds depends on the willingness of firms to borrow money to undertake new investment projects, such as building new factories or engaging in research and development or purchase of capital goods. Firms will compare the returns they expect to make on an investment with the interest they incur on borrowing the funds. The lower the interest rate, the more investment projects firms can profitably undertake and the greater the quantity demanded of loanable funds.

The demand for loanable funds also stems from the willingness of households to borrow for the purchase of consumer durables and housing. The lower the interest rate, the lower the total cost of purchasing. Hence the higher the households' quantity demanded of loanable funds. This explains why the quantity demanded of loanable funds varies inversely with the rate of interest and the demand curve for loanable funds slopes downwards from left to right.

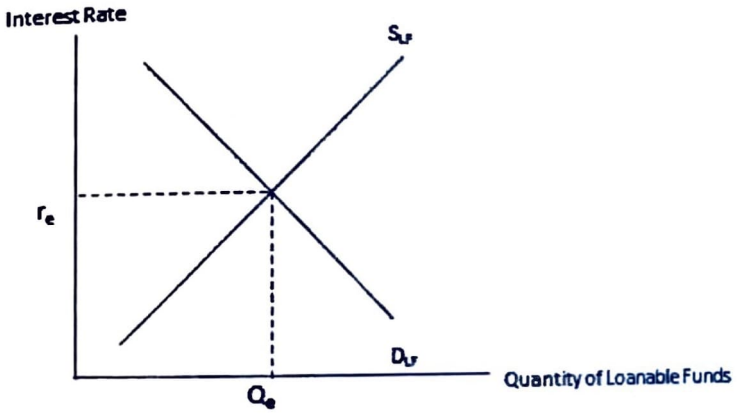
Governments also demand loanable funds for the purpose of financing public infrastructure projects and financing fiscal deficits.

Supply of Loanable Funds

The supply of loanable funds is determined by the level of national saving (Real National Income – Consumption Expenditure – Government Expenditure) in the economy. The quantity of loanable funds supplied varies directly with the interest rate. The higher the rate of interest, the higher the opportunity cost of present consumption as the interest on savings forgone is higher. Hence the higher the interest rate, the higher the level of savings and therefore the greater the amount of loanable funds supplied. The supply of loanable funds curve is upward sloping, indicating a direct relationship between the quantity of loanable funds supplied and the rate of interest.

Equilibrium in the Loanable Funds Market

The equilibrium real interest rate, r_e, is determined when the Q_d of loanable funds equals the Q_s of loanable funds as seen below. At any interest rate above r_e, there is an excess supply of loanable funds and therefore interest rate will fall. At any interest rate below r_e, there is excess demand for loanable funds and therefore interest rate will rise.



Changes in Demand for Loanable Funds

A change in any factor apart from interest rate on households' and firms' decision to borrow funds is shown by a shift of the demand curve for loanable funds.

i) Expected profit: Other things remaining the same, the greater the expected profit rate from new capital, the greater is the amount of investment spending undertaken and hence the greater is the demand for loanable funds by firms.

ii) Technological advancement: With greater advancement in technology, the productivity of capital will improve. This results in an increase in expected profits. Thus, more investment will be undertaken and the demand for loanable funds will increase.

iii) High economic growth: With a high economic growth, households and firms become more optimistic and are inclined to consume and invest more, resulting in an increase in demand for loanable funds.

Changes in Supply of Loanable Funds

Supply of loanable funds comes from national savings. Factors that cause a shift of the supply curve of loanable funds include:

i) Disposable income: The greater the households' disposable income, the greater the absolute level of savings, ceteris paribus. A higher level of savings means more funds are available for making loans at each interest rate, hence increasing the supply of loanable funds.

ii) Expected future income: If households or firms expect future income to increase, they will spend more currently. Hence, savings in the current period will fall. The smaller quantity of savings will mean the amount of loanable funds available at each interest rate is lower. This results in a decrease in the supply of loanable funds. Conversely, if they expect future income to decrease, more savings will be accumulated. Hence more loanable funds are available at each interest rate, thus increasing the supply of loanable funds.

iii) Monetary policy: Expansionary monetary policy that increases real national income will increase the national savings and supply of loanable funds. On the other hand, a decrease in money supply will mean that less funds are available for lending.

iv) Fiscal deficit: When the government spends, there will be less loanable funds available reducing national saving.

Appendix 3: Techniques to control Money Supply and Interest Rates

Techniques to control Money Supply

There are a variety of techniques that a central bank could use to control the money supply. Assume in each case that the central bank wishes to reduce money supply. A restrictive monetary policy will result in a fall in the supply of money relative to the demand for money. The monetary authority can reduce Ms by a variety of ways such as:

(i) Open Market Operations

Open Market Operations are the most widely used of the four techniques around the world. They involve the sale or purchase by the central bank of government securities (bonds or bills) in the open market.

If the central bank wishes to reduce the money supply, it sells more securities. When people buy these securities, they pay for them with cheques drawn on banks. Thus, banks' balances* with the central bank are reduced. If this brings bank reserves below their prudent ratio, banks will reduce advances. There will be a multiple contraction of credit* and hence of money supply.

(ii) Reduced Central Bank lending to the banks

The central bank in most countries is prepared to provide extra money to commercial banks. Discount rate refers to short term rate which the Central Bank charges the commercial bank for funds borrowed. When the discount rate is raised, the other short term rates in the economy will tend to rise. If banks obtain less money in this way, they will have to cut back on lending. Less credit will be created and money supply will therefore be reduced. Thus, borrowing becomes more costly thereby checking aggregate demand.

(iii) Bank's Liquidity Ratio

The use of a minimum reserve ratio may impact credit creation* and money supply. The central bank could impose a statutory minimum reserve ratio on the banks. Such ratios come in various forms. The simplest is where the banks are required to hold a given minimum percentage of their deposits in the form of cash deposits with the central bank. The reserve ratio is to prevent banks from:
1. Having a shortage of cash when large deposits are withdrawn and
2. Limit the amount of credit that will be created.

Credit Creation
The use of a minimum reserve ratio: The central bank could impose a statutory minimum reserve ratio on the banks. Such ratios come in various forms. The simplest is where the banks are required to hold a given minimum percentage of their deposits in the form of cash of deposits with the central bank.

This system works as follows.
For example, let's assume that a deposit, cash of $100,000 is made into Bank A. If the reserve ratio is 10%, then $10,000 must be kept on hand by Bank A ($10,000 is 10% of $100,000) and up to $90,000 of new loans can be issued by Bank A.

When the $90,000 worth of loans are deposited into Bank B, this sum is added to the reserves of Bank B and an additional $81,000 of new loans can then be issued by Bank B ($81,000 is 90% of $90,000). This process goes on and on until eventually there is no more added to the reserves.

Appendix 4: Quantitative Easing Explained

Quantitative easing—QE for short—is a monetary policy strategy used by central banks like the Federal Reserve. With QE, a central bank purchases securities in an attempt to reduce interest rates, increase the supply of money and drive more lending to consumers and businesses. The goal is to stimulate economic activity during a financial crisis and keep credit flowing.

What Is Quantitative Easing (QE)?

When a central bank decides to use QE, it makes large-scale purchases of financial assets, like government and corporate bonds and even stocks. This relatively simple decision triggers powerful outcomes: The amount of money circulating in an economy increases, which helps lower longer-term interest rates. This lowers the cost of borrowing, which spurs economic growth.

By buying longer maturity securities, a central bank is aiming to lower longer-term market interest rates. Contrast this with one of the main tools used by central banks: Interest rate policy, which targets shorter-term market interest rates.

When the Federal Reserve adjusts its target for the federal funds rate, it's seeking to influence the short-term rates that banks charge each other for overnight loans. The Fed has used interest rate policy for decades to keep credit flowing and the U.S. economy on track.

When the fed funds rate was cut to zero during the Great Recession, it became impossible to reduce rates further to encourage lending. Instead, the Fed deployed QE and began purchasing mortgage-backed securities (MBS) and Treasuries to keep the economy from freezing up.

QE Sends a Powerful Message to Markets

Central banks like the Fed send a strong message to markets when they choose QE. They are telling market participants that they're not afraid to continue buying assets to keep interest rates low.

"It's a powerful signal that the Fed wants to stimulate economic growth and that is an influential force on capital markets and asset prices," says Bill Merz, head of fixed income research at U.S. Bank Wealth Management in Minneapolis. "That signaling effect so far has been the most influential component of quantitative easing."

QE is deployed during periods of major uncertainty or financial crisis that could turn into a market panic. It's intended to both address immediate concerns in the financial markets and stave off an even worse crisis, says Luke Tilley, chief economist at Wilmington Trust in Philadelphia and a prior economic advisor at the Federal Reserve Bank of Philadelphia.

"One goal is to put out the house fire and the other is to use the fire hose to flood the system with liquidity so you don't have a financial crisis," he says.

How Does Quantitative Easing Work?

Quantitative easing works by making large-scale asset purchases. In response to the coronavirus pandemic, for example, the Fed has begun purchasing longer-maturity Treasuries and commercial bonds. Here's how the simple act of buying assets in the open market changes the economy (mostly) for the better:

Fed buys assets. The Fed can make money appear out of thin air—so-called money printing—by creating bank reserves on its balance sheet. With QE, the central bank uses

new bank reserves to purchase long-term Treasuries in the open market from major financial institutions (primary dealers).

New money enters the economy. As a result of these transactions, financial institutions have more cash in their accounts, which they can hold, lend out to consumers or companies, or use to buy other assets.

Liquidity in the financial system increases. The infusion of money into the economy aims to prevent problems in the financial system, such as a credit crunch, when available loans decrease or the criteria to borrow money drastically increase. This ensures the financial markets operate as normal.

Interest rates decline further. With the Fed buying billions worth of Treasury bonds and other fixed income assets, the prices of bonds move higher (greater demand from the Fed) and yields go lower (bondholders earn less). Lower interest rates make it cheaper to borrow money, encouraging consumers and businesses to take out loans for big-ticket items that could help spur economic activity.

Investors change their asset allocations. Given the now-lower returns on fixed income assets, investors are more likely to invest in higherreturning assets—like stocks. As a result, the overall stock market could see stronger gains because of quantitative easing.

Confidence in the economy grows. Through QE, the Fed has reassured markets and the broader economy. Businesses and consumers may be more likely to borrow money, invest in the stock market, hire more employees and spend more money—all of which helps to stimulate the economy.

The Downsides of QE

Implementing QE comes with potential downsides, and its impact is not universally beneficial to everyone in the economy. Here are some of the dangers:

QE May Cause Inflation

The biggest danger of quantitative easing is the risk of inflation. When a central bank prints money, the supply of dollars increases. This hypothetically can lead to a decrease in the buying power of money already in circulation as greater monetary supply enables people and businesses to raise their demand for the same amount of resources, driving up prices, potentially to an unstable degree.

"The biggest criticism of QE is that it might cause rampant inflation," says Tilley. But that doesn't always happen. For instance, inflation never materialized in the 2009-2015 period when the Fed implemented QE in response to the financial crisis.

QE Isn't Helpful for Everyone, May Cause Asset Bubbles

Some critics question the effectiveness of QE, especially with respect to stimulating the economy and its uneven impact for different people.

Quantitative easing can cause the stock market to boom, and stock ownership is concentrated among Americans who are already well-off, crisis or not. "There is a healthy debate in academia and capital markets about the efficacy of quantitative easing," Merz says, adding that in his observation, academic papers are "split down the middle' on whether this policy does what it's intended to do. "The two primary critiques are that it might not work and we have trouble proving that it does."

That said, Michael Winter, the founder and chief executive officer of Leatherback Asset Management, notes that quantitative easing has been

"extremely effective" in stabilizing and eventually increasing asset prices in both the fixed income and equity markets. And when the market rebounds quickly, as it did following the bear market of 2020, the question becomes when do we say enough is enough?

By lowering interest rates, the Fed encourages speculative activity in the stock market that can cause bubbles and the euphoria can build upon itself so long as the Fed holds pat on its policy, Winter says. "This is a confidence game; market participants think the Fed has their back and as long as they do, there's limited fear," he says.

QE May Cause Income Inequality

A final danger of QE is that it might exacerbate income inequality because of its impact on both financial assets and real assets, like real estate. "It has benefited those who do well when asset prices go up," Winter says.

This potential for income inequality highlights the Fed's limitations, Merz says. The central bank doesn't have the infrastructure to lend directly to consumers in an efficient way, so it uses banks as intermediaries to make loans. "It is really challenging for the Fed to target individuals and businesses that are hardest hit by an economic disruption, and that is less about what the Fed wants to do and more about what the Fed is allowed to do," he says.

"I have likened it to standing at the edge of a swimming pool and holding a pitcher of water that is dyed purple, and then dumping that water into the swimming pool," Tilley says. "It's not going to take any time before you don't know where the purple water goes." In other words, once QE money is on the balance sheets of primary dealers, it may not benefit everyone in the economy as intended.

Historical Examples of Quantitative Easing

The Bank of Japan has been one of the most ardent champions of quantitative easing, deploying this policy for more than a decade. The European Central Bank and the Bank of England also used QE in the wake of the global financial crisis that began in 2007.

The Fed began using QE to combat the Great Recession in 2008, and then-Fed Chair Ben Bernanke cited Japan's precedent as both similar and different to what the Fed planned to do. In three different rounds, the central bank purchased more than $4 trillion worth of assets between 2009 and 2014.

In the first rounds of QE during the financial crisis, Fed policymakers pre-announced both the amount of purchases and the number of months it would take to complete, Tilley recalls. "The reason they would do that is it was very new, and they didn't know how the market was going to react," he says.

By the third round of QE in 2013, the Fed moved away from announcing the amount of assets to be purchased, instead pledging to "increase or reduce the pace" of purchases as the outlook for the labor market or inflation changes.

"During the financial crisis, it was relatively uncharted territory and so the Fed was more cautious about messaging and more cautious about the amounts of purchases and the duration of their policies," Merz adds. "Once some of the concerns cited by critics in the market didn't come to fruition, at that point the Fed was emboldened to consider expanding the program and doing it in larger sizes."

QE and the Coronavirus Crisis

Building on the lessons of the Great Recession, the Fed relaunched quantitative easing in response to the economic crisis caused by the Covid-19 pandemic. Policymakers announced plans for QE in March 2020—but without a dollar or time limit.

The unlimited nature of the Fed's pandemic QE plan was the biggest difference from the financial crisis version. Market participants got comfortable with this new approach after three rounds of QE during the financial crisis, which gave the Fed flexibility to keep purchasing assets for as long as necessary, Tilley says.

Winter notes that the stock market took off in response to the new plan. The S&P 500 surging nearly 68% from its March 2020 lows through the end of the year, at least in part because of the safety net of QE.

Statements from policymakers reinforced that it would support the economy as much as possible, Merz says. "When you have an institution as powerful as the Fed throwing the kitchen sink at supporting the recovery and saying again and again they will support this as long as it works, we should listen," he says.

Does QE Work?

Yes and no say Tilley, Winter, and Merz. The policy is effective at lowering interest rates and helps to boost the stock market, but its broader impact on the economy isn't as apparent. And what's more, the effects of QE benefit some people more than others, including borrowers over savers and investors over non-investors.

QE has been "hugely effective" in the early parts of both the most recent coronavirus crisis and the financial crisis, according to Tilley. "In March 2020, the illiquidity in the Treasury market was striking; it was scary," he says.

But once the market has stabilized, the risk of QE is that it could create a bubble in asset prices—and the people who benefit most may not need the most help, Winter says. And the cost to this policy is significant in that it adds to the imbalances in income inequality in this country, he adds.

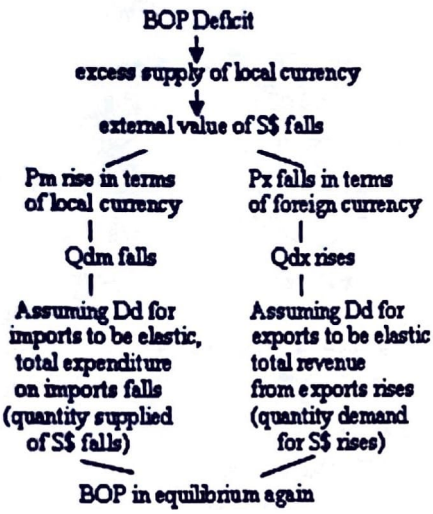
And there are lingering concerns about the potential of relying too heavily on QE, and setting expectations both within the markets and the government, Merz says. "An explosion in the money supply could harm our currency and that's the ultimate fear behind QE that hasn't happened in a dramatic way," he adds.

What's clear is that there are pros and cons to QE, and even evaluating its effects is difficult, Stephen Williamson, a former economist with the Federal Reserve Bank of St. Louis, concluded in a paper. "With respect to QE, there are good reasons to be skeptical that it works as advertised, and some economists have made a good case that QE is actually detrimental," he writes.

Source: Forbes Advisor, 2022

(https://www.forbes.com/advisor/investing/quantitative-easing-qe/)

Appendix 5: An Assessment on the Floating versus the Fixed Exchange Rate Systems

	Floating Exchange Rate System	Fixed Exchange Rate System
Advantages	**1. Automatic correction of BOP disequilibrium**  **2. Allows greater freedom to pursue independent domestic policy goals** Allows the government to use monetary and fiscal policy to pursue internal policy objectives such as full employment, economic growth, low inflation or price stability, without external constraints (i.e. maintaining BOP equilibrium). Under the floating exchange rate system, the government will be free to pursue expansionary policies targeted to reduce unemployment without worrying that they will aggravate BOP deficit as it is self-correcting. **3. No need to hold foreign reserves** It will not be necessary for the country to maintain large reserves of foreign exchange to manage the value of their currency. Thus, reserves can be put into more productive use elsewhere.	**1. Provides greater certainty** This may encourage International Trade since it provides certainty and reduces risks to importers and exporters. Increased trade allows countries to fully exploit their comparative advantage. Foreign direct investment may be encouraged. Firms will be much more willing to invest in the long term and set up factories in a foreign country if the uncertainty of exchange rate fluctuation is removed. **2. Prevents speculation** An appropriate and credible fixed exchange rate will not attract speculation. If people believe that exchange rate will remain fixed, they see no point in speculating. If there is no speculative pressure on the currency, the Central bank will need to intervene less to maintain the rate. **3. Exerts discipline** The government will need to maintain low inflation if it does not want the fixed rate to diverge from the free market rate, which makes the exchange rate either undervalued or overvalued. Inflation can lead to changes in quantity demanded of exports and imports, hence affecting demand and supply of currency. Domestic firms and employees may also try to maintain low costs to remain competitive in international markets. Monetarists have argued that a fixed exchange rate imposes a monetary discipline upon governments from excessive expansionary fiscal policies.

Disadvantages

1. Uncertainty and instability
Wide fluctuations in the exchange rate can cause international businesses to lose confidence in the economy. They are unsure of their profit levels in international business dealings and may suffer losses if exchange rate moves against them. Fluctuations in exchange rate can deter long term investments too. Firstly, foreign investors may experience a fall in profit margins if the domestic currency depreciates drastically against foreign currencies. Secondly, loans denominated made in foreign currency incur large debt payments if domestic currency weakens considerably against other currencies.

2. Encourages speculation
Fluctuations in exchange rate will encourage speculative movements of currencies and may have a destabilising influence, causing the fluctuations to be self-perpetuating.
Example: If speculators see a decline in the exchange rate as a signal for further decline, they would move 'hot money' out of the country, causing a greater decline in the exchange rate.

3. Inflationary impact
Depreciation which corrects BOP deficit will cause a rise in domestic price level since imports become dearer and exports cheaper, leading to a greater demand for the country's goods and possible demand-pull inflation. This may also cause cost-push inflation especially if imports are mainly raw materials and essential foodstuffs.
On the other hand, appreciation may not cause a comparable fall in domestic prices and wages because they tend to be rigid and sticky downwards.

1. Need to hold foreign reserves
BOP disequilibrium will cause the exchange rate to fluctuate in a flexible exchange rate system. To prevent such fluctuations, the Central Bank will buy or sell foreign exchange in the forex market in order to support the official exchange rate. Thus, the Central Bank must hold sufficient foreign reserves; otherwise the official rate will have to be changed in order to correct the BOP disequilibrium.

2. Monetary policy ineffective
The government cannot control inflation by attempting to control money supply. By reducing money supply and raising interest rates, hot money is attracted into the country, which puts an upward pressure on the exchange rate. To prevent the currency from appreciating, the government has to sell the domestic currency in the foreign exchange market. When the buyers of the currency spend it, the currency is deposited into the local banking system, raising money supply again. This cause interest rates to fall, negating the effects of the original intended contractionary policy.

3. Speculation during times of persistent BOP deficit
If persistent BOP deficits occur and the central banks have to use large amounts of foreign reserves to maintain the fixed exchange rate, it will be a matter of time before the government runs out of foreign reserves and the fixed rate can no longer be maintained. There will be eventual depreciation of currency. This may invite confidence crisis and increase speculative activity, and uncertainty. Example, the Asian Financial Crisis in 1997.

Appendix 6: Why is Singapore Different, i.e. neither Float nor Fixed?

(Source: Singapore Exchange Rate Policy, MAS)

Since the Asian crisis, there has been a growing consensus that the only sustainable exchange rate regime for emerging markets is either a currency board or a floating exchange rate regime. Singapore stands in contrast to this conventional wisdom. Why does MAS choose a managed float? The short answer is that this provides MAS with flexibility to deal with shocks while at the same time maintaining the purchasing power of the Singapore dollar (SGD).

A basic philosophy underlying Singapore's exchange rate policy is to preserve the purchasing power of the SGD, in order to maintain confidence in the currency and preserve the value of workers' savings, especially their CPF balances. Over the years, the managed float has served Singapore well in this respect. Inflation and interest rates have been low, and expectations are for the SGD to appreciate over time.

When economic conditions change, and it is necessary to reduce the real exchange rate, the government prefers to do this by direct measures. This includes reducing wages through the variable bonuses, and in extremis by reducing employer contributions to the Central Provident Fund. This has happened twice: in the mid-1980s recessions, and again in the Asian financial crisis. The government believes that it is better to confront the issue squarely and persuade workers to accept a direct wage cut. If it glossed over the problem through a steeper SGD devaluation, workers would find out later that inflation had eroded the purchasing power of their wages. In fact their loss would be greater because most workers have accumulated substantial CPF savings denominated in SGD, whose real value would also shrink.

Workers would seek higher wage settlements to compensate, and the wage price spiral would soon erode away the temporary cost advantage. Worse, Singaporeans would lose confidence in the currency and the government.

❖ Why not float?

A floating exchange rate regime would prevent the government from meeting this fundamental objective. It would also not be appropriate for a small and open economy like Singapore for two other reasons.

First, MAS has found the exchange rate to be the most effective instrument to keep inflation low. Other possible intermediate targets, in particular interest rates are less effective in influencing real economic activity and domestic inflation outcomes. The main advantage of a floating regime – the ability to pursue an independent monetary policy – is less relevant to Singapore that to other larger, less open economies with domestic policy imperatives.

Second, a freely floating SGD may become too volatile in the short-run. Worse, the currency could become misaligned over a sustained period of time, leading to resource misallocation.

❖ Why not fixed?

First, the Singapore economy has highly diversified trading links, substantial fiscal surpluses, and a long track record of low inflation. Both inflation and interest rates have been lower in Singapore than in the US. There is thus little need for a nominal anchor for the SGD to manage inflationary expectations, or for the discipline imposed by the monetary policy of a foreign country – most likely the US – to which the SGD is pegged.

Second, there would be a cost resulting from the adoption of the anchor country's monetary policy because of the divergence in business cycles. This is shown by Hong

Kong's example. While Hong Kong's business and economic cycle has become increasingly aligned with that of China, its peg to the USD ties its monetary policy closely to that of the US. During the early 1990s, the Hong Kong economy was growing rapidly and warranted tighter monetary conditions, but interest rates fell in line with those in the US, which was experiencing economic slowdown. This contributed to an asset price bubble. Then during the Asian crisis, when the regional currencies depreciated sharply, the Hong Kong dollar experienced a sharp involuntary appreciation in trade-weighted terms. The adjustment was severe, especially in asset price deflation.

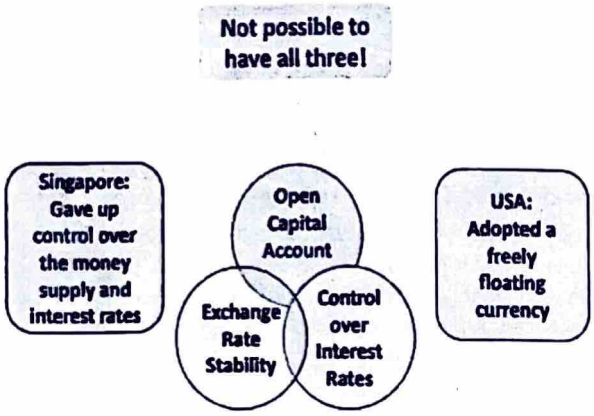
Third, a fixed exchange rate would make it more difficult for Singapore to absorb shocks from abroad, and adjust the value of the SGD exchange rate in line with changes in the country's underlying macroeconomic fundamentals. This would be so even if the SGD were pegged to a trade weighted basket rather than a single anchor currency. For example, during the Asian crisis from late 97 to early 98, when the regional economies depreciated sharply against the USD, the SGD too depreciated against the USD, but by much less. In trade-weighted terms the SGD actually appreciated moderately, because MAS exercised flexibility to allow the exchange rate to rise above the policy band. If the SGD had been required to remain strictly within the policy band, or had been pegged to the NEER, the MAS would have had to force the SGD to depreciate much more against the USD, at a time when market sentiment was weak. This could have resulted in a loss of confidence in the SGD. Instead, MAS only brought down the NEER to within the policy band months later, when financial markets had stabilized and conditions had become more conducive.

Appendix 7: Implications of an Exchange Rate-Based Monetary Policy - Open Economy Trilemma

(Source: MAS, Economics Explorer Series Monetary Policy & The Economy)

According to the Open Economy Trilemma, a country cannot have an open capital market, conduct conventional monetary policy based on domestic interest rates, and manage its currency at the same time. It can choose only two of the three policy options. The US, for example, has an open capital market and wants to control domestic interest rates, so it allows its currency to float freely. Other countries may desire to use domestic interest rates to stimulate the economy and to fix their currencies at the same time. In such instances, they would have to impose currency and capital controls in order to maintain stability in the exchange rate.

The Open Economy Trilemma



Singapore has chosen to manage the exchange rate as its operating instrument of monetary policy for the reasons explained earlier [*see section 4.2*]. It is also a major international financial centre and has had no capital or currency controls since 1978, which means the economy is completely open to capital flows. In view of the policy trilemma and the fact that MAS targets the exchange rate, it cannot also determine domestic interest rates or the money supply.

Should MAS bring about a shift in domestic interest rates relative to world rates, this would be met by a shift of funds in or out of Singapore. This is because Singapore has no controls on capital flows, hence changes in the difference between the global and domestic interest rates (such as the US$ LIBOR and S$ SIBOR) will result in capital flowing in or out. Such capital flows will cause the exchange rate to appreciate or depreciate.

To keep the S$NEER within its policy band, MAS must then offset the impact of its initial adjustments to the domestic interest rate. In doing so, this means that MAS effectively gives up control over the domestic interest rates and the money supply. Monetary policy in Singapore is synonymous with exchange rate policy.

As can be seen, given its preference to maintain free capital flow, attempts at managing Singapore's interest rate would result in loss of control over its exchange rate. The converse of attempting to managing exchange rate causing Singapore to not be able to manage interest also holds true.

The S$ has tended to appreciate against most other currencies over long periods of time, and hence domestic interest rates in Singapore move in line with, but are typically a little lower than, global rates. In sum, domestic interest rates in Singapore are effectively determined by foreign interest rates in global financial markets, particularly those in the US.

Appendix 8: Further Readings

	Overnight Rate (Source: Bank of Canada)
	Bank Rate (Source: Bank of England)
	Open Market Operations (Source: Bank of Korea)