



## Occasional Paper Series

2006, Number 1

### **A Primer on Inflation**

*Marjorie Heerah-Pampusa,  
Waësh Khodabocus and Vandana Morarjee*

### **A Primer on Core Inflation**

*Jitendra N. Bissessur and Vandana Morarjee*

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**Bank of Mauritius**



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Issued by the Bank of Mauritius  
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## Foreword by the Governor

Early textbooks in economics did seldom use the word “inflation” in its technical sense as has been used since the early decades of the last century. They spoke of inflation of money supply or the quantity of credit created in the economy. The inflation of money supply or credit in excess of the desired level was deemed to cause increases in the general price level. Today the word “inflation” clearly means a sustained increase in the aggregate price level causing a fall in the purchasing power of money.

The analysis of the price mechanism is a fundamental contribution of economists to the understanding of the workings of our society. Adam Smith helped us understand the price mechanism. If workers, landowners, investors etc. buy at lowest prices and sell at highest prices they will all, individually and collectively, be better off in the material sense. When there are shortages sellers raise prices. This induces suppliers to supply more; it simultaneously induces buyers to seek alternative goods. Conversely, when there are surpluses prices fall. This induces producers to supply less; it simultaneously induces consumers to buy more. Flexible prices are necessary for markets to operate efficiently. In any market-based economy, price fluctuations signal producers and consumers about shortages and surpluses.

Some countries – mostly the communist countries – did away with the price mechanism. Allocation of scarce resources was done by a system of rationing, that is, by queuing and not by price increases. Consumers willing and able to queue for hours or even days and weeks got the goods. This was and indeed is the most inefficient way of allocating scarce resources. Readers will recall that communist countries have shunned their methods of allocating scarce resources through central planning and adopted market oriented system of price determination. In the context of *perestroika* Mr Gorbachev praised the efficacy of the price mechanism.

Is inflation a good thing? Some economists posit that mild inflation is good for the economy. Trade Unions resist cuts in money wages and even a wage freeze. They generally seem to be less concerned about cuts in *real* wages that are a result of *money* wages growing less than increases in the price level. It goes to say that when there is inflation real wages can be brought down without a discretionary reduction in money wages. Clearly, because of rigidities in certain prices, a mild inflation eases the price mechanism. Other economists argue that the risk for mild inflation turning into galloping inflation is high. They are of the view that once inflation accelerates it is indeed difficult to stem the momentum. It is like toothpaste out of the tube. Once the paste is out, it is difficult to get it back into the tube. Galloping inflation is likely to turn into hyperinflation leading to the destruction of the currency. The view that mild inflation would necessarily lead to hyperinflation has not gained much support.

Economists with a monetarist bent of mind cling to the conviction that inflation is a monetary phenomenon. Milton Friedman forcefully observed that ‘Inflation is always and everywhere a monetary phenomenon’. Henry Wallich commented that inflation is a monetary phenomenon in the same way as shooting people is a ballistic phenomenon. Over the years economists have increasingly adopted much more rigorous methods of analysing factual evidence. There is no clear-cut case for definitively stating that the monetarists have got it altogether right. Analyses of the causes of inflation for the period 1970 to 1990 for the UK and a number of similar studies on inflation for several other countries do not clearly support the view that “inflation is *always* and *everywhere* a monetary phenomenon”. (italics mine).

Since a variety of factors affect the price level, both monetary and non-monetary, central bankers have devised methods to isolate the impact of such shocks like the price of oil from the headline inflation rate to obtain the core inflation rate. The core inflation rate provides a guide for the conduct of monetary policy in order to achieve lasting price stability. It also provides a good indication of the extent to which monetary policy succeeds in achieving price stability.

This first issue of the Bank of Mauritius Occasional Paper Series is devoted to inflation that is a major concern for central bankers. The commitment to price stability as the primary goal of monetary policy as stated in central bank legislations in no way implies that the health of the economy should be sacrificed. On the contrary, by ensuring a stable price environment, monetary policy helps foster economic growth. In Mauritius, the price stability objective without jeopardizing growth prospects is laid down in the Bank of Mauritius Act 2004.

These Occasional Papers, initiated by me, ought to have been published a few years ago. For some reasons the publication has been delayed. The first best time to plant a tree was twenty years ago. The second best time is right now. I do fervently hope that this publication will help readers understand and appreciate the Primers on Inflation and Core Inflation. I am pleased to extend my personal appreciation to the authors of the two papers.

R. Basant Roi, G.C.S.K.

## A Primer on Inflation

*Marjorie Heerah-Pampusa, Waësh Khodabocus and Vandana Morarjee*

### Abstract

This paper gives an overview of the concept of inflation and puts into perspective the role of the Bank of Mauritius in maintaining price stability in Mauritius. Its aim is to explain in simple terms the meaning, measurement, causes and effects of inflation. The monetary and non-monetary factors that triggered inflation in Mauritius over the period 1975 to 2005 are briefly described. The policy actions initiated by the Bank of Mauritius over the years as well as its current monetary policy framework are elaborated. It is seen that, by exerting closer control over money supply, the Bank of Mauritius has been able to reduce the rate and volatility of inflation, especially as from the beginning of 2000.

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## **1. Introduction**

Inflation is the term used to describe a sustained increase in the general price level of goods and services over a given period of time. With an annual inflation rate of 5 per cent, for example, the amount of money required to purchase the same volume of goods and services today compared to 20 years ago would have more than doubled.

As a simple example of rising prices over time, a person going to the movies today has to pay around Rs150 for a ticket. Thirty years ago, a movie ticket would have cost only one or two rupees. With Rs150, a middle-income household could have bought foodstuffs for a few weeks three decades ago!

Rising prices have important economic and welfare implications. Their primary effect is a rise in the cost of living and, as corollary, an erosion in purchasing power of a currency. A rapid rise in the general price level creates uncertainty in the economy, rendering decision-making and forward planning by consumers, businesses, and government difficult. Eventually, inflation may strain a country's social fabric as each group in society competes with other groups to ensure its wages are keeping up with the rising level of prices.

The social and economic costs of inflation have made authorities more concerned with a stable price level as a goal of economic policy. There is a general consensus today that a stable price level is an important condition for promoting a healthy macroeconomic environment conducive to economic growth.

Central banks around the world have therefore made it their priority to control inflation and maintain price stability. In Mauritius, according to the Bank of Mauritius Act 2004, the primary objectives of the Bank of Mauritius are to maintain price stability and promote orderly and balanced economic development.

This paper describes the basic concepts relating to inflation. Section 2 explains the measurement of inflation in Mauritius. Sections 3 and 4 elaborate on the causes and effects of inflation, respectively. A historical perspective of inflation in Mauritius is provided in Section 5. Finally, the role of the Bank of Mauritius in controlling inflation is reviewed in Section 6.

## **2. How is Inflation Measured?**

While inflation should reflect the change in the general price level in the economy, it is practically an impossible task to measure the changes in prices of all the goods and services consumed by all households in the economy. To overcome this, the price level is computed with reference to a consumption basket made up of a selection of goods and services that would be consumed by a typical household.

Using the prices of the goods and services making up the consumption basket, it is possible to construct a Consumer Price Index (CPI). In Mauritius, the CPI is computed every month by the Central Statistics Office (CSO), and is published within five working days after the reference month.

## 2.1 The Construction of the CPI

### *Household Budget Survey*

The construction of the CPI begins with a Household Budget Survey conducted by the CSO. This survey yields information on the spending habits of private households in Mauritius and allows the CSO to determine the goods and services that will form part of the representative consumption basket. The weights of those goods and services are obtained by comparing expenditure on those items to total consumption expenditure.

The CSO conducts the Household Budget Survey every five years or so to keep track of changes in consumption patterns and to re-evaluate the weights attached to each item in the basket. The last Survey was carried out in 2001-02, which is currently the base period for the calculation of the CPI.

### *Composition of the Consumption Basket*

The composition of the current consumption basket, based on data obtained from the 2001-2002 Household Budget Survey, comprises the following 12 divisions:

1. Food and Non Alcoholic Beverages
2. Alcoholic Beverages and Tobacco
3. Clothing and Footwear
4. Housing, Water, Electricity, Gas and Other Fuels
5. Furnishings, Household Equipment and Routine Household Maintenance
6. Health
7. Transport
8. Communication
9. Recreation and Culture
10. Education
11. Restaurants and Hotels
12. Miscellaneous Goods and Services

### *Calculation of the CPI*

To calculate the CPI, the CSO collects the prices of 824 item indicators – that is, those commodities that sell in greatest volume – in the twelve divisions regularly each month according to strict procedures and methods. The identities of the item

indicators in the CPI basket are kept confidential so that their prices are not artificially modified. Prices include taxes, if any, imposed on the commodities.

Once prices have been collected and checked for consistency and validity, the CPI is calculated by means of the Laspeyres index<sup>1</sup>:

$$CPI_t = \frac{\sum_i P_{it} Q_{i0}}{\sum_i P_{i0} Q_{i0}}$$

where,

$$CPI_t = \text{CPI in period } t;$$

$$\sum_i P_{it} Q_{i0} = \text{Total cost of all items in the fixed basket of goods and services in period } t; \text{ and,}$$

$$\sum_i P_{i0} Q_{i0} = \text{Total cost of all items in the fixed basket of goods and services in base period } 0.$$

## 2.2 Calculation of the Inflation Rate

In Mauritius, the rate of inflation is measured by the percentage change in the yearly average of the CPI. Table 2.1 shows the monthly CPI for 2004 and 2005 and their averages.

**Table 2.1**  
**Consumer Price Index**

Month	2004	2005
January	109.7	116.1
February	110.1	116.7
March	110.1	117.1
April	110.4	117.1
May	110.7	117.2
June	111.3	117.3
July	112.5	118.0
August	112.7	118.0
September	113.1	117.3
October	114.6	118.2
November	114.7	118.8
December	115.0	119.5
<b>Average</b>	<b>112.1</b>	<b>117.6</b>

Source: CSO, Government of Mauritius; Bank of Mauritius publications.

<sup>1</sup> The Laspeyres index measures the cost of purchasing a fixed basket of goods in the base period and compares it to the cost of buying the same basket in the current period.

The inflation rate for December 2005 is computed as follows:

$$\begin{aligned}\text{Inflation Rate} &= \left\{ \left( \frac{\text{Average CPI for 12 months ended December 2005}}{\text{Average CPI for 12 months ended December 2004}} - 1 \right) \times 100 \right. \\ &= \left\{ \left( \frac{117.6}{112.1} - 1 \right) \times 100 \right. \\ &= 4.9 \text{ per cent}\end{aligned}$$

## 2.3 Some Related Concepts of Inflation

### *Hyperinflation*

Hyperinflation is the extreme form of inflation, with prices rising by 1 thousand or 1 million or even 1 billion per cent per year. It is caused by a self-reinforcing vicious cycle of printing money, leading to inflation, leading to more printing of money, and so on and so forth. As a result, people lose confidence in the monetary system and try to get rid of their currency before prices rise, further leading to the collapse of money as a medium of exchange and forcing a reliance on complex barter arrangements. This may cause an entire economic system to collapse.

The classic illustration of hyperinflation is the German case. In 1921, after World War I, Germany faced the need to make war reparations and reconstruct the economy. The government paid for its expenditures simply by printing more currency (that is, by increasing the amount of money in the economy). As a result, between January 1922 and November 1923, the average price level increased by more than 20 billion times and, by 15 November 1923, 4.2 trillion (4,200,000,000,000) marks were required to buy one US dollar.

After World War II, hyperinflation occurred in Hungary, China and Greece. Some recent examples of countries that experienced hyperinflation comprise Argentina (inflation rate of 3,100% in 1989), Peru (inflation rate of 7,500% in 1990), Brazil (inflation rate of 2,100% in 1993), Ukraine (inflation rate of 5,000% in 1993), and Zimbabwe (inflation rate of 1,200% in August 2006).

### *Galloping Inflation*

Galloping inflation occurs when prices start increasing at double or triple digit rates of, say, 25 or 150 per cent per annum. It gives rise to serious economic distortions since money loses its value quickly. People have a tendency to hold minimal cash balances while hoarding goods and acquiring assets.

### *Creeping Inflation*

Creeping inflation refers to a general price increase of 1 to 5 per cent each year. Such inflation is not considered a serious threat to economic and social progress. It may even stimulate economic activity through increased consumption and investment.

### *Suppressed Inflation*

Inflation is said to be suppressed, or repressed, if price controls hold down prices when general inflationary tendencies are present in the economy.

### *Stagflation*

Stagflation is a concept that originated in the 1970s to describe the combination of a stagnant economy and inflation. At that time, the unemployment rate rose as a result of sharp increases in energy costs combined with strong wage pressures.

### *Slumpflation*

Slumpflation refers to high inflation and significant negative growth, as occurred in the republics of the former USSR in the 1990s.

### *Deflation*

Deflation refers to a sustained fall in the general price level in an economy. Often deflation occurs due to a lower growth in aggregate demand compared to output growth. During the Great Depression of the 1930s in the United States, the fall in the general price level was associated with prolonged decline of economic activity and higher unemployment. Since the late 1990s, the Japanese economy has experienced falling prices as a result of low growth in consumption and investment.

### *Disinflation*

Disinflation should not be confused with the term deflation. It is the process through which inflation is reduced or eliminated. In the past, the most commonly cited argument against reducing inflation was the loss of employment and output that could have resulted. However, efforts to exploit this trade-off between inflation and output have revealed that, in the long run, there is no such trade-off.

### *Core Inflation*

The measurement of a “core” or “underlying” inflation is based on the fact that movements in the general price level are the result of both temporary and persistent shocks. The calculation of the core inflation therefore excludes from the CPI a number of significant, temporary shocks or any other external influences, such as changes in tax rates or oil prices.

A measure of core inflation has an important role to play both as a guideline for monetary policy and as a benchmark against which to assess the performance of a central bank in maintaining price stability. The key is to arrive at a measure of core



inflation that is readily verifiable by independent agents and that is timely so that the credibility of monetary policy is enhanced.

## 2.4 Other Measures of Changes in Price Level

So far emphasis has been laid on changes in the prices of goods and services primarily consumed by households. However, there are other measures of changes in prices that are computed and published by the CSO namely the GDP deflator, the producer price indices, export and import price indices, the wage rate index and the construction price index.

### *GDP Deflator*

The Gross Domestic Product (GDP) Deflator is a price index for total economic output and is used to measure the real value of goods and services produced in the country.

### *Producer Price Index (PPI)*

In Mauritius, the PPI is computed on a monthly basis for two sectors, namely agriculture and manufacturing.

The PPI for agriculture (PPI-A) gives a measure of the average change in the selling prices which producers receive for their agricultural products.

The PPI for manufacturing (PPI-M) measures the change in the price at which manufacturers sell their output on the domestic market. It gives the trend in the prices of a constant basket of goods, representative of the output of manufacturing industries. The selling price is net of all discounts and rebates as well as the value added tax, but includes excise duties where applicable.

### *Export and Import Price Indices*

The Export Price Index (EPI) provides an overall measure of pure price changes (in Mauritian rupees) of domestically produced goods exported to other countries. The Import Price Index (IPI), on the other hand, measures price changes of goods purchased from other countries (excluding freeport transactions). It provides a proxy measure for price changes of imported goods. Both indices are computed on a quarterly basis.

### *Wage Rate Index*

The Wage Rate Index, which is computed from wage data collected from a survey carried out among a sample of large establishments in September of each year, measures changes in the cost of labour over time. It is considered a reliable indicator of wage pressure in the economy.

### *Construction Price Index*

The Construction Price Index measures the change in the level of prices of construction works and is used as the deflator for the measurement of real growth in the construction sector.

## 3. Causes of Inflation

Basically, an increase in the general price level can originate either from the demand side or from the supply side of the economy. Since inflation is defined as a sustained increase in the price level, it must be the result either of repeated falls in aggregate supply or repeated increases in aggregate demand, as explained in Box 3.1. Given that repeated falls in aggregate supply are unlikely because of technological progress, changes in aggregate demand are therefore a necessary explanation for inflation.

The factors that cause changes in aggregate demand can be traced back to two major schools of thought in economics: the Monetarists and the Keynesians. Monetarists believe that only changes in the money supply can shift aggregate demand. On the other hand, Keynesians believe that aggregate demand is influenced by a wide array of factors apart from money. In particular, they consider the components of aggregate demand, that is, expenditure by households, businesses and government, and net exports.

However, both monetarists and Keynesians ultimately agree that aggregate demand can increase continuously only if there is continuous expansion in the money supply. Box 3.2 gives more details on those two schools.

The interaction of aggregate demand and supply gives rise to two causes of inflation: demand-pull and cost-push inflation.

### 3.1 Demand-pull Inflation

Demand-pull inflation tends to be generated when there is excess demand for goods and services, that is, when aggregate demand exceeds aggregate supply over a given period of time.

As seen in Box 3.1, excess demand may result when households and/or the private sector and/or the government spend more on goods and services than what is produced. This higher expenditure can only be sustained by increases in the amount of money, thus the explanation of “*too much money chasing too few goods*”.

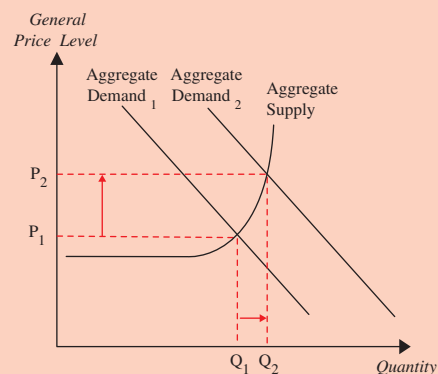
### BOX 3.1

#### AGGREGATE DEMAND AND AGGREGATE SUPPLY

Aggregate demand (AD) refers to the total demand for goods and services in an economy. It is therefore made up of total expenditure by households, business units and the government, and net exports.

Aggregate supply (AS) refers to output or the total amount of goods and services produced in the economy. It depends on various factors, among which the size of the working population, existing equipment and machines, physical infrastructure, natural resources and the level of technology.

The interaction between AD and AS determines the general price level in the economy. If AD is greater than AS (excess demand), people want to buy more goods and services than what is produced in the economy. This will cause prices to rise. Conversely, if AS is greater than AD (excess supply), the amount of goods and services produced in the economy is more than what people want to buy. Prices will fall as a result.



A simple illustration is presented in the chart. Without going into the dynamics of the process, an increase in AD from quantity  $Q_1$  to quantity  $Q_2$  would lead to a rise in the general price level from price level  $P_1$  to price level  $P_2$ .

As a simple example, suppose that the amount of money in the economy is doubled so that people now have twice as much money that they want to spend on goods and services. At first, firms may not be able to increase output to satisfy the additional demand. This would lead to aggregate demand exceeding aggregate supply and would eventually generate upward pressures on costs and prices.

### BOX 3.2

#### MONETARIST V/S KEYNESIAN VIEWS ON INFLATION

##### Monetarist View

According to the monetarists, aggregate demand can only be affected by shifts in money supply. Therefore, money is the only cause of inflation. Their view can be simply explained by Fisher’s Quantity Theory of Money, which is represented by the following equation of exchange:

$$MV = PT$$

where  $M$  is the quantity of money;  $V$  is the velocity of circulation of money (i.e. the number of times money changes hands);  $P$  is the general price level; and  $T$  is the number of transactions in the economy.

The above equation is in fact an identity as total spending ( $MV$ ) must be equal to total income ( $PT$ ). Since  $T$  is assumed given and  $V$  is considered stable, any change in  $M$  will result in a change in  $P$ , if the identity is to hold. Thus, in this perspective, inflation must be driven by money growth.

##### Keynesian View

The Keynesian analysis allows for a host of factors other than money supply to affect aggregate demand, like consumer expenditure, investment, fiscal policy and net exports, for example. In addition, in this framework, aggregate supply is affected by supply shocks and workers’ attempts to increase their wages.

However, changes in those factors are limited in scope and cannot occur repeatedly. For instance, government cannot raise its expenditure or reduce taxes indefinitely in an effort to increase aggregate demand. At some point, it will have to restrict its expenditure, and taxes cannot be reduced beyond zero. Only money can grow repeatedly. Thus, inflation cannot be driven by fiscal policy alone.

Supply-side factors alone, like workers’ attempts to increase wages, are also not enough to explain inflation. If wages rise, there may be a one-off increase in prices as a result but if there is no corresponding increase in aggregate demand, the rise in prices will not be sustained and inflation will not occur.

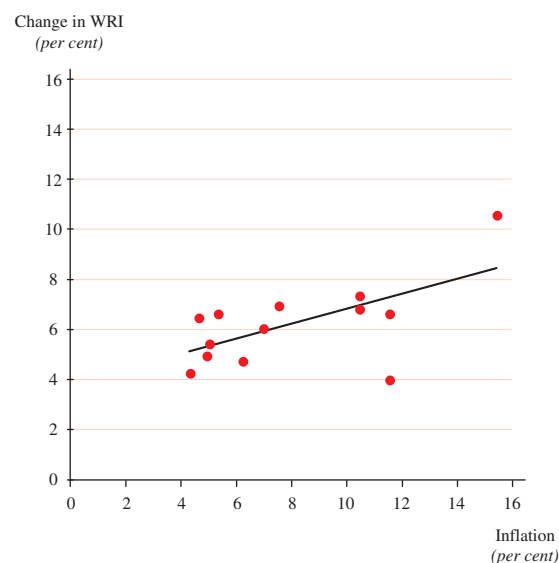
### 3.2 Cost-push Inflation

Cost-push inflation occurs when costs of production go up and are passed on to consumers in the form of higher prices. There are various factors that may cause production costs to increase: wage increases, fall in the value of the currency (depreciation), higher foreign prices, higher taxes, and higher interest rates.

## Wage Increases

A general increase in wages, not matched by a corresponding increase in output, causes the price of goods and services to rise as firms pass on the higher wage costs to consumers. This may occur when employees unions demand wage increases that are in excess of productivity increases. In Chart 3.1, the upward sloping linear trend line depicts the positive correlation between inflation and changes in the wage rate index for the period 1994 to 2005 in Mauritius.

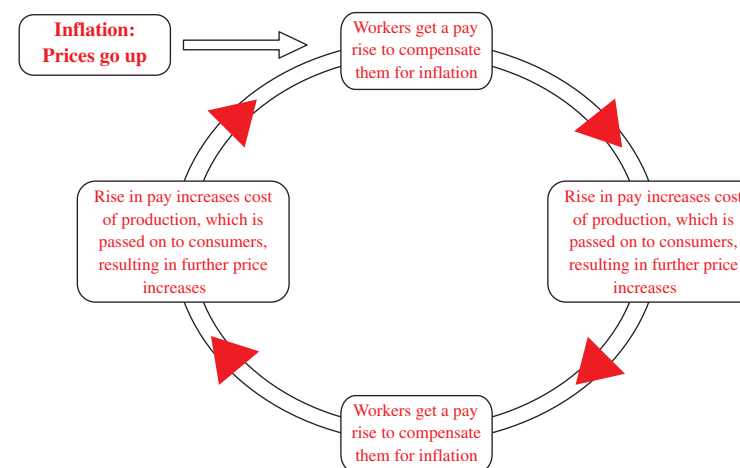
**Chart 3.1**  
**Inflation and Changes in the Wage Rate Index (WRI)**



Source: CSO, Government of Mauritius; Bank of Mauritius publications.

When nominal wages – that is, wages in rupee terms at current prices – go up, it is not always the case that workers can purchase more goods and services than previously. If wages increase by 5 per cent when the general price level has gone up by 10 per cent, workers suffer from what is generally called “money illusion” if they think that they are better off. When workers realise that their purchasing power has in fact gone down, they ask for higher wages, which in turn triggers further price increases. This vicious circle is generally known as a wage-price spiral, which is illustrated in Chart 3.2.

**Chart 3.2**  
**Wage-Price Spiral**



## Movements in Foreign Prices and Exchange Rates

As a large proportion of raw materials, machinery and equipment used in production is imported, a rise in the price of imports will raise the costs of production. The price of imports may go up as a result of:

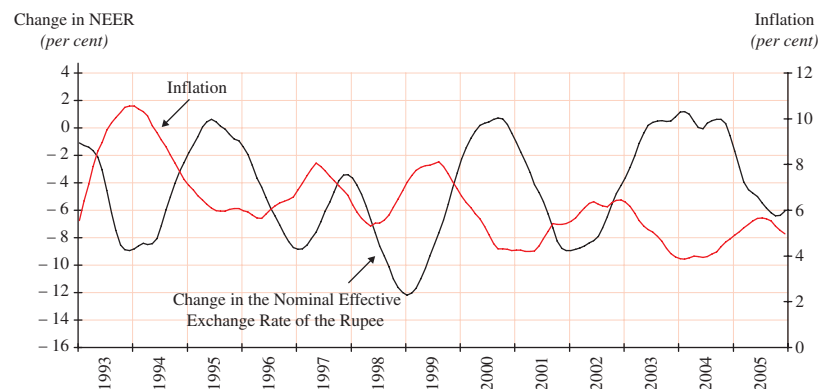
- a rise in prices in the exporting countries; and/or,
- a rise in the cost of freight; and/or,
- a depreciation of the rupee, that is, when more rupees are required to purchase one unit of foreign currency.

Chart 3.3 shows that changes in the 12-month moving average Nominal Effective Exchange Rate (NEER) of the Rupee<sup>2</sup> and the inflation rate are closely related. Generally, abstracting from other factors, a downward movement of the curve denoting the change in NEER leads to higher inflation while an upward movement causes inflation to decline. It is worth pointing out that presently around 70 per cent of Mauritian imports are denominated in US dollar.

<sup>2</sup> The NEER is a trade weighted average of bilateral nominal exchange rates of the rupee against currencies of selected major trading partners. Here, an import bias is attributed to the computation of the NEER of the rupee; that is, more weight has been given to the US dollar as it is the principal currency used for payment of imports.

### Chart 3.3

#### Inflation and Change in the 12-month Moving Average Nominal Effective Exchange Rate (NEER) of the Rupee: 1993-2005



Source: CSO, Government of Mauritius; Bank of Mauritius publications.

### 3.3 Fiscal Policy and Inflation

Government generally makes use of fiscal policy to influence economic activity. Increases in tax rates or rises in expenditure may result in a higher price level in the economy.

#### Higher Indirect Taxes

Indirect taxes are generally classified into taxes on domestic goods and services, such as value added tax, and taxes on international trade and transactions, such as import/custom duties.

Government can raise revenue either by imposing higher indirect tax rates or by introducing new indirect taxes. The rise in indirect taxes directly increases price level, if we assume other things to remain unchanged. For instance, all increases in the value added tax since its introduction in September 1998 have been followed by one-shot increases in the inflation rate.

#### Budget Deficits

When government expenditure exceeds government revenue, that is, when there is a budget deficit, the way in which government finances this deficit has an impact on the price level. If government chooses to finance its budget deficit through the sale of treasury bills/bonds to the public, then the general price level is not directly affected. However, government may opt to borrow from the central bank to finance its deficit, a process equivalent to printing money. This can be a highly inflationary

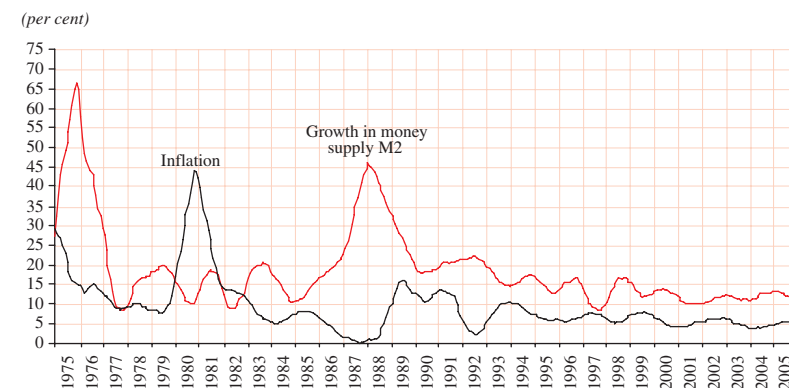
process as the amount of money in the economy is increased. When people have more money to spend, there is an increase in the demand for goods and services, which in turn creates inflationary pressures.

### 3.4 Money and Inflation

Although distinct causes of inflation have been identified, the general consensus is that a large increase in the money supply almost inevitably leads to a large increase in prices. This is captured in the famous quote by Milton Friedman that inflation "... is always and everywhere a monetary phenomenon". Chart 3.4 depicts the growth in money supply M2 and the inflation rate on a monthly basis from 1975 to 2005. Money supply M2 is a broad measure of money supply in the economy and comprises currency held by the public, demand, savings and fixed deposits as well as foreign currency deposits held by residents in Mauritius. Clearly, high volatility and growth in money supply produced a high rate of inflation accompanied by significant variability up to the early 1990s. Thereafter, reduced variability and relatively lower growth in money supply was followed by an inflation rate that was both lower and less variable.

### Chart 3.4

#### Inflation Rate and Growth in Money Supply M2: 1975-2005



Source: CSO, Government of Mauritius; Bank of Mauritius publications.

In the case of Mauritius, examination of data as well as econometric testing have shown that the impact of money growth on prices occurs after a lag of one to two years. This lag occurs because prices do not immediately go up when people spend more on goods and services. For instance, sellers may first try to run down stocks before they increase prices.

### 3.5 Inflation Expectations

Economic variables like the economic growth rate, unemployment rate and inflation rate are usually known with a lag as it takes some time to collect and process the underlying data. At any particular time, households, business units or government may hold some views on the future behaviour of economic variables. Their outlook for inflation is termed inflation expectation.

If there is an expectation that inflation will increase in the future, then people's behaviour at present can effectively lead to more inflation than would have necessarily occurred. For example, suppose consumers expect the price of soap to go up in the near future. They will therefore buy more soap now before the expected increase in price takes place. This behaviour *de facto* forces the price up well before the increase would otherwise have occurred.

The question that arises is what determines the expected rate of inflation. The simple answer is monetary policy and how much people believe in the ability and commitment of the authorities – that is, the government and the central bank – to achieve their inflation objectives.

## 4. Effects of Inflation

The primary effect of inflation is a rise in the cost of living accompanied by a fall in the purchasing power of the domestic currency.

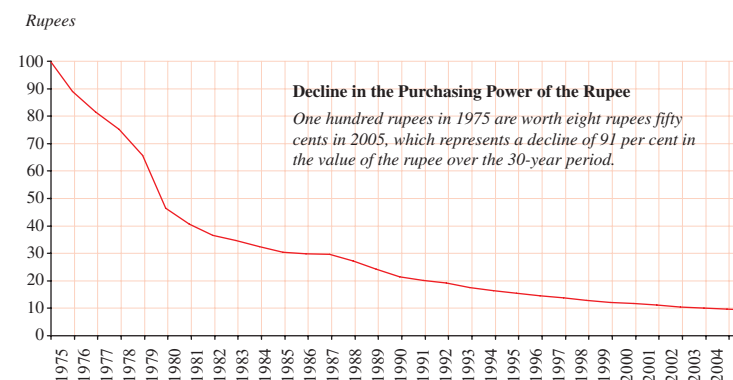
A simple illustration of the effect of inflation on purchasing power is shown in Table 4.1. The amount of money that will be needed to purchase the same volume of goods and services that Rs10,000 can buy today is assessed over a period of 20 years under different inflation rates. For example, in ten years time, with an annual inflation rate of 5 per cent, a person will need Rs16,289 to purchase the same volume of commodities that Rs10,000 can buy today. Obviously, that person will need a lot more than Rs16,289 in twenty years time to buy what Rs10,000 can buy today!

**Table 4.1**  
**Effect of Inflation on Purchasing Power**

Number of Years	Income at Today's Value	Income needed to equal Rs10,000 over time		
		3% Annual Inflation	4% Annual Inflation	5% Annual Inflation
0	10,000	10,000	10,000	10,000
5	10,000	11,593	12,167	12,763
10	10,000	13,439	14,802	16,289
15	10,000	15,580	18,009	20,789
20	10,000	18,061	21,911	26,533

In Mauritius, as illustrated in Chart 4.1, the inflation rate has eroded the purchasing power of the rupee such that Rs100 in 1975 are worth only Rs8.50 in 2005. In other words, with Rs100 in 1975 a person could purchase a given volume of goods and services at prevailing prices; however, following increases in the general price level during the thirty-year period up to 2005, the same hundred rupees could only purchase a share of 8.50 per cent of the amount of goods and services that could have been purchased in 1975.

**Chart 4.1**  
**Decline in the Purchasing Power of the Rupee: 1975-2005**



### 4.1 Why is Inflation Bad?

The level of inflation is a determining factor of the costs it imposes on individuals and the economy as a whole. It is widely accepted that low inflation – between 1 to 3 per cent according to conventional wisdom – promotes a healthy macroeconomic environment. Some of the costs that are associated with inflation are considered below.

#### (i) Redistribution of Income and Wealth

Since wages, assets and debts are all denominated in rupee terms, any changes in their relative prices as the price level increases will tend to redistribute income and wealth. As prices rise, some wages that are indexed to the price level will increase at least as rapidly as the increase in prices while others will tend to lag behind. This leads to a redistribution of income in the economy, as the purchasing power of some sections of the population will be more seriously affected than others by the price increase.

Similarly, some asset prices increase as prices in the economy go up while other assets tend to lose value in times of inflation. Thus, there is a redistribution of wealth among the holders of those assets.

#### *(ii) Loss of Export Competitiveness*

If domestic prices are increasing much faster than those in other countries, then, in the absence of a devaluation/depreciation of the rupee, exports of goods produced locally will become more expensive and therefore less competitive. As a result, foreign demand for local products will decline while domestic demand for foreign goods will increase. The following example is illustrative.

Assume that the inflation rate is the same both in Mauritius and in the US and that the Rs/US\$ exchange rate is fixed at Rs25. In Year 1, good X costs Rs1,000 (US\$40) in Mauritius while a similar good Y in the US costs US\$45 (Rs1,125). Assuming no other costs, initially X is cheaper than Y and, therefore, Mauritius exports good X to the US. In Year 2, assume domestic prices increase much faster than foreign prices: the price of X goes up by say 20 per cent to Rs1,200 (US\$48) while the price of Y increases by say 3 per cent to around US\$46 (Rs1,150). X is now less competitive than Y. US citizens demand less of X thereby causing a decline in Mauritian exports to the US. Conversely, Mauritian citizens increase their demand for Y, causing a rise in imports from the US. Thus, higher domestic inflation induces a loss of competitiveness and the combined effect of the reduction in exports and the increase in imports creates a trade deficit.

#### *(iii) Uncertainty*

High levels of inflation, which generally tend to be more variable and less predictable, foster an environment of uncertainty about the nature of contracts, especially those extending over a long period. Firms may be reluctant to undertake new investment projects if inflation keeps on varying. In addition, individuals may be reluctant to spend in an unstable environment. Both these factors could reduce economic growth in the long run.

#### *(iv) Distortion of the Tax System*

In most countries, wages and other sources of income are computed in nominal terms. When prices rise, wages and income tend to go up as well – that is, indexing of wage or other income to inflation. Also, many countries have progressive income taxes – that is, the tax rate increases as an individual's income rises. Unless the tax system makes allowances for increases in income due to inflation, increases in wages and income would move individuals and businesses to higher tax brackets so that they would be faced with higher effective tax rates. This would cause a

distortion of the tax system that could have large effects on the incentives for investment and saving.

For example, assume that a 30 per cent income tax is paid on any income above Rs2,000. Initially, a person earning, say Rs3,000, will pay income tax of Rs300  $[(3,000 - 2,000) \times 30 \div 100]$ . Suppose that after ten years of inflation, the person's income has doubled to Rs6,000 in order to enable him consume the same basket of commodities but that the tax brackets and tax rates have remained the same. That person now pays income tax amounting to Rs1,200  $[(6,000 - 2,000) \times 30 \div 100]$ . Thus, although wages and prices have doubled, nominal taxes paid have increased fourfold.

#### *(v) Collapse of the Monetary System*

The monetary system can function reasonably well as long as the value of the monetary unit is reasonably stable and predictable. As the inflation rate increases and becomes more variable – as was the case with countries that experienced hyperinflation – the countries' monetary system may collapse. For instance, in certain Latin American countries, the rate of inflation has been so high that people have preferred to use a more stable currency, like the US dollar, instead of their national currency.

### **4.2 Who Suffers from Inflation?**

#### *(i) Lenders/Creditors*

Since most loans are not indexed to inflation, an increase in the general price level means that the amount lenders receive back from borrowers at the time the loan matures may be worth less in terms of goods and services than what they lent out, depending on the level of interest rate charged by the lender.

#### *(ii) Savers/Currency Holders*

Because people's receipts of income and expenditures are typically not perfectly coordinated, money provides an important store-of-value function enabling purchasing power to be kept until it is eroded. Inflation makes it expensive for people to hold/hoard the domestic currency because it loses its value over time.

#### *(iii) People with Fixed Incomes*

People with fixed income, pensioners for instance, may experience a fall in the purchasing power of their income over time. As prices go up, they may find that they can buy less goods and services than they used to in the past. The wealthy, in contrast, can protect themselves partly against inflation by investing in real assets



such as land and buildings or in financial instruments such as deposits and government debt instruments that may offer a higher return than the inflation rate.

*(iv) Taxpayers*

If wages or salaries are indexed to the rate of inflation, they will increase in rupee terms so as to keep pace with inflation. Unless the tax system makes allowance for increases in wages due to inflation, a rise in wages will shift people into higher tax brackets. They will thus end up paying a larger share of their wages in the form of tax.

*(v) Businesses Using Prices for Planning Purposes*

In times of inflation, economic agents become confused. Does an increase in the price of a product indicate that people want more of it – has the demand for that product increased – or does it occur simply as part of the regular inflation-related adjustments to prices? Businessmen, not knowing which of the two kinds of price increases have occurred, may wait much longer before expanding their businesses and employing more resources in reaction to a permanent increase in demand. In other words, inflation may result in a misallocation of resources.

*(vi) Government*

With rising prices, interest rates tend to rise with the result that the cost of servicing government debt may go up.

**5. History of Inflation in Mauritius**

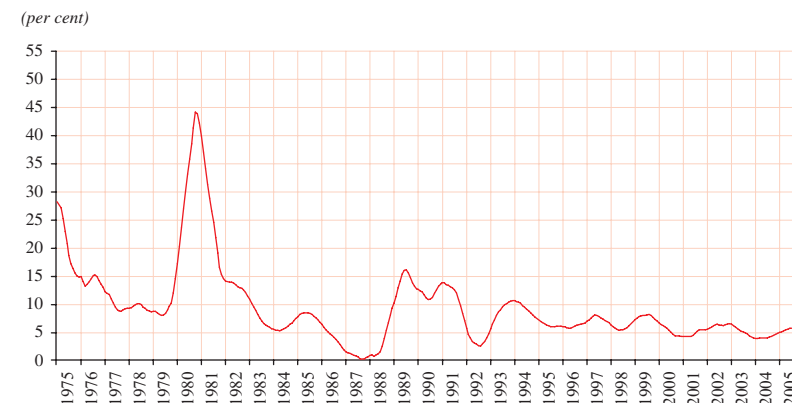
Movements in the domestic price level over the past 30 years have to a large extent been influenced by economic policies pursued by the authorities. The 1970s and 1980s were characterised by large fluctuations in the rate of inflation. These were progressively reduced as from the early 1990s and the inflation rate moved within a much narrower range from 1994 onwards. The reorientation of monetary policy towards a greater focus on price stability played an important role in this respect. In addition, general improvements in supply conditions, economic and financial liberalisation, a more competitive market place, and a more stable macroeconomic environment contributed to lowering the inflation rate in the last decade or so.

On average, the monthly rate of inflation was 9.3 per cent over the period 1975 to 2005, ranging from a minimum of 0.2 per cent in August, September and October 1987 to a maximum of 44.0 per cent in October 1980.

**5.1 Evolution of the Inflation Rate**

The trend in the monthly inflation rate for Mauritius over the period 1975 to 2005 is shown in Chart 5.1. For the purpose of explaining the movements in the general price level, four periods have been identified.

**Chart 5.1**  
**Evolution of the Inflation Rate: 1975-2005**



Source: CSO, Government of Mauritius; Bank of Mauritius publications.

**1975-1982**

During the period 1975 to 1982, price developments on both the domestic and external fronts triggered substantial price increases.

The sugar boom in 1974, following large sugar production and high sugar prices on the world market, was accompanied by a high rate of expansion in money supply and significant increases in wages and salaries. The government resorted to price controls with a view to containing inflation. The number of commodities whose prices were administered by the government was gradually increased from over 1,100 individual items in 1977 to some 6,000 items by June 1978.

Rising oil prices in the late 1970s, bad weather conditions which caused serious damage to foodcrops in the early 1980s and the introduction of a sales tax of 5 per cent in 1982, were among the other main factors leading to the rise in the general price level.

In the late 1970s Mauritius embarked on its first Structural Adjustment Programme with the International Monetary Fund (IMF). In October 1979 the rupee was devalued by 22.9 per cent. In the months following the devaluation, the direct

impact on prices was severely felt with import prices rising significantly. In October 1980, an all-time high inflation rate of 44.0 per cent was recorded. In September 1981, the rupee was again devalued by 16.7 per cent, but its effects on domestic prices were more evenly distributed over time and lasted longer than the sudden surge in prices following the first devaluation.

Over the period 1975 to 1982, the monthly inflation rate averaged 17 per cent, moving in a range of 7.9 per cent to 44.0 per cent.

### *1983-1991*

The period 1983-1991 witnessed the second Structural Adjustment Programme, which laid the foundation for rapid economic development. During that period, economic and financial liberalisation were initiated. The rapid pace of economic development from 1983 to 1991 was accompanied by a noticeable rise in the standard of living. The strengthening of the three pillars of the economy, namely the sugar sector, the Export Processing Zone (EPZ) and the tourism sector, resulted in high growth rates and a consistently declining unemployment rate.

Initially, the rate of inflation decelerated mainly due to a gradual decline in the value of the US dollar, sharp decreases in prices of oil and raw materials, and a reduction in import duties on specific products. From 1987 onwards, there was a jump in the inflation rate. Sustained balance of payments surpluses coupled with the salary increase of 30 per cent, following the Pay Research Bureau (PRB) Award of 1987, gave an impetus to monetary expansion, triggering a surge in aggregate demand in the economy. The resulting effects on prices were, however, mitigated following improvements in supply conditions.

With a view to dampening inflationary expectations in the economy, price controls on some essential items of imported foodstuffs were reintroduced in 1988. It is worth noting that the number of commodities whose prices were controlled was gradually reduced from 115 at the end of 1983 to 17 in 1988.

The monthly average inflation rate for that period was 7.4 per cent, ranging between a minimum of 0.2 per cent and a maximum of 16.0 per cent.

### *1992-1999*

Following the liberalisation of the economy in the early 1990s, the conduct of monetary policy switched from direct to indirect monetary management. During that period the Bank of Mauritius focused on controlling the growth of money in the economy. More emphasis was laid on price stability with a view to promoting a sound macroeconomic environment.

However, though monetary growth was substantially reduced in the 1990s compared with the 1970s and the 1980s, other factors contributed to raise the

inflation rate periodically. The main factors that pushed up prices were the PRB Award in 1993, the hike in the sales tax rate in June 1996 from 5 to 8 per cent and the subsequent replacement of the 8 per cent sales tax by a higher value added tax of 10 per cent in September 1998. Movements in prices of petroleum products also accounted for movements in the general price level.

The monthly inflation rate was less volatile during the period 1992-1999. It averaged 6.8 per cent, varying between a minimum of 2.5 per cent and a maximum of 10.5 per cent.

### *2000-2005*

The Bank of Mauritius re-engineered its monetary policy framework in 1999 with a view to laying more emphasis on interest rates to control monetary growth and make it more consistent with economic growth. Subsequently, the rate of inflation was effectively reduced to an average of 5.1 per cent during the period 2000 to 2005, varying between a minimum of 3.8 per cent and a maximum of 6.6 per cent.

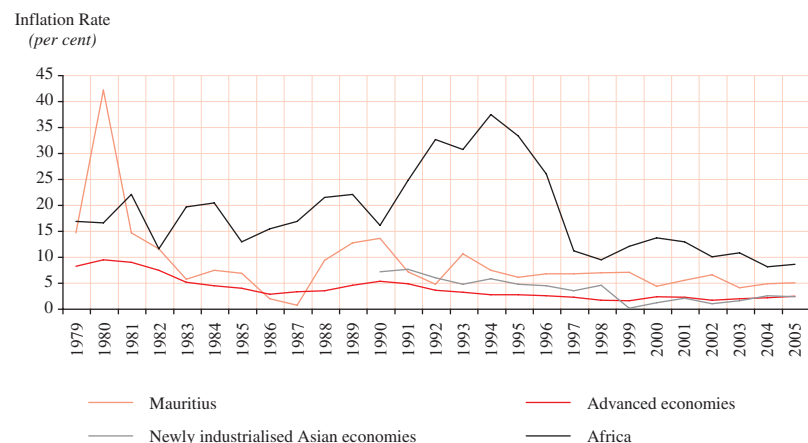
It is noteworthy that non-monetary factors contributed towards sustaining the average rate of inflation close to 5 per cent. Some of these factors include the successive increases in the value added tax rate (to 12 per cent as from July 2001 and further to 15 per cent as from July 2002) and the substantial increases in the domestic prices of petroleum products in line with movements on the international market, which were passed on to consumers through the Automatic Pricing Mechanism introduced in April 2004.

## **5.2 Comparison with Inflation Rates in Selected Groups of Countries**

The performance of Mauritius on the inflation front is in some ways similar to and in other ways different from the experience of the rest of the world as shown in Chart 5.2. As from the 1990s, inflation in Mauritius, newly industrialised Asian economies, and advanced economies generally moved in line with each other. This reflects efforts of the central bank to narrow the inflation differential between Mauritius and its major trading partners.



**Chart 5.2**  
**Inflation Rates in Selected Groups of Countries**



Source: World Economic Outlook 2006, International Monetary Fund; CSO, Government of Mauritius; Bank of Mauritius publications.

## 6. The Role of the Bank of Mauritius in Controlling Inflation

Over the last two decades, a growing consensus emerged that price stability should be the overriding goal of monetary policy. The rationale for pursuing price stability is that, in the long run, it encourages employment and economic growth and, therefore, contributes towards improving the general welfare of citizens. Many advanced economies have therefore assigned their central banks the responsibility of controlling inflation. Box 6.1 describes price stability and its benefits.

The Bank of Mauritius Act 2004 states that “*The primary object of the Bank shall be to maintain price stability and to promote orderly and balanced economic development*”. Even the repealed Bank of Mauritius Act 1966 had given the central bank the statutory responsibility “... *to safeguard the internal and external value of the currency...*” and “... *to direct its policy towards achieving monetary conditions conducive to strengthening the financial system and increasing economic activity and the general prosperity of Mauritius*”.

To achieve its objective of price stability, the Bank needs to formulate and implement a number of actions. The set of actions designed by a central bank to fight inflation is termed monetary policy.

### BOX 6.1

#### PRICE STABILITY

Price stability is defined as a situation whereby the sustained increase in the general price level is kept at an acceptable minimum. One of the most suitable interpretations of a stable price level is given by Alan Greenspan, until recently the Chairman of the Board of Governors of the US Federal Reserve System (the central bank of the United States of America):

*“For all practical purposes, price stability means that expected changes in the average price level are small enough and gradual enough that they do not materially enter business and household decisions.”*

The following are among the most important benefits of price stability in the economy:

- (i) Price stability enables the price system to work better. Lower inflation reduces the variability between individual prices and therefore reduces the distortions in the price system. As a result, the economy operates more efficiently and therefore grows faster.
- (ii) As inflation diminishes, the variability of inflation is also reduced. This results in the future being less uncertain and more predictable. A reduction in inflation causes inflationary expectations to dissipate, thereby causing a decline in short-term and long-term interest rates.
- (iii) By enabling the price system to work better, minimising tax distortions, lowering interest rates, and helping to stabilise financial markets, price stability promotes economic growth.

It should be remembered that the full benefits from an environment of stable prices can only be reaped when the general public is confident that inflation will not re-emerge to erode the value of their money or their assets.

### 6.1 Monetary Policy in Mauritius

The role of the Bank of Mauritius in monetary policy making has evolved since its creation. The conduct of monetary policy has taken on greater significance with the process of economic and financial liberalisation in the 1980s and 1990s.

#### Direct Monetary Control

Prior to 1991, monetary policy was conducted primarily by establishing an annual ceiling for the expansion of credit by banks and by imposing reserve requirements. Alongside, the Bank regularly issued interest rate guidelines to banks. Interest rates were set, in part, on the basis of the presumed importance of the activity for which credit was to be used; lower rates were set for high priority sectors. The Minister of Finance announced the Bank Rate, which was the Bank’s minimum discount and advances rate. The yield on Treasury Bills was set in relation to the Bank Rate.

The objectives of that system of monetary policy implementation were to prevent, through the overall credit ceiling, an excessive and inflationary credit expansion and to set interest rates at levels that would encourage, or at least not discourage, investment.

Over time, however, such a framework of direct controls brought in rigidities to the banking system and hindered competition.

### *Indirect Monetary Control*

Mauritius embarked on a gradual process of financial liberalisation in the late 1980s. Exchange controls were removed in gradual steps until the suspension of the Exchange Control Act in July 1994 and a more flexible exchange rate regime replaced the previous basket-peg regime. As the economic environment became more market-oriented and financial markets more liberalised, the implementation of monetary policy also evolved. The Bank of Mauritius switched from direct control to indirect monetary management.

Under indirect monetary management, a central bank uses its position as the sole supplier of central bank funds to the monetary system to influence the growth of money as well as the broad spectrum of market interest rates. Therefore, by steering the supply of central bank funds, the Bank of Mauritius can effectively affect the potential growth of money in order to influence inflation ultimately. For instance, the sale of Bills by the central bank allows it to remove funds from the monetary system, thus reducing money growth. Conversely, purchase of Bills by the central bank enables it to provide funds to the system, thus raising the growth rate of money.

## **6.2 Current Monetary Policy Framework**

The current formulation of monetary policy rests on the premise that changes in the rate of interest affects money supply and the exchange rate in the economy, and ultimately, inflation. The Bank of Mauritius uses a comprehensive set of indicators that provides essential information on the risks to the inflation rate.

The current monetary policy framework is based on projecting desired growth rates for monetary aggregates – such as money supply, credit and net foreign assets – consistent with the growth of total nominal income in the economy. The actual growth rates of these aggregates are closely monitored relative to their desired path. For instance, the Bank needs to ensure that money supply moves in line with output growth. This would prevent the emergence of excess money that might fuel excess demand and, ultimately, generate inflationary pressures.

Any divergence between the actual and desired movements in monetary aggregates may be reduced by changes in the key signalling interest rate of the Bank of Mauritius, which is currently the Lombard Rate, accompanied by changes in the

supply of reserve money to ensure that market conditions are consistent with the desired growth rates of the aggregates.

Liquidity management is an integral part of the monetary policy framework. The Bank of Mauritius manages liquidity with a view to creating orderly conditions in the market so that only a change in the Lombard Rate acts as a signal for a change in market interest rates and to ensuring that supply and demand conditions in the market are consistent with those changes. The main operations conducted by the Bank to manage liquidity are the sale/purchase of Bank of Mauritius Bills, and repurchase transactions. Box 6.2 provides more details on the tools of monetary policy.

### **BOX 6.2**

#### **TOOLS OF MONETARY POLICY**

The Bank of Mauritius has various tools at its disposal to conduct monetary policy. Presently, the Bank of Mauritius carries out changes in its key interest rate – currently the Lombard Rate – to signal to the market its monetary policy stance. It then initiates measures to ensure that market interest rates remain consistent with the new level of the key interest rate. The principal tools used by the Bank of Mauritius to conduct monetary policy are outlined below.

#### **Open Market Operations (OMOs)**

OMOs are broadly defined as the purchase or sale of securities by the central bank to influence liquidity in the system. By purchasing securities, the Bank of Mauritius injects funds and, conversely, by selling securities it removes funds from the monetary system. These operations allow the Bank of Mauritius to manage liquidity in the money market.

The Bank of Mauritius also engages in repurchase (repo) or reverse repurchase (reverse repo) agreements at its own initiative to address the liquidity situation in the market. Under a repo/reverse repo, the Bank supplies/absorbs liquidity to the market by purchasing/selling eligible securities from/to banks with an agreement to resell/repurchase them at a specified time on a given future date.

#### **Reserve Requirements**

Banks are legally required to hold specified reserve assets in the form of balances with the central bank equal to some minimum percentage, known as the cash ratio, of their total deposits. A rise in reserve requirements leads to a contraction of the money supply and vice versa.

#### **Lombard Facility**

Under the Lombard Facility, the Bank of Mauritius stands ready to provide overnight collateralised advances to banks at their initiative. The rate payable for use of this facility, the Lombard Rate, acts as a signal of the monetary policy stance of the Bank.

### 6.3 How does Interest Rate Affect Inflation?

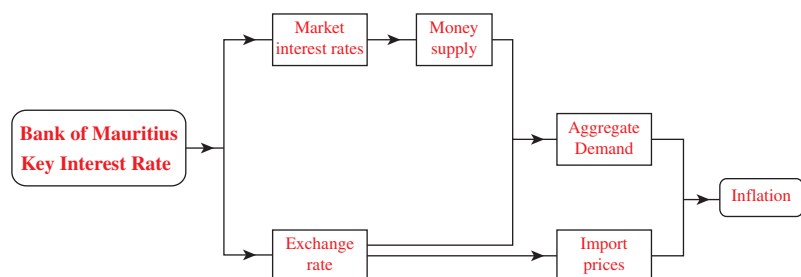
The Bank of Mauritius currently uses the Lombard Rate as the key interest rate to signal changes in its monetary policy stance. There are two main channels through which changes in the Lombard Rate may affect economic activity and, ultimately, inflation: through banks' lending and deposit rates, and through the exchange rate of the rupee.

Suppose aggregate demand in the economy exceeds aggregate supply as a result of an increase in the amount of money in excess of what would be needed to purchase the output produced. The Bank of Mauritius will have to consider increasing the Lombard Rate to contain aggregate demand. When the Lombard Rate goes up, banks take it as a signal to increase their own respective lending and deposit rates. To ensure that market conditions are consistent with the tighter policy announced by the increase in the Lombard Rate, the Bank of Mauritius will also have to slow the growth rate of reserve money and, hence, of money supply M2. Higher interest rates tend to encourage savings at the expense of borrowing to finance consumption and may reduce investment. A fall in consumption and investment in the economy causes a fall in aggregate demand, which eventually stems the inflationary pressure.

A change in the Lombard Rate also affects the exchange rate. An increase in interest rates makes rupee-denominated assets more attractive than foreign currency-denominated assets and, thus, increases the demand for assets denominated in rupees. The effect would be an appreciation of the domestic currency, resulting in a reduction in the price of imports. This would ultimately contribute towards alleviating inflationary pressures within the economy.

Chart 6.1 illustrates in a simple manner the channels through which a change in the Bank of Mauritius key interest rate would influence the rate of inflation.

**Chart 6.1**  
**Transmission Mechanism of Monetary Policy**



### 6.4 Other Monetary Policy Frameworks

It is useful to consider how monetary authorities in other countries go about controlling inflation.

#### *Exchange Rate Targeting*

One method of reducing inflation and keeping it low is for a country to peg the value of its currency to that of a low-inflation country. For example, by pegging the British pound to the German mark in 1990, the United Kingdom was able to lower its inflation rate from around 10 per cent to around 3 per cent in 1992, when it was forced to leave the Exchange Rate Mechanism (ERM). The use of an exchange rate peg, however, forces a country to abandon the use of monetary policy to respond to shocks. Monetary authorities only have a small amount of discretion in the conduct of monetary policy. In addition, shocks to the anchor country are easily transmitted to the targeting country. In order for an exchange rate peg to work satisfactorily, it has to be credible. Otherwise, the country pegging its exchange rate may experience speculative attacks on its currency.

Currency boards and dollarisation are examples of exchange rate regimes in which the monetary authorities have no discretion in the conduct of monetary policy.

#### *Monetary Targeting*

In the 1970s, after the collapse of the Bretton Woods system, the use of monetary aggregate targets as a nominal anchor for the conduct of monetary policy became popular in a number of countries. Under this framework, a chosen monetary aggregate – for example, broad money supply M2 – is targeted to grow at a predetermined rate. However, monetary authorities remained flexible enough to allow the monetary aggregate to deviate from its target in order to cope with short-term real output and exchange rate considerations.

By the mid-1970s, several countries, including the United States, Germany, the United Kingdom and Switzerland, were announcing monetary targets. From 1975 to 1985, countries that were following a monetary targeting regime achieved some success in reducing inflation. However, monetary targeting has a major drawback: the relationship between money supply and inflation may be unstable, especially in an environment of ongoing financial innovation. By the mid-1980s, that problem became decisive in causing most countries to abandon monetary targeting as the basis for conducting monetary policy.

### *Inflation Targeting*

The breakdown of the relationship between monetary aggregates and inflation has oriented monetary authorities towards inflation targeting. In recent years, central banks around the world have either adopted an explicit inflation target or have shown a commitment to maintaining low inflation as part of their monetary policy framework.

Inflation targeting involves the public announcement of a target for inflation. The central bank is assigned the statutory responsibility to achieve the inflation target and is, therefore, faced with increased accountability for achieving that target. Inflation targeting framework is a very flexible system in that monetary authorities can use a comprehensive set of available information and are free to respond to shocks to the economy.

However, any additional objectives have to be compatible with the inflation target. Experience to date shows that the co-existence of multiple anchors (for example, a crawling currency peg, or a monetary aggregate target together with an inflation target) sooner or later becomes a source of policy conflict, which damages credibility.

New Zealand, Canada and the United Kingdom were among the first countries to adopt inflation targeting. Their success in keeping inflation under control encouraged several other countries – among them Australia, Finland, Israel, Spain and Sweden, to name just a few – to employ inflation targets. Following the inflation-fighting tradition of the German Bundesbank, the European Central Bank has adopted an explicit target for inflation.

### *Discretionary Monetary Policy*

In some countries, there is no explicit strategy that is clearly articulated in the fight against inflation. Monetary authorities adopt a forward-looking behaviour and act pre-emptively. This strategy is based on the premise that monetary policy affects the economy with a lag. Therefore, if monetary authorities believe that inflationary pressures will surface at some time in the future, they act today to prevent them. In this case, there is no nominal anchor and the strategy is also less transparent than inflation targeting. Obviously, the success of this strategy depends upon the correctness of the views of the individuals making monetary policy decisions.

The United States is prominent among the countries following such a strategy and, at least since the early 1980s, has been very successful in keeping down inflation. Following several decades of accelerating inflation, the Chairman of the US Federal Reserve Board and other members of the Federal Open Markets Committee (FOMC) have always shown a strong commitment to low inflation and price stability and have therefore acted accordingly.

## **7. Conclusion**

This paper has examined simple concepts relating to inflation. Its measurement, causes and effects have been outlined with particular reference to the Mauritian context. The historical overview of the movements in the inflation rate in Mauritius has highlighted the monetary and non-monetary factors that generated inflation during the period 1975-2005.

It is the statutory responsibility of the Bank of Mauritius to contain inflation and thereby maintain price stability. The monetary policy frameworks used by the Bank of Mauritius to achieve its goal have evolved from direct monetary control up to the early 1990s to indirect monetary control in the wake of financial liberalisation in 1994. Since this period, the Bank of Mauritius has been laying greater emphasis on the price stability objective of monetary policy. The focus, which was initially placed on reserve money as the operating target of monetary policy, shifted to the use of a key interest rate, currently the Lombard rate, to signal the monetary policy stance of the Bank as from late 1999, with emphasis remaining on money supply as the intermediate target of policy.

Generally, by exerting greater control on money supply, the Bank of Mauritius has been able to lower the rate and volatility of inflation in the 1990s and during the period 2000-2005, particularly.

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## A Primer on Core Inflation

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### Abstract

Over the years, the concept of core inflation has become important for central banks across the world. This primer introduces the concept of core inflation in conjunction with the conduct of monetary policy by the Bank of Mauritius. Core inflation, which refers to the trend component of inflation, provides information on the long-term direction of consumer price movements and serves as an indicator of future inflation. It has an important role to play both as a guideline for monetary policy and as a benchmark against which to assess the performance of a central bank in maintaining price stability. The important aspects relating to core inflation as well as various methods used to measure core inflation are described. Three different measures are derived for Mauritius and compared to CPI inflation.

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## **1. Introduction**

Price stability is often one of the most important objectives that a central bank is mandated to achieve. The primary objectives of the Bank of Mauritius, as set out in the Bank of Mauritius Act 2004, are to maintain price stability and to promote orderly and balanced economic development. The Bank is also required to regulate credit and currency in the best interests of the economic development of Mauritius and to ensure the stability and soundness of the financial system of Mauritius.

By tradition, the price stability objective has been guided by developments in the Consumer Price Index (CPI). However, it is widely recognised that while some of the factors that affect a country's price level, as measured by the CPI, are persistent, others may be purely temporary. Since it is generally accepted that monetary policy affects inflation only over time, then the short-term fluctuations in the inflation rate cannot be completely offset by any action of the central bank.

It is therefore vital for the central bank to discern between the various types of shocks that affect the rate of inflation. Specifically, it is important to know whether the shock is a temporary supply shock, or a one-time event, that will have a transitory effect on the rate of inflation and that the central bank therefore needs not counter, or whether it is a demand shock with persistent effects to which monetary policy must respond.

Since the persistent factors causing inflation, which can be given by the trend rate of inflation, are important as a guide for monetary policy, it becomes necessary to establish an appropriate measure for this concept, which has been generally referred to as core inflation. The aim of this paper is to explain the concept of core inflation.

## **2. What is Core Inflation?**

It is universally accepted that the Consumer Price Index reflects the impact of some factors that are beyond the control of the central bank. These factors may result from adjustments in prices of administered goods and services, taxes, adverse weather conditions or oil market shocks. For instance, following a cyclone, the production of vegetables may be affected giving rise to a supply shock that increases their prices and, as a result, CPI inflation. The rise in price level, in this case, is due to the supply constraint, which is expected to last only until the next vegetable harvest, unless the domestic supply shortage is met by imports.

While these kinds of shocks may have considerable impact on the general price level as measured by the CPI, any change in the stance of monetary policy will have little or no effect on the resulting inflation. In this respect, Bryan and Cecchetti

(1993) have stated that “... *transitory fluctuations in the price level caused by non-monetary events, such as sector specific shocks or measurement errors, should not be reflected in the policy decisions of the monetary authority as these price changes do not constitute underlying monetary inflation*”.

Therefore, it is common practice in many countries to distinguish between inflation as measured by the Consumer Price Index (CPI) and known as “headline inflation”, and another concept of inflation generally referred to as “underlying”, “trend” or “core” inflation. From a policy point of view, headline inflation is decomposed into a transient component on the one hand and a trend component on the other hand. The trend component, which is referred to as “core” inflation, reflects persistent sources of inflationary pressures and contains the most relevant information from a central bank’s perspective. If price fluctuations from non-monetary sources are effectively removed from headline inflation, the resulting core inflation can then be regarded as the outcome of monetary policy.

Core inflation thus serves as a useful complement to headline inflation by providing information about the long-term direction of consumer price movements and serving as an indicator of future inflation.

### **3. How is Core Inflation Different from CPI or Headline Inflation?**

CPI inflation, also known as headline inflation, refers to the rate of change in the overall CPI published by the Central Statistics Office (CSO). It aims at capturing changes in peoples’ cost of living based on the movements of the average price of a specified basket of commodities and services consumed by a typical Mauritian household. In measuring CPI inflation, it is recognised that, at times, the prices of some items included in the consumption basket may exhibit significant volatility and therefore project a distorted impression of the general rate of inflation, or central tendency of price movements, in the sense that movements in the aggregate CPI are quite different from movements of most prices comprising the index.

Estimates of core inflation seek to address this problem and are widely used as measures of the underlying movements in the average consumer prices. Measures of core inflation aim at capturing the permanent, or long run trend, in the prices of consumer goods and services by taking out the effects of temporary disturbances or shocks on the average CPI inflation. Core inflation is generally associated with expectations and demand pressure components of measured inflation and excludes items subject to supply shocks and short-term volatile movements.

### **4. Why do we Need to Measure Core Inflation?**

Headline inflation is often considered to be vulnerable to factors beyond the control of economic policy, and has tended to be historically volatile because of temporary shocks or disturbances in a particular area of the economy, causing it to move away from its long-term trend. In Mauritius, the volatility in the headline inflation rate has been caused by various factors, such as disturbances in agricultural food supply, movements in international oil prices and administered prices, and even changes in tax rates. Thus, there may be instances wherein the headline inflation rate reaches double-digit levels, even though the majority of the prices in the CPI consumption basket are recording only mild increases. In such cases, the headline inflation rate may no longer be a reliable indicator of the general trend in prices.

An appropriately defined measure of core inflation can then help to identify the underlying trend in prices, which, in turn, provides a better gauge of the overall state of the economy. Equally important, temporary shocks in food and oil prices and other similar disturbances in headline inflation are usually associated with the supply factors. These factors tend to be outside the control of monetary policy, which focuses more on factors affecting aggregate demand.

Core inflation, which is considered a good indicator of current and future trends in headline inflation, enables policymakers to determine whether current movements in consumer prices represent short-lived disturbances or are part of a broader permanent trend. Such knowledge is an important input to the formulation of economic policy, particularly monetary policy. By excluding certain items with volatile price movements from the overall measure of CPI inflation, core inflation provides the long-term trend of inflation, which can be directly affected by monetary policy.

### **5. How is Core Inflation Measured?**

Core inflation is not a variable that can be observed directly: it needs to be estimated. However, there is no widely accepted theoretical definition of core inflation. Otto Eckstein (as cited by Taillon (1997)) considers core inflation to be the increase in prices that occurs when the economy is on its long-term growth path. Others take core inflation to be the “monetary” inflation that occurs as a result of growth of the money stock. According to Alan Blinder (1997), core inflation is that part of inflation that can be controlled by the central bank and for which the latter bears ultimate responsibility.

The complexity of estimating core inflation is compounded by the fact that, despite the lack of a widely accepted theory, many calculation methods using statistical or econometric procedures have been developed in recent years in an attempt to isolate



the price trend. Against this background, core inflation is accordingly taken to be the price trend, that is, the persistent element of measured CPI inflation.

Broadly speaking, there are three approaches to developing relatively good measures of core inflation: the structural approach, the exclusion-based approach and the statistical approach. They are examined below.

### **5.1 The Structural Approach**

The structural approach draws a direct link between policy and core inflation, defining the latter as the inflation rate that is controllable through monetary policy. The difficulty with this approach, however, is that the resulting measure of core inflation tends to be sensitive to the assumptions underlying the model. The arrival of new data results in a change in the historical core inflation series produced by the model.

### **5.2 The Exclusion-based Approach**

The exclusion-based approach excludes certain items from headline inflation in order to remove the influence of unrepresentative price movements. This approach, which is defined as CPI excluding food and energy, or even administered prices in the CPI basket, is the most commonly used method for assessing underlying inflation. The rationale for excluding food and energy, for example, is that prices of these items are subject to large, short-term variations due to factors such as weather conditions and oil prices. Many of the variations are driven by non-monetary factors and can be quickly reversed. As such, food and energy prices do not convey much useful information about underlying price trends.

One issue with exclusion-based measures is that they might discard potentially useful information about core inflation that may be contained in food and energy prices or whatever categories that are excluded. This concern is particularly significant for less developed economies where food tends to have a much larger weight in the CPI basket than in advanced economies. By excluding a portion of the expenditure-weighted CPI basket, it may deviate from a cost-of-living concept, which may be of greater concern to the general public.

### **5.3 The Statistical Approach**

The statistical approach to measuring core inflation examines the distribution of price movements at a highly disaggregated level and excludes movements that are too extreme, leaving only those that are typical for the period under consideration. It then re-aggregates the goods and services whose price movements are typical. The most widely used statistical method is the trimmed mean approach. The major advantage of this approach is that it does not automatically exclude certain components every

month and is less subjective than the exclusion method, as the choice of the components to be excluded is less arbitrary. However, this method depends on the level of disaggregation to which it is applied. Also, part of the information in the official measure is disregarded every month.

Another statistical method is the weighted median, which simply takes the median inflation rate that corresponds to a cumulative CPI weight of 50 per cent from the highest-to-lowest ranking.

## **6. Do Other Countries Monitor Core Inflation?**

Yes. Most countries do publish a measure of core inflation. Among central banks, it has become an international practice to monitor core inflation, irrespective of the monetary policy framework that they use.

## **7. How do Other Countries Measure Core Inflation?**

All countries, in which core inflation indices are compiled, use similar methods for their calculation. The most popular method for deriving core inflation is the exclusion of certain elementary price indices – which are characterized by strong disturbances (seasonal or supply related) or which are not representative due to other reasons – from the overall price index of consumer goods and services.

The majority of countries using the exclusion method to define core inflation exclude shocks such as policy changes in taxes, exchange rate, interest rate and items that exhibit seasonal patterns. The most common items excluded are food and energy since these items are traditionally considered as volatile components of the overall CPI basket.

Of the countries using the exclusion-based approach, the South African Reserve Bank excludes interest rates on mortgage payments, the Central Bank of Philippines excludes volatile food and energy items, the Central Bank of Chile excludes vegetables, fruits and other fuels, the Bank of Thailand excludes raw food and energy prices, the Bank of England excludes mortgage payments, while the US Federal Reserve excludes food and energy prices.

Some central banks also employ statistically based methods that remove the impact of extreme or outlier price changes (both positive and negative) from the overall inflation rate. The most common statistical measures of core inflation that are used are the trimmed mean and weighted median. The Reserve Bank of Australia, for example, calculates a 30 per cent trimmed mean measure of core inflation, while the Bank of Canada utilises the weighted median approach.

## 8. How do Policymakers use Core Inflation in Other Countries?

Core inflation is used as a supplementary indicator to headline inflation in many countries and is published alongside the headline rate. Some inflation targeting central banks also use core inflation as the target for the conduct of monetary policy.

## 9. What are the Desirable Properties of Core Inflation Measures?

A good measure of core inflation should track trend inflation over a long time period, that is, the average rate of core inflation should match the average rate of overall inflation. In other words, measures of core inflation should neither understate nor overstate the long term trend price changes. A good core inflation measure should be able to forecast the future movement of the headline inflation.

A credible measure of core inflation should be transparent in calculation, verifiable, easy to communicate and widely recognised. The measure so chosen should possess the following requisites:

### (a) Timeliness

If the measure is not available in a timely manner or is subject to revision frequently, then it will lose its practical value. Moreover, timely availability of core inflation figures helps to initiate corrective policy measures at the appropriate time.

### (b) Robustness and Unbiasedness

If the measure cannot be relied upon to remove the sorts of distortions that it ought to, or if it shows a systematically different trend than the series from which it is derived, it will then provide false signals, leading to policy biases and failure to gain public credibility.

### (c) Verifiability

If the measure of core inflation is not readily verifiable, it is unlikely to have great credibility, thereby bearing limited practical value either as a measure against which to assess monetary policy performance or as a guide for inflation expectations.

## 10. What are the Measures of Core Inflation for Mauritius?

The Bank of Mauritius calculates three measures of core inflation by using the exclusion and statistical approaches.

### (i) CORE1

The first measure, CORE1, is obtained using the exclusion-based approach. It strips “Food, Beverages and Tobacco”, which are considered as volatile components, from the overall CPI.

### (ii) CORE2

The second measure, CORE2, also uses the exclusion-based approach. In addition to “Food, Beverages and Tobacco”, it also excludes energy prices and administered prices from the overall CPI. The case for excluding energy and administered prices is that these prices are not determined by market mechanism, but are subject to different kinds of regulation and government tax policies. The list of goods and services in the current CPI basket that are subject to price control comprise bread, government imported rice and white flour, imported onions, cement, water charges, waste water tax, electricity charges, cooking gas, kerosene, workmen wages, domestic and household services, gasoline, diesel oil, road tax, bus fare, postal services, telephone and telegraph services, MBC TV licence, driving test fee and passport fee.

### (iii) TRIM10

The third measure of core inflation is calculated using the trimmed mean approach (TRIM10). It truncates 5 per cent of each tail of the distribution of price changes, that is, it excludes 5 per cent of the most positive and 5 per cent of the most negative price changes. Core inflation is computed by taking the weighted average of price changes for the rest of the components.

These three derived core inflation measures call for a certain degree of caution, as the methods do have their limitations, the most obvious ones being that part of the information in the overall CPI is disregarded each month and that they involve some degree of subjectivity.

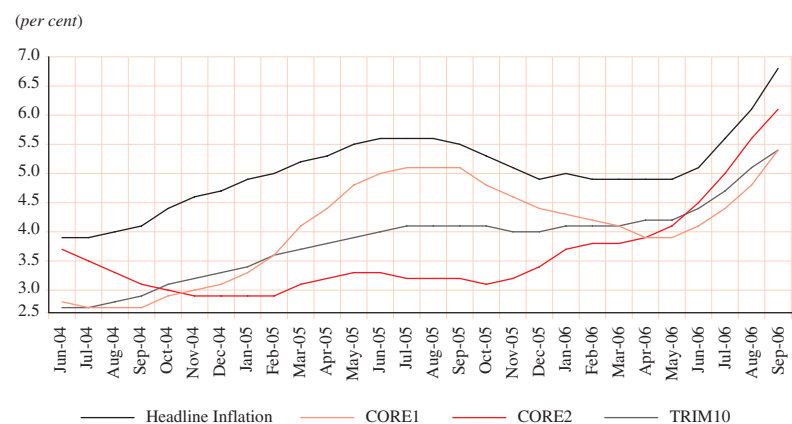
## 11. Will Core Inflation Replace the Current CPI or Headline Inflation in Mauritius?

No. Core inflation is not intended as a replacement for headline inflation, but will be used as a complementary indicator of the general movement in prices of goods and services. The Bank of Mauritius monitors core inflation rates as part of broad inflationary indicators in the economy.

## 12. Review of Core Inflation in Mauritius

Chart 1 shows the evolution of headline as well as the three different measures of core inflation over the period June 2004 through September 2006. During fiscal year 2004-05, while headline inflation varied between 3.9 per cent and 5.6 per cent, core inflation as measured by these three measures fluctuated between 2.7 per cent and 5.0 per cent, indicating a deviation in the range of 0.4 to 2.3 percentage points.

**Chart 1**  
**Evolution of Headline and Core Inflation**



Between July 2005 and June 2006, headline inflation ranged between 4.9 per cent and 5.6 per cent while the core measures of inflation fluctuated within a band of 3.1 per cent and 5.1 per cent. Specifically, while CORE 1 declined from 5.1 per cent at the end of July 2005 to 4.1 per cent at the end of June 2006; CORE2 rose from 3.2 per cent to 4.5 per cent and TRIM10 went up from 4.1 per cent to 4.4 per cent over the same period. Thus for fiscal year 2005-06, the deviation between headline inflation and core inflation measures ranged between 0.4 and 2.4 percentage points.

Since August 2006, the Bank has started to disseminate monthly core inflation data in its Monthly Statistical Bulletin.

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