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South African Reserve Bank

The cost of inflation

by M.M. Smal

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by M.M. Smal[1]

1. Introduction

Inflation undermines the role of money as a unit of account and as a monetary standard. This contrasts with most other activities where, once a standard is chosen, every effort is made to ensure that it is maintained (Konieczny, 1994). Inflation creates confusion because, while it is easy to recognise that one rand buys fewer goods and services, it is much more difficult to determine what it *is* worth and what it *will* be worth. The former problem deals with the role of money as a means of exchange, whereas the latter affects the role of money as a store of value. It is not surprising that nowadays high inflation is generally recognised internationally by monetary and fiscal authorities as undesirable and bad for national economies. There is a growing appreciation worldwide that it is not possible to achieve long-term growth and employment by tolerating, let alone fuelling, high rates of inflation.

In South Africa, the De Kock Commission in its final report in 1985 states that "in the long term the primary objective of monetary policy should be the maintenance of reasonable stability of the domestic price level." This important objective of monetary policy is also recognised in the South African Reserve Bank Act. In his first Governor's Address to the Bank's shareholders in August 1989, Dr C. L. Stals stated that the Bank's primary mission is to protect the value of the rand, i.e. to combat inflation. Since August 1989 the Reserve Bank's policy actions have placed a high priority on counteracting the forces of inflation in the South African economy (Meijer, 1990: 31).

From time to time, policy makers, and particularly the monetary authorities, have been accused of contributing to the sub-optimal performance of the South African economy through their actions to reduce inflation. Although there is a price to be paid for reducing inflation, policy makers have to face the question of whether that price would not be lower than the price that would ultimately have to be paid for allowing high, and often increasing, inflation.

The desire to reduce inflation reflects a judgment that inflation imposes significant costs on the community. The first argument for the case of price stability would be to identify the cost of inflation itself. Unfortunately, many of the social costs of inflation are difficult to calculate accurately. Even the economic costs of inflation are not easy to quantify. These costs are usually spread over an extended period and are not as evident as the costs of price stabilisation policies, which are normally confined to a relatively short period. Moreover, the costs of inflation constantly change over time as economic behaviour adapts to inflation.

Given the diversity of the types of costs that have been identified as stemming from inflation, no specific empirical research has comprehensively quantified all these costs. However, the analysis of empirical evidence on the nature of the relations among inflation, uncertainty, relative price variability and output growth has made substantial progress in the 1990s. Although consensus cannot be said to exist, there are now firm indications that the gross benefits of low inflation are larger than was thought at the beginning of the 1990s (O'Reilly: vii).

It is not the purpose of this article to undertake an extensive empirical analysis to calculate the exact cost of inflation in South Africa. Instead, a summary is provided of some of the costs of inflation, illustrated with graphs and tables. The next section describes the measurement and historical development of inflation in South Africa. Then the main changes in attitudes to inflation are discussed, and the most important costs of inflation dealt with. The article concludes that inflation creates uncertainty about the future, that there are costs in having to cope with inflation and that "living with inflation" is no solution for sustainable higher economic growth or development. It highlights the need to ensure that inflation does not become a permanent feature of the economy.

2. Measurement and historical development

Inflation is best described as a *sustained rise* in the *general level* of prices – "sustained", "rise" and "general level" being the operative words. Inflation therefore refers to a *process* of rising prices rather than to a state of "high" prices. Stated differently, inflation results in a continued decline in the quantity of goods and services that can be bought with a fixed amount of money, or, in other words, a decline in the purchasing power of money.
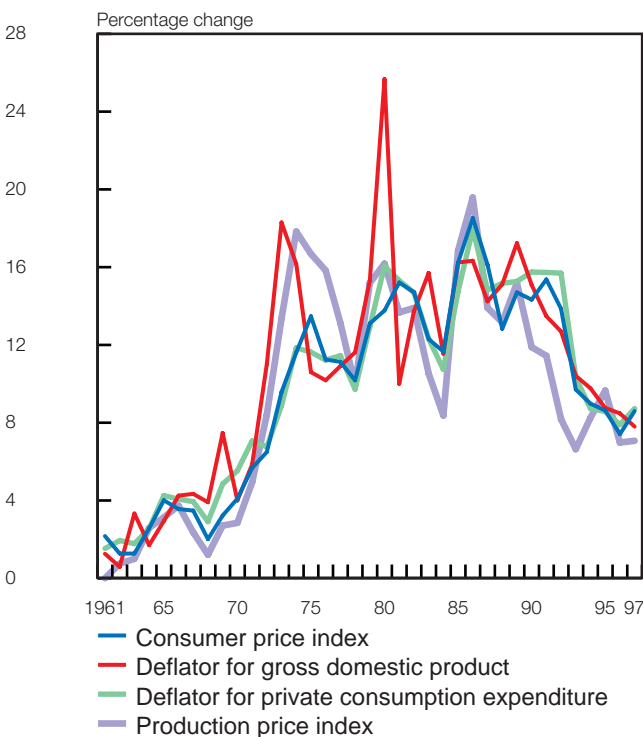
Many countries, including South Africa, experienced an abrupt acceleration in their inflation rates during the mid-1970s. In most cases, the acceleration of inflation was accompanied by increased volatility of annual inflation rates.
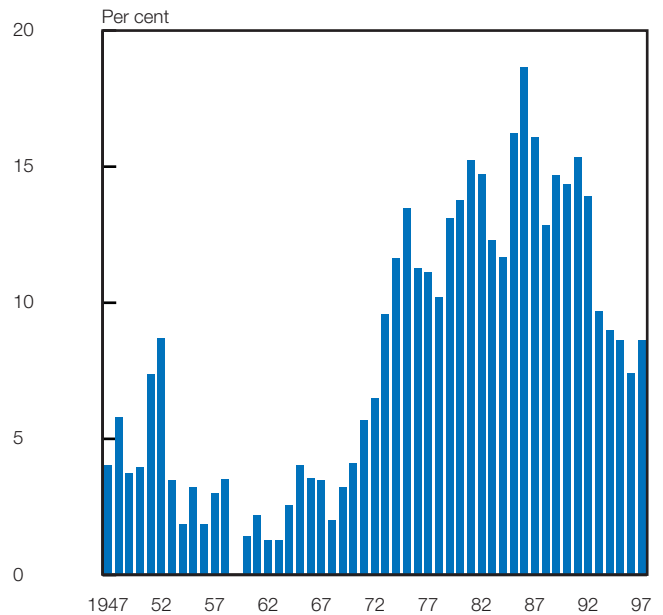
Internationally, inflation rates are measured according to price changes in a large number of combinations of goods and services. In South Africa, the more important indicators of inflation include changes in the overall consumer price index, the production price index, the deflator for gross domestic product and the deflator for private consumption expenditure. The average annual percentage change in these four indices is depicted in Graph 1.

It is clear that changes in these indices generally move in tandem. Deviations occur at times because of the different sets of goods and services included in the various indices. For instance, it is noticeable that in 1980 the price change measured by changes in the deflator for gross domestic product, was much larger than the price increases measured by changes in the other three indices. The gold price is reflected in the deflator for gross domestic product, but it is not included in the other indices. Therefore the other three indices indicate much lower price increases in the domestic economy than the deflator for gross domestic product, which reflects the increase to an all-time high average annual price of gold of US$613 in

Graph 1: Indicators of inflation in South Africa

Legend:
- Consumer price index
- Deflator for gross domestic product
- Deflator for private consumption expenditure
- Production price index

Graph 2: Consumer price inflation in South Africa

1980. Despite the availability of several other price indicators, the most popular indicator of overall price changes in the South African economy remains the changes in the overall consumer price index.

Graph 2 shows the South African record of inflation from 1946, measured as the year-to-year percentage change in the average annual consumer price index; in every year since the end of World War II, the average annual level of consumer prices has increased. During the 52 years from 1946 to 1997 the average level of consumer prices rose about forty-sevenfold, increasing by 4 638 per cent over the entire period or at an average rate of 8,7 per cent per annum. Applying this price change to an imaginary item costing R100 in 1946, it would cost about R4 638 in 1997, or expressed in terms of purchasing power, one rand in 1997 could only purchase about one-fiftieth of the goods and services that it could in 1946.

Five distinct inflation periods can be identified over this 52-year period (Meijer, 1990, identifies four inflation periods). From 1946 to 1952 price changes were still influenced by post-war adjustments as well as the repercussions of the Korean War. The average consumer price inflation over this period amounted to 4,9 per cent per annum. A comparatively high degree of price stability prevailed during the period from 1953 to 1968, when the average annual rate of consumer price inflation was 2,4 per cent – the lowest average rate in the post-war period. At this rate, it would have taken 29 years for consumer prices to double. The years from 1969 to 1973 saw the run-up to double-digit inflation, with inflation accelerating every year. In

Graph 3: Differences in movements of components of the overall consumer price index in South Africa

Index: 1975=100

- ▬ Overall consumer price index
- ▬ Clothing and footwear
- ▬ Educational services
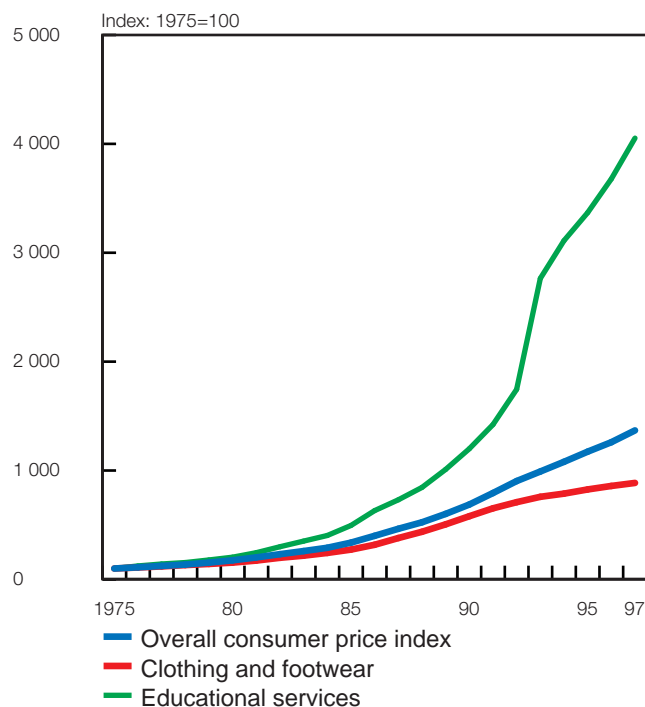
the double-digit inflation years from 1974 to 1992, the average annual rate of consumer price increases amounted to 13,8 per cent. At this rate, prices would have doubled approximately every five years. From 1993 onwards single-digit price changes, comparable to those of the early 1970s, were again recorded.

One should note that all the prices included in a certain price index do not necessarily rise in the same proportion over any particular period. Graph 3 shows that the average inflation rate of "clothing and footwear" was considerably lower than overall consumer price inflation, whereas inflation in the cost of "educational services" outpaced the rise in the overall consumer price index since 1975. The sharp increase in the cost of educational services in 1993 reflected a change in the financing of Model C schools and the associated price rise that ensued.

3. Changing attitudes toward the cost of inflation

It was traditionally thought that the economic costs of inflation were negligible. Economists believed that economic prosperity depended on the optimal allocation of resources, which in turn depended only on the relative prices of commodities and the availability of productive resources. Since there is no real reason for price ratios to change when the average price level changes, it was inferred that neither the price level nor its rate of change would, *ceterus paribus,* affect the volume of production of goods and services.

Until as recently as the 1960s, most economists were not unduly alarmed by inflation. Many believed that the costs of inflation were compensated for by the reduction in unemployment and the higher level of real output that could be attained by allowing inflation to continue, the "trade-off" between inflation and unemployment, illustrated by the Phillips curve. Part of the conventional wisdom at that time was that mild inflation was a healthy development because it facilitated the relative price changes that were necessary to improve flexibility in the economy and overall economic performance.

A crossroads was reached during the 1970s, when inflation accelerated world-wide from the reasonably low levels of the 1950s and the 1960s and output growth failed to respond in similar fashion. Economists started to realise that inflation changes the relative rewards that can be expected from alternative types of economic activity. Consequently they saw inflation as a powerful force capable of directing economic effort into areas that were not always desirable or beneficial to society.

Two important conclusions can be drawn from the re-examination of the inflationary process in the 1970s. The first is that the supposed benefits of inflation were overstated. The notion that higher employment levels can be attained by inflation, or by encouraging it, gave way to the concept that at any given time there is a level of unemployment consistent with stable inflation, called the non-accelerating inflation rate of unemployment (NAIRU). If a government wants to reduce unemployment below this critical level, it has to accept *constantly rising* inflation. The second conclusion is that the costs of inflation were previously understated, especially the adverse effects of inflation on potential production. Inasmuch as inflation distorts economic decisions, it misallocates productive resources and reduces output and real income to below the level that would have been attained in a stable price environment.

Price stability is currently widely recognised as one of the preconditions for sustainable growth, the efficient allocation of real resources and the reduction of distortions in the distribution of income. Since the 1990s, many researchers have made increasing efforts to empirically quantify the cost of inflation, or stated differently, to calculate the benefits of low inflation. While consensus does not yet exist, there are indications that the benefits of low inflation could be greater than was thought at the beginning of the 1990s.

People tend to focus on nominal values because they are more easily understood. It is therefore understandable why some would propose that the best

solution to inflation would be to index the system in order to remove the distortions arising from inflation. The preservation of policy credibility along with technical and administration considerations prevented this solution from being universally accepted (O'Reilly: 50). Institutional arrangements accordingly continued to focus mostly on nominal contracts and a nominal accounting system, despite high inflation. This led to the conclusion that the best and cheapest form of indexation is one which focuses on maintaining price stability (O'Reilly: 51; Jenkins, 1998).

In recent years, many countries have chosen to reduce inflation and to maintain price stability afterwards. Monetary policy was used extensively in this process. The basic tenet is that the comparative advantage of monetary policy is to reduce inflation, and that its potential contribution to stable growth lies herein. The argument that the central bank should emphasise curbing inflation comes from the twin beliefs that inflation imposes costs on society that reduce economic prosperity and that monetary policy can lower inflation but cannot have a permanent effect on real aggregate demand. This view is clearly reflected in the widely accepted definition of a central bank's task, namely to achieve and maintain price stability, and the consequent operational autonomy or independence that most governments give to their central banks to deploy the instruments required to attain this goal.

4. Cost of inflation

There seems to be little disagreement that inflation costs exist and that they will be manifested in many ways. What is not clear, is the extent to which the costs are large enough to warrant remedy. This ambiguity arises in part because of the difficulties inherent in empirical work attempting to measure the costs.

One difficulty faced when investigating the cost of inflation is that researchers are looking for deviations from the level of production from a measure of potential production that would exist in an inflation-neutral world. In principle, in the absence of other macroeconomic disturbances, any deviations from the inflation-neutral level of production induced by policy decisions, incur a cost that might be eliminated by appropriate policy. Given that inflation results from many factors other than policy choices and given that production is also endogenously determined by a host of factors, this significant identification problem was considered an impediment to empirical work on the cost of inflation (McTaggart: 17). Considerable efforts have been made lately to estimate the benefits of disinflation, using partial-equilibrium and general-equilibrium analysis.

The effect of inflation in South Africa will only be illustrated in this article by using graphs and tables without attempting to quantify the cost linked to inflation. However, reference will be made to some of the latest empirical results obtained in the 1990s where single-country and cross-country data were used in analyses.

The cost of inflation can be grouped under four headings, namely uncertainty, shoe-leather costs, redistributional costs and economic costs. Briefly, "shoe-leather" costs refer to wasted resources because of frequent visits to the bank to withdraw money, or in modern parlance, unnecessary cost incurred by the implementation of costly cash management systems. Redistributional costs arise because not all individuals are able to fully hedge themselves against inflation or because nominal interest rates do not fully adjust to incorporate inflation. Economic costs arise because inflation may cause people to change their investment or saving behaviour, with the result that the economy's growth potential is reduced.

4.1 Uncertainty

Decisions to buy or sell and to borrow or invest are based on both current and future prices, and inflation creates confusion about the information that these prices convey. As a result, there can be over-investment in some production sectors relative to the underlying demand and underinvestment in others with the resultant need for adjustment.

A considerable body of literature has accumulated concerning the relation between the level of inflation and its variability. Golob (1993) surveyed the empirical literature on inflation and uncertainty and concludes that these studies have found that both survey and mathematical estimates of uncertainty are positively related to the level of inflation, i.e. the higher the inflation, the greater the uncertainty.

Uncertainty also has a time dimension. It may be possible to forecast tomorrow's inflation rate with a high degree of certainty but to be far less certain about the inflation rate a few months or years hence. Table 1 reports summarised statistics on the average annual

Table 1. Mean and standard deviation of inflation in South Africa

Period	Mean	Standard deviation
1960-1969	2,50	0,97
1970-1979	9,66	3,03
1980-1989	14,61	1,98
1990-1997	10,84	2,93

rate of consumer price inflation in South Africa and its variability, as calculated by its standard deviation, over the period from 1960 to 1997.

Examining the data by decades, the 1960s are characterised by a low average level and low variability of inflation. The advent of the 1970s sees a virtual quadrupling of average inflation, to almost double-digit levels, along with a threefold increase in variability. The 1980s show even higher inflation rates, but less variability than in the 1970s, an indication of a slightly more stable inflation rate but at a higher level. In the 1990s inflation is reduced, but variability increases again to almost the same level as in the 1970s. The higher variability of inflation in the 1970s could be the result of the change from single-digit price increases to double-digit price increases. In the 1990s the opposite movement in price increases, from double-digit to single-digit inflation rates, could again have resulted in the higher variability. It therefore appears that changes in the inflation regime could have led to this higher variability and uncertainty.

4.2 Shoe-leather cost

Among the earliest researched costs of inflation is the "shoe-leather" cost, arising from considering real money balances as a consumption good and inflation as a tax on real money balances. Individuals then minimise their cash holdings which do not earn any interest. They incur the cost of worn shoe-leather, i.e. the cost of wasted resources and opportunity, when going frequently to the bank to withdraw cash for their daily purchases.

Higher inflation also results in the increased supply of financial services by financial institutions. The shoe-leather cost of going to the bank contributed to the development of methods of payment without cash, such as debit or credit cards. Households substitute transactions in financial services for money balances so that the financial services sector increases its share in the overall value of production. The size of a nation's financial sector (measured either by the financial sector's share of GDP or by employment) is strongly affected by its inflation rate (English, 1996; O'Reilly: 26).

Related to shoe-leather costs are "menu" costs, that is the cost involved in changing prices more frequently in accordance with the frequency and magnitude of price changes. Constantly changing prices result in increased price uncertainty on the part of businesses and households. However, these costs are unlikely to be large except in the case of hyperinflation (Flynn & Parkinson: 3).

4.3 Redistributional costs

Inflation-induced redistribution is costly because it induces changes in behaviour as individuals reallocate resources to avoid the effects of inflation, that is, time

Table 2. Purchasing power of money

Year	Consumer price index	Price of item*	Purchasing power of R100**
	Index 1995 =100	Rand	Rand
1946....................	2,46	100,00	100,00
1950....................	2,93	119,10	83,96
1960....................	4,10	166,67	60,00
1970....................	5,39	219,11	45,64
1980....................	14,95	607,72	16,45
1990....................	58,65	2 384,15	4,19
1997....................	116,57	4 738,62	2,11

* The price of an item which cost R100 in 1946.
** The value, or purchasing power, of R100 in 1946 terms.

and resources are diverted away from their initial use to less productive activities in an attempt to avoid the effects of inflation on income. Because resources are then used in activities in which they would not otherwise be used, except for the existence of inflation, efficiency losses are incurred.

### 4.3.1 Redistribution from holders of money balances

People cannot completely eliminate holding cash for transaction purposes. The purchasing power of money is eroded by inflation, hence there will be some redistribution of wealth from holders of money balances. Firms and individuals also hold assets in bank deposits. The purchasing power of these deposits also falls with inflation if the real after tax interest rate is negative.

Table 2 illustrates how inflation erodes the purchasing power of money. The effect of the high inflation years of the 1970s and 1980s is clear. In the 1970s the purchasing power of money was reduced by almost two-thirds within 10 years. In the 1980s the value of money was eroded even faster by about three-quarters over the 10-year period. The benefit of the slowdown in inflation from the mid-1990s can be seen in the slowdown in the erosion of the purchasing power of money in the period 1990 to 1997.

4.3.2 Redistribution from lenders to borrowers

There is substantial empirical evidence that anticipated or expected inflation is reflected in nominal interest rates, often referred to as the Fisher effect. The essence of the Fisher effect is that nominal interest rates (i) include a real component (r) and an inflation expectations component (π^e), i.e. $i = r + \pi^e$. A fully anticipated inflation rate is then reflected in nominal interest rates so that lenders are compensated for the

Graph 4: Real and nominal returns

Per cent

Legend:
— Nominal interest rate on fixed deposits of twelve months
— Inflation-adjusted interest rate
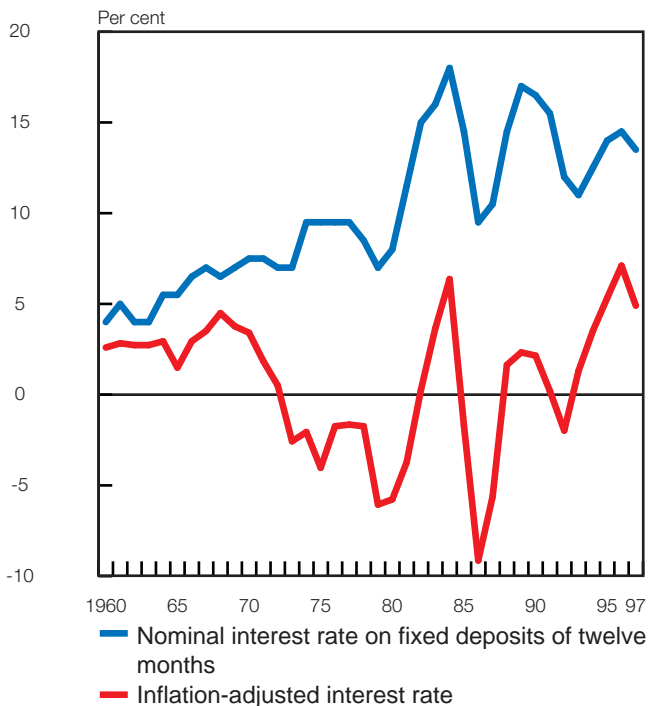
reduction in the purchasing power of the principal of a loan caused by inflation. If the actual inflation turns out to be higher than expected inflation, the real return to lenders will be lower than expected, resulting in a redistribution of income from lenders to borrowers. If actual inflation is less, there will be a redistribution of income from borrowers to lenders.

Graph 4 shows the nominal and real interest rate (i.e. nominal rates adjusted for observed inflation) on fixed deposits of twelve months. Although nominal interest rates have increased in response to higher inflation, real returns to lenders have declined almost continuously from the latter part of the 1960s until the late 1980s, thereby eroding the purchasing power of savers. The only exception during this period was in 1984 when the real return on savings was positive. Since 1989 the real return had become positive and, except in 1992, has remained positive ever since. Tax is also levied on nominal interest income. When the tax effect is taken into account, the real return to savers declines further, so that they have no incentive to save.

4.3.3   Redistribution from fixed income earners
Inflation will transfer income away from people with fixed incomes to the financial institutions in which they invested their funds or to borrowers. It is natural to think of pensions when one refers to fixed incomes and

how they lose purchasing power with persistent inflation. A potentially more important issue in years to come is the performance of investment funds as more people start saving for their own retirement. If returns on funds are unable to keep pace with inflation, members of those funds will suffer a real loss in wealth and, ultimately, in retirement income. While this seems *a priori* unlikely given the historical performance of funds, inflation could impact indirectly on the rate of return of these funds in the long run by slowing the rate of economic growth. Similarly, to the extent that inflation depresses real values in the stock market and raises the risk premium attached to equity investment, high inflation could also have an adverse effect on fund earnings (Flynn & Parkinson: 5-6).

As noted previously, inflation can cause a redistribution of income from lenders to borrowers if inflation is not fully reflected in nominal interest rates. Implicit in this statement is that first of all inflation must be expected; and once expected, it must be built into higher nominal interest rates. It is reasonable to expect that adding inflation expectations to current interest rates can easier and more likely be taken into consideration by those people or institutions with a higher degree of market power or financial sophistication than smaller and less sophisticated entities. To this extent, market participants with more funds to offer financial intermediaries or who lend directly to borrowers are more likely to be able to negotiate a full pass-on of inflation than those with small amounts of funds and hence weaker market power. Furthermore, lower income groups may have less knowledge of financial markets or be unable to incur the potentially large fixed costs of acquiring hedging assets. Hedging against the costs of inflation may therefore be less accessible to low income or low wealth groups. As a consequence, low-income households may be more seriously affected by the redistributive costs of inflation than wealthier households.

4.3.4   Redistribution to government
Inflation interacts with the wage and tax systems, pushing wage earners into higher tax brackets, inducing labour/leisure substitutions and necessitates more frequent wage negotiations, increasing the probability of industrial unrest.

However, nominal wages in South Africa have tended to keep pace with inflation over time. If personal income tax rate scales remain unchanged, individuals move into higher marginal tax brackets and are subjected to a higher tax burden (called bracket creep or the fiscal drag phenomenon), despite there being no change in real pre-tax personal income. The result is the redistribution of income from individuals – as real after-tax income falls – to the government. These effects can be largely offset by downward adjustments to the tax scales. Graph 5 shows the

Graph 5: Average weighted tax rate on individuals

Per cent
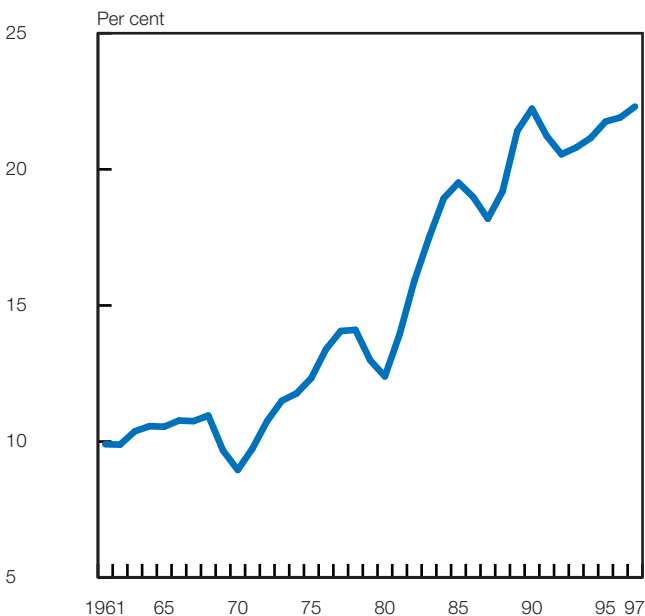
average weighted tax rates for all individual taxpayers (See Smal, 1995, for the calculation of the average weighted tax rates for individual taxpayers) for the period from 1960 to 1997. This rate has increased almost consistently and in 1991, the year before the introduction of the Standard Income Tax on Employees (SITE), reached its second-highest level ever. After declining briefly in 1992 and 1993, the rate has increased ever since and reached its highest rate of 22,3 per cent in 1997 without any major changes in the statutory tax scales.

4.4 Economic costs

4.4.1 Labour market effects

Inflation can interact with the outcomes in the labour market in a number of ways. First, if adjustments are sluggish, say because of the existence of nominal wage contracts, then inflation will erode real wages and possibly increase employment. Inflation in labour markets will have an impact on the type of contracts workers enter into. Because it is the existence of fixed nominal contracts that leads workers to supply more labour for lower real wages, an increase in the variability of inflation will lead to shorter average contract lengths. So the problem of renegotiating contracts becomes more important and more resources are devoted to this essentially unproductive activity.

There may be other avenues through which inflation can have adverse effects on the labour market. One possible source of concern for workers who are

negotiating wage contracts is the variability of inflation. If workers could fully anticipate the extent to which inflation will erode the real wage over the life of a contract, then that information could be incorporated into the contract. However, variable inflation will induce risk-averse workers to negotiate a nominal wage that incorporates a premium to cover the eventuality that the realised price level may be higher than the expected price level. Increasing uncertainty about inflation, which is closely related to the increasing variability of inflation, will therefore push up the average nominal wage rate and hence the real wage, which may result in an upward wage-price spiral. Alternatively, risk-averse workers could settle for a lower wage but with clauses providing for wage adjustments in the event of an acceleration in inflation.

4.4.2 International competitiveness

In theory, if South Africa's inflation rate were higher than that of its trading partners the nominal exchange rate of the rand should depreciate to compensate for the loss in competitiveness. In practice, purchasing power parity seems to hold only in the long run. The possible reasons for the failure of purchasing power parity to hold in the short run are many and varied, including transaction costs, wage and price rigidity, the interaction between inflation and the nominal taxation system, and the impact of other factors on the exchange rate. Nevertheless, higher inflation than in trading partner and competitor countries normally leads to a one-sided adjustment in the exchange rate of a currency that can make a country vulnerable to speculative attacks.

Graph 6 depicts the relative inflation rates of South Africa and its main trading partners compared with developments in the nominal effective exchange rate of the rand. The weighted inflation rate in South Africa's main trading-partner countries (United States of America, United Kingdom, Germany and Japan) was compiled by weighting their respective inflation rates with the size of their respective total trade with South Africa. The movements in relative purchasing power parity are broadly matched by movements in the nominal effective exchange rate of the rand. The slightly more than fivefold increase in the ratio of South Africa's consumer price index to the weighted average index of consumer prices in trading-partner countries from 1970 to 1997 has been accompanied by a depreciation in the average effective exchange rate of the rand to a value slightly less than one-sixth of its value in 1970.

Because a loss in competitiveness has an impact primarily on the traded goods sector (see next section), high inflation makes it more difficult to reduce a current account deficit in a sustainable fashion. A current account deficit is more easily financed in a world of deregulated capital markets. Although liberalisation has made financing easier, it has also led to an

Graph 6: Relative inflation and the exchange rate

Index: 1970=100

- Nominal effective exchange rate of the rand
- Ratio of consumer prices in trading-partner countries to consumer prices in South Africa
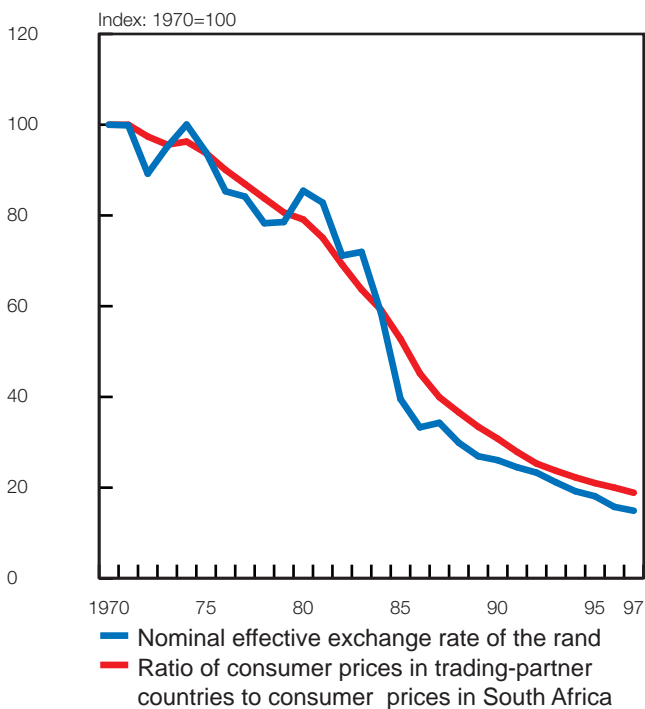
increase in the volume and volatility of short-term capital flows, which appear to be more sensitive to interest rates.

If higher interest rates cause the exchange rate to appreciate, attempts to reduce embedded inflation by raising interest rates, although necessary, erode the competitiveness of domestic producers, exacerbating the original loss of competitiveness from higher inflation. In short, the net effect is that a high inflation rate erodes a country's international competitiveness over sustained periods and attempting to reduce deeply entrenched inflation can, in turn, erode competitiveness, albeit only temporarily. This affects economic activity and investment in the traded goods sector and impedes the process of reducing a current account deficit.

4.4.3 Tradables and non-tradables

Cross-sectoral investment patterns will also be affected by rigidities or other distortions which interrupt the processes of restoring purchasing power parity following an increase in the domestic price level. As stated in the previous section, to the extent that the nominal exchange rate does not adjust to maintain consistency in the real exchange rate, domestic inflation ultimately reduces domestic competitiveness in world markets. This will be reflected in declining profitability in the traded goods sector and a movement of resources out of the traded goods sector into the

non-traded goods sector – a movement that would not have occurred had there been more price stability (McTaggart: 8).

The traded goods sector is also exposed to more competition than the non-traded goods sector and is less capable of passing on the impact that inflation has on its cost base. For example, if wages increase across the board in South Africa, the non-traded goods sector would be better able to pass on the increase as all competitors in each market face much the same increase in the cost structure. It would be more difficult for import-competing industries to pass on the increase in costs via higher prices, because prices of imported goods would not be directly affected by the South African wage increase, with consequent impacts on the efficient allocation of resources across firms and industries.

4.4.4 Depreciation of asset values

Since equipment can be applied for a long time period, businesses need to account for the gradual deterioration of equipment and make provision for its replacement in the future. Inflation distorts this process when accounting systems operate on a historical cost basis, and not on replacement cost. With inflation, most depreciation rules entail that the real value of depreciation allowances is eroded and so the true extent of depreciation is understated. Therefore, inflation significantly distorts the value of depreciation allowances, increases the effective tax rate on profits and in this way significantly penalises investment.
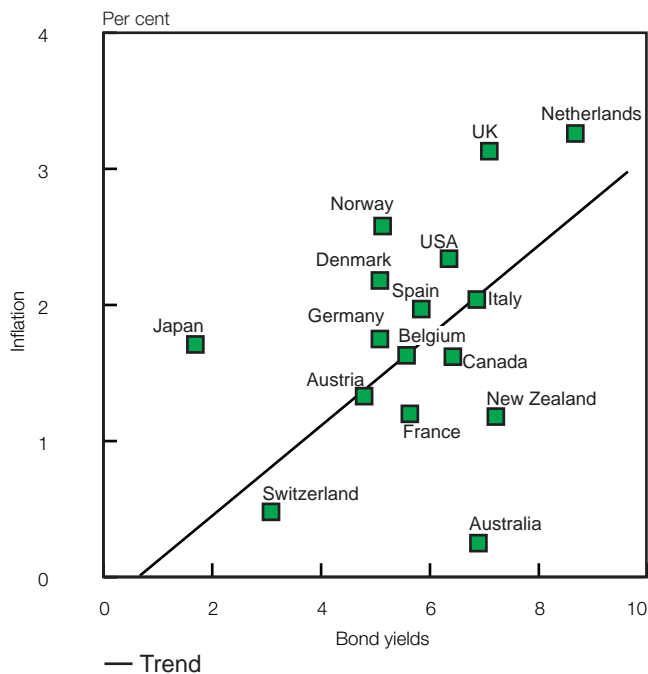
4.4.5 Nominal and real interest rates

With relatively high inflation rates in recent years, the nominal interest rates in South Africa have also tended to be high as the anticipated inflation rate was incorporated into nominal interest rates. The Fisher effect, adjusted for taxation effects, states that in order to keep the after-tax real interest rate constant, the nominal interest rate must rise by more than an increase in inflation to compensate for the increase in the tax burden as nominal income rises. Lenders are normally taxed on nominal interest payments and borrowers are able to deduct nominal interest payments, therefore lenders have to bear a higher tax burden than borrowers. The nominal interest rate lenders receive must therefore rise by more than the nominal interest rate borrowers face. In general, the actual rise will be between that required for borrowers and lenders so that the real return on saving declines but the real cost of lending increases.

An additional effect on interest rates arises from the fact that inflation increases uncertainty about future price movements. This greater uncertainty tends to increase the real interest rate sought by investors and, therefore, the level of nominal interest rates.

Graphs 7 and 8 provide further evidence that inflation has costs in terms of investment and the growth potential – and that these costs continue long after inflation has been reduced. Graph 7 plots the

Graph 7: Inflation and long-bond yields in developed countries, 1997

Per cent

(Chart: Inflation plotted against Bond yields, with data points for Netherlands, UK, Norway, USA, Denmark, Spain, Germany, Italy, Belgium, Japan, Austria, Canada, France, New Zealand, Switzerland, Australia, and a Trend line)

Inflation

0   2   4   6   8   10
Bond yields

— Trend

Graph 8: Inflation and short-term interest rates in emerging market countries, 1997

Per cent

(Chart: Inflation plotted against Interest rates, with data points for Mexico, Hungary, Poland, South Africa, Czech Republic, Brazil, Chile, Indonesia, Philippines, Malaysia, Argentina, and a Trend line)

Inflation

5   10   15   20   25
Interest rates

— Trend
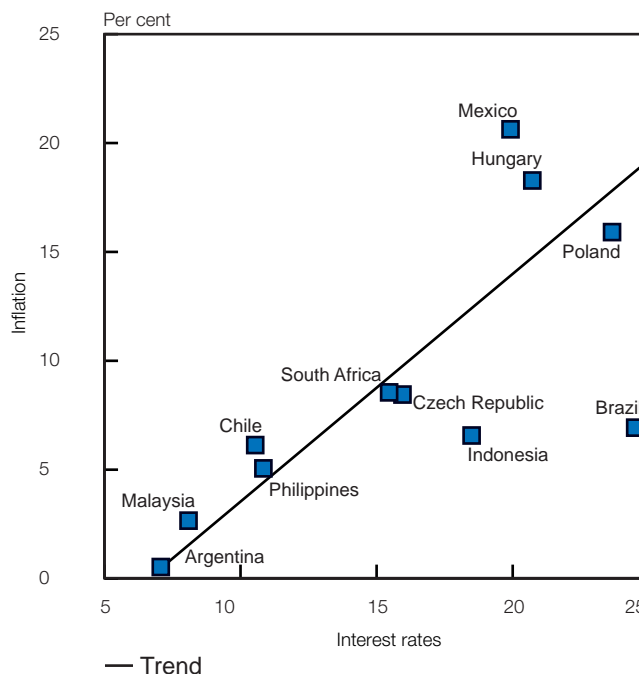
yields on long-term bonds against average inflation in 1997 in a few selected developed countries. Graph 8 shows the relation between inflation and short-term interest rates in a selection of emerging market economies. It seems that those countries that have experienced high inflation also have the highest level of interest rates. This is not intended to suggest that other factors are unimportant, but there is a striking correlation between inflation and rises in interest rates.

4.4.6 Saving and investment

Whether or not decisions about savings and investment are distorted by inflation depends on whether the real costs of and returns on those activities are affected by inflation. Therefore, the relation between inflation and real interest rates, discussed in the previous section, becomes important.
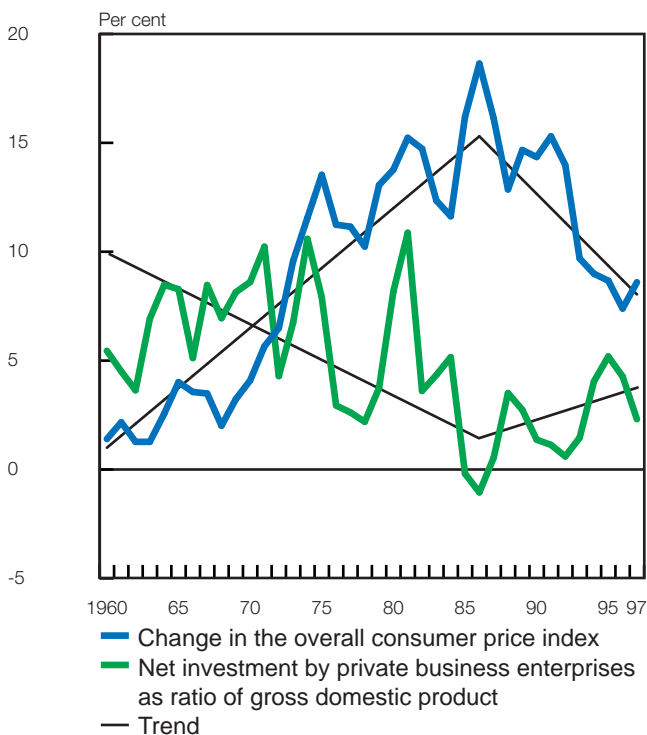
The net impact of inflation on saving is theoretically ambiguous. In the short run, inflation could lead to a decline in the real return on saving if it is not compensated fully by nominal interest rates. The taxation of that part of interest payments which is intended to compensate for the erosion of purchasing power by inflation further lowers the real return on saving. To the extent that savers are sensitive to changes in after-tax interest rates, inflation will have a negative impact on saving, thus affecting the supply of loanable funds for investment financing.

This negative effect of inflation on savings has to be set against the degree to which higher inflation increases uncertainty about the future. Higher uncertainty could increase the precautionary motive to accumulate assets and therefore have a positive impact on saving. In general, however, the interaction between inflation, the tax system and savings behaviour manifests in a reduction in the savings rate.

In terms of investment itself, some factors such as increased uncertainty, reduced competitiveness and higher interest rates, are likely to reduce the level of investment. In fact, the level of net investment, that is investment which adds to the existing capital stock, has fallen markedly in the 1970s and 1980s compared with the low inflation decade of the 1960s. Net investment by private business enterprises as a ratio of gross domestic product is depicted together with inflation in Graph 9. As inflation accelerated from the low levels recorded in the 1960s to the high average rate of 18,6 per cent in 1986 and then declined to an average rate of 8,6 per cent in 1997, net investment by private business enterprises as a ratio of gross domestic product first decreased to its lowest level of -1,1 per cent in 1986 and then resumed an upward trend again to its 1997 level of 2,3 per cent.

Inflation erodes the real value of investment and depreciation allowances which create an incentive to invest in shorter lived capital and to eschew large-scale, longer term projects (McTaggart: 7). Since

41

Graph 9: Inflation and the net investment ratio

Per cent

- Change in the overall consumer price index
- Net investment by private business enterprises as ratio of gross domestic product
- Trend

temporary shrinkage of real aggregate income and wealth, but a reduction in the economy's capacity to produce income and employment in the long run. Furthermore, overinvestment in inflation hedge assets may create an asset price bubble with potential economic risks.

4.4.7 Economic growth

As discussed above, inflation has important, identifiable and distorting effects on the markets for production factors. In the labour market, inflation's biggest effect is probably on the negotiation process that workers and firms enter into when settling the wage contracts. Inflation and the variability of inflation will induce firms and workers to negotiate more often, while at the same time clouding the information and increasing the probability of confrontation and strikes. With respect to capital, the identified effects of inflation on higher interest rates, increased uncertainty, reduced competitiveness and lower, and distorted, investment levels will all tend to result in a sub-optimal real fixed capital stock. Inflation also increases the real tax burden of firms, reduces real cash flows and increases the cost of equity financing. Apart from inducing a lower capital stock, inflation also biases investment more heavily towards assets other than plant and equipment and is financed increasingly through debt. In addition, inflation also distorts the production

profitability directly affects the incentive to invest, disruptions in the distribution of profits between sectors of economic activity will add to the distortion of cross-sectoral investment patterns and the composition of the capital stock. In general, a firm's pricing policy varies according to the market structure in which it operates. Firms less able to pass on cost increases suffer from significantly larger profit decreases during inflationary periods. As indicated above, firms operating in the tradable goods market suffer greater distortions from inflation than those in the non-tradable goods market. Investment expenditure also shifts to the financial services industry because there is an increased demand for its services on account of inflation.

The issue of the interaction between taxes and inflation was touched on earlier. Since inflation induces a situation where borrowers gain and the tax system allows for interest cost to be written off against profits, the interaction of inflation with the company tax system produces a bias towards debt financing in the financing of investment.
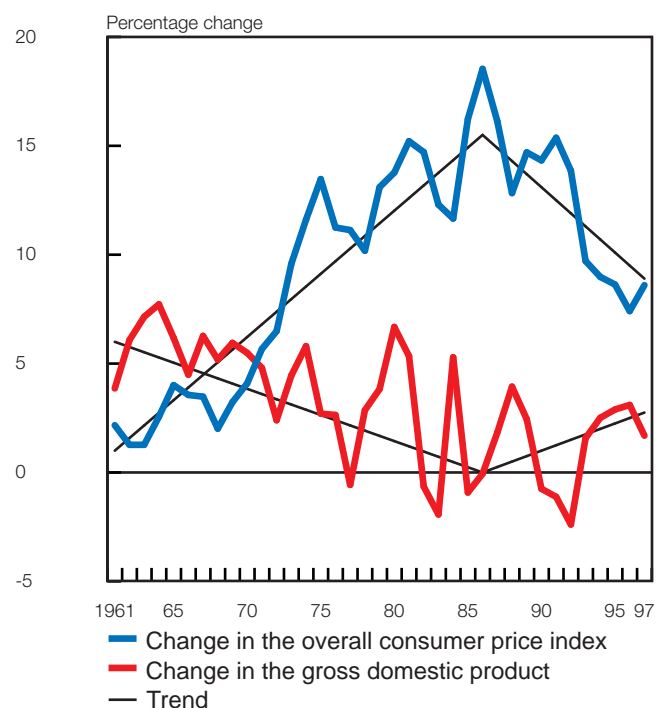
Inflation tends to reduce investment in productive assets (such as plant and equipment) and redirects it to other forms of investment (inflation hedge assets such as property or equity), leading to a slowdown in economic growth. This slowdown in production growth has serious consequences in that it is not merely a

Graph 10: Inflation and economic growth in South Africa

Percentage change

- Change in the overall consumer price index
- Change in the gross domestic product
- Trend

processes so that the reduced levels of input are used in less efficient techniques of production and this has a significant effect on marginal and average labour and capital productivity. Since both labour and capital, and also aggregate technology are adversely affected, inflation significantly reduces the level of production and income in the economy.

Graph 10 compares inflation in South Africa, as measured by changes in the annual level of the consumer price index, with economic growth, as measured as changes in the annual real gross domestic product. It indicates a broad inverse relation between inflation and real economic growth. This relation should not be interpreted naively or simplistically as supporting the contention that high inflation causes low growth. Rather, price stability should be seen as a necessary, but not sufficient, condition for high, sustainable economic growth.

Table 3 summarises some of the recent empirical findings about the cost of inflation in terms of reduced economic growth in various countries (O'Reilly: 58). It is clear that the findings are varied, indicating that for every one percentage point reduction in inflation, income increases by between 0 and 0,3 percentage points.

To illustrate the calculated cost of inflation, the following findings from a recent paper by Motley (1998) are highlighted. Motley focuses on the argument that in the long run persistent inflation leads to a reduced growth rate of real gross domestic product. As many as 78 "non-oil" countries, for which 1960 to 1990 data were available, were included in a cross-country analysis. Cross-section regression equations were estimated over the full 30-year sample period. The results imply that in the long run steady state, a 10 per cent inflation rate would reduce annual per capita growth in an average country by about 0,25 of a percentage point. With steady-state growth of 2 per cent (the assumed rate of Harrod-neutral technical change[2]), per capita gross domestic product would double in 35 years. If the growth rate were reduced to 1,75 per cent, this doubling would take 39 years. The empirical results lead to the conclusion that a 5 percentage point reduction in inflation could boost annual growth by between 0,1 and 0,5 percentage points.

An increase in growth of less than 0,5 of a percentage point may appear insignificant, but when evaluated over the long run the cumulative gains in future income from lowering inflation can be impressive. In order to judge whether the move towards price stability would be worthwhile, Motley calculated the present value of the long-run benefits in order to compare them with the upfront costs of inflation containment. The calculation is sensitive to the interest rate used to discount future benefits. Rough calculations suggest that the benefits exceed the costs by a wide margin: "For example, with a 40-year working life, a 3 per cent real discount rate, and a convergence parameter of 2½ per cent, a reduction in inflation that would yield a 0,1 percentage point boost to steady state growth would increase the discounted lifetime income of a typical worker by an amount equal to about 15 per cent of one year's income, while a 0,5 percentage point boost to steady state growth would be worth almost 140 per cent of one year's income. These estimates of the benefits of lower inflation appear to exceed the costs of bringing inflation down, which have been estimated as amounting to at most 12 - 15 per cent of one year's gross domestic product for a 5 percentage point reduction in inflation" (Ball, 1993; Motley: 27).

Much of the cost of bringing inflation in South Africa

Table 3. Time-series estimates of the benefits of disinflation

Study	Country	Estimate[c] Per cent	EV[d] Per cent
Cameron, Hum and Simpson (1996)	Canada, USA, UK, Germany	0[a]	0
Fortin (1993)	Canada	0[a]	0
Sbordone and Kuttner (1994)	USA	0[a]	0
Stanners (1993)	Industrialised countries	0[a]	0
Bullard and Keating (1995)	58 post-war economies	0[a]	0
Grimes (1991)	OECD	0,10[a]	3,40
Smyth (1994)	USA	0,20[a]	7,00
Jarret and Selody (1982)	Canada	0,30[a]	10,60
Bruno and Easterly (1996)	Cross-country	0[a] if π<40%	0
Judson and Orphanides (1996)	Cross-country	0[a] if π<10%	0
Barro (1995)	Cross-country	0,02[b]	0,40
Fischer (1993)	Cross-country	0,04[a]	1,40
Cozier and Selody (1992)	Cross-country	0,10[b]	1,98

a. Growth rate effect
b. Temporary growth rate effect lasting 30 years
c. The estimated income or productivity gain (per cent of GDP) for a one percentage point reduction in the rate of inflation
d. The equivalent value (EV), i.e. the proportional increase in consumption the household would require in each period in the initial high-inflation steady state to be as well off in the low-inflation steady state

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[2] Harrod-neutral technical change is a technical process which increases the efficiency of labour, so that the labour force expressed as efficiency units increases faster than the number of workers available.

down was borne in the late 1980s and early 1990s. As mentioned, inflation declined from 18,6 per cent in 1986 to 8,6 per cent in 1997. To ensure that inflation stays low, future inflationary pressures will have to be resisted. The findings of current empirical research suggest that the short-term costs of such resistance will probably be worth bearing.

5. Conclusion

While the list of potential costs from sustained inflation is long, the orders of magnitude are difficult to estimate empirically. Having said that, the consistency of some findings that the costs of inflation are significant provides some support for the view that sustained inflation has an erosive effect on an economy's distribution of income and potential growth.

Resources are redirected in undesirable ways when relative prices change owing to the interaction between inflation and institutional arrangements. Part of the costs of inflation arises from resources being wasted on activities such as the pricing of goods, the management of cash flows and cash balances and the development of non-taxable employee benefits. Other more serious costs are brought about by the combined effect of inflation and the income tax system that reduces the incentive for consumers to save and for businesses to invest.

Inflation costs also arise from the unpredictability of inflation that causes temporary changes in relative prices and increases risks of doing business. Inflation changes the relative prices of production factors and final goods and services. The resulting reduction in potential production is aggravated by the weakening of trade and financial relations with other countries, contributing in turn to a lessening of business confidence and lower income growth. The socially divisive nature of inflation because of its redistribution of income, is also an important non-measurable cost.

Although it is not easy to provide empirical evidence of the precise magnitude of the economic costs of inflation, recent empirical studies indicate that inflation is not generally helpful for countries in their efforts to promote economic growth. With so little to be gained from continuing inflation, and the unavoidable reduction in current national income because of it, the cumulative gains in future income should be sufficient motivation for governments to reduce inflation to levels where it no longer has an influence on the decisions that individuals and businesses make. Members of society could then base decisions to buy, sell, borrow, save or invest on confidence in the current and future value of the domestic currency.

References

Ball, L. 1993. How costly is Disinflation? The Historical Evidence. *Business Review.* Philadelphia: Federal Reserve Bank.

Barro, R. 1995. Inflation and economic growth. *Bank of England Quarterly Bulletin* vol. 35, no. 2, p 166-176.

Bruno, M. and Easterly, W. 1996. Inflation and Growth: In Search of a Stable Relationship. Paper presented at the Twentieth Annual Economic Policy Conference of the Federal Reserve Bank of St. Louis, 26-27 October 1996. Federal Reserve Bank of St. Louis Review.

Bullard, J. and Keating, J. 1995. The Long-Run Relationship between Inflation and Output in Postwar Economies. *Journal of Monetary Economics,* vol. 36, no.3 p.477-496.

Cameron, N., Hum, D. and Simpson, W. 1996. Stylized facts and stylized illusions: inflation and productivity revisited. *Canadian Journal of Economics,* vol. 29, no. 1, p. 152-162.

Cozier, B. and Selody, J. 1992. Inflation and Macro-economic Performance: Some Cross-Country Evidence. *Working Paper* 92-6. Ottawa: Bank of Canada.

De Jager, B.L. 1991. The case against inflation. *Departmental Memorandum* (unpublished), no. 15, South Africa: Reserve Bank.

English, W. 1996. Inflation and Financial Sector Size. U.S. Board of Governors of the Federal Reserve System, Washington, D.C. Mimeograph.

Fischer, S. 1993. The role of Macroeconomic Factors in Growth. NBER *Working Paper* 4565.

Flynn, B. and Parkinson, M. 1995. The cost of inflation: A Survey. Occasional Paper, no. 13, Department of Economics. University of Melbourne.

Fortin, P. 1993. The Unbearable Lightness of Zero-inflation Optimism. *Canadian Business Economics,* vol. 2, no. 3, p. 3-18.

Golob, J. 1993. Inflation, Inflation Uncertainty, and Relative Price Variability: A Survey. *Research Working Paper* 93-15. Kansas City: Federal Reserve Bank.

Grimes, A. 1991. The Effects of Inflation on Growth: Some International Evidence. *Weltwirtschaftliches Archiv,* vol. 127, no. 4, p. 631-644.

Jarrett, J.P. and Selody J. 1982. The Productivity-Inflation Nexus in Canada, 1963-1979, *Review of Economics and Statistics,* vol. 69, no.3, p. 361-367.

Jenkins, W.P. 1998. Wrap-Up Discussion. *In Price Stability, Inflation Targets, and Monetary Policy.* Proceedings of a Conference held by the Bank of Canada, May 1997, p. 475-484. Ottawa: Bank of Canada.

Judson, R. and Orphanides, A. 1996. Inflation, Volatility and Growth. *Finance and Economics Discussion Series* 96-19. U.S. Board of Governors of the Federal Reserve System, Washington, D.C.

Konieczny, J. 1994. The Optimal Rate of Inflation: Competing Theories and Their Relevance to Canada. In *Economic Behaviour and Policy Choice Under Price Stability*. Proceedings of a conference held at the Bank of Canada, October 1994, p. 1-40. Ottawa: Bank of Canada.

McTaggart, D. 1992. The cost of Inflation in Australia. *Paper* presented at the Reserve Bank Conference on Inflation and Disinflation, 10-11 July 1992. Australia: Reserve Bank.

Meijer, J.H. 1990. Notes on Inflation. *Quarterly Bulletin*. South Africa: Reserve Bank.

Motley, B. 1998. Growth and Inflation : A Cross-Country Study. *Economic Review.* 1998, Number 1, p. 15-28. San Francisco: Federal Reserve Bank,

O'Reilly, B. 1998. The Benefits of Low Inflation: Taking Stock. Techinical Report No. 83. Ottawa: Bank of Canada.

Republic of South Africa. *Commission of Inquiry into the Monetary System and Monetary Policy in South Africa: The Monetary System and Monetary Policy in South Africa* (Final Report), RP 70/1984. Pretoria: Government Printer.

Sbordone, A. and Kuttner, K. 1994. Does inflation reduce productivity? *Economic Perspectives,* vol. 18, issue 6, p. 2-14. Chicago: Federal Reserve Bank.

Smal, M.M. 1995. The framework of the public sector equations in the South African Reserve Bank's econometric model. *Occasional Paper*, no. 7. South Africa: Reserve Bank

Smyth, D. 1994. Inflation and Growth. *Journal of Macroeconomics,* vol. 16, no. 2, p. 261-270.

Stanners, W. 1993. Is low inflation an important condition for high growth? *Cambridge Journal of Economics*, vol. 17, no. 1, p. 79-107.