Impact of Consumer Price Index on Stock Prices

Arooj Mustafa

111-022-009

Bahria University

ABSTRACT

Research in economics and finance documents a negative relationship between stock prices and CPI in markets of industrialized economies. This paper attempts to explore how far this holds true in the context of Pakistan’s macro economic environment, over the period of 2002 to June 2005.

Monthly stock indices have been obtained from the KSE100 index for the period January 2002 to June 2005 and the monthly CPI values have been obtained from the Federal Bureau of Statistics for the same time period. The empirical methodology used is regression analysis and it is used to detect the magnitude and direction of the relationship under study.

The results do not follow suit with the previous literature and show a significant positive relationship between the variables during the time period under consideration. However, the importance of this relationship can not be denied. It has had and may continue to have noteworthy implications for Pakistan’s economy.

LIST OF TABLES

Table 3.1: Monthly Figures for Stock Index. 31

Table 3.2: Price Indices in Pakistan (Base Year 2000-01=100) 32

Table 3.3: CPI for the years 2002 – 2005 33

Table 4.1: Results of Regression Analysis 36

TABLE OF CONTENTS

ABSTRACT i

LIST OF TABLES ii

Chapter

I. Introduction 1

- Rationale of the study 9
- Problem statement 11
- Objectives of the study 11
- Hypothesis development 13
- Definitions of terms 13

II. Literature Review 16

III. Method

- Data collection and sources of data 30
- Procedure 33

IV. Results and discussions 36

V. Conclusion and Recommendations 38

VI. References 40

Appendix A: Headline and Core Inflation

Appendix B: Price Indices

Appendix c: Results of Regression Analysis

Introduction

The influence of the macro economy on the stock market is a subject of enduring importance and fascination to academics, investment professionals, and monetary policy makers. Researchers have devoted much of their effort to models that link stock prices to consumption through the first-order conditions of individual investors.

The importance of stock prices can not be denied. Stock prices are important because they influence both, consumer spending and business investment and there is a systematic relationship between inflation and stock prices (Tatom, 2002).

Stocks represent ownership in a company. Therefore, the price of a stock shows what investors feel the company is worth at that point in time. Stock prices can change at any rate; some have dramatic price swings everyday while others stay the same for days at the time.

There are hundreds of variables that drive stock prices, the most important of which are earnings, inflation, interest rates and supply and demand (Heiner, 1983).

A negative correlation between inflation and stock prices has become one of the most commonly accepted empirical facts motivating large numbers of financial and monetary economics studies (Bakshi and Chen, 1996).

The evidence of a negative relationship between stock prices and inflation has intrigued researchers over the past two decades. Furthermore, there is some evidence that the negative relationship between inflation and stock returns in developed markets results from a so called “proxy hypothesis” (Fama, 1981). According to the proxy hypothesis, the negative relationship between stock returns and the inflation reflects the deleterious effects of the inflation on the real economic activity. There is evidence to show that equities in industrialized economies have failed to maintain their value during periods of high inflation. For example, during the rapid inflation years of 1970s, U.S. stocks prices did not keep pace with general price levels. According to Fisher (1930) asset values should be positively related with expected inflation, providing a hedge against rising prices. If the implied positive relationship between stock prices and the inflation does not hold, stock investors will be vulnerable to inflation.

Price stability, therefore, has always been of primary importance in formulating and devising macro economic goals. With this in view, fiscal and monetary policies are designed to ensure stable prices and to maintain a high growth rate. The most visible impact of inflation in recent times is its effect on real output, relative prices, stock prices, taxes and interest rates. It also discourages saving and promotes consumption. The effect of inflation severity is due to the uncertainty of losing the real value of money.

Because of the cost of **inflation**, in Pakistan, several policy measures such as the control of the budget deficit through appropriate fiscal and monetary policies, the improvement of agricultural productivity, the fostering of investment to stimulate output and the constant vigilance on the market situation to ensure the adequate availability of consumer goods to the common man at a reasonable price have been taken to bring inflation down to a tolerable level. As result, there has been considerable price stability in the country over the years 1999–2004. The inflation rate during the period averaged 3.7 percent with the lowest 3.1 percent in 2002-03.The recent strategy of containing inflation intends to alleviate poverty on the one hand and safeguard the average consumer against the hardships of rising prices on the other.

Four different **price indices** are published in Pakistan: the **consumer price index** (CPI), the **wholesale price index** (WPI), the **sensitive price index** (SPI) and the **GDP deflator**. The CPI covers the retail prices of 375 items in 35 major cities and reflects roughly the cost of living in the urban areas. The WPI is used to measure the price movement of selected items in the primary and wholesale markets. The items covered under the WPI are those which are offered in lots for sale. The WPI covers the wholesale price of 425 items prevailing in the city of origin of the commodities. The SPI covers prices of 53 essential items consumed by those households whose monthly income ranges from Rs.3000 to Rs.12000 per month. In most countries, the main focus for assessing inflationary trends is placed on the CPI, because it most closely represents the cost of living. In Pakistan, the main focus is placed on the CPI as

a measure of inflation as it is more representative with a wider coverage of 375 items in 71 markets of 35 cities around the country.

In Pakistan, prices remained volatile during the decade of the 1990s, ranging between 5.7 percent and 13.0 percent mainly because of decelerating economic growth, expansionary monetary policies, output set-backs, higher duties and taxes, a depreciating Pak Rupee, frequent adjustments in the administered prices of gas, electricity and POL products, etc. The changes introduced in the economy added a major element of distortion in economic relations with an inevitable pressure on prices, GDP growth and the performance of the large-scale industrial sector. The pressure on prices intensified in 1994-95 when inflation went up to 13 percent (Appendix A). Both the food and non-food inflation contributed to the persistence of double digit inflation, averaging 12.2 and 10.7 percent respectively against the overall CPI inflation of 11.4 percent during 1990-97. However, the inflation rate has started to decline over the three years between 1998-2000 because of an improved supply position, strict budgetary measures and depressed international market prices. The inflation rate which was at 5.7 percent in 1998-99, has been reduced to 3.6 percent in 1999-2000 and further to 3.1 percent in 2002-03 (the lowest in the last three decades). This low level of inflation has been achieved as a result of strict fiscal discipline, the lower monetization of the budget deficit, an output recovery, a reduction in duties and taxes, and appreciation of exchange rate.

The inflation rate based on the Consumer Price Index (CPI) for the first ten months of the fiscal year (July-April) 2003-04 has averaged 3.9 percent against 3.3 percent for a comparable period of the previous year. The food price inflation has increased by 4.9% and non-food by 3.3% as against 3.1 percent and 3.4 percent during same period of the previous year. The analysis of headline inflation (overall increase in CPI) bifurcated into food, non-food and non-food non-energy indicates that the overall inflation is still low but a significant increase in food inflation is the major factor that has forced headline inflation to move up. The nonfood non-energy inflation, which is also known as core inflation, remained quite subdued owing to the pursuance of prudent fiscal, monetary and exchange rate policies. The Central Banks around the world tend to focus on core inflation that excludes the impact of food and energy prices. Core inflation basically represents policy (fiscal, monetary, exchange rate polices) induced inflation. They do this, not because food and energy are not important, but to extract a better predictor of the underlining tendency of inflation. Food and energy price changes are subject to considerable random noise. For example, tomatoes crop was damaged by excessive rains in Sindh causing its price to rise substantially. An initial spike in tomatoes prices were reversed when the new crop came to the market. Similarly, oil prices in the international market are unusually high because of the winter demands and a rebounding global economy, particularly in United States and Asia. The oil price is likely to revert back towards OPEC’s target range of $24-30 per barrel from the current level of over $40 per barrel. With reversal of oil prices to the OPEC’s price target, the

energy prices will come down. The central banks, therefore, focus on core inflation rather than overall inflation.

Much of the surge in food price inflation over the last year has been the result of an increase in the price of wheat, wheat flour, rice, meat, edible oil and onions. The increase in the prices of these items has been due to several factors. The supply shortage of wheat in the market was caused by: (i) a 16.7 percent increase in support price of wheat for the Year 2004 crop; (ii) below target production in the Year 2003; (iii) delay in import of wheat; (iv) depletion of stocks due to exports in the preceding two years; and (v) withholding wheat supply by hoarders and speculators. The increase in edible oil prices in the local market can be linked to a 31 percent increase in palm oil prices in the world market due to tight global supply. The damages to the onion crop in Sindh by heavy rains and supply gaps pushed onion prices up in the local market. The prices of mutton and beef increased owing to their greater demand on account of the bird flu virus. The prices of 14 items, contributing to an increase in food inflation, have increased in the range of 0.7% (chicken farm) to 38.7% (onions). At the same time the prices of 6 items including sugar, tea, eggs, potatoes, moong and gram pulses have decreased in the range of 3.5%(gram pulse) to 20% (potato). Based on the trend of the prices of these items, the contribution of food inflation to the overall inflation has been estimated at 50% against 38% for the same period last year.

The analysis of the inflation rate on a month-to-month basis for the period July-April 2003-04 indicates that

barring February, the overall inflation continued to rise. This was mainly driven by the increase in food price inflation. The food inflation since October 2003 till April 2004 increased at a much higher rate against non-food and overall CPI inflation because of an unusual rise in the prices of the principal food items like wheat flour, meat and fresh vegetables. The moderation in the non-food inflation during this period was the result of a lower increase in the price of fuel, energy and transportation.

Similarly, during 2004-05, the rising CPI was mainly driven from the non-food group as opposed to the previous year, where the rise was dominated by rising food inflation. Food inflation decelerated sharply during the middle of 2005. The major contribution to the fall in food inflation during this period can be attributed to fall in prices of wheat, its products and a few other crops. The fall in wheat prices resulted due to a record wheat harvest along with administrative measures taken by the government (permission for duty free imports of wheat). The government also allowed imports of sugar and other essential food items and provided them through utility stores at controlled prices. However, the non food inflation steadily rose during the period of 2004-05. This was mainly due to rising fuel prices. This was due to rising international prices of fuel.

The study of the **income and consumption behavior** of different parts of society and their abilities to afford the consequences is of great importance as inflation effects the purchasing power of different income groups differently. An analysis of the ten month (July-April)

inflationary trend across the four income groups indicates that people in the lower income group, up to Rs.3000, have experienced a relatively higher inflation (4.5%) compared to those in higher income groups (3.7%). This is because of higher food inflation as the poor spend a larger part of their income on food items.

The **Wholesale Price Indicator** (Appendix B) has recorded an upward trend during 2003-04. It increased at a rate of 7.1 percent during (Jul-Apr) 2003-04 against an increase of 5.8 percent in the same period of last year. Significant features of wholesale price behavior indicate that prices of building materials, raw materials and manufacturing items have increased substantially while prices of fuel, lighting and lubricants have decreased over the last year. The higher increase in building materials (21.9%) against 1.4% last year was due to an increase in the prices of iron bar and sheet and cement owing to the greater demand because of increased construction activities. The increase in raw materials (17.6%) over an increase of 13.1% last year was mainly due to an increase in the domestic and international market prices of cotton and cotton related items. The increase in manufacturing items prices (8.0%) over an increase of 1.4% was due to an increase in the prices of cotton yarn, nylon yarn, fertilizer and chemicals.

The overall WPI inflation recorded a steep rise in 2004-05.however, WPI food inflation has been decelerating and has been declining since April 2005. Basically, due to a fall in the prices of wheat, pulses, sugar, onions etc. prices of vegetable ghee and cooking oil also witnessed

deceleration due to declining prices of palm oil in the international market. It was mainly due to rising fuel prices that drove WPI higher during this period. Rise in raw material prices also lead to the same effect.

The **Sensitive Price Indicator,** (Appendix B) which is based on the prices of 53 essential items, has increased by 5.8 percent during the first ten months of the current fiscal year (July-April) 2003-04 over 3.7 percent in the comparable period last year. During this period the prices of 21 items in the food group have increased with significant rises in price of wheat (18.5%), wheat flour (18.0%), rice irri-6 (13.2%), beef (19.5%), mutton (28.9%), onion (38.6%), vegetable ghee loose (12.8%), red chilies (10.9%), cooking oil (1.2%) and milk fresh (6.9%). At the same time, the prices of some basic items like sugar, tea, moong and gram pulse and eggs have declined because of sufficient supply and easy availability of these items in the market. However, most of the items under the non-food group of the SPI with the exception of a few either declined or remained unchanged.

SPI observed abrupt fluctuations during the latter part of 2004 and early part of 2005. It can mainly be attributed to a fall in prices of wheat and its products. Also, prices of tomato and onions declined as well, during this period.

Rationale of the Study

We live in a dynamic global economy that is clearly becoming increasingly integrated and synchronous. A healthy, functioning global economy involves free and open

capital markets and a supporting legal structure. An ongoing assessment of these critical elements is essential to the development of healthy capital markets, and with that need for assessment comes fertile ground for provocative investment research.

The stock markets are, to some degree, leading indicators of economic health. Thus studies as this one can help create an authentic culture in the stock market as people referring to this study will be able to find out the magnitude of impact of inflation (using CPI as a measure of inflation) on the stock index.

John Campbell and Tuomo Vuolteenaho's study "**Inflation Illusion and Stock Prices**" suggest that a policy of stable inflation will serve to reduce market mispricing and thus contribute to stock market efficiency.

The importance of stock prices can not be denied. Stock prices are important because they influence both, consumer spending and business investment and there is a systematic relationship between inflation and stock prices. Research into this matter, will, therefore, further enhance the understanding about consumer spending and business investments in Pakistan’s context.

The drive behind this particular research is to explore changes in CPI as a variable that directly affects stock prices. This research is, therefore, important and significant to gauge the real value of stocks. Several researches believe that inflation will affect stock prices through their impact on real activity. Investors generally,

associate higher inflation with restrictive monetary policy and economic instability.

Problem statement

This paper aims to inspect and find out whether changes in the Consumer Price Index have any effect on the stock prices or not, in the context of Pakistan. It intends to examine the relationship between inflation and stock prices, using the consumer price index as a measure of inflation.

Objectives of the study

Stock market is considered as the barometer of the economy. Investors, globally, review the stock price indices to evaluate the economic feasibility for investing purposes. A large number of determinants affect stock prices and, in this manner, transmit positive or negative signals in the market.

Inflation, being one of the major factors influencing and having an impact on the stock prices, requires serious and intense research. Previous researches have found a negative relationship between inflation (CPI) and stock prices. Thus bringing forth the need to determine whether such a relationship exists in the context of the Pakistani economy or not.

Findings of this investigation should be important for portfolio managers and economic policy makers. The Pakistani economy has gained importance in the last few years and is continuing to do so. Several mutual funds have

been formed to invest solely in the market as a means of international diversification. Furthermore, local equity markets have been opened up for investment by foreigners. However, potentially important relationships between macroeconomic variables and stock prices in these equity markets have not been studied. This study should, in this way, contribute to the literature.

Pakistan, being a developing economy, has to ensure a positive and healthy economic environment, to encourage investment, both at a local and foreign level. An inverse relation between CPI and stock prices means that CPI levels or inflation levels have to be kept in check, to evade falling stock prices and in turn, sending out negative signals in the market. It has to be understood that investment is a stimulus to growth and it is even more important for a developing economy like Pakistan.

This study will emphasize on this very fact and explain its importance. This study will depict the value and significance of this relationship. It is imperative for macro economic policy makers to keep in view this relationship while devising the economic strategy. A strategy should be formulated to minimize the inflation so that, at least, one variable that negatively affects stock prices is kept in check.

Containing prices within limits, therefore, is a prime target of the government’s economic policy. However, due to economic integration and the free interplay of market dynamics, the safeguard and protection of the poor segments of society from the hardship of rising prices and the burden of poverty has become increasingly important.

Therefore, this study has been carried out with clear objectives in mind. It has been tried and attempted to further clarify the importance of these macro economic variables through this research.

Hypothesis

Ho: there is no association between Consumer Price Index and stock prices

H1: there is strong association between Consumer Price Index and stock prices

Definition of Terms

Inflation: a persistent increase in the level of consumer prices, or a persistent decline in the purchasing power of money, caused by an increase in the available currency and credit beyond the proportion of available goods and services.

Consumer Price Index (CPI): CPI is a measure of inflation and it represents a wide coverage of 375 items in 71 markets of 35 cities, all over Pakistan.

Stock Market: Essentially a market is a place which introduces a buyer to a seller. In the case of stocks the buyer and seller are dealing in small ownership portions of companies or shares.

Stock Index: An indicator used to measure and report value changes in a selected group of stocks. How a particular

stock index tracks the market depends on its composition; the sampling of stocks, the weighing of individual stocks, and the method of averaging used to establish an index.

Gross Domestic Product (GDP): the market value of all the goods and services produced by labor and property located in a country. It equals Gross National Product (GNP) minus the net inflow of labor and property incomes from abroad.

Gross National Product (GNP): the most comprehensive measure of a nation's total output of goods and services, consisting of the total retail market value of all items and services produced in a country during a specified period.

Gross Domestic Product (GDP) Deflator: it is a measure of the cost of goods purchased by a nation's households, government and industry.

Monetary Policy: it is the strategy of influencing movements of the money supply and interest rates to affect output and inflation. An "easy" monetary policy suggests faster growth of the money supply and lower short term interest rates in an attempt to increase aggregate demand, but it may lead to a higher level of inflation. A "tight" monetary policy suggests slower growth of the money supply and higher interest rates in an attempt to reduce inflationary pressures by lowering aggregate demand.

Economic growth: it is the increase in the value of goods and services produced by an economy. It is generally considered to be an increase in the income of a nation. It

is conventionally measured as the percentage increase in the GDP and is ‘inflation-adjusted’.

Proxy hypothesis: according to the proxy hypothesis, the negative relationship between stock prices / stock returns and inflation reflects the deleterious effects of inflation on the real economic activity.

LITERATURE REVIEW

It is now taken as a stylized fact, by market participants and academicians alike, that stock prices and returns on stocks suffer significantly in the face of high or rising inflation. This view contrasts starkly with the state of conventional wisdom and economic theory less than three decades ago, when an investment in equities was believed to be a relatively good hedge against inflation. That earlier perception was challenged by the drubbing equity investors took during the 1970s, and was refuted by several studies that offered compelling statistical evidence of inflation's negative effect on stock prices and returns (Sharpe, 1999).

The predominant academic view regarding the impact of inflation on stock prices is that high inflation results in lower stock prices (Barnes, Boyd and Smith, 1999). The earliest studies mainly document the negative co variation between stock prices and inflation (Linter, 1975; Bodie, 1976). This negative co variation has been most recently confirmed by Hess and lee, 1997.

Inflation can be decomposed into expected and unexpected inflation and after research; both pieces have been found to be negatively related to stock prices (Fama and Schwert, 1977).

The dimension of the stock price-inflation puzzle that generated the greatest sustained academic interest was the apparent negative relation between inflation and subsequent stock prices. The explanation that garnered early support

was known as the ‘proxy hypothesis’ (Fama, 1981). It held that; i) a rise in inflation augurs a decline in the real economic activity and ii) the stock market anticipates the decline in corporate earnings associated with this slowdown.

According to another study, the negative relation between stock prices and expected inflation is the result of two effects: a rise in expected inflation coincides with both (i) lower expected real earnings growth and (ii) higher required real returns. The earnings channel is not merely a reflection of inflation’s recession-signaling properties; rather, a substantial portion of the negative valuation effect appears to be the result of a negative relation between expected long term inflation and projections of long-term real earnings growth. The effect of expected inflation on required (long-run) real stock returns is also substantial. A one percentage point increase in inflation is estimated to raise required *real* stock returns about one percentage point, which amounts to about a 20 percent decline in stock prices. At the same time, the inflation related component in expected real stock returns has a high degree of commonality with the component related to the expected real long-term bond yield (Sharpe, 1999).

Much of inflation’s negative valuation effect can be explained by interactions between inflation and the tax code, such as those arising from inflation-related distortions to accounting profits (Feldstein, 1980). However, some researchers have argued that such an explanation can not account for the styled facts. Instead, they have suggested that stock prices may have been

distorted by *money illusion*, that is, stocks may have been priced as if investors mistakenly used nominal interest rates to discount real earnings (Modigliani and Cohn, 1979; Summers, 1983).

Various theories have been devised by researchers all over the world to assess the impact of inflation on stock prices. A diverse range of parameters have been used to gauge this relationship. Parameters such as GDP, stock returns and the like, are all reflective of the same relationship.

Many studies confirm that the real gross domestic product (GDP) is an important indicator of the performance of an economy. The growth rate of real GDP has a positive effect on stock returns, such that, expected returns are high because investment growth is high (Cochrane, 2001). By contrast, if increased output causes higher transaction demand for money, the Central Bank is expected to raise the interest rate. A rise in risk free rates, which investors use to discount the future cash flows of stocks, increases the required rate of return on equity, and causes a fall in their price. However, inflation may also cause investors to require higher risk premiums for their investment, if inflation ‘eats out’ some of their profits. The conventional view suggests that a restrictive monetary environment serves as bad news, and hence, investors become more risk averse (Sierimo, 2002).

Models in monetary economics that assume a role for money and endogenize the price level and inflation together with stock prices typically cite the empirical findings that

real stock prices are negatively correlated with inflation, expected or unexpected. This result is contradictory to the traditional view that equities should be a good hedge against inflation.

The spurious negative correlation between inflation and real stock prices has been explained by some researchers. It has been found that contemporaneous correlation between real stock prices and inflation is negative unless both money growths is pro cyclical and its co variance with output growth dominates the variance of the latter (Bakshi and Chen, 1996). From this view point it is reasonable to expect that stock prices are nonlinearly related inflation or the current state of the business cycle measured by expected inflation (Barnes, 1999; Boyd, 2001).

In a small open economy under fixed exchange rates fiscal policy instruments affect output, but monetary policy has no effect because of forced sterilization through interventions. Hence the question of monetary policy tightness translates into focusing on different exchange rate regimes and the current account balance. If we approximate a current account deficit by the expected change in the interest rate and inflation, we note that agents demand fewer financial assets at given interest differentials as inflation rises. Higher nominal or real interest rates make the rate of return on debt instruments relatively more attractive to investors than equities, which reduces the demand for shares and their prices fall accordingly (Griffin, 2002). Alternatively, the Central Bank’s goal could be a stable increase in money supply or modest inflation, which could be achieved allowing the

exchange rate to float. Under rational expectations and floating exchange rates, an unexpected, permanent increase in the rate of money growth stimulates output temporarily via surprise inflation. However, one period later this effect evaporates, leaving the economy with permanently higher inflation. Inflation is often restrained by increasing interest rates, which should eventually show up as a reduction in stock returns (real activity unchanged).

If devaluation is used to avoid financial crisis, the crisis may be exacerbated because higher expected inflation following devaluation typically results in a rise in interest rates. Similarly, if debt contracts are denominated in foreign currency, devaluation of the domestic currency increases the debt burden of domestic firms. Since assets are typically denominated in the domestic currency, there is no simultaneous increase in the value of the company’s assets. The combined result is that devaluation leads to a substantial deterioration in company’s balance sheet and a decline in net worth, which in turn means that effective collateral has shrunk, providing less protection to lenders. In the end, devaluation leads to a decline in stock returns (Mankiw, 1985).

If the main goal of the Central Bank is to fight inflation and maintain the credibility and stability of the economy, it should choose fixed exchange rates. Yet, despite its inherent advantages, an exchange rate target results in the loss of independent monetary policy, since changes in the anchor country lead to corresponding change in interest rates in the target country. Another disadvantage is that

speculators may begin to question whether a country's commitment to the fixed exchange rate peg would hold. A country may thus have to keep its interest rates sufficiently high to fend off their attacks, and this in turn is bad for investment and employment.

A problem in measuring monetary policy stringency in many developing economies is the gradual deregulation of the financial markets. With fixed exchange rates and a high degree of capital mobility, the behavior of banks and the characteristics of the credit market also come into play when trying to insulate the effects of monetary policy; i.e., monetary policy affects output only if it changes the availability of loans (Patelis, 1997).

When the monetary authority can correctly foresee a rise in inflation expectations, the need for tighter monetary policy is diminished. But, if the policy actions are taken too late, a much higher rise in interest rates is required to produce the same results. In addition, monetary policy has to be forward-looking, as it takes time for the Central Bank's actions to have any influence on the economy. Consequently, putting a dummy variable in the model when the Central Bank has announced a rise in interest rates does not necessarily tell when this policy action influences the economy. Moreover, researchers have allowed for different behavior between real stock prices and inflation under different monetary policy regimes and have made use of the MS-VAR model to determine the signs and magnitudes of the contemporaneous correlations between inflation and returns in the regimes obtained, which we

hope to be able to interpret as tight or loose monetary policy regimes.

In spite of mean switches, which tend to have a natural interpretation as a business cycle, interpreting the estimation results from the MS-VAR models is not always obvious. By contrast, generalized impulse response functions summarize the information in the autoregressive parameters, variances and covariances of each regime, thus making it easier to illustrate the models estimated. Furthermore, several studies describe how the size and magnitude of observed correlation between inflation and returns are affected by the source of fluctuations in the economy; i.e., real or monetary shocks (Marshall, 1992; Giovannini, 1989; Lastrapes, 1998). This is tested using the regime-dependent impulse response function.

A number of approaches attempt to explain the negative relationship between stock prices and inflation that consistently appears in empirical studies. One approach is to explain it in terms of the Fisher theory and the existence of irrational investors (Modigliani and Cohn 1979). But most researchers explain it through a link between the real and monetary sectors. For example, there are explanations that incorporate the demand for money (Fama, 1981) and money-neutral environments (Boudoukh, 1994).

The missing variable in these explanations is the money supply and whether the exercise of monetary policy changes the relationship between inflation and real assets. It has been hypothesized that unexpected monetary policy causes

the shifts in stock prices and returns and inflation (Goto and Valkonov, 2001). Unexpected contractionary monetary policy leads to decreases in excess stock returns and to a temporary increase in inflation. This is due to the assumed superior information relative to future inflation and the use of contractionary monetary policy to combat increasing inflation. Subsequently, it has been found that between 20 and 25 percent of the covariance between excess returns and inflation can be explained by monetary supply shocks (Goto and Valkonov, 2001).

This theory supports the idea that increasing inflation is a leading indicator of negative stock prices and returns; thus the relationship between inflation and stock prices and returns is negative. This relationship is important, as illustrated by the construction of a trading rule which assumes that inflation is a causative factor to determining stock returns. A negative relationship between inflation and stock prices and returns implies a switching rule where stocks are traded for an asset that maintains a positive real rate relative to inflation during periods whenever unexpected contractionary monetary policy reduces stock returns. The trigger for this switching transaction was changes in the Treasury bill rate (Fama and Schwert, 1977) which was used as a proxy for anticipated inflation.

The importance of the academic reasoning that has been discussed to this point is that the negative correlation between inflation and stock prices is not spurious whenever there is an explanation for its existence. Therefore, we can reasonably expect this relationship to continue.

An equation has been developed that can be used to measure the impact of inflation on real sustainable growth (Hardouvelis, 1987). Sustainable growth is defined as the level of real growth in sales that can be sustained without a deterioration of the financial structure of the firm or a decline in the dividend yield. Using this approach, it has been found that inflation can severely hinder a firm's ability to grow unless it is willing to accept a deterioration of its financial structure or a reduction of its dividend payout. Applying this approach to several firms, it has been further found that a 10 per cent inflation rate can reduce real sustainable growth by as much as 6.5 per cent for capital-intensive firms (Giammarino, 1998). Furthermore, an econometric study found that stock market returns are negatively correlated with a variable that measures the difference between the growth rates in excess of sustainable growth (Chan, 1993).

There is, therefore, some evidence indicating that inflation may in fact, over time, impact the value of a firm even if real activity is not affected. Firms may choose to maintain their real growth by adding financial leverage, but in such situations the financial risk of the firm may also be modified. This raises another way in which inflation may affect stock prices; if we assume that inflation can affect real growth and free cash flows, then inflation is also likely to help push up the risk premium on stocks (Giammarino, 1998).

As regards the impact of inflation announcements on stock prices, research has been carried out studying the effects of its expected and unexpected components. The literature

demonstrates that, if for the majority of the authors2 there is no effect from the expected component of the announcements on stock prices (which support the market efficiency hypothesis). In fact, if for Kessel (1956) the increase of the unexpected component has a positive impact on stock prices when the issuer is a net debtor, for Feldstein and Summers (1979), Feldstein (1980) and Flannery and Protopapadakis (2002), the increase of the unexpected component has the opposite effect.

According to the generalized Fisher hypothesis, equity stocks, which represent claims against the real assets of a business, may serve as a hedge against inflation. Consequently, investors sell financial assets in exchange for real assets when expected inflation is pronounced. In such a case, stock prices in nominal terms fully reflect expected inflation and the relationship between these two variables should be found positively correlated. Equities are a hedge against the increase of the price level due to the fact that they represent a claim to real assets and, hence, the real change on the price of the equities should not be affected (Bodie, 1976). If considered that firms are in a position to predict their profit margins and since equities are claims on current and future earnings, it also follows that the stock market operates as a hedge against inflation, at least in the long run. The earnings should be consistent with the inflation rate, and hence the real value of the stock market should remain unaltered in the long run. The argument that stock market serves as a hedge against inflation, implies that investors are fully compensated for increases in the general price level through corresponding increases in nominal stock market

returns. Thus, the real returns remain unaffected. In other words the argument is that the real value of the stock market is immune to inflation pressures. Many studies provide evidence of a negative relationship between the inflation rate and the stock market returns. Fama (1981) suggests that there is a negative correlation between stock returns and the level of inflation. The negative relationship exists due to the correlation between inflation and future output. In particular, since stock prices reflect firms' future earnings potential, an economic downturn predicted by a rise in inflation will depress stock prices. In another study, negative correlations have been found between stock prices and inflation in the short run which is followed by positive correlations in the long run (Anari and Kolari, 2001).

Several researchers believe that inflation will affect stock prices through its impact on real activity. It is logical to assume that periods of higher inflation will often trigger a more restrictive monetary response, which may help slow economic growth. Inflation may also lead to a less stable economic environment, which may contribute to a higher risk premium on stocks. Thus, there may be a signaling effect associated with inflation. Investors may associate higher inflation with restrictive monetary policy and economic instability (Giammarino, 1998).

Another research proposes that stock market investors are subject to inflation illusion (Modigliani and Cohn, 1979). Stock market investors fail to understand the effect of inflation on nominal dividend-growth rates and extrapolate historical nominal growth rates even in periods of changing

inflation. Thus, when inflation rises, bond market participants increase nominal interest rates which are used by stock market participants to discount unchanged expectations of future nominal dividends. This implies that stock prices are undervalued when inflation is high and may become overvalued when inflation falls (Ritter and warr, 2002).

Therefore, as can be seen, several studies have investigated the negative relationship between equity returns and inflation in the U.S. and other industrialized economies. However, very few papers have addressed the same issue for developing economies (Chatrath et. all, 1996). Lintner (1975), Fama and Schwert (1977), Fama (1981, 1982), Geske and Roll (1983), and Wahlroos and Berglund (1986), among others, find evidence that stock returns are negatively affected by both expected and unexpected inflation in the U.S. More recently, Serletis (1993) and Thornton (1993) investigate a related issue of stock prices and money supply in the U.S. and UK. Fama (1981) and Geske and Roll (1983) offer an explanation for the negative relationship between stock returns and inflation, through a hypothesized chain of macroeconomic linkages, based on the money demand and the quantity theory of money. This explanation may be summarized as: (i) contrary to the suggestion of the Phillips curve, there is a negative relationship between inflation and real economic activity; and (ii) stock returns are directly related to the real economic activity.

Based on (i) and (ii), Fama, Geske, and Roll hypothesis predicts that rising inflation rates reduce real economic

activity and demand for money. A reduction in economic activity negatively affects the future corporate profits and stock prices. The resulting negative relationship between the stock returns and inflation is referred to as the “proxy effect,” in the sense that it reflects the detrimental consequence of inflation on real economic activity. Fama argues that the proxy effect vanishes when real activity does not fall because of inflation. Ram and Spencer (1983) discuss the negative relationship between stock returns and inflation and offer an explanation for this phenomenon. Their empirical tests based on an augmented Fisher- Phillips relationship; show that some of Fama’s findings may be reversed. However, they admit that the issue is not fully settled and further research is necessary.

Economic literature has presented a set of theories that try to explain the reaction of stock prices to inflation. One of the theories justifies the negative correlation between stock price returns and the level of inflation, on the basis of the negative correlation between inflation and future output. In accordance with Fama (1981) and Kaul (1987) this can be explained by (a) the positive correlation between inflation level and inflation uncertainty and by (b) the negative correlation between inflation uncertainty and real economic activity. In fact, an increase in the inflation uncertainty makes the real profits in the future, associated with the investment, more uncertain, reducing current investment and, consequently, the future output (*ceteris paribus*).

Considering that the expected inflation represents the inflation level, it underlies that the expected inflation is the variable that is correlated with future output and, consequently, with the current stock returns (Lee, 1999). On the other hand, the previous analysis should not be limited to the expected component of inflation, but also to the unexpected component (Pearce and Roley, 1988).

METHOD

Data and Sources of Data

Data required to assess the impact of CPI on stock prices consisted of the stock price figures and the CPI figures. The data was collected through secondary sources.

The data includes stock index for Karachi stock market from January 2002 to June 2005. This was obtained from a website www.businessrecorder.com. The KSE monthly closing index was gathered providing us with a total of 42 observations starting from January 2002 to June 2005. Of the various stock indices available, KSE 100 index was selected since it better represents the state of the Pakistani economy.

Stock indices are available on a daily, weekly, monthly and even yearly basis. However, for this study monthly indices were used, since data regarding the CPI values is only available on a monthly or yearly basis. Therefore, to utilize the maximum data base and to improve on the reliability of data and research, monthly figures were chosen.

Table 3.1, below shows the data.

Table 3.1: Monthly Figures for Stock Index.

Months	2002	2003	2004	2005
Jan	1620.18	2545.07	4841.33	6 7 4 8 . 4 2
Feb	1765.95	2399.14	4840.37	8 2 6 1 . 2 8
March	1868.2	2715.71	5106.66	7 7 7 0 . 5 2
April	1898.96	2902.41	5430.43	7 1 0 4 . 6 5
May	1663	3099.04	5498.5	6 8 6 0 . 1 5
June	1770.12	3402.47	5280.96	7 4 5 0 . 9 6
July	1787.6	3933.17	5290.04	
Aug	1974	4461.47	5346.45	
Sept	2019.86	4067.82	5217.87	
Oct	2278.53	3781.03	5332.54	
Nov	2285.87	4039.37	5567.79	
Dec	2701.41	4471.6	6218.46	

The consumer price index (CPI), the wholesale price index (WPI), the sensitive price index (SPI) and the GDP deflator are the four different price indices that are published in

Pakistan. In Pakistan, the main focus is placed on the CPI as a measure of inflation as it is more representative with a wider coverage of 375 items in 71 markets of 35 cities around the country.

Table 3.2: Price Indices in Pakistan (Base Year 2000-01=100)

Features	**CPI**	**SPI**	**WPI**
Cities covered	35	17	18
Markets covered	71	51	16
Items covered	375	53	425
Number of Commodity Groups	10	-	5
Number of Quotations	106,500	10,404	1550
Income Groups	Four	Rs. 3000 per month	-
Occupational Groups	All categories combined	3 urban	-
Reporting Frequency	Monthly	Weekly	Monthly
Source: Federal Bureau of Statistics			

The figures for CPI were obtained from the Federal Bureau of Statistics. Monthly figures from January 2002 to June 2005 have been gathered and converted into the base year

2000/2001. The base year used in calculating the CPI values is changed after every ten years.

The following table 3.3 shows the monthly CPI values.

Table 3.3: CPI for the years 2002 – 2005 (converted into base year 2000/2001).

Months	2002	2003	2004	2005
Jan	103.06	106.56	112.05	121.58
Feb	103.39	107.06	111.67	122.78
March	104.74	107.1	112.81	124.37
April	105.10	107.45	113.89	126.53
May	104.4	107.14	114.68	125.97
June	104.9	106.92	115.98	
July	106.04	107.53	117.56	
Aug	106.37	108.24	118.24	
Sept	106.57	108.89	118.69	
Oct	106.74	110.49	120.1	
Nov	106.65	111.15	121.44	
Dec	106.39	112.15	120.44	

Procedure

This study has been undertaken in an effort to determine the relationship and the extent of the relationship between CPI and stock prices. To analyze the sensitivity of the stock market to changes in CPI, regression analysis has been used. Statistical software, SPSS was put to use to calculate the regression. Cause and effect relationship is established through certain types of regression analysis.

This study is also using regression to support its cause and effect relationship.

For every corresponding month from the year 2001 to 2005, the stock index and CPI values are regressed. The regression model that has been used is a function of Stock index in terms of CPI and other variables that might have an impact on stock prices. However, all these variables other than CPI have been held constant for the purpose of this study. This has been done so that the sole impact of CPI can be inspected and verified.

The regression model, when put in mathematical terms, is as follows:

$S = a + b * I + c * D + f * G + \ldots\ldots +$

In this regression model S stands for Stock prices, a is a constant, I is the CPI figure for inflation; b, c and f are all constants; D and G are other variables that have an impact on Stock prices but are held constant for the purpose of this research and e is the estimate of error and is known as the stochastic term. This model may include all variables that have an effect on the stock prices. All these variables are not mentioned in the model because they are held constant and are only control variables.

Independent Variable: the inflation measure, that is, CPI is the independent variable in this study. The impact of CPI on the dependant variable has been analyzed. This is also known as the explanatory variable as it will elucidate the relationship.

Dependent Variable: The stock index is the dependent variable upon which the impact of the CPI has been analyzed. The dependant variable is also known as the explained variable, since it portrays the influence of the independent variable.

Control Variables: all variables, other than the independent variable, that have an impact on the stock prices have been held constant during the course of this study. These variables, called the control variables, include demand and supply, government policies, trade policies, exchange rates, privatization news, IPO’s etc.

RESULTS AND DISCUSSIONS

Regression model has been used to assess the impact of CPI on stock prices. The independent variable is the CPI and dependent variable is stock prices. The results obtained have been summarized in the table 4.1.

Table 4.1: Results of Regression Analysis

Correlation, Regression Coefficients, Standard Error in brackets, T values in parenthesis, F Statistics and P values in italics.

Dependent Variable	Intercept	CPI	R^2	F-statistics
Stock Prices	[-24744.847]	[257.582]	[.888]	*310.425*
	[1637.469]	[14.620]		
	(-15.112)	(17.619)		
	.000	*.000*		*.000*

As can be seen from the table, the empirical findings show a significant relationship between CPI and stock prices. The Sig value in the ANOVA table (Appendix C) proves that the model is significant. The value of p, that is, .000 is less than 0.05 thus we reject the null hypothesis; ‘there is no significant relationship between CPI and stock prices’ and accept the alternate hypothesis; ‘there is a significant relationship between CPI and stock prices’. Overall model is significant F (310.425) as the significance level is less than 0.05.

The value of R square, 0.888, shows that there is a very strong relationship between the two variables as it is greater than 0.5. It demonstrates the extent to which the

CPI accounts for variation in the stock prices. It is the proportion of variation in the stock prices. The value depicts that 88.8% of variation in stock prices is owing to inflation.

The value of Beta demonstrates the direction of the relationship between the variables. The coefficient of beta in this study is 257.582. This shows a positive relationship between CPI and stock prices and indicates that if there is an increase in inflation, the stock prices will also rise.

The t value is 17.619, which portrays its importance in determining the impact that CPI has on the stock prices. The t-value is not very significant for this study since it explains the relative importance of different independent variables and in this study there is only one independent variable, that is, CPI.

CONCLUSION AND RECOMMENDATIONS

This paper investigates a widely reported negative relationship between stock prices and inflation for a major emerging economy, Pakistan. The empirical research and findings conducted under this study have, however, indicated a positive relationship between CPI and stock prices in Pakistan for the years 2002 to 2005.

The empirical tests were conducted within Fama's (1981) proxy hypothesis, which states that there is a negative relationship between inflation and real activity and the relationship between stock prices and real economic activity is positive. The findings, in this case, do not support the negative relationship between inflation and stock prices.

This study has contributed by investigating the very important subject of whether a negative relationship between stock prices and inflation found for a large number of developed economies is present in Pakistan or not. Developing economies have had to fight high inflation rates to curb its negative impacts. Thus, this study has served to highlight the differences and similarities in the relationship between CPI and stock prices across the developed and emerging economies.

There can be a number of reasons for this positive relationship that has been found under this study. Various government policies, the monetary and fiscal policies, different regimes, political stability and the general health of the economy during the period under consideration

can have an impact on both, the direction and magnitude of this relationship.

However, the importance of keeping inflation levels and containing prices within limits can not be denied. It is a prime target of the government’s economic policy. However, due to economic integration and the free interplay of market dynamics, the safeguard and protection of the poor segments of society from the hardship of rising prices and the burden of poverty has become increasingly important.

It is recommended that the government should keep inflation low through a series of policy measures. These may include the creation of a stable macro-economic environment by keeping a check on budgetary expenditure and the stimulation of growth in the commodity-producing sector.

In conclusion, though the results of this very research put forward a positive relationship between CPI and stock prices, further research can be made by taking data from different political regimes and a larger number of years. This would reinforce the extent, direction and magnitude of this relationship with Pakistan’s context. Further research should also be done to analyze all other factors that might have an impact on the stock prices, in particular and on the economy, in general.

REFERENCES

Anari and Kolari (2001). A. Anari and J. Kolari. Stock Prices and inflation. Journal of Financial Research, pages 587–602, 2001.

Bakshi, G. S., and Z. Chen (1996). Inflation, asset prices, and the term structure if interest rates in monetary economies, *Review of Financial Studies,* 9, 1, 241-276.

Barnes,M. (1999). Inflation and returns revisited: a TAR approach. The Journal ofMultinational Financial Management, No. 9, pp. 233 - 245.

Barnes, Michelle, John H. Boyd, and Bruce D. Smith (1999). “Inflation and Asset Returns”, European Economic Review 43, 737-754.

Bodie (1976). Bodie. Common stocks as a hedge against inflation. Journal of Finance, pages 459–470, 1976.

Boudoukh, Jacob, Matthew Richardson and Robert F. Whitelaw (1994). Industry returns and the fisher effect, *Journal of Finance* 49, 1595-1614.

Boyd, J. & Levine, R. & Smith, B. (2001). The impact of inflation on financial sector performance. Journal of Monetary Economics, No. 47, pp. 221 - 248.

Chan, K. (1993) Imperfect Information and Cross-Autocorrelation among Stock Prices, Journal of Finance, 48, 1211-1230.

Chatrath, A., S. Ramchander, and F. Song (1996). “Stock Prices, Inflation and Output: Evidence from India.” *Applied Financial Economics*, 7: 439-45.

Cochrane, J.H. (2001). Asset Pricing, Princeton University Press.

Fama, E. F. and G. W. Schwert (1977). Asset Returns and Inflation, *Journal of Financial Economics,* 5, 115-146.

Fama, E. (1981). Stock Returns, real activity, inflation, and money, *American Economic Review* 71, 545-565.

Feldstein, M. and L. Summers (1979). Effects of Inflation on the taxation of capital income in the corporate sector, National Tax Journal 32, 445-470.

Feldstein, M. (1980) “Inflation and the Stock Market.” *American Economic Review*, 70:39-47.

Fisher, Irving (1930). The theory of interest, New York, McMillan.

Flannery, M. and Protopapadakis, A. (2002). Macroeconomics Factors do Influence Aggregate Stock Returns, *Review of Financial Studies*, **15**, 751-82.

Geske, R.&Roll, R. (1983). The fiscal andmonetary linkage between stock returns and inflation. The Journal of finance, Vol. 38, No. 1, pp. 1 - 33.

Giammarino, R.(1998). Central Bank Policy, Inflation, and Stock Prices, *Proceedings of a conference held by the Bank of Canada.*

Giovannini, A. (1989). Uncertainty and liquidity. Journal of Monetary Economics, No. 23, pp. 239 - 258.

Goto, Shingo and Rossen Valkanov.(2001). “The Fed’s Effect on Excess Returns and Inflation Is Much Bigger Than You Think.” Presented at AFA conference.

Griffin, John M. (2002) Are the Fama and French factors global or country-specific?, *Review of Financial Studies* 15, 783-803.

Hardouvelis, G. (1987). Macroeconomic Information and Stock Prices, *Journal of Economics and Business*, **39**, 253-57.

Heiner, R. (1983). $On the Origins of Predictable Behavior, American Economic Review, 73, 560-595.

Hess, Patrick J. and Bong-Soo Lee (1997). “Stock Returns and Inflation with Supply and Demand Disturbances”, mimeo, University of Houston.

Kaul, G. (1987). Stock returns and inflation: The role of the monetary sector, *Journal of Financial Economics* 18, 253-276.

Kessel (1956). R.A. Kessel. Inflation caused wealth redistribution: a test of hypothesis. American Economics Review, pages 128–141, 1956.

Lastrapes, W. (1998). International evidence on equity prices, interest rates and money. The Journal of International Money and Finance, No. 17, pp. 377 - 406.

Lee and Strazicich (1999). J. Lee and M. Strazicich. Minimum lm unit root test 1999a.

Lintner J. (1975). “Inflation and Security Returns.” *Journal of Finance*, 30: 259-80.

Mankiw, N. Gregory (1985). Small menu costs and large business cycles: a macroeconomic model of monopoly, *Quarterly Journal of Economics* 100, 529-537.

Marshall, D. (1992). Inflation and asset return in a monetary economy, *Journal of Finance,* 47, 1315-1342.

Modigliani, Franco, and R.A. Cohn (1979). Inflation and the stock market, *Financial Analyst Journal* 35, 24-44.

Patelis, A.D. (1997) Stock return predictability and the role of monetary policy, *Journal of Finance* 52, 1951-1972.

Pearce, D., and V. Roley (1988), Firm characteristics, unanticipated inflation, and stock returns, Journal of Finance 43, 965-981.

Ram, R. and Spencer, D. E. (1983). “Stock Returns, Real Activity, Inflation and Money: Comment.” *American Economic Review*, 71:463-70.

Ritter, Jay R. and Richard S.Warr (2002). The decline of inflation and the bull market of 1982—1999, Journal of Financial and Quantitative Analysis 37, 29—61.

Serletis, A. (1993). “Money and Stock Prices in the United States.” *Applied Financial Economics*, 3: 51-54.

Sharpe, S.A. (1999). Stock Prices, Expected Returns, and Inflation Division of Research and Statistics, Federal Reserve Board, Washington, D.C. 20551.

Sierimo, C. (2002). TESTING THE EFFICIENT MARKET HYPOTHESIS OF THE HELSINKI STOCK EXCHANGE Further empirical evidence based on nonlinear models, Helsinki 2002.

Summers, L. (1983). The nonadjustment of nominal interest rates: A study of the Fisher effect, in J. Tobin, ed., Macroeconomics, Prices, and Quantities (Washington, D.C.: Brookings Institution) 201-224.

Tatom, J. A. (2002). Articles on Business Economics. http://www.findarticles.com/p/articles/mi_m1094/is_4_37/ai_94774171/pg_5

Thornton, J. (1993). “Money, Output, and Stock Prices in the UK: Evidence on Some (non) Relationships.” *Applied Financial Economics*, 3:335-38.

Wahlroos, B. and T. Berglund (1986). “Stock Returns, Inflationary Expectations and Real Activity.” *Journal of Banking and Finance*, 10:377-89.

APPENDIX C

Results of Regression Analysis

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	CPI	.	Enter

a All requested variables entered.
b Dependent Variable: STP

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.943	.888	.886	633.1397	.888	310.425	1	39	.000

a Predictors: (Constant), CPI

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	124438926.771	1	124438926.771	310.425	.000
	Residual	15633770.045	39	400865.899		
	Total	140072696.816	40			

a Predictors: (Constant), CPI
b Dependent Variable: STP

Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-24744.847	1637.469		-15.112	.000
	CPI	257.582	14.620	.943	17.619	.000

a Dependent Variable: STP

APPENDIX A

Headline and Core Inflation

	Indices				Headline & Core Inflation			
Year	General	Food	Non-Food	Non-Food Non-Energy	General	Food	Non-Food	Non-Food Non-Energy
1991-92	47.41	46.33	48.52	48.84	10.58	10.64	10.52	10.52
1992-93	52.07	51.84	52.31	53.26	9.83	11.74	7.81	9.05
1993-94	57.94	57.72	58.18	58.97	11.27	11.34	11.22	10.72
1994-95	65.48	67.24	64.09	65.49	13.02	16.67	10.17	11.06
1995-96	72.55	74.05	71.36	72.59	10.79	10.13	11.34	10.84
1996-97	81.11	82.86	79.73	81.07	11.80	11.89	11.73	11.68
1997-98	87.45	89.20	86.07	86.82	7.81	7.65	7.94	7.09
1998-99	92.46	94.46	90.89	92.15	5.74	5.90	5.61	6.14
1999-00	95.78	96.56	95.16	96.16	3.58	2.23	4.69	4.35
2000-01	100.00	100.00	100.00	100.00	4.41	3.56	5.09	3.99
2001-02	103.54	102.50	104.28	103.59	3.54	2.44	4.28	3.59
2002-03	106.75	105.40	107.66	106.25	3.10	2.89	3.24	2.56
Jul-Apr								
2002-03	106.69	105.58	107.44	106.05	3.27	3.11	3.37	2.63
2003-04	110.89	110.75	110.98	109.56	3.93	4.89	3.29	3.31

Note: Source: Federal Bureau of Statistics

1) 1990-91 base year series have been converted into series with a base of 2000-01.

2) Overall CPI Inflation is the Headline Inflation and Non-Food Non-Energy Inflation is referred as Core Inflation.

APPENDIX B

Price Indices

Groups/ Fiscal Year	B. Wholesale Price Index by Groups						3. Sensitive Price Indicator	4. GDP Deflator
	General	Food	Raw Materials	Fuel, Lighting & Lubricants	Manufactures	Building Materials		
1991-92	44.84	45.42	43.78	34.09	52.38	56.72	46.26	224.33
1992-93	48.14	50.24	48.67	34.83	54.63	57.97	51.22	244.28
1993-94	56.03	57.23	62.55	40.81	63.67	66.47	57.26	274.73
1994-95	65.00	67.50	72.16	44.90	73.40	81.04	65.85	312.60
1995-96	72.22	75.44	75.95	52.95	79.88	87.33	72.90	338.48
1996-97	81.62	84.37	87.01	62.17	89.41	98.63	81.98	388.00
1997-98	86.99	90.45	93.81	69.65	91.62	98.62	88.01	413.39
1998-99	92.51	96.55	103.21	75.81	94.45	99.62	93.68	437.59
1999-00	94.15	97.09	92.39	83.16	98.76	97.15	95.39	100.00
2000-01	100.00	100.00	100.00	100.00	100.00	100.00	100.00	107.84
2001-02	102.01	101.95	100.31	103.14	101.87	101.10	103.37	110.51
2002-03	107.77	105.62	115.51	115.95	103.67	102.90	107.06	115.01
Jul-Apr								
2002-03	107.64	105.62	114.10	116.70	103.16	102.15	107.18	115.01
2003-04	115.22	111.91	134.21	117.91	111.06	124.56	113.40	122.78

Note: Source: Federal Bureau of Statistics

1) WPI and SPI 1990-91 base year series have been converted into series with a base of 2000-01

2) GDP Deflator base year 1980-81 = 100 has been changed with 1999-2000 = 100 as new base year