Stock Returns-Inflation Relation in India

K R Shanmugam
Professor
Madras School of Economics,
Gandhi Mandapam Road, Chennai – 600 025, Tamil Nadu, India
shanmugam@mse.ac.in

and

Biswa Swarup Misra
Associate Professor
Xavier Institute of Management
Bhubaneswar, Orissa
biswa@ximb.ac.in
Tel: (91674) 3983895 (off); 919438148406 (cell)

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MADRAS SCHOOL OF ECONOMICS
Gandhi Mandapam Road
Chennai 600 025
India

Phone: 2230 0304/ 2230 0307/2235 2157
Fax : 2235 4847 /2235 2155
Email : info@mse.ac.in
Website: www.mse.ac.in

STOCK RETURNS-INFLATION RELATION IN INDIA

K.R. Shanmugam and Biswa Swarup Misra

Abstract

This study contributes to the stock returns-inflation relation literature in developing countries by revisiting the issue with reference to the emerging economy, India. More specifically, it tests whether the Indian stock market provides an effective hedge against inflation using monthly data on real stock return, inflation and real activity from April 1980 to March 2004 and a two-step estimation procedure. Results of the study indicate that (i) the Indian stock market reflects future real activity; (ii) the negative stock returns-inflation relation emerges from the unexpected component of the inflation and (iii) this negative relation vanishes when we control for the inflation-real activity relation, thereby providing a strong support for Fama's proxy effect hypothesis. The split sample analyses indicate that the Fama hypothesis is valid only in pre reform period. In the post reform period, real stock returns have been independent of inflation, i.e., the Fisher Hypothesis is valid.

JEL classification code: G14, E 31

Key words: Stock Return, Inflation, Fama's proxy effect hypothesis

1. INTRODUCTION

The relationship between stock returns and inflation has been a topic of great interest both in theoretical and empirical literature. Despite the extensive research on the exact relationship between them, the issue still remains vexing. The genesis of the debate goes back to Fisher (1930). According to him, inflation should not affect real stock returns.[1] This notion in the literature was identified as *the Fisherian hypothesis*. The Fisher hypothesis suggests that stock market serves as a hedge against inflation. This implies that investors are fully compensated for increases in the general price level through corresponding increases in the nominal stock market returns and thus the real returns remain unaffected. In the typical approach followed to test the Fisher hypothesis, the nominal stock returns are regressed on inflation. A statistically significant positive unit coefficient for the inflation variable in such a regression would substantiate the inflation hedge hypothesis. In such situations, stock prices in nominal terms should fully effect the expected inflation and the relationship between these two variables should be positively correlated.

The Fisher hypothesis, when studied using real rather than nominal stock returns, suggests that real stock returns should be independent of inflation.[2] In contrast several studies emerged in the context

[1] He argues that real returns are determined by real factors such as time preferences of investors and the productivity of capital that are independent of nominal variables such as money supply and inflation. Although Fisher suggests this for interest rate, it can be generalized for any risky return derived from efficient market.

[2] Bodie (1976) argues that equities are hedge against inflation as they represent a claim to real assets and, hence, the real change on the price of the equities should not be effected. In this situation, firms are able to predict their profit margins and since equalities are claims not on current but also on future earnings, which confirms that stock market operates as a hedge against inflation, at least in the long run.

of US (eg. Lintner (1975), Fama (1982), Geske and Roll (1983)) and European economies (e.g. Asprem (1989)) which consistently rejected the Fisherian hypothesis. Although these studies showed that the inflation affected real stocks negatively, they failed to provide any explanation for this anomaly popularly known as *"a stock return-inflation puzzle".*

Later, two important approaches emerged to provide explanations for this anomaly along with others*: tax effect hypothesis* by Feldstein (1980) and *proxy hypothesis* by Fama (1981). Feldstein (1980) observed that inflation generates artificial capital gains due to the valuation of depreciation and inventories. The capital gains, however, are subject to taxation. Thus, corporate face increased tax liabilities in an inflationary situation. The ultimate effect of the inflation induced tax liabilities is a reduction in the real after tax earnings. The rational investors will take into account this effect of inflation by reducing common stock valuations. In this sense, inflation causes movement in stock prices. Although appealing, this explanation is contextual and is woven around the US tax regime.

Fama (1981) argued that the negative relationship between stock returns and inflation has its basis in the money-demand theory and the quantity theory of money. Fama hypothesises that rising inflation rates reduce real economic activity and demand for money. When economic activity dips, it negatively affects the future corporate profits and hence, stock prices. The negative relationship between inflation and the stock returns is on account of the 'proxy effect' in the sense that it reflects the detrimental consequence of inflation on real economic activity. According

to Fama, the statistical relationship between inflation and stock returns should disappear once the effect of real output growth is controlled for.

The Reverse Causality hypothesis by Geske and Roll (1983), another popular explanation of the negative association between inflation and stock prices, brings in fiscal and monetary linkages to explain the relationship between stock returns and inflation. According to this hypothesis, a reduction in real activity not only affects the stock prices adversely, but it also leads to a fall in government revenue and rise in fiscal deficits. Since the central bank monetizes a portion of fiscal deficits, the money supply increases, which in turn increases the inflation.

Interestingly, findings of Ram and Spencer (1983) are at variance with that of both Fisher's and Fama's Hypotheses. They find a positive relationship between real activity and inflation, consistent with the conventional Phillips curve theory and a negative relationship between real activity and real stock returns. They also find that inflation "causes" real stock return unidirectionally.

Although numerous studies emerged on the topic, most of them concern with developed nations particularly, in the United States.[3] Only a few studies analyzed this issue in the context of developing countries with relatively nascent stock markets and potentially unique transmission

[3] For more recent studies in the context of USA, see Aarstol (2000), and Shrestha et al., (2002). Anari and Kolari (2001), Rapach (2002), and Luintel and Paudyal (2003) provided evidence for other developed countries.

mechanisms mediating real activity and monetary policies (Chatrath et al., 1997). For instance, Floros (2004) found no relation between inflation and stock returns in Greece. Spyrou (2004) found little evidence to support the Fisher hypothesis in a study of ten emerging economies, *viz,* Chile, Mexico, Hong Kong, Argentina, Thailand, South Korea, Malaysia, Brazil, the Philippines, and Turkey.

The present study attempts to analyze the stock returns-inflation relationship in a developing country, India during April 1980-March 2004. The choice of Indian case is interesting for several reasons. First, there has been a system overhaul of the Indian financial system following an economic crisis in the early 1990s. As a consequence, the administered financial system is now more aligned to the market. Second, there have been innovations in financial instruments, institutions and operating procedures in the deregulated financial era. The Indian economy has recently witnessed several reform measures including greater de-regulation of industry, a more flexible currency and an increasing openness to foreign investment. The reform measures have been guided by the spirit to improve the efficiency of the financial system. The reform measures have caught positively with the investors as has been evidenced by a great deal of attention from foreign institutional investors particularly from North America, Japan and Europe.[4] In an economy, which is marked by greater market orientation coupled with efficiency enhancing measures, the question of whether stock returns hedge against inflation is an interesting field of enquiry.

[4] Foreign investors pumped in US $8.3 billion in equities in 2004 and more than US $ 8.5 billion in 2005.

Chatrath et al., (1997) is the only study that investigates the stock return-inflation relation in India during 1984 to 1992 in the light of Fama's proxy hypothesis. The result of this study provides only partial support for Fama's hypothesis. The validity of the results needs to be revisited in light of financial sector reforms in the post 1990 period and stock market reforms in particular. Literature on Fisher Hypothesis also suggests that the relationship between inflation and stock returns has time dependency associated with it. While evidence for the Fama hypothesis is found in studies with shorter time periods, the Fisher hypothesis is validated in studies that span over relatively long time horizons (Firth, 1979; and Gultekin, 1983). For instance, Anari and Kolari (2001) report a negative correlation between stock prices and inflation in the short run and a positive correlation between them in the long run. As such, we have considered a fairly long time period of twenty-four years to unravel the stock return inflation relationship in the Indian context in this study.

However, the movement away from a repressed financial system coupled with greater openness has encouraged the entrepreneurial spirit and the stock market has seen unprecedented growth in the later part of our study period. The decade of the 1990s was also characterized by low inflation. These two developments leads one to surmise that perhaps the nominal stock returns would be able to hedge for inflation. To investigate whether the relationship has undergone a change in the post financial sector reform years, we have studied the stock-market-inflation relationship for the pre-reform post-reform phases separately in addition to the full period study.

Further, Chatrath et al., (1997) study used the consumer price index (CPI) measure of inflation following studies relating to developed countries. Use of CPI to capture the price situations is fraught with the limitation that there is not a single indicator of CPI in India. Four different variants of CPI are compiled on monthly basis that are designed for specific group of population with specific objectives.[5] The use of a specific version of CPI might have a bearing on the empirical findings. Hence the CPI may not be the most suitable indicator of inflation in India. Another comprehensive alternative measure for inflation comes from the implicit price deflator of GDP. This is an annual series (recently quarterly series), which is available with a lag of two years. Besides, from time to time data revisions complicate its usability for inflation-related price interventions. The Indian context, however, offers the possibility of using another indicator of prices, namely the Wholesale Price Index (WPI). The WPI is more representative of the prevailing price situation because of its wider coverage compared to the CPI. The WPI is also available with a smaller lag of one week compared to the CPI (Reddy, 1999). Hence, the WPI rather than the CPI is used extensively as a measure of inflation in India and important monetary and fiscal policy changes are often linked to it.[6] As such, our study uses the WPI as the indicator of inflation unlike Chatrath et al., (1997) study uses the CPI to capture the price situation.

[5] The CPI for industrial workers is used for determining the dearness allowances to be paid to public sector and industrial workers besides fixation and revision of minimum wages to scheduled employments while CPI indices for agricultural laborers and urban non-manual employees for measuring the impact of increase in prices on rural and urban poverty.

[6] The WPI also has several limitations: First, only goods are included in its purview and services are excluded. Secondly, the WPI measure captures the value of gross transactions in the economy. It amounts neither to a producers' nor a consumers' basket for the measurement of inflation. Thirdly, given the use of the Laspeyre's formula, it requires frequent base year revisions, particularly in an economy undergoing structural changes at a rapid rate.

The remainder of this study proceeds as follows. Section 2 explains the model, data and estimation methods employed in this study. The empirical results are presented and discussed in Section 3 and the main conclusions are summarized in Section 4.

2. MODEL, DATA AND ESTIMATION

The empirical setting of this study first attempts to test the validity of the Fisher hypothesis. In the event of obtaining the results contrary to the Fisher hypothesis, an attempt is made to test the Fama's hypothesis. The empirical model to test the Fama's hypothesis in turn boils down to testing the validity of the following two propositions:

1. *There is a negative relation between inflation and real activity.*
2. *There is a positive association between real activity and stock returns.*

For this purpose, this study employs the following empirical models:

$$I_t = \delta + \alpha_i G_{t+i} + \varepsilon_t \quad (1)$$

$$RR_t = \gamma + \Sigma \beta_i G_{t+i} + \phi_t \quad (2)$$

where I, G and RR represent inflation, real activity and real stock return respectively. Both leads and lags of G are incorporated in the above equations because of lack of theory or a priori evidence pertaining to the relationship between real activity, inflation and real stock return in India. The equation (1) is used to test proposition 1 *viz,* negative association

between inflation and real activity. The first proposition holds when some αs' are significantly negative. The second proposition is tested using the equation (2). If some of the estimated βs' are significantly positive, it will signify a positive relation between real activity and real stock returns. Both the equations (1) and (2) can be estimated using the Ordinary Least Square (OLS) method and accounting for White heteroscedasticity correction.

Since the proxy effect explanation is based on an indirect relationship between real stock returns and inflation, the above single equation treatments may yield inconsistent estimates. This problem can be addressed by adopting a two-step OLS procedure to study the relationship between real returns and inflation as in Chatrath et al., (1997). First, the inflation is regressed on the lagged, contemporaneous and leading values of the real activity and the estimated residuals (ε_t) from this equation can be obtained. The ε_t vector represents the inflation variable that is purged of the relationship between inflation and real activity. In the second step, the inflation adjusted stock returns or real stock return is regressed on lagged, contemporaneous and leading values of real activity and on the estimated residuals in the first step as regressors.

Thus, the estimated equation in the second stage of analysis takes the following form:

$$RR_t = \gamma + \Sigma \beta_i G_{t+i} + \lambda \varepsilon_t + \phi_t \qquad (3)$$

A zero co-efficient of ε_t (i.e., $\lambda = 0$) in the equation (3) would confirm the proxy hypothesis that real stock returns are independent of inflation once the impact of real activity on inflation has been controlled for.

Since the inflation can be decomposed into the expected inflation (EI_t) and the unexpected component (UI_t), one can expect the indirect relationship of stock returns with these two components. In order to test this kind of relationship, the stock returns are regressed separately on the expected inflation and unexpected inflation components.

First, the Hodrick-Prescott (HP) filter is used to derive the expected and unexpected components of the inflation.[7] This filter decomposes the given series (such as inflation) into its trend and unexpected deviations from the trend. As suggested in Hodrick and Prescott (1980) for monthly data, we have used (θ)=14400 as the value of the smoothing parameter. The HP filter technique allows for a stochastic trend component while deriving the temporary or unexpected component. Under the assumption that market participants form rational expectations regarding inflationary trend, the off-trend or temporary portion of the series may be considered to represent the unexpected inflation.

After deriving the expected and unexpected components of inflation using the HP filter technique, the following three equations can be estimated.

[7] The other method suggested in the literature is ARIMA model. The white noise residuals of the ARIMA model are treated as the unexpected component of the series under question. We use the HP filtering technique in the study as it relies on a minimum number of assumptions and, hence, is more acceptable.

$$I_t = \delta_1 + \Sigma \alpha_{1i} G_{t+i} + \varepsilon_{1t} \quad (4)$$

$$EI_t = \delta_2 + \Sigma \alpha_{2i} G_{t+i} + \varepsilon_{2t} \quad (5)$$

$$UI_t = \delta_3 + \Sigma \alpha_{3i} G_{t+i} + \varepsilon_{3t} \quad (6)$$

To examine whether the proxy effect is strong enough to explain the negative inflation-stock return relationship, finally the following three equations can be estimated:

$$RR_t = \gamma_1 + \Sigma \beta_{1i} G_{t+i} + \lambda_1 \varepsilon_{1t} + \phi_{1t} \quad (7)$$

$$RR_t = \gamma_2 + \Sigma \beta_{2i} G_{t+i} + \lambda_2 \varepsilon_{2t} + \phi_{2t} \quad (8)$$

$$RR_t = \gamma_3 + \Sigma \beta_{3i} G_{t+i} + \lambda_3 \varepsilon_{3t} + \phi_{3t} \quad (9)$$

The zero value of λ_i would confirm the proxy hypothesis that real stock returns are independent of inflation (expected and unexpected) once the impact of real activity on inflation (expected and unexpected) has been controlled for. Thus, our main objective here is to see whether $\lambda = 0$ or not. If $\lambda = 0$, the proxy hypothesis is valid.

This study utilizes monthly data on stock price index, index of industrial production (IIP) and wholesale price index (WPI) in India during April 1980 to March 2004, covering 288 months. We have constructed three study variables from the available data namely, nominal stock return (R_t), inflation (I_t) based on WPI and growth in industrial production (G_t), which proxies real activity.[8] The stock price data are obtained from the

[8] Annualized growth rates of WPI and IPI are calculated (using the formula: log (t_1 / t_{-12}), where t_1 and t_{-12} represent the data in current period and the data in twelve months ago respectively; in the process first 12 data points are lost) to arrive at the inflation rate and the industrial production growth. The nominal returns on stocks are calculated in the same manner.

Stock Exchange, Mumbai (BSE Sensex). The Ministry of Industry, Government of India and Central Statistical Organization (CSO) are the sources for the WPI and the IIP respectively. The real stock return (RR_t) is computed by subtracting I_t from R_t. Table 1 provides the descriptive statistics of the study variables. During the study period RR_t was relatively volatile as compared to I_t and G_t. The Augmented Dickey-Fuller (ADF) test statistics shown in Table 1 indicate that all our study variables are I (0) variables, *i.e.*, they are stationary at levels. Therefore, the results from standard OLS regression would be valid.[9]

3. EMPIRICAL RESULTS

First, we present the estimation results for the full period April 1980 till March 2004 and then discuss separately the results for the pre and the post reform sub periods.

(i) Relation between Inflation and Stock Return: As noted earlier, the HP filter is employed to derive the expected and unexpected components of inflation. In order to test the validity of Fisher's hypothesis, the real stock return is regressed separately on inflation (I), expected inflation (EI) and unexpected inflation (UI). Table 2 presents the estimation results. While the parameters of I (Column 1) and UI (Column 3) are negative and statistically significant (at 1 percent level), the coefficient of EI is insignificant. Further, this negative relationship emerges mainly from the unexpected component of the inflation. Therefore, one can

[9] Almost all earlier studies on the topic use the Johensen co-integration test to find the long run relationship between inflation and returns. Since our study variables are stationary at levels we address the proxy hypothesis by imposing the two-step solution.

reject the Fisher's hypothesis that real return and the inflation rate vary independently of each other in the Indian context. However, the results also suggest that the Fisher hypothesis is valid only in the case of stock return and expected component of inflation. The next task is to explain the negative relationship between inflation (unexpected) and real returns through the two-step procedure discussed in Section-2.

***(ii) Inflation Vs. Real Activity*:** Table 3 presents the estimation results of equations (4-6) pertaining to proposition 1. As expected, there exists a negative relationship between real activity, G and inflation, I. This result is inconsistent with the Phillips curve and indicates that inflation may lead to a lower growth of real GDP. It is, however, noted that the negative and significant parameter (at 5 per cent level) pertains only to a lead value of G, i.e., $G_{t+3.}$ Thus, the real activity seems to lead the decline in inflation rather than vice versa. Interestingly, G is significantly influencing only the unexpected inflation.

***(iii) Stock Returns Vs. Real Economic Activity*:** Column 4 of Table 3 reports the estimation results of equation 2 pertaining to proposition 2 of the Fama hypothesis. G_{t+6} is the only term which is statistically significant and it has a positive sign. This implies that real activity influences the real return positively with a lead of 6 months.

Thus, the above results strongly reject the Fisher's hypothesis when we consider inflation and stock return in isolation for the full period under study. The results also seem to at least partially validate Fama's proxy effect hypothesis. Now we can examine whether the proxy effect

is strong enough to explain a negative inflation-stock return relationship by regressing real return on purged inflation, expected inflation and unexpected inflation.

(iv) Stock Return Vs. Inflation and Real Activity: Table 4 shows the estimated results of equations (7)-(9). The Column 1 includes the purged inflation along with real activity variables while Columns 2 and 3 include purged expected and purged unexpected inflation respectively. Since the purged inflation coefficient is not statistically significant even at 10 per cent level in Column (1), the negative relationship between inflation and real stock returns vanishes when we control for the inflation-real activity relationship. This result is consistent with Fama's hypothesis. Besides, the effects of both purged expected inflation and purged unexpected inflation are insignificant, clearly indicating the independence of real returns and inflation. Thus, the proxy effect is strong enough to explain the negative inflation-stock returns relationship in India.

(v) Real stock return and Inflation relationship during Pre and Post Reform Periods: Results of the split period analyes shown in Table 5 indicate that the inflation variable negatively and significantly influences stock returns during the Pre-reform period (April 1980 to March 1990) and this negative relation emerges because of expected component of inflation. During the post reform period (April 1990 to March 2004), the inflation effect is zero, implying that real returns are independent of inflationary trends. Therefore, we cannot reject the Fisher's hypothesis for the post reform period.

We also find a negative relation between inflation and real activity (G_{t+3}) during pre-reform period and no relation between them during post reform period.[10] Table 6 shows the estimated results of equations (7)-(9) for pre-reform period. The purged inflation/expected/unexpected component coefficients are not statistically significant even at 10 per cent level during the pre-reform period. Thus, the results are consistent with Fama's hypothesis and the proxy effect strongly explains the negative inflation-stock return relationship during the pre-reform period.

4. CONCLUSIONS

In order to test the efficiency and the strength at which inflation is related to stock returns, the study has decomposed the inflation into expected and unexpected components using HP filter and employed a two-step procedure. In the first step, the inflation, unexpected inflation and expected inflation equations are estimated with real activity as the regressor. The residuals from the first step estimations are used as regressors in addition to real activity in the real stock returns equation in the second stage.

The results indicate that the stock returns and the inflation (unexpected inflation) are negatively related (i.e., Fisher's hypothesis is rejected) when we consider the entire 24-year period. The real activity and inflation are also negatively related while the real activity positively influences the real return with a lead of about 6 months. Thus our results provide a strong empirical support for the validity of Fama's proxy effect hypothesis in the context of an emerging economy, India. The results

[10] Results are not shown, but available with authors on request.

also bring out some unique aspects of the relationship among inflation, real activity and stock returns in India. The real activity seems to lead the decline in inflation rather than vice versa. The negative relationship between real returns and inflationary trends seem to emerge mainly from the unexpected component of the inflation. Moreover, it seems that the Indian Stock market reflects future real activity. However, a notable month lag is documented between the industrial production and stock market activity in India.

The split sample analyses indicate that the Fama hypothesis is valid only in pre reform period and not in post reform era. The results for the post reform period suggest that real stock returns have been independent of inflation. This finding is in contrast to most of the earlier studies, which validated the Fisher hypothesis for sufficiently longer time horizons. The validity of the Fisher hypothesis in the shorter time horizon in case of India is perhaps reflective of the structural changes noticed in the Indian financial system in the post reform period. However, more detailed research efforts needs to be made to understand the process by which stock return acts as a hedge against inflation. We hope that this study contributes to the stock returns-inflation relation literature in developing countries, as it has addressed the issue in the light of Fisher and Fama hypotheses with reference to the emerging economy, India.

Table 1: Descriptive Statistics of the Study Variables

Variables	Mean (S.D)	ADF Statistics
Real Stock Return (R_t)	0.0812 (0.297)	-2.98 * *
Inflation (I_t)	0.0690 (0.033)	-2.61 * * *
Expected Inflation (EI_t)$^{\$}$	0.0695 (0.023)	-1.83 * * *
Unexpected Inflation (UI_t)	-0.0006 (0.021)	-5.54 *
Real Activity (G_t)	0.0625 (0.037)	-3.49 * *

AIC criterion is used for lag length selection; $ Unit root tests are based on Dickey-Fuller GLS De-trending Statistics. *,**and ***refers to significance at 1 per cent, 5 per cent and 10 per cent level of significance.

Table 2 Stock Market Returns Vs Inflationary Trends (Dependent Variable: Real Stock Returns)

Variables	(1)	(2)	(3)
Constant	0.1911 (1.551)	-0.0589 (-0.211)	-0.1065 (-0.380)
Inflation (I)	-1.4035 (-2.180)	-	-
Expected Inflation (EI)	-	2.3672 (0.612)	2.8613 (0.738)
Unexpected Inflation (UI)	-	-	-1.6178 (-2.447)
Adjusted R^2	0.88	0.88	0.88

Figures in the parentheses are t values

Table 3: Inflationary Trends / Stock Returns Vs Real Activity

Variables	Dependant Variable			
	Inflation	***Expected Inflation***	***Unexpected Inflation***	***Real Stock Return***
	(1)	**(2)**	**(3)**	**(4)**
Constant	**0.0777** (4.467)	**0.1183** (3.461)	**0.0074** (1.014)	**0.0057** (0.043)
G_{t-12}	0.0262 (1.307)	-0.0002 (0.091)	0.0212 (1.066)	-0.2607 (1.068)
G_{t-9}	-0.0129 (0.686)	-0.0006 (0.307)	-0.0160 (0.863)	-0.4048 (1.756)
G_{t-6}	0.0298 (1.611)	-0.0004 (0.198)	0.0270 (1.479)	0.0989 (0.434)
G_{t-3}	-0.0111 (0.602)	-0.0006 (0.304)	-0.0141 (0.772)	-0.1033 (0.454)
G_t	-0.0188 (0.936)	0.0002 (0.111)	-0.0190 (0.963)	0.1068 (0.432)
G_{t+3}	-0.0607 (3.330)	-0.0001 (0.066)	-0.0582 (3.235)	0.1233 (0.553)
G_{t+6}	0.0056 (0.308)	-0.0002 (0.087)	0.0055 (0.306)	0.5633 (2.524)
G_{t+9}	-0.0274 (1.501)	0.0000 (0.011)	-0.0247 (1.368)	0.2475 (1.104)
G_{t+12}	0.0316 (1.686)	0.0002 (0.089)	0.0267 (1.425)	0.0464 (0.201)
Adjusted R^2	0.93	0.99	0.85	0.88

Figures in parentheses are absolute t values.

Table 4: Stock Returns- Inflation Relationships after Controlling Inflation-Real Activity Relation (Dependent Variable: Real Stock Returns)

Variables	(1)	(2)	(3)
Constant	0.0019 (0.015)	0.0071 (0.062)	0.0020 (0.017)
G_{t-12}	-0.2195 (0.896)	-0.2278 (0.933)	-0.2197 (0.897)
G_{t-9}	-0.3785 (1.641)	-0.4053 (1.755)	-0.3786 (1.642)
G_{t-6}	0.1117 (0.489)	0.0884 (0.387)	0.1113 (0.487)
G_{t-3}	-0.0743 (0.325)	-0.1041 (0.455)	-0.0749 (0.328)
G_t	0.1063 (0.426)	0.0922 (0.374)	0.1060 (0.428)
G_{t+3}	0.0652 (0.289)	0.0561 (0.250)	0.0658 (0.292)
G_{t+6}	0.5390 (2.407)	0.5115 (2.281)	0.5385 (2.404)
G_{t+9}	0.2021 (0.894)	0.1952 (0.866)	0.2022 (0.895)
G_{t+12}	0.1340 (0.569)	0.1016 (0.431)	0.1326 (0.564)
ε_{1t} (Purged Inflation)	0.1779 (0.269)	-	-
ε_{2t} (Purged Expected Inflation)	-	82.9768 (1.374)	-
ε_{3t} (Purged Unexpected Inflation)	-	-	0.2003 (0.294)
Adjusted R^2	0.88	0.88	0.88

Figures in parentheses indicate the absolute t values.

Table 5: Stock Market Returns Vs Inflationary Trends during Pre-reform and Post Reform Periods (Dependent Variable: Real Stock returns)

Variables	Pre-Reform Period (1980:4 to 1990:3)			Post Reform Period (1990:4 to 2004:3)		
Constant	0.1925 (1.317)	0.6719 (1.193)	0.5102 (0.966)	0.1949 (1.104)	-0.1896 (-0.573)	-0.2332 (-0.673)
I_t	-2.0029 (-2.214)	-		-1.1237 (-1.280)	-	-
EI_t		-9.0712 (-1.101)	-1.8382 (-1.952)	-	4.4092 (0.995)	5.1341 (1.106)
UI_t		-	-6.8783 (-0.883)	-	-	-0.4202 (-1.565)
Adjusted R^2	0.90	0.90	0.90	0.87	0.87	0.87

The values in the parentheses are t values.

Table 6; Stock Returns-Inflation Relationship after Controlling Inflation-Real Activity Relation during Pre-reform Periods

Equation	Constant	G_{t-12}	G_{t-9}	G_{t-6}	G_{t-3}	G_t	G_{t+3}	G_{t+6}	G_{t+9}	G_{t+12}	ε_{it}	Adj-R^2
(1)	-0.0660 (0.299)	0.0829 (0.263)	-0.0550 (0.188)	0.1366 (0.473)	0.2497 (0.877)	0.2000 (0.570)	-0.0867 (0.284)	0.7013 (2.307)	0.1132 (0.370)	0.0014 (0.004)	-0.8505 (0.767)	0.9
(2)	-0.0509 (0.216)	0.0735 (0.231)	0.0061 (0.018)	0.1743 (0.583)	0.2547 (0.891)	0.1433 (0.306)	-0.0605 (0.197)	0.6935 (2.272)	0.1010 (0.324)	-0.0546 (0.137)	-31.8805 (0.272)	0.9
(3)	-0.0682 (0.309)	0.0861 (0.273)	-0.0564 (0.193)	0.1371 (0.475)	0.2509 (0.882)	0.2071 (0.591)	-0.0858 (0.281)	0.7023 (2.310)	0.1133 (0.370)	0.0056 (0.017)	-0.8709 (0.782)	0.9

(Figures in parentheses are absolute t values)

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