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INFLATION HEDGE IN INDIA:
STOCKS OR BULLION

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INTRODUCTION

Considerable work has been done in the past to investigate whether or not common stocks provide an adequate hedge against inflation. The earliest work on the subject goes back to the last century when Irving Fisher (1896) expressed the nominal rateof interest on a bond as the sum of its real rate and the rate of inflation expected to prevail over the life of that bond. This relationship between the nominal interest rate and the rate of inflation, commonly known as the 'Fisher' effect, has since then provided the foundation upon which the subsequent definitions of inflation hedge have been built. The entire spectrum of literature in the context has been lucidly documented by Lintner (1975).

These definitions can basically be categorised into three alternative mathematical forms. These forms alongwith the hypotheses required for an asset to be an inflation hedge are given below:

Form	Hypothesis
$r_t = \alpha_1 + \beta_1\, i_{t-1}$	$\beta_1 = 0$
$r_t = \alpha_2 + \beta_2\, i_t$	$\beta_2 > 0$
$r_t = \alpha_3 + \beta_3\, u_t$	$\beta_3 \geq 1$

where r_t is the real rate of return on the asset in period t

i_{t-1} is the rate of inflation in period t-1, which is a proxy for anticipated rate of inflation in period t

i_t is the rate of inflation in period t

and u_t is the unanticipated rate of inflation in period t.

The inference drawn from various empirical studies employing one or the other form of specifications described above, did not in general support the hypothesis of common stocks being a hedge against inflation. In fact, Oudet (1973), Branch (1974), Nelson (1976), Bodie (1976), Jaffe and Mandlekar (1976), and Fama and Schewart (1977) found a significant negative correlation between the return on common stocks and rate of inflation. Earlier however, Reilly, Johnson, and Smith (1970,71) found common stocks to be a partial hedge against inflation. All these studies used American data. Only Firth (1978), using British data, found a significant positive relationship between the return on common stocks and the anticipated rate of inflation.

Thus, even as common stocks come to be regarded as inadequate inflation hedge in study after study, relatively lesser efforts appear to have been invested in examining other possible hedges against inflation, such as the bullion. In India however, there is a paucity of work done on the subject of inflation hedge itself.

The only study we came across in the Indian context was that of Mayya (1977). He regarded an asset as an inflation hedge, if the percentage increase in the value of the asset over a certain period, outstripped the percentage increase in the rate of inflation over the same period. Using this method of analysis, he inferred that both gold and silver were inflation hedges over 1962-63 to 1973-74 period, while stocks were not. His analysis however lacked statistical rigour. We therefore examined the possibility of the common stocks or the bullion being inflation hedges in the India, employing the necessary statistical rigour.

METHODOLOGY

In this study, we regard an asset a hedge against inflation if the rate of increase in its nominal value is greater than the rate of increase in inflation.

This definition assumes the following mathematical form:

$$\log V_t = \alpha + \beta \log I_t + e_t$$

where V_t is the nominal value of the asset in period t

I_t isthe inflation index in period t

In the above specification,

$$\beta = \frac{\partial V_t / V_t}{\partial I_t / I_t}$$

Therefore, an asset would be a partial hedge if the value of β is positive. The null hypothesis implied would be:

$$H_O : \beta \leq 0$$

And an asset would be a complete hedge if the value of β is greater than one. The implied null hypothesis in this case becomes:

$$H_O : \beta \leq 1$$

The assets examined as possible inflation hedges were gold, silver, and common stocks. The two different measures of inflation used were Consumer Price and Wholesale Price Indices. The monthly statistics on these variables for 1968–1981 period were taken from the Reserve Bank of India Bulletin. This bulletin compiles the statistics as follows:

(a) The bullion prices are the average spot prices of gold and silver on the last Friday of every month.

(b) The monthly index for the value of common stocks is arrived at by averaging the stock prices of weeks ending Saturday, base 1961–62.

(c) The consumer Price Index numbers are the indices for urban non–manual employees, base 1961–62.

(d) The wholesale price index numbers are the indices of wholesale prices of all commodities, base 1961–62.

Gold, silver, and common stocks were regressed against the consumer price and the wholesale price indices separately. This was done because it is not certain as to which of the two indices is a better measure of inflation.

The regression results for the 1968-81 period are presented in Table 1.

TABLE 1

Regression Results, 1968-81

Sr.No.	Variables Dependent	Independent	α	β	R^2	DW	F
1	Gold	CPI	-8.00 (-48.39)	2.58 (85.04)	.98	0.13	7293
2	Silver	CPI	-3.52 (8.37)	1.91 (49.08)	.94	0.18	2408
3	Stocks	CPI	1.55 (8.37)	0.57 (16.84)	.63	0.06	284
4	Gold	WPI	-6.21 (-43.43)	2.20 (86.28)	.98	0.17	7445
5	Silver	WPI	-2.19 (-11.87)	1.63 (49.4)	.94	0.19	2442
6	Stocks	WPI	1.89 (12.17)	0.50 (18.02)	.66	0.06	3250

Notes: a) The figures in parentheses are the t-values for the estimated coefficients.

b) The number of observations for all regressions were 168.

We observe from the table above that the values of β for all the

six regressions are positive and significantly different from zero.

This implies that for the 14 year period considered, all the three

assets were partial hedge against inflation. However, the values

of β for gold and silver are not only significantly positive but

are also significantly greater than one. Thus the bullion emerged

as a complete hedge against inflation for the period considered.

As the DW statistics were small, we re-estimated the coefficients

after correcting for the first order serial correlation using the

estimated values of γ . The inferences drawn in the preceding

paragraph remained unaltered.

A study of the residuals of the above set of regressions

showed an interesting pattern. For each of the regressions, the

residuals appeared to be randomly distributed around zero mean

for the first five or six years; were predominantly negative for the

next four or five years; and were predominantly positive for the remaining

(see figures 1,2 and 3 for the plots of residuals). The pattern suggested

a need to study the behaviour of the three assets during shorter
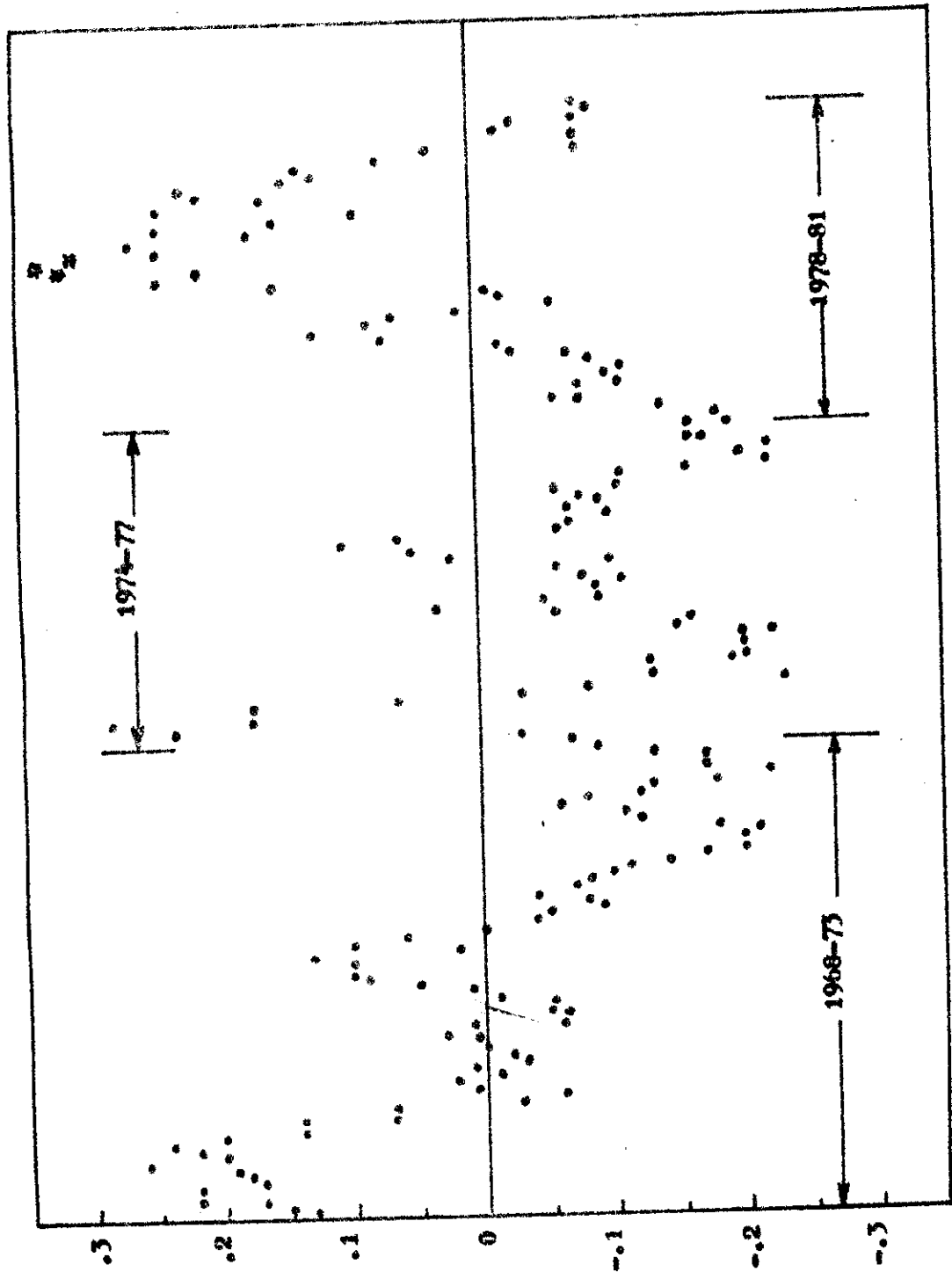
time spans.

Accordingly the fourteen year period was divided into three sub-periods.

Guided by the plots of the residuals, it was decided to demarcate the sub-

periods as: 1968-73, 1974-77, and 1978-81. Other reasons which could

possibly justify the division of the fourteen year period as above,

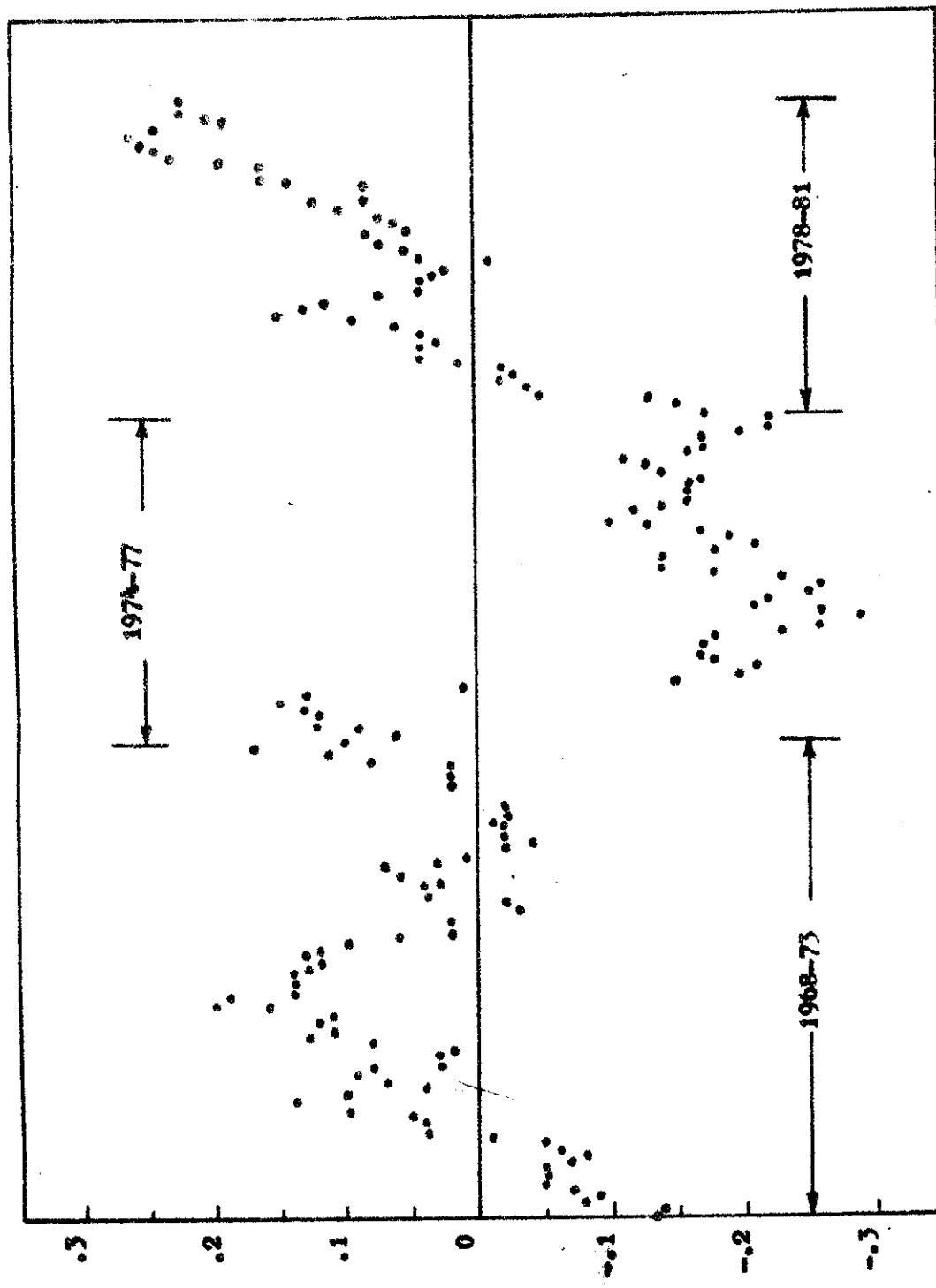are as follows:
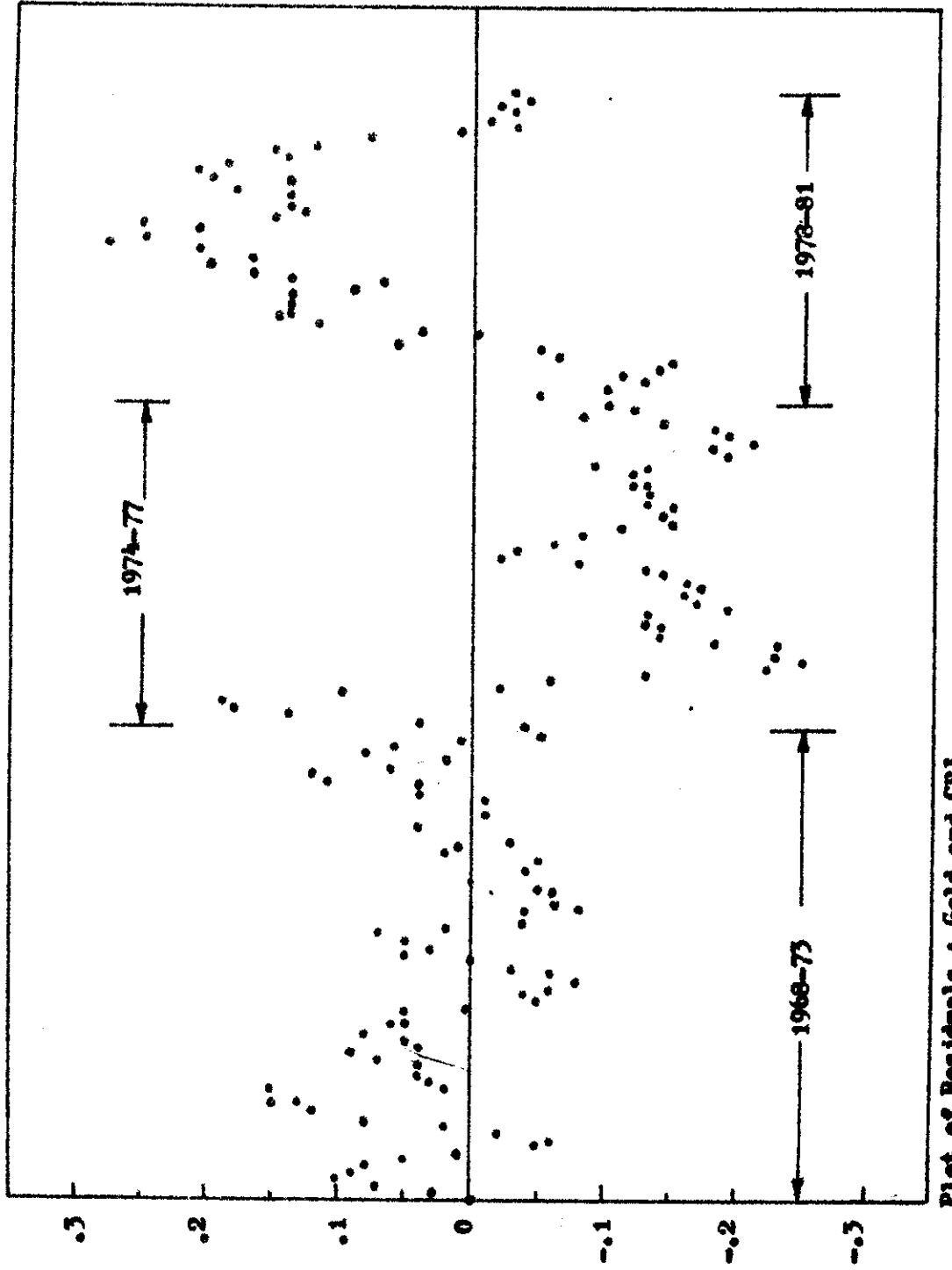
Plot of Residuals : Gold and CPI

Fig. 1

Plot of Residuals : Silver and CPI

* denotes very large values of residuals

Fig. 2

Plot of Residuals : Stocks and CPI   Fig.3

(a) the 1968-73 span was relatively stable economic period preceeding the oil crisis.

(b) The 1974-77 period witnessed a process of adjustment to the oil crisis. This span was also marked by a dividend freeze on securities in 1974-75, followed by two years of political anomaly.

(c) The last sub-period, 1978-81 represents the post 'emergency' period in India.

The regression results for these three sub-periods have been tabulated in Tables 2,3, and 4 respectively.

TABLE 2

Regression Results, 1968-73

| Sr. No. | Variables | | α | β | R^2 | DW | F |
	Dependent	Independent					
1	Gold	CPI	-7.26 (-20.43)	2.44 (35.40)	.95	0.43	1253
2	Silver	CPI	1.89 (3.79)	0.86 (8. 90)	.93	0.22	79
3	Stocks	CPI	0.85 (1.75)	0.72 (7.60)	.45	0.15	57
4	Gold	WPI	-4.03 (-16.10)	1.78 (37.36)	.95	0.65	1396
5	Silver	WPI	2.93 (8.25)	0.65 (9.56)	.57	0.23	91
6	Stocks	WPI	1.85 (5.07)	0.51 (7.34)	.44	0.15	54

TABLE 3

Regression Results, 1974-77

Sr. No.	Variables Dependent	Variables Independent	α	β	R^2	DW	F
1	Gold	CPI	-0.57 (-0.75)	1.23 (9.01)	.64	0.45	81
2	Silver	CPI	5.04 (4.87)	0.36 (1.96)	.08	0.75	3.8
3	Stocks	CPI	9.38 (8.90)	-0.85 (-4.53)	.31	0.20	20.5
4	Gold	WPI	-0.29 (-0.26)	1.15 (5.87)	.43	0.30	34.5
5	Silver	WPI	5.37 (4.35)	0.30 (1.38)	.04	0.71	1.9
6	Stocks	WPI	5.91 (4.02)	-0.23 (-0.88)	.02	0.16	0.78

TABLE 4

Regression Results 1978-81

Sr. No.	Variables Dependent	Variables Independent	α	β	R^2	DW	F
1	Gold	CPI	-9.04 (-10.57)	2.78 (18.84)	.89	0.15	355
2	Silver	CPI	-4.71 (-3.70)	2.13 (9.72)	.67	0.24	94
3	Stocks	CPI	-2.69 (-6.33)	1.32 (18.02)	.88	0.26	325
4	Gold	WPI	-4.74 (-10.22)	1.97 (25.45)	.93	0.28	648
5	Silver	WPI	-1.73 (-2.23)	1.56 (12.07)	.76	0.35	146
6	Stocks	WPI	-0.32 (-0.88)	0.88 (14.46)	.82	0.17	209

For the sub-period 1968-73, all the three assets qualified as partial hedges. Gold alone was found to be a complete hedge for both the measures of inflation considered.

During the second sub-period 1974-77, gold barely qualified as a complete hedge when regressed against CPI, at 5% level of significance; it was only a partial hedge when the measure of inflation was WPI. Silver in turn was a partial hedge when CPI was the measure of inflation and not a hedge at all when WPI was the indicator used. For the first time however, the coefficents for common stocks were negative for both the measures of inflation and thus they were not a hedge during this period.

The poor performance of all the three assets during this period as compared to the earlier six year span may perhaps be ascribed to the uncertain economic conditions prevailing at the time because of the apprehensions about the political situation in the country.

In the last sub-period 1978-81, the market optimism was duly reflected by the fact that all the three assets emerged as complete inflation hedges when regressed against CPI. The bullion continued to be a complete hedge against WPI, while the common stocks turned out to be only a partial hedge. The fact that the common stocks should have emerged as complete hedge in this period alone, and not in either of the two earlier sub-periods or even in the total span of fourteen years, seems to underscore the sudden buoyancy in the Indian Capital market following the end of political uncertainty

in 1977. The inferences drawn from the regression coefficients for the sub-periods are thus consistent with the scatter of the residuals observed earlier.

CONCLUSION

The inferences drawn in the paper bear out the perceived role of gold in the Indian society. In India, gold has always been considered a better store of value than silver and our results justify the belief. The surprising aspect of our study is the fact that the Indian Capital Market, though possibly less perfect than its American counterpart because of its smaller size, concentrated assets holding, and inefficiencies of information flow in the market, should yet have its common stocks as at least a consistent partial hedge against inflation.

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