



AN ANALYSIS OF ECONOMIC BUBBLE: FORMATION, SUSTENANCE AND BURST

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Abstract

Formation of economic bubble is an inherent tendency within the 'self-driven' capitalist system. Financialization has made the formation of bubbles frequent. It provides the support for the sustenance of the bubble and finally burst and again formation and so on. Speculative bubbles have in place over the rational bubbles due to abnormal growth of newer financial instruments with very high potential of return on investment (ROI). Bursting of bubble has widespread negative impact at the origin as well as periphery due to contagion. This again raises the doubt about the so-called spontaneous nature of the finance capital.

Keywords Economic Bubble, Financialization, Capitalism.

I. Introduction

Economic bubble can be considered as a typical euphoric state of an economy both in micro and macro level. Here micro refers to the firm or company level whereas macro signifies economy as a whole. The underlying force behind the formation of economic bubble is psychological exuberance of profit seeking economic agents over and above the intrinsic value of the underlying. There are several types of economic bubble which are broadly can be called as asset bubble. We are primarily interested with equity market as an asset class and bubbles of this equity asset class in this study. Needless to say that the Indian stock market is our preferred choice in this study. This analysis can be easily extended for other asset class also.

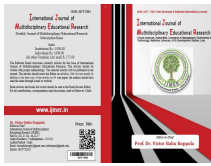
There is no historical evidence of structural homogeneity on the basis of size, duration and its degree of impact on the economy. The basic premise of our analysis for the formation and sustenance of bubble is over deepening of finance which is occasionally termed as 'financialization' in political economy debate strictly on the monetarist platform and the disjoint between real economic activity and the growth of financial sector. In other words financialization is the means of providing excess liquidity through the channel of finance capital instead of channel of real commodity production for the building of euphoria resulting into bubble. Supremacy of money values leads the proliferation of pure financial assets such as futures, options etc. which has very insignificant relation with the real economic activities (Elson, 2000). The self-driven financialization process is strong enough to ignore the base of the real economic activities. In the recent meeting of Monetary Policy Committee (MPC) of Reserve Bank of India, it is clearly mentioned by one of the distinguished members that the accommodative policy of central bank has increased the asset price and has failed to revive the real economy. He has further mentioned that the liquidity support during the pandemic had widened the gap between the real economy and the capital market. This is the most outrageous outcome of capital in this era of finance capital.

The present study is structured into following sections. Section II has described the formation of equity bubble. Section III proves the disjoint between real economic activity and the stock market performance. Impacts of bubble burst on both the real economy and the financial sector are described in Section IV. Finally Section V concludes the study.

II. Financialization and formation of bubble

Excess Liquidity

There is no doubt that the any asset bubble is liquidity driven. Formation of bubble in the stock market is always an outcome of excess liquidity. Financialization is the means of excess liquidity in the capital market. First liquidity and then excess liquidity propels the valuation of the asset beyond the intrinsic value. The premium valuation builds up gradually. The building of this pseudo valuation gap upon the base of the intrinsic value finally reach the stage of suspicious stage of further



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value addition. At this maturing stage of bubble and occurrence of any ‘Black Swan’ event or any minor change economic policy results into the burst of the asset bubble.

To understand the formation and sustenance of the asset bubble we will now provide little bit more emphasis on the financialization process so far resulted in India following the new economic reform. For the sake of specificity we will strict to the definition of krippner (2005) i.e. “financialization as a pattern of accumulation in which profits accrue primarily through financial channels rather than through trade and commodity production”.

With reference to above definition, if we go by the firm level analysis i.e. the micro analysis of financialization debate on Indian context, we can easily find out the increasing financial activities by non financial firms or companies in the name of business diversification during the last decade. The giant non-financial conglomerates in India have embarked into financial activities. For example, Reliance has demerged and listed its financial business ‘Jio financial’ recently. This is a clear diversification from non-financial core business of oil and natural gas sector to financial business. Other prominent examples are LT Finance, Bajaj Finance .

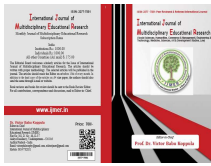
Derivative – to – cash volume ratio

If we look into the matter from individual investor as well as from institutional investor’s perspective, again the micro basis of financialization, we can easily show the enormous growth of speculative activities during the last decade. Transaction activities in the highly risky financial instruments such as equity and commodity derivatives has increased manifolds by both the retail as well as institutional investors following the financial opening in India. Derivative – to – cash volume ratio, the indicator which reveals the level of speculation in the equity market, has sky-rocketed in India (See Table_1). We generate 45 times more volume in relative term compared to the cash volume in the speculative space than the largest equity market in the World i.e. US market.

Table_1: Derivative – to – cash volume ratio

Name of the Country	Derivative – to – cash volume ratio
India	422
Germany	36
Israel	17
Brazil	13
South Korea	12
US	09
Japan	02
Australia	02
Spain	02
Poland	01

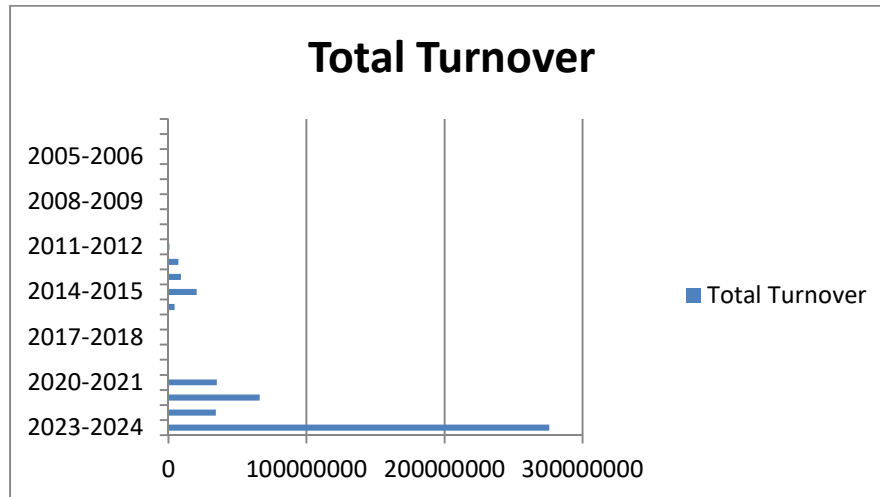
Source: Bloomberg, November, 2023.



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Table_2: Turnover in the Derivative Market

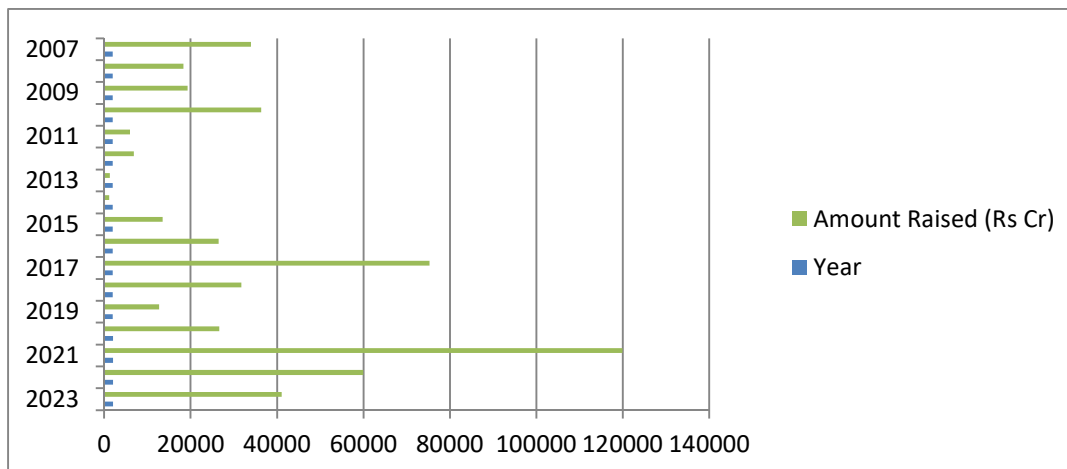


Source: Data is retrieved from www.nseindia.com on 12/12/2023.

Initial Public Offering (IPO)

Perhaps the latest bubble has formed in the Indian stock market is the abnormal volume growth in the market of Initial Public Offering (IPO) (refer to Table_3). Even this IPO boom is also liquidity driven. The nexus between high net worth individuals (HNI) and the non-banking financial corporations (NBFCs) has made the boom possible. The interest rate spread of the short term loan say for maximum 10 days period of loan for providing the initial margin to book the IPOs is so lucrative that NBFCs has supplied an enormous amount of funding to the HNIs. This liquidity has further generated a huge return on the day of listing. This is basically liquidity siphoning from the organized financial system to support some speculative gain on the day of listing by the HNIs. There is nothing supportive to the real business of the company. Needless to mention that it is just a formation of bubble in this typical asset class instead of price discovery. RBI has recently comes with the restriction on this lending and has increased the risk weightage on the NBFCs lending.

Table_3. Recent IPO Boom



Source: Data is retrieved from www.nseindia.com on 12/12/2023.



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Building up Minsky Moment

Following the above analysis we are suspicious about the building up of the Minsky moment in the Indian stock market following the recent run of the equity after the catastrophic event of COVID 19. There was a momentary crash just on the onset of the pandemic. But market recovered within a very short span of time. Market has made its all time high on 15th December, 2023. It has moved almost 168% from the pandemic low ignoring the fear of recession. This rally in Indian market is the fastest among the global peers. The detailing of the building up of Minsky moment is beyond the scope of the present study. Some of the issues which are supporting the phenomenon and the making of the bubble are mentioned here. The retail participation has increased from around 3 million investors in January 2020, to 12 million in January 2022, as per exchange data.

III. Divergence between real economic activity and stock market performance

The study has used monthly data starting from May, 2006 to April, 2023 that yield 204 observations. All the time series data are taken from the various issues of the Hand book of Statistics, Reserve Bank of India. We specify a model relating to the stock market index of India (considering NIFTY here) to growth of the index of industrial production (GIIP), rate of inflation (INF), exchange rate (ER) and monetary index (MI) in equation (1) as follows:

$$NIFTY_t = \beta_0 + \beta_1 GIIP_t + \beta_2 INF_t + \beta_3 ER_t + \beta_4 MI_t + \epsilon_t \quad (1)$$

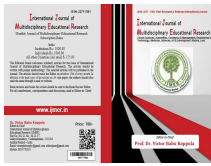
Where:

β_0 is constant or intercept term, t is the deterministic trend and ϵ_t is the stochastic error term. The rate of inflation of the economy is measured by the growth rate of natural logarithmic value of Wholesale price Index (WPI). The formula used to calculate the growth rate is: $\dot{X}_t = (\ln X_t - \ln X_{t-1}) * 100$, where \dot{X}_t is the growth rate of the variable X at time t . Exchange rate is the bilateral nominal exchange rates of India's currency (Rupee) relative to the U S Dollar. MI is defined earlier. The β_s are the coefficients to be estimated. The expected signs of the parameters are: $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 < 0$, $\beta_4 > 0$.

In order to estimate all the β_s of the equation (1) firstly we have to check the stationarity of all the time series data under consideration. Econometric analysis involves several tests for stationarity checking. Three widely used tests such as Augmented Dickey Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests have been applied in this study. If the variables are stationary in levels i.e., integrated of order zero [I(0)] then ordinary least squares (OLS) method can be used to estimate the parameters of equation (1). But if all the variables are I(1), then the co-integration approach will be appropriate to examine the long-run relationship among the data series. For the co-integration test, the most commonly used methods are the Engle and Granger (1987), the Johansen (1988) and Johansen and Juselius (1990) method. According to Engle and Granger (1987), a linear combination of two or more non-stationary variables are said to be co-integrated if each of the time series are themselves non-stationary. Apart from the Engle-Granger technique, the Johansen and Juselius method of co-integration test is based on the maximum likelihood estimation of the unrestricted vector auto regressive (VAR) model to determine the number of co-integrating vectors in the analysis. In our present study we employ the Johansen and Juselius method because it treats all test variables as endogenous variables and that is why it is supposed to be more powerful than the Engle and Granger tests. The analysis is based on a VAR of order k given by

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \dots + A_k Z_{t-k} + \epsilon_t \quad (2)$$

Where Z_t is a $(n \times 1)$ vector of jointly determined non-stationary I (1) endogenous variables, A_i for all $i = 1, 2, \dots, k$ is an $(n \times n)$ matrix of parameters and ϵ_t is a white noise residual of zero mean and constant variance. The lag order k must be determined appropriately so that residuals are uncorrelated and homoskedastic. In order to determine the number of co-integration vectors (r), Johansen (1990, 1995) suggested two test statistics, namely the trace test statistics (λ trace) and the maximum eigenvalue test statistics (λ max). The trace statistic tests the null hypothesis that the number of distinct co-integrating vector is less than or equal to q against a general unrestricted alternatives $q = r$. The test is calculated as follows:



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$$\lambda \text{ trace } (r) = -T \sum_{i=r+1} \ln(1 - \hat{\lambda}_i) \quad (3)$$

Where T is the number of usable observations, and the λ_i s are the estimated eigenvalue from the matrix. The Second statistical test is the maximum eigenvalue test ($\lambda \text{ max}$) and it tests the null hypothesis that there is r of co-integrating vectors against the alternative r+1 co-integrating vectors. It is calculated according to the following formula:

$$\lambda \text{ max } (r, r+1) = -T \ln(1 - \lambda_{r+1}) \quad (4)$$

In order to determine the optimum lag length for co-integration test we use the standard criteria of lag length selection. After having co-integrating relation one should estimate vector error correction (VEC) model for long-run causality and short-run dynamics otherwise VAR model has to be estimated. Now we specify VECM of order k in equation (5) as:

$$\Delta Z_t = \delta + \Pi Z_{t-k} + \epsilon_t \quad (5)$$

With $\epsilon_t \sim N(0, \Sigma)$, $i = 1, 2, \dots, n$

and Π

Where Z_t is a (n×1) vector of jointly determined non-stationary I(1) endogenous variables such that $\Delta Z_t = \dots$. Again, ΔZ_t is the VAR component in first difference. ΠZ_{t-k} implies error-correction components. X_t is a (q×1) vector of stationary I(0) exogenous variables. δ is a (n×1) vector of parameters (intercepts). ϵ_t is the vector of independently normally distributed. Ψ is an (n×q) matrix of parameters. Φ is an matrix of short term adjustment coefficients among variables with k-1 number of lags. Π is an (n×n) long-run impact matrix of error-correction mechanism. The rank of Π i.e., $R(\Pi)$ provides the basis for determining the existence of co-integration or long-run relationship among the variables. Since the term ΠZ_{t-k} provides information about the long-run relationship among the variables in Z_t , the Π matrix can be decomposed into the product of two matrices α and β such that $\Pi = \alpha\beta'$ where α = an (n×r) matrix which represents the speed of adjustment coefficient of the error-correction mechanism and β' = an (n×r) matrix of co-integrating vectors represents up to r co-integrating relationship in the multivariate model which represent long-run steady solutions.

The results of the ADF, PP and KPSS tests suggest that not all the variables under consideration are stationary in level but they are stationary in first difference. Using the standard lag length criteria we have optimum lag length of 9 for co-integration test. The trace test statistics fail to reject the null hypothesis of the existence of two co-integrating equations at 5% level of significance, while the maximum eigenvalue test statistics also indicate the null hypothesis of two co-integrating equations cannot be rejected at 5% level of significance. Hence a stable long-run relationship among the variables under



study is established. The LNNIFTY co-integration equation is shown in Table 5. All the estimated coefficients have their own expected sign and except MI all the estimated coefficients are statistically significant.

The estimation of error-correction model (ECM) for stock market return indicates that stock market return has positive impact after one month lag and negative impact after five month lag and both are significant at 5% level. This implies that the short-run market returns are ambiguous by its past values. The error-correction coefficient, ECM (-1), measures the speed of adjustment towards long-run equilibrium. In the present study the estimated value of ECM (-1) carries the expected negative sign but it is insignificant. The adjusted R^2 is 0.07 implying very low explanatory power of the model. The Durbin-Watson statistic being 2 indicates that the residuals are uncorrelated with their lagged values.

Further generalized variance decompositions and impulse response function are used to study the dynamic characteristics of every endogenous variable in the system. Variance decompositions give the proportion of the n-periods-ahead forecast error variance of a variable that can be attributed to another variable. Here we measure the proportion of the forecast error variance of LNNIFTY that can be explained by shocks given to the other variables of the model. Again the basic idea of the impulse response function is to measure the time profile of the effect of shocks at a given point in time on the future values of endogenous variables of a dynamic system.

For our model at the end of the 12-month forecast horizon, around 96.08 per cent of the forecast error variance of LNNIFTY is explained by its own innovations. GIIP, INF, ER and MI explain about 0.03 per cent, 2.55 per cent, 0.68 per cent and 0.38 per cent of the total variation after 12 month respectively. Thus, the relationship between INF and LNNIFTY is more prominent. Impulse responses of LNNIFTY denote the lag period of impulse (Unit: month) in the horizontal axis and the response of impulse in vertical axis. Other than ER the direction of change observed in the impulse response in each graph conforms to the sign obtained earlier in the co-integrating vector. LNNIFTY itself is almost unchanged in the short term as well as in the long term time frame. The impact of a one standard deviation shock to GIIP on LNNIFTY is positive within nine months and then it converges to the base line. The effect on LNNIFTY of a one standard deviation shock to INF is negative but in between three to seven months it shows slight positivity. The immediate and permanent effect on LNNIFTY of a one standard deviation shock to ER is negative and stronger. The immediate and permanent effect on LNNIFTY of a one standard deviation shock MI is positive.

IV. Bursting of bubble and its impacts on macro economy

Crash of an equity bubble within a very short span of time has direct and indirect impact on the macro economy. Equity bubble burst or in other words stock market crash causes the flight of hot capital. If the economy is sufficiently open financially then the local currency is depreciated fast. Labour intensive industries mostly in manufacturing industries depend on imports of commodities. Not only that India has to carry a mammoth import bill for crude oil. As currency depreciates due to stock market crash so the import bill gets inflated. Direct impact is on the rise of the oil price. Oil is the most important component of energy basket. Rise of oil price is certainly responsible for the increase of general price level. Inflationary pressure, after a certain threshold level, impacts the growth negatively (see Appendix for threshold level inflation). Growth is the most fundamental yardstick to gauge the economic progress of an economy. It is directly related to the level of employment. We have undergone the stock market crash acting as the catalyst to the global financial crisis of 2008 and the subsequent drop in the production followed by widespread level of unemployment. Bursting of equity bubble, of course is a result of some deep rooted economic crisis such as currency crisis, debt default or banking crisis. But the burst of bubble certainly makes the crisis more pronounced. So we can infer that the equity bubble can be considered in some cases as precursor to certain deep rooted economic crisis to be unfolded in near future. Therefore, any over optimistic euphoria in the equity space, be it in terms of volume or superior speculation over the intrinsic value, can be symptomatic to the early indication of economic catastrophe.

So understanding the interaction between the financial cycle and business cycle has become critical to macroeconomic policy formulation (Kose, 2010). Detail of this analysis is beyond the scope of the present study. But few observations in this



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context we want to mention here as it is related to bubble formation and sustenance to bubble. The seminal work by Kose (2010) has shown the time inconsistency between the financial cycle and business cycle. Here time inconsistency means the duration as well as the lag between the two cycles. Financial cycle for the downward move is sharper than the business cycle (Kose, 2010). Bursting of equity bubble which can be proximated to severe stock market crash is followed by a prolonged economic slowdown. The recent example is the global economic slowdown after the global financial crisis. Indian economy has taken almost six to seven years to reach the pre-crisis level in terms of growth and employment. Government has to bear with the fiscal stimulus for a decade in India for the damage control and it is even longer in case of US and some of the developed European nations. But the fundamental problem with this systematic adjustment to revive the economy is to follow fiscal austerity measure and strictly speaking cut in the social sector spending. So financialization led economic slowdown finally ends into cuts into social sector spending i.e. growth at the cost of the poor to restore the shareholders value. Perhaps the highest fallacy of the finance led capitalism!

VI. Conclusion

So finally we can conclude that finance capital led-liquidity has played important role to the formation of equity bubble. Bursting of equity bubble after some deep rooted economic crisis has made the financial cycle sharper. Recovery of equity market both after the global financial crisis and Covid-19 pandemic is sharper than the real economic recovery. This again reaffirms the disjoint between real economic activity and the performance of the financial sector. The impact of equity bubble burst is not just limited to the financial sector. It affects the real variables of the economy by different indirect channels in the short to medium term. Therefore, widening the gap between real economic activity and the financial sector activity is detrimental for both the real economy and growth of finance capital.

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Appendix

Threshold Level of Inflation

Estimation of the Linear Model at $K = 3$ to 10

$$\dot{GDP}_t = \beta_0 + \beta_1 \ln \pi_t + \beta_2 * D_t (\pi_t - K) + \beta_3 \ln \dot{N}_t + \beta_4 \ln \dot{v}_t + u_t$$

\dot{GDP}_t = growth rate of real GDP

π_t = rate of Inflation

$D_t = 1 : \pi_t > K$

$= 0 : \pi_t \leq K$

$\ln \dot{N}_t$ = growth rate of population

$\ln \dot{v}_t$ = growth rate of investment

u_t = error term

The parameter K represents the threshold level of inflation. The coefficient β_1 signifies the impact of low inflation on growth and the sum of β_1 and β_2 indicates the impact of high inflation on growth.

We have chosen the value of K arbitrarily from 3 to 10 considering only the integer value for the estimation of the above regression equation. The threshold value of inflation is that level of inflation when growth is maximum. So the corresponding value of K is obtained when the residual sum of squares (RSS) of the above estimation is minimum.

The present study uses annual dataset on WPI to get the inflation rate, growth rate of GDP at factor cost, population growth rate and investment growth rate obtained from various issues of Handbook of Statistics published by Reserve Bank of India.

Table: Estimation of Threshold Model at $K = 3$ to 10

K	Predictor	Coef	Std. Error Coef	T	P	RSS
3%	Constant	9.409	2.360	3.99	0.000	172.838
	Inflation	-0.5890	0.1564	-3.77	0.001	
	Inflation Difference	-0.886	1.889	-0.47	0.642	
	Population growth	-0.2656	0.9371	-0.28	0.779	
	Investment growth	0.9562	0.3010	3.18	0.003	
4%	Constant	9.428	2.066	4.56	0.000	170.290
	Inflation	-0.5558	0.1598	-3.48	0.001	
	Inflation Difference	-1.356	1.618	-0.84	0.408	
	Population growth	-0.1896	0.9306	-0.20	0.840	
	Investment growth	0.9561	0.2984	3.20	0.003	



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5%	Constant	9.249	1.945	4.75	0.000	167.647
	Inflation	-0.5275	0.1624	-3.25	0.003	
	Inflation Difference	-1.617	1.465	-1.10	0.278	
	Population growth	-0.0890	0.9315	-0.10	0.924	
	Investment growth	0.9374	0.2960	3.17	0.003	
6%	Constant	10.017	1.987	5.04	0.000	159.382
	Inflation	-0.9009	0.2116	-4.26	0.000	
	Inflation Difference	2.064	1.204	1.71	0.096	
	Population growth	-0.3936	0.9028	-0.44	0.666	
	Investment growth	0.8827	0.2909	3.03	0.005	
7%	Constant	10.640	2.084	5.11	0.000	156.600
	Inflation	-1.0406	0.2594	-4.01	0.000	
	Inflation Difference	2.734	1.449	1.89	0.068	
	Population growth	-0.2343	0.8905	-0.26	0.794	
	Investment growth	0.8821	0.2880	3.06	0.004	
8%	Constant	0.991	2.118	4.72	0.000	165.723
	Inflation	-0.9219	0.2744	-3.36	0.002	
	Inflation Difference	1.959	1.547	1.27	0.215	
	Population growth	-0.1047	0.9223	-0.11	0.910	
	Investment growth	0.8797	0.2989	2.94	0.006	
9%	Constant	9.453	1.938	4.88	0.000	166.015
	Inflation	0.9123	0.2492	-3.66	0.001	
	Inflation Difference	2.079	1.488	1.40	0.172	
	Population growth	0.1236	0.9478	0.13	0.897	
	Investment growth	1.0247	0.2979	3.44	0.002	
10 %	Constant	8.871	1.955	4.54	0.000	173.471
	Inflation	-0.6822	0.2369	-2.88	0.007	
	Inflation Difference	0.505	1.579	0.32	0.751	
	Population growth	-0.1383	0.9897	-0.14	0.890	
	Investment growth	0.9718	0.3108	3.1	0.004	

The

above estimation result clearly indicates that the threshold level of inflation in India is 7 per cent during the period of study. The result is also in line with our previous historical observation that growth is optimum when inflation remains within the band of 6 to 7 percent. So it is customary to say that growth will be penalized if inflation crosses the 7 per cent threshold level of inflation.