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"Exploring Relationship of Indian Stock Market with Gross Domestic Production: An Econometric Analysis"

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Abstract: The argument that higher stock prices would presage faster economic growth makes a lot of sense. Since stock prices are the present discounted value of the future stream of expected dividends, an increase in anticipated economic activity — and hence earnings and dividends — should be associated with a boost in the stock market. Growth of economy is represented by GDP and stock market return is represented by NSE Nifty. In order to examine the relationship between stock return and GDP, time series econometric tools such as unit root test- AugmentedDickey Fuller Test (ADF) is employed to test whether data is stationary or not. Further to examine the casual relation between stock return and GDP during entire sample period (Dec-2005 to Dec-2016) Cross correlation is employed. Any kind of association not found in this research.

Key words: GDP, CNX Nifty, volatility, Indian stock market, unit root test, Managing Risk

Introduction

Many researcher have conducted research on relationship between stock market and GDP. One of the reasons why stock prices are lagging the GDP value is the poor performance of listed companies. Revenue and earnings of companies in the CNX 500 index have been lackluster over the past few years. While revenue for these companies has grown by 5.4 per cent annually between 2011-12 and 2015-16, net profit has been more or less flat (0.2 per cent) during this period.

Different detrending techniques would probably lead to different results. However, the main (and fairly modest) point is that the stock prices are an imperfect indicator of recessions and booms. And of course this should be temporarily stimulative to GDP, but as the money flows from financial assets to consumer goods, prices will rise more for the latter than the former. But for the creation of money & credit, I think the market & GDP would be trending down now–because of the housing collapse & the very high level of debt.

Literature review

(Summers, May 1981)Suggested that the increases in the value of housing and decreases in the value of corporate wealth may have a common explanation, the inter- action of inflation and a non-indexed tax system. The acceleration of inflation has sharply increased the effective rate of taxation of corporate capital income, while reducing the effective taxation of owner- occupied housing. These changes have been capitalized in the form of changing asset prices. In the long run, they will lead to significant changes in the size and composition of the capital stock. The first section of the paper describes in more detail the no objectivities caused by inflation. A simple model presentation how inflation and taxation relate to determine asset prices is presented in the second section. The third section presents some unpolished empirical tests suggesting that increases in the expected rate of inflation may account for a significant part of the asset price changes which have been observed. A final section concludes the paper by commenting on some implications of the results.

(Pindyck, June 1984) Advocates an alternative explanation: a substantial increase in the riskiness of capital investments. Arthur emphasis on the variance of firms' real gross marginal return on capital has increased significantly, increasing the relative riskiness of investors' returns on equity, and that this can explain a large part of the market decline. They also assess the effects of increase in the mean and variance of the inflation rate, and a decline in firms' expected return on capital.

(Udegbunam, Jan-Jun 2001)Stated stocks for the Long Run by Jeremy Siegel is a book which describes relationship of economy and stock market for more than a decade, Stocks for the Long Run has been the authoritative guide to understanding market forces and building a successful portfolio. In this new fourth edition, Jeremy Siegel updates his argument for long-term stock market investment with: comparisons of ETFs, mutual funds, and index options and futures; evidence that the rapid growth of emerging markets will not only continue but may accelerate; insight into the benefits of fundamental indexation over market value indexation; an updated look at the surprising validity of Calendar Effects; and fresh analysis of the best-performing stocks since the formulation of the S&P 500 Index.

(Geetha, Rosle , Vivin Vincent Chandran, & Victoria Chong, 2011) Found the relationship between inflation and stock returns. Inflation was distinguished as expected and unexpected inflation. The study revealed that there is long run relationship between expected and unexpected inflation with stock returns but there is no short run relationship between these variables for Malaysia and US but it exists for China.

(Christiano, Ilut, Motto, & Rostagno, 2010) Studied historical data and model simulations support the following conclusion. Inflation is low during stock market booms, so that an interest rate rule that is too narrowly focused on inflation destabilizes asset markets and the broader economy. Adjustments to the interest rate rule can remove this source of welfare-reducing instability. For example, allowing an independent role for credit growth (beyond its role in constructing the inflation forecast) would reduce the volatility of output and asset prices.

(Bekaert & Eric Engstrom, April 2010) Concluded the so-called Fed model postulates that the dividend or earnings yield on stocks should equal the yield on nominal Treasury bonds, or at least that the two should be highly correlated. In US data there is indeed a strikingly high time series correlation between the yield on nominal bonds and the dividend yield on equities. This positive correlation is often attributed to the fact that both bond and equity yields commove strongly and positively with expected inflation. Contrary to some of the extant literature, we show that this effect is consistent with modern asset pricing theory incorporating uncertainty about real growth prospects and habit-based risk aversion. In the US, high expected inflation has tended to coincide with periods of heightened uncertainty about real economic growth and unusually high risk aversion, both of which rationally raise equity yields.

(Ahmed, K.M. Zahidul, & Khan, , June 2015) Found the linkage between stock prices and inflation has been intensively investigated since the 1990s. Most of the studies in the industrialized economies have shown a negative relationship between stock market return and inflation. Thus there is considerable interest surrounding the relationship between stock markets and inflation. This paper investigates the relationship between inflation and stock market returns in Bangladesh using monthly data for the period 2004 to 2013. To test for the order of integration of the variables, ADF and PP tests were used and the results show that all the variables are integrated in the same order I(1). The Johansen test procedure confirmed that there is single cointegration equation at 5 percent significance level and thereby indicating the long run equilibrium relationship between the variables. The findings of the study have showed that the speed of adjustment in the Vector Error Correction model (VECM) is significant and relatively very high. The value of the ECM is -0.9373 which implies that, on average, the system corrects the disequilibrium errors annually by about 94%. The results also indicate that there is a uni-directional short run causal relationship between inflation and stock price index.

(Choudhry, 2014) Analyzed the relationship of high inflation and interest rates with stock returns in Brazil from May 1986 to May 2011, during which

Brazil experienced sub periods of both high inflation (May 1986-June 1994) and relative monetary stability (July 1994-May 2011). The result in the total period is dominated by high inflation volatility, and the findings suggest a bidirectional relationship between stock returns and inflation. During the high-inflation sub period, interest rates are relevant to explain future changes in inflation and stock returns. Under low inflation, movements in interest rates are better anticipated by equity investors, suggesting higher market efficiency than in high-inflation circumstances.

(Rigobon & Brian Sack, 2003) Said movements in the stock market can have a significant impact on the macro economy and are therefore likely to be an important factor in the determination of monetary policy. However, little is known about the magnitude of the Federal Reserve's reaction to the stock market, in part because the simultaneous response of equity prices to interest rates makes it difficult to estimate. This paper uses an identification technique based on the heteroskedasticity of stock market returns to measure the reaction of monetary policy to the stock market. We find a significant policy response, with a 5 percent rise (fall) in the S&P 500 index increasing the likelihood of a 25 basis point tightening (easing) by about a half.

(Sulaiman, Noman Arshed, & Hassan, 2016) Evaluated the impact of stock market development on general price level in five SAARC countries. The estimated results of Panel OLS, Fixed Effect model and Random Effect model has revealed that OLS model is not applicable thus, we have to use panel cointegration to find out the unbiased and normally distributed coefficient estimates to find out how the stock market development influences inflation. The results of long run estimates Fully Modified OLS suggests that in the long run, market capitalization is decreasing inflation, total value of stock traded is increasing inflation and turnover ratio is decreasing inflation in the long run. Thus, the results of our two proxies suggest that stock market development can help put chains on inflation in SAARC countries by introducing more firms to increase size and volume of share transaction, as they will load to rise in production.

(Phiri, 2017) Suggested the empirical investigation into financial variables affecting the performance of stock markets gained importance. This study investigates the asymmetric cointegration effects of inflation on the stock market returns for the Johannesburg Stock Exchange (JSE) using monthly data collected from 2003 to 2014. The empirical model used in the study is the momentum threshold autoregressive (MTAR) model. Indeed, our results reveal a negative, nonlinear cointegration relationship between inflation and stock returns in South Africa with causality running unidirectional from inflation to stock returns. The results further suggest that investors cannot hedge against rising inflation by investing in equity

stocks listed on the JSE. Second, monetary policy, through the use of inflation targets, can provide a stable financial environment for the growth of equity markets in South Africa. (Vanita Tripathi & Seth, 2014)

Advocated an extensive debate on the association between real economy and stock market recital especially in the context of emerging markets. This article examines the underlying relationships between the stock market performance and select macroeconomic variables in India, using monthly data for the period of 1997 to June 2011. Factor analysis is used, ADF and PP Unit root tests, Regression, ARCH model, Granger causality and Johansen Co-integration test for data analysis. Impulse Response analysis has also been performed to check the response of stock market to shocks created in the real economy.

We find a significant correlation among stock market indicators and macroeconomic factors. We identified three principal factors through Factor analysis via Inflation, Interest rate and Exchange rate. The overall explanatory power of the regression model is 23.8%, 23.3% and 16.9% respectively for Sensex, Market capitalization and Market Turnover. There is uni directional causality from stock market to real economy. We find five co-integrating relationships between stock market and macro-economic variables. These results suggest that the stock prices movement is not only the result of behaviour of key macroeconomic variables but it is also one of the important reasons of movement in other macro dimension in the economy.

(Kumari, February 2, 2011)Investigated the relationship between stock returns and inflation in India during 1991:4 to 2009:3. Weekly, monthly and quarterly indexes of BSE Sensex and NSE Nifty are used. Weekly, monthly and quarterly Wholesale Price Index (WPI) and monthly Consumer Price Index (CPI) are used as measures of inflation. The analysis is also carried for the sub period 2002:4-2009:3, and the pre-crisis and post-crisis analysis is conducted through the analysis of the sub period 2005:1-2009:4. Unit root tests, Granger causality test and regressions are performed for examining the nexus between the variables. Vector Auto regression (VAR) methodology has been employed to investigate the causal link between stock returns and inflation. Impulse Response Functions (IRF) check the response to disturbance in the system. The results suggest that there is no significant relation between stock returns and inflation in post-reform period in India.

(Iqbal, March 2017) Conducts a comprehensive empirical study of hedging budding of gold against contrary movements of stock prices, inflation and exchange rate for India, Pakistan and the United States. Using daily and monthly data covering the period of 1990 to 2013, this paper first explains the average gold returns using an EGARCH model. The paper also investigates whether hedging potential of gold remains equally strong

in several bearish and bullish conditions of gold market using a quintile regression approach. It was found that there is a fairly robust evidence of gold acting as a safe haven against exchange rate risk in Pakistan and India. However, the evidence of gold hedging stock market risk is not uniformly strong in varying gold market conditions in the three countries. Also the evidence that gold hedges inflation risk in the US is realized only during the average and bearish conditions of gold market but not during bullish trends. The paper found robust evidence of gold acting as a safe haven against deteriorating local currency in Pakistan using daily data. The hedging and safe have benefit of gold against currency risk is also fairly strong in India as evidenced in the daily data. Thus, the empirical findings of gold acting as either a hedge or a safe haven against the risks in other asset markets need some qualification pertaining to the gold market condition itself.

Research Methodology

In order to examine association between stock return and inflation tools which are used for study is unit root tests – Augmented Dickey fuller [ADF] test use the existence of a unit root as the null hypothesis.

Objectives

1. To study association between stock market and GDP.
2. To evaluate interdependence of Indian stock market and GDP.

Data collection

For the research, Yearly closing value of CNX Nifty is taken. The NSE nifty is an index which is considered as barometer of Indian capital market. Secondary data is taken for the period of 2005 to 2016.Growth rate as GDP obtained from web site of IMF.

Hypothesis

H0: There is not any association between Indian stock Market and GDP.
H1: There is association between Indian stock Market and GDP.

Tools and Techniques used for Empirical Analysis

Table 1: Descriptive statistics (Quantitative data)

	*R_*	*GDP*
Mean	17.72229	7.691750
Median	23.18275	7.590000
Maximum	74.69375	10.26000

contd. table 1

	*R_*	*GDP*
Minimum	–51.79438	3.891000
Std. Dev.	34.60739	1.855211
Skewness	–0.389707	–0.468330
Kurtosis	2.742991	2.560766
Jarque-Bera	0.336771	0.535130
Probability	0.845028	0.765241
Sum	212.6675	92.30100
Sum Sq. Dev.	13174.39	37.85991
Observations	12	12

Unit root test

A unit root test is used for whether a time series variable is non stationary and possesses a unit root. For unit root testing here we have used Augmented Dickey Faller Test ADF test.

Augmented Dickey Faller Test- the ADF statistic, used in the test.An augmented Dickey–Fuller test (ADF) tests. The alternative hypothesis is different depending on which version of the test is used, but is usually stationarity or trend-stationarity.

Statistics summary

Unit root and stationary tests
Dickey-Fuller test: ADF (stationary)

Table 2: Unit root Test

Null Hypothesis : GDP has a unit root
Exogenous : Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=2)

	t-Statistic	*Prob.**
Augmented Dickey-Fuller test statistic	–3.324055	0.0423
Test critical values :	1% level	–4.297073
5% level	–3.212696	
10% level	–2.747676	

*MacKinnon (1996) one-sided p-values.
Warning : Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 10

Test interpretation:

H0: There is a unit root for the series.

Ha: There is no unit root for the series. The series is stationary.

As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha. As the computed p-value is lower than the significance level alpha=0.05, one should reject the null hypothesis H0, and accept the alternative hypothesis Ha.

Table 3: Cross Correlation

Covariance Analysis: Ordinary
Date : 08/19/17 Time : 15:51
Sample: 2005 2016
Included observations:

Covariance Correlation Probability	*R_*	*GDP*
R_	1097.866 1.000000 ———	
GDP	40.61636 0.690124 0.0130	3.154992 1.000000 ———

Analysis and interpretation

Table 1 represents descriptive statistics of variables. It is evident that average GDP rate over the study period is 7.6917 percent. It ranges from3.89 to 10.26 and even volatitlity is 1.855. And Skewness is -0.46, as it is negative it means that data is negatively skew and it shows left tailed of distribution is longer than the right. Kurtosis Measures weather data is highly tailed or light tailed. It is -1.84 it means it has negative skew. Average CnxNiflty return is 17.72%. Standard deviation is much higher as it varies from -51.794 to 74.694. Table 2 shows result of unit root test. ADF (augmented Dicky Fuller test) test result. This indicates there is no unit root in the series and series is stationary. Table 4 Shows result of Cross Correlation between GDP and CNX Nifty return. Outcome of this reveals that there series is not cross correlated and one of the series is white nose which means sample are regarded as sequence of uncorrelated variables.

Conclusion

This study investigates the relationship between Indian stock market and Inflation rate using yearlyclosing data of CNX Nifty and inflation for the period of Dec-2005 to Dec-2016. To test integration first of all unit root testing applied on both variable CNX Nifty and GDP. ADF was used and result shows that all the variables are stationary in the level and integrated in same order. After that Cross correlation forecasting is used to determine

association. Result of the study reveals that there is positive association between Indian stock market and GDP.

In this environment, consumers are more likely to spend money and make major purchases, such as houses or automobiles. With stock prices in bull mode, they have more wealth and optimism about future prospects. This confidence spills over into increased spending, which leads to increased sales and earnings for corporations, further boosting GDP.

When stock prices are low, it negatively affects GDP through the same channels. Companies are forced to cut costs and workers.

Conclusion of this research is expected to be of immense importance to investors on taking rational decision on assets allocation, managing risk and advancement of literature in econometrics.

However study suffers from some limitation. In this research study only 12 years data have been considered. This study can be more strong and exhaustive if long time periods are used. Moreover paper comprises of only two variables and thereby more variables like, CPI(Consumer price index), WIP(wholesale price Index) may be incorporate to bring diversified outcome.

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