# INTERLINKAGE AMONG CONSUMER PRICE & INDUSTRIAL PRODUCTION INDEX WITH MAJOR MACROECONOMIC VARIABLES

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## Abstract

Movements of stock exchange or indices illustrate the inclusive market sentiment. Investors use it to forecast the imminent market trend. In India, the consumer product and industrial product sector play an imperative role in driving the growth of the economy; whether as a strategic sector or as a mobiliser of funds for investment. The aims of this research are to examine the relationship between the industrial production index and consumer confidence index with macroeconomic variables mainly Interest Rate (Base Lending Rate), Inflation Rate (Consumer Price Index), and Money Supply. The methodology used was Multiple Regression Analysis which to identify the relationship between both of the stock market indices and the macroeconomic variables. The monthly sample data taken for the period of ten years was then computed using SPSS and E-views. Results show that all variables have significance correlation with the indices. Whilst BLR and IR have negative relationship with consumer product and industrial product index in Indian Market. Results also show that M2 has a positive relationship with consumer and industrial index which suggests that all variables have significant relationship with the market indices.

Keywords Narrow Money, Broad Money, Macroeconomic variables, Multiple Regression Analysis.

#### Introduction

The dramatic changes in all sectors such as manufacturing, industrial, consumer product, property, finance and many more; due to globalization and liberalization concept applied by Indian government have influence the stock return by all the companies that listed in the Main Market. Performance of all companies listed in the Main Market which has been fluctuated based on the market condition that had affected several factors such as economic, financial, business and liquidity.

The sectoral indices served as an indirect measure of the performance of the economy. The reason is: a well- formulated stock market index can be Sensitive barometer of political short-run and economic developments. On the other hand, the investors have expressed their interest in the performance of the ten sectors in the Indian stock market. Such interest has resulted in the growth of all sectors becoming alternatives for agents looking to diversify their risks in choosing the right investments in the financial market. The investor or portfolio holder's expectations on future values of macroeconomic variables can impact the stock prices and macroeconomic variables become risk factors in their portfolio substitution. Thus, it is important to study the effect of macroeconomic variables on stock market indices.

Arguments about macroeconomic variables such as inflation, interest rate and money supply have significant impact on stock prices were among the popular topics debated. The researches believed that government financial policies and macroeconomic events have influence on general economic activities including the stock market and have motivated them to investigate the dynamic relationship between industrial production index and consumer confidence index and macroeconomic variables.

#### Past researches

Stock prices are generally believed to be determined some fundamental by macroeconomic variables such as interest rate, exchange rate and inflation rates. Several studies have attempted to capture the effect of economic forces on stock returns in dif macroeconomic variables and stock prices with US economic data. Fama (1981) documents a strong positive correlation between common stock returns and real economic variables like capital expenditures, industrial production. Real GNP, money supply, lagged inflation and interest rates. Chen, Roll and Ross (1986) find that the changes in aggregate production. Inflation, the short-term interest rates, the maturity risk-premium and default risk- premium are the economic factors that explain the changes in stock prices.

The relationship between stock prices and interest rates has received considerable attention in the literature. According to Asprem (1989), Fama (1990). Hulmash and Trivoli (1991) show that there is a negative relationship between interest rates and stock returns in Korea. Zordan (2005) found historical evidence illustrates that stock prices and interest rates are inversely correlated.

Omran (2003) who focused on examining the impact of real interest rates as a key factor in the performance of the Egyptian stock market found a significant long-run and short-run relationship between the variables, implying that real interest rates had an impact upon stock market performance. Uddm and Alam (2007) found that Interest Rate has significant negative relationship with Share Price and Changes of Interest Rate has significant negative relationship with Changes of Share Price.

For decades, it was generally believed that inflation and stock returns exhibited a negative correlation. However, there are conflicting inferences in the literature about the relationship between inflation and real stock returns. Nelson (1976). Fama and Schwert (1977). Schwert (1981) report evidence of an inverse relationship between inflation and real stock returns. On the other hand, Boudoukh and Richardson (1993) find strong support for a positive relationship between nominal stock returns and inflation

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at long horizons while Choudhry (2001) finds that current stock market returns are positively correlated with current inflation in high inflation countries.

Rapach (2002) disputes the findings of an inverse relationship between real stock prices and inflation. Using the King and Watson (1997) methodology of testing for long-run neutrality, Rapach (2002) finds no evidence of a long-run inverse relationship in a study involving sixteen industrialized countries. Shiller and Beltratti (1992) find little correlation between inflation and stock returns, but do find an inverse relationship between stock returns and interest rates. Such a relationship is supported by Campbell and Ammer (1993) among others. Authors provide explanations for an inverse relationship between inflation and stock returns in several ways. Fama (1981). Feldstein (1980). Modigliani and Cohn (1979) and Pindyck (1984) are among those researchers who have proposed explanations to the anomalous findings stating negative relationship between inflation and stock returns.

More recently, researchers started analyzing this relationship for developing countries. Apergis and Eleftheriou (2002) found that in the high inflation country Greece. Stock returns seem to be linked to inflation rather than interest rates. Omran and Pointon (2001) uncovered negative relationship between inflation and stock market activity in Egypt.

Mukherjee and Naka (1995) argue that if an increase in money supply leads to economic expansion via increased cash flows, stock prices would benefit from economic growth lead by such expansionary monetary policy. In the case of Japan, the study shows that money supply is positively related to stock market. Consistently, Maysami and Koh (2000) support the view of Mukherjee and Naka (1995) for both long run and short run dynamic interaction between money supply and stock returns for the case of Singapore. Fama (1981, 1990) and Chen, Roll and Ross (1986) tested the relationships between inflation and stock market activity in Egypt.

Shah and Thomas (1997) argue that because of the enabling government policies stock market in India is more efficient than the Indian banking system both in terms of quality of information processing and imposition of transaction cost. Their research support the idea that stock prices are a mirror which reflect the real economy, and are relatively insensitive to factors internal to the financial system such as market mechanisms. However the arguments require more explanation.

Pethe and Karnik (2000), using Indian data for April 1992 to December 1997, attempts to find the way in which stock price indices are affected by and affect other crucial macroeconomic variables in India. But this study runs causality tests in an error correction framework on non-cointegrated 9 variables, which is inappropriate and not econometrically sound and correct. The study of course avows that in the absence of cointegration it is not legitimate to test for causality between a pair of variables and it does so in view of the importance attached to the relation between the state of economy and stock markets. The study reports weak causality running from IIP to share price index (Sensex and Nifty) but not the other way round. In other words, it holds the view that the state of economy affects stock prices.

#### Data and methodology

Data were collected from secondary sources such as books, internet, database and journals that are related to this topic. The sampling size was based on monthly basis for each variable from January 1995 until December 2009. This research had tried to look at the possibility of the significance correlation between dependent variables; Stock market indices (Consumer Product and Industrial index in Indian scenario) and independent variables; Interest rate (BLR). Inflation rate (CPI) and Money supply (M2). The Multiple Regression Analysis has been adopted to identify' the relationship between both of the stock market indices and the three independent variables. The actual computation on sample data on all variables (dependent and independent) which consist of a period of 9 years was computed using SPSS.

#### **Indicators Consider in Study**

- Lending interest rate (BLR in %): Lending rate is the bank rate that usually meets the short- and medium-term financing needs of the private sector. This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. The terms and conditions attached to these rates differ by country, however, limiting their comparability.
- Source: International Monetary Fund, International Financial Statistics and data files.
- Real interest rate (IR in %): Real interest rate is the lending interest rate

adjusted for inflation as measured by the GDP deflator. The terms and conditions attached to lending rates differ by country, however, limiting their comparability.

- Source: International Monetary Fund, International Financial Statistics and data files using World Bank data on the GDP deflator
- Broad money to total reserves ratio (M2R is calculated in form of ratio):Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident central other than the sectors government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper. The ratio has been calculated taking total money reserve and Broad money.
- Source: International Monetary Fund, International Financial Statistics and data files.
- Broad money (M2 with reference to % of GDP) Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper.
- Source: International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.
- Inflation, consumer prices (INF is in annual %): Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.
- Source: International Monetary Fund, International Financial Statistics and data files.
- Consumer price index (CPI): Consumer price index reflects changes in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Data are period averages.

- Source: International Monetary Fund, International Financial Statistics and data files.
- Wholesale price index (WPI): Wholesale price index refers to a mix of agricultural and industrial goods at various stages of production and distribution, including import duties. The

Laspeyres formula is generally used.

- Source: International Monetary Fund, International Financial Statistics and data files.
- **The Index of Industrial Production** (**IIP**): Index of Industrial Production has historically been one of the most wellknown and well-used indicators for

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deciphering manufacturing activity in the country. The IIP measures volume changes in the production of an economy, and therefore provides a measurement that is free of influences of price changes, making it an indicator of choice for many investors.

• Source: Central Statistics Office (CSO), RBI and data files.

















## **Trend Analysis using Charts:**

The interest rate has the maximum point of nine percent and minimum for 0.60 percent in 2007 and 2010 respectively. Base lending rate starts from 8 percent and gone up to 16 percent in the entire sample period. Broad money has the rising trend starting from 2005. However, the broad money to reserve ratio is declining from 2000 to 2005 and thereafter it is continuously stagnant.

Inflation rate is at its minimum point in 2010 and thereafter at highest point in 2007 at 9 percent. Base lending rate turning around at average 10 to 12 percent.

As the variable are in different units, so we have used the log values of the data to convert it into standardized and normalized data set. The descriptive statistics for the data are mentioned below:

Table 1: Descriptive Statistics						
Variables Name	Abbreviation Used	Minimum	Maximum	Mean	Std. Deviation	Kurtosis
Real interest rate (%)	IR	52	2.20	1.2956	.89534	.798
Lending interest rate (%)	BLR	2.12	2.59	2.3798	.14807	152
Broad money to total reserves	M2R	1.16	1.59	1.4500	.15865	535
Broad money (% of GDP)	M2	4.29	4.38	4.3544	.02573	4.398
Inflation (annual %)	INF	1.77	2.48	2.1407	.26376	-1.552
Consumer price index	CPI	4.31	4.99	4.6764	.24627	-1.372
Wholesale price index	WPI	4.41	4.87	4.6679	.17051	-1.595
IIP (Basic Goods)	IIP	4.84	5.16	4.9917	.11436	-1.247

If the kurtosis is close to 0, then a normal distribution is often assumed. These are called mesokurtic distributions. If the kurtosis is less than zero, then the distribution is light tails and is called a platykurtic distribution. If the kurtosis is greater than zero, then the distribution has heavier tails and is called a leptokurtic distribution. As per the descriptive statistics data for broad money and interest rate is leptokurtic. However rest all variables are platykurtic in their distribution. Basically, a small standard deviation means that the values in a statistical data set are close to the mean of the data set, on average, and a large standard deviation means that the values in the data set are farther away from the mean, on average. As all the values of the standard deviation are small so we may conclude that the values used in data set is revolving round the average value.

## **Correlation Analysis:**

The below-mentioned correlation take shows that M2R is only correlated with BLR and INF is correlated with IR. On the other hand the IIP is correlated with three other variables and WPI is highly related to M2R and CPI and vice versa.

Table 2: Correlation Analysis								
	IR	BLR	M2R	M2	INF	СРІ	WPI	IIP
IR	1	.647	307	276	708*	.042	.004	133
BLR		1	746*	370	288	630	607	.578
M2R			1	.472	.093	.915**	.938**	868**
M2				1	.400	.382	.340	392
INF					1	181	146	.219
СРІ						1	.989**	992**
WPI							1	972**
IIP								1

\*. Correlation is significant at the 0.05 level (2-tailed).\*\*. Correlation is significant at the 0.01 level (2-tailed).

### Multiple Linear Stepwise Regression Model:

Table 3: Stepwise Regression Model							
Variables	Model 1	Model 2	Model 2				
	CPI – Dependent	IIP – Dependent	WPI – Dependent				
IR	-	-	-				
BLR	-	-	-				
	0.342	0.179	-				
M2R	{4.340}	{0.056}					
	(.005)	(.018)					
M2	-	-	-				
INF	-	-	-				
	12.792	-0.566	1.467				
СРІ	{19.776}	{-15.793}	{7.987}				
	(.000)	(.000)	(.000)				
	-	-	0.685				
WPI			{17.454}				
			(.000)				
	-1.725	7.380	-				
IIP	{-15.793}	{71.312}					
	(.000)	(.000)					
R	0.998	0.997	0.989				
R Square	0.996	0.994	0.978				
Adj. R Square	0.995	0.992	0.974				
Durbin- Watson	1.756	1.802	1.539				
F Stats	783.630	513.920	304.663				
Model Sig.	.000	.000	.000				

Coefficient; { } - Denotes t- Statistics; () - denotes Significance.

The analysis showed in table 3 is that the explanatory variables; considered in literature are regressed again in the present annual data. The finding suggests that the Model one is perfect model fit for the CPI in India. The model is proved to be significant with IIP and M2R, the independent variable. However when we applied stepwise model for the same data keeping IIP as dependent variable, a new regression equation is formed with the two independent variable (i.e. M2R and CPI). The third model considered in the table is significant with dependent variable of WPI and independent variable of CPI. It can be predicted that production index and consumer index can be easily predicted by one another and broad money to reserve ratio.

Through statistics of Durbin Watson test and R2 value, we can summarize that all three Models are the best fit model in the research study with the dependent Variable of CPI, IIP and WPI.

## **Conclusions and Implications:**

In conclusion, this paper makes a significant contribution to the existing financial and economic literature, and we are optimistic that later generations will benefit from reading this study and using it as an investment guide, either in India or elsewhere. This paper examined selected macroeconomic variables during the past 9 years using monthly data for the broad money supply (M2), industrial production index, interest rate, and consumer price index. Many statistical tools and techniques were used evaluate the relevant to relationships.

Interestingly, our results for the industrial production index do not support the postulates presented by Chen et al., 1986; Eraslan, 2013; Fama, 1981; Humpe& Macmillan, 2009; Nishat&Shaheen, 2004. This might be because the industrial production index in India is adjusted, which may not be the case elsewhere. However, previous findings on CPI were confirmed by the existence of a negative relationship between CPI and Interest rate (See Al-Sharkas, 2004; Fama, 1981; Mukherjee & Naka, 1995; Nishat&Shaheen, 2004; Zhao, 1999). We also found a positive relationship between money supply and these Indices, which confirms earlier postulates Eraslan, 2013: (See Kwanchanok, 2000; Liangnakthongdee,

1991; Maysami & Koh, 2000; Mukherjee & Naka, 1995).

All the macroeconomic variables used in the study namely; interest rate, WPI, CPI and money supply have been found to have a relationship with each other in correlation analysis.

This makes it clear that there is, in fact, relationship between these а macroeconomic factors and that the macroeconomic factors play a great role in the market fluctuations and can be used to explain them. According to the literature reviewed, there was a lack of studies in developing economies and there were limited studies concerning the nature of the relationship between macroeconomic variables and the market index in MENA region. By shedding light on this unexplored area, the results have contributed theoretically to literature. The results have proven the relationship between that macroeconomic variables and index market differs from one economy to another even in economy with a lot of similarities. This will help investors predict the direction of the market and focus only on the significant variables and their impact on different economies. practical Furthermore, several implications can be derived from these results. The macroeconomic variables such as interest rate, Broad money, WPI, CPI and money supply have proven to be strongly associated. Government policies regarding these factors should consider this association, which will eventually lead to a more stable market. Moreover, investors as well as governments should take into consideration that the market index fluctuation has an impact on the macroeconomic variables.

#### Future Research Agenda:

The present study has further scope for more comprehensive results as several new areas for research could be derived from the results of this work. First, a further investigation can be done using the other variables that were commonly used in research to explain changes in stock prices including variables like foreign exchange reserves and oil prices which will help draw a complete picture on the factors that affect the stock market. Second, testing the relationship between macroeconomic variables and market index in other countries in the MENA region can also be investigated. A third area can be concerned with investigating in depth the causal relation from the market index to some

macroeconomic variables. As stated in previous research, the market index is associated with the economic growth and it should cause changes in macroeconomic variables, but lack of this causation relationship may form a huge question mark. Fourth, further studies can investigate the differences and similarities of the structure of the central bank and its independence, the behavior of investors and whether these changes actually affect the relationship between macroeconomic variables and the market index. In general, researchers found that macroeconomic variables have a strong relation with stock market, which supports the results that the four variables have some kind of association with the market index and the fact that there is a long run relationship between macroeconomic variables and the production index. This means that macroeconomic variables can be used to explain fluctuations other markets indices. Any further research that helps explore this area will be of great benefit to practitioners and decision makers, especially in developing countries as they can use the research findings to enhance their economic development.

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