A STUDY ON INFLATION EFFECT ON INDEX OF INDUSTRIAL PRODUCTION OF INDIAN

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ABSTRACT: After the effect of global financial recession Indian Index of industrial production growth rate Momentum got effected in the past five years data shows that lots of ups and downs where observed. This study had focus how inflation effected the Indian index of industrial production .This study has considered 10years data that is from 2006to2015. Granger causality has been applied on Johensen co-integration data and the result observed that inflation had influence on IIP and Interest rates. Regression weights estimates indicated that IIP influenced the GDP. This analysis is useful for industrialist, equity investor, central bank and Governments.

Key Words: Exports, Imports, IIP, Inflation. Repo & Reverse repo, GDP,

INTRODUCTION:

In India the central statistical organization (cso) is responsible for compilation and release of the index of industrial production. This is monthly index and is intended to measure changes over time in the volume of industrial production. The base year of the current series of IIP in India is 1993-94 which is being revised to1999-2000. The current series of IIP with base 1993-94 is base on 538 individual items clubbed into 283 groups of items. The distribution of these items (items groups) and weights (100) among the three sectors covered by index is as under

Sector	No. of items (item groups)	weights
Mining	64(1)	10.47
Manufacturing	473(281)	79.36
Electricity	1(1)	10.17
Total	538(283)	100.00

The scope of IIP in India is confined to mining, manufacturing and electricity sectors only gas production is included in manufacturing sector distribution of gas and water is not covered under the existing of IIP. Let there be a sectoral compilation of IIP like mining, manufacturing, electricity for international comparability sectoral IIPs may also be computed based on annual survey of

manufacturing industries for international. As the IIP is quantitative index, it is based on the production of items being expressed in physical terms. However, the unit of reporting in respect certain items like machinery, machine tools, ships building ect. is in value terms .the monthly figures of production, is such cases is derived by deflation such value figures by appropriate wholesale price index(WPI)of the concerned categories. At present the indices for servicing producing activities are not being compiled in India. The index is a simple weighted arithmetic mean of production relatives calculated by using laspeyre's formula $I=\sum(Wi*Ri)/\sum Wi$. Index of industrial production in India is a fixed based (reference) time index and not a chain index. The main advantage of using a fixed reference time index is the computational ease and availability of data. The major hindrance for compiling a chain index in India is the non-availability to timely data for updating of weights on an annual basis.

REVIEW OF LITERATURE:

1: Sam-Veg Patel (2012): the researcher main focus of his study is to know effect of macroeconomic variables performance on the Indian stock market. This study found that the long run relationship between macroeconomic variables had affected the Indian stock markets, the study also revealed, and causality run from exchange rate to stock market indices to IIP and oil price had an effect on Indian stock market. This study is limited to only monthly data that is from January 1991 to December 2011.This study has a significant relation to my study that is microeconomic variables.

2: Aparna (2011): This study focused on imports of cured oil impact on Indian economy by considering GDP, IIP and WPI. The study found by using vector auto regression (VRA) to analyze the objective since a direct causal relationship could not established. This study is limited only to three variables such as IIP, GDP, and WPI. His study is only to micro analysis where as my study related to macro analysis that is inflation effect on IIP.

3: Angshuman Hait Joice John, Abhiman Das and Anujit Mitra1(2013):   The focus of this study is that pricing power measures the extent to which business can pass input cost to consumer through finished goods. Empirical results indicated that pricing power has a statistically significant and positive impact on output growth in case of non-food manufacturing products. The impact of pricing power on inflation is also positive but relatively subdued. A fall in pricing power, therefore, is followed by higher and faster decline in output than in inflation. This study is limited only to the pass on the increases in input costs to consumers.

4: Yilmaz Bayar,Cuneyt Kilic (2014): This study focuses on the effects of oil and natural gas price on industrial production in the 18 euro zone member countries. They found that oil price and natural

gas prices had negative effect on industrial production in euro zone countries. This study is limited only to euro zone countries. My study is related to inflation effect on IIP. where as his study is related to oil and natural gas price effect on IIP

5: W. Stanners (2012): The focus of this study is to examine symmetric and asymmetric relationship among sector indexes of industrial production index and gross domestic production in turkey .the production indexes are total industry, energy and manufacturing. It is mainly found that contrary to Engle-granger test results there are short run and long run positive correlations among the series considered except energy index. The energy index should be treated separately since its long run behavior presented no co- integration indicating that its long run pattern differs from other production

6: Dimitrios N. Subeniotis,Dimitrios L. Papadopoulos, Ioannis A. Tampakoudis, Athina Tampakoudi (2011): The focus of this study is to examine market capitalization, industrial production, economic sentiment indicator and inflation impact on EU-12 stock market price. The empirical results reveal a strong effect of the first three factors while inflation has negative but not statistically significant coefficient. Further the variables that affect the stock market positively are market capitalization and the economic sentiment indicator. Finally an applied statistical model confirms the significant convergence of the EU-12stock market in the long run, indicating a low geographic diversification across European market.

7: M.taslimi, M Goudarzi and R.Rostamian (2012): This study focuses on inflation effect on industrial production and influences of the price index for agricultural. The result from the vector auto regression test in the industry section indicated that industrial added-value, real exchange rate variable, the volume of liquidity and inflation uncertainty is in positive relation with the price index industrial products. The variance decomposition results indicate that in short, middle, and long period of time most contributions of fluctuations for industrial products price index are followed by the industrial products price and they were about respectively. The results show that the inflation uncertainty variable along with about variables has a significant impact on industrial production price especially in long run.

8: Carmem Aparecida Feijo Paulo Gonzaga M. de Carvalho (2014): This study focuses on industrial production in Brazil in the nineties. During this period official industrial statistics went a great revision and so the evaluation of impact of openness over industrial structure was under dispute among specialists. Two positions emerged in the debate on one hand it was understood that

productivity growth was spurious. On the other hand specialists accepted that productivity growth was real, but there was no consensus about the figures of growth. They aim is to briefly describe the source of official statistical information available until now and to drop some conclusions about the bias of the different sources of measurement of industrial productivity. As a conclusion we will show that Brazilian industrial productivity has increased in all sections but with no convergence trend. This study is limited only to the one country in nineties.

9: M Jamil (2014): This study focus on exchange rate volatility and its impact on industrial production before and after the introduction of common currency in Europe. The result found that all the countries enjoyed benefits after the introduction of common currency by reduction in negative impact of real exchange rate volatility even some countries also faced increase in real exchange rate volatility.

Need: In recent days RBI governor trying hard to control the inflation along with tight liquidity in the system. Corporate are facing lot of problems at the cost of capital and there was a greater demand by the this segment to decrease the interest rates, so that flow of liquidity will be pushed by the banking into the system and which will have a positive impact on the growth of the economy. In order to have a control on the inflation central bank kept liquidity tight but it had negative impact on IIP activity. This analysis has been emphasized to find the impact of inflation when liquidity is high.

OBJECTIVE:

1. To know the relationships between inflation IIP GDP and monitory policy rate.

2. To measure the inflation change impact on interest rates.

3. To know the interest rate impact on iip.

4. To find the inflation impact on iip, gdp and nifty.

5. To measure iip growth rate impact on gdp and Indian imports and exports.

Hypothesis:

H0 – Null Hypothesis: Inflation does not affect repo rate.

H0 – Null Hypothesis: Inflation does not affect reverse repo rate.

H0 – Null Hypothesis: IIP does not affect exports and imports.

H0 – Null Hypothesis: IIP does not affect GDP.

Scope:

This study has been emphasized on macro economic variables to find the impact of Inflation on index of industrial production growth. This analysis as focused on 10years data 2004 to 2014 for inflation consumer price index data has been considered

Empirical study: index of industrial production, gross domestic product, repurchase rate, reverse repurchase rate, exports and imports

Research methodology:

T test is used to compare two different set of values. It is generally performed on a small set of data. T test is generally applied to normal distribution which has a small set of values. This test compares the mean of two samples. T test uses means and standard deviations of two samples to make a comparison. The formula for T test is given below:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Correlation

The correlation is one of the most common and most useful statistics. A correlation is a single number that describes the degree of relationship between two variables. The most frequently used correlation coefficient in data analysis is the Pearson product moment correlation. It is symbolized by the small letter r, and is fairly easy to compute from raw scores using the following formula

$$r = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{\sqrt{[\, n\Sigma x^2 - (\Sigma x)^2 \,][\, n\Sigma y^2 - (\Sigma y)^2 \,]}}$$

Regression

Regression is the closest thing to estimating causality in data analysis, and that's because it predicts how much the numbers "fit" a projected straight line. There are also advanced regression techniques for curvilinear estimation. The most common form of regression, however, is linear regression, and the least squares method to find an equation that best fits a line representing what is called the regression of y on x.

$$Y = A + Bx$$

Granger causality test: Ordinarily, regressions reflect "mere" correlations, but Clive Granger argued that causality in economics could be reflected by measuring the ability of predicting the future values of a time series using past values of another time series. Since the question of "true causality" is deeply philosophical, econometricians assert that the Granger test finds only "predictive causality"

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \epsilon_t$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t$$

(5)

Johansen co integration test:

In statistics, the Johansen test, named after Søren Johansen, is a procedure for testing co integration of several time series. This test permits more than one co integrating relationship so is more generally applicable than the Engle–Granger test which is based on the Dickey–Fuller test for unit roots in the residuals from a single co integrating relationship

DATA ANALYSIS

1. Objective

		Inflation	IIP	GDP	Repo	Reversere	CRR
Inflation	Pearson Correlation	1	0.315	-0.267	-.516*	-.509*	-0.052
	Sig. (2-tailed)		0.189	0.27	0.024	0.026	0.832
	N	19	19	19	19	19	19
IIP	Pearson Correlation	0.315	1	-.572*	0.24	0.366	-0.423
	Sig. (2-tailed)	0.189		0.011	0.323	0.123	0.071
	N	19	19	19	19	19	19
GDP	Pearson Correlation	-0.267	-.572*	1	-0.091	-0.21	.539*
	Sig. (2-tailed)	0.27	0.011		0.71	0.389	0.017
	N	19	19	19	19	19	19
Repo	Pearson Correlation	-.516*	0.24	-0.091	1	.949**	0.042
	Sig. (2-tailed)	0.024	0.323	0.71		0	0.866
	N	19	19	19	19	19	19
Reversere	Pearson Correlation	-.509*	0.366	-0.21	.949**	1	-0.206
	Sig. (2-tailed)	0.026	0.123	0.389	0		0.398
	N	19	19	19	19	19	19
CRR	Pearson Correlation	-0.052	-0.423	.539*	0.042	-0.206	1
	Sig. (2-tailed)	0.832	0.071	0.017	0.866	0.398	
	N	19	19	19	19	19	19

Interpretation:

The above tables Bi-Varity co-relation depicts that inflation is having negative co-relation with all select Variables except IIP.IIP are moderately negatively co-related with GDP and CRR. But where as inflation, Repo and reverse repo rate are observed slightly to moderately co-related. In this analysis repo rate is having a stronger co relation with reverse repo rate

2. Objective

Variable name	Rank or No. of CEs	Information Criteria by Rank and Model						
		Data Trend: None	None	Linear	Linear	Quadratic		
		No Intercept	Intercept	Intercept	Intercept	Intercept		
		No Trend	No Trend	No Trend	Trend	Trend		
		LLR MODEL					AIC	SIC
Inflation-Reporate	0	-61.57635	-61.5764	-61.5302	-61.5302	-61.4888	8.197044	8.390191
	1	-52.61252	-52.5591	-52.5251	-49.2946	-49.2927	7.576565	7.962859*
	2	-49.04385	-48.9856	-48.9856	-45.6599	-45.6599	7.630481	8.209923
Inflation-Reversereporate	0	-59.25837	-59.2584	-59.247	-59.247	-59.1763	8.434449	8.623262
	1	-47.95523	-47.9457	-47.9395	-43.0559	-42.9854	7.460697	7.838324
	2	-44.08684	-44.0657	-44.0657	-39.1109	-39.1109	7.478246	8.044686

Null Hypothesis:	Obs	F-Statistic	Prob.
REPORATE does not Granger Cause INFLATION	16	3.71264	0.0586
INFLATION does not Granger Cause REPORATE		1.08575	0.3712
DREVERSEREPO does not Granger Cause INFLATION	15	7.29391	0.0111
INFLATION does not Granger Cause DREVERSEREPO		0.51354	0.6133

Interpretation: Johensen co-integrated test as been applied between inflation and interest rates. Log likely wood rank Values where observed in decreeing trend in both linear and quadratic model along with the alpha level Hence data is stated to be co-integrated of a inflation with both the interest rates during analysis period Granger causality test as been applied to reverse repo rate and repo rate with inflation the null hypotheses is accepted because the probability value is less then 5%.but inflation does granger cause the reverse repo rate. Null hypothesis is rejected and accepted alternative HO H1.granger causality test depicts that repo rate was cause inflation. But reverse repo rate is not cause by the inflation

3. **OBJECTIVE**
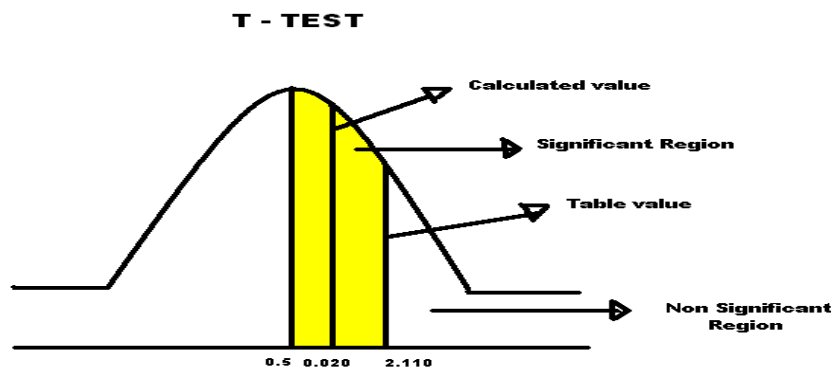
Interpretation: Two tale test hypothesis' analysis has been applied on a sample data of interest rates and IIP the hypothesis' analysis is accepted because the calculated value is less than the table value which indicates that interest rates is having impact on IIP. Alternative H1 is rejected

4. Objective

Model Summary

Multiple R	.757
R Square	.573
Adjusted R Square	.488
Std. Error of the Estimate	.188
Log-likelihood Function Value	-33.514

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.712	3	.237	6.715	.004
Residual	.530	15	.035		

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	.712	3	.237	6.715	.004
Residual	.530	15	.035		
Total	1.242	18			

Coefficients

	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta	Std. Error		
(Constant)	-6.483	6.972			-.930	.367
IIP	.140	.043	1.593	.491	3.248	.005
GDP	.115	.343	.092	.274	.335	.742
Nifty	-.002	.000	-1.320	.388	-3.405	.004

Interpretation: Regression weight estimate has been applied to measure the impact of inflation on economic indicators on economic indicators the R value is nearly 60% that is 57.3 the probability value is found to be significant but co-efficient of IIP and nifty probability value are observed significant but GDP probability is not significant.

4. Objective

Model	R	R Square	Adjusted I	Std. Error	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.612a	0.375	-0.094	15.25392	0.375	0.799	3	4	0.555	1.323

a. Predictors: (Constant), IMPORTS, GDP, EXPORTS

Model		Sum of Sq	df	Mean Squ	F	Sig.
1	Regressio	557.94	3	185.98	0.799	.555a
	Residual	930.728	4	232.682		
	Total	1488.669	7			

Model	Unstandar	Standardized Coefficients		t	Sig.	
	B	Std. Error	Beta			
(Constant)	202.887	32.672		6.21	0.003	
GDP	-5.793	4.632	-0.582	-1.251	0.279	
EXPORTS	0.431	0.725	0.492	0.595	0.584	
IMPORTS	-0.34	0.667	-0.431	-0.51	0.637	

a. Dependent Variable: IIP

Interpretation: The above analysis of linear trend model shows that IIP is not influencing the micro economic factors such as GDP and Indian exports & imports. Because, probability value is found to be not significant i.e., $.555 \geq 0.5$. The co-efficient but exports & imports are not significant.

Findings:

1. Inflation is found to be positively co-related with IIP but it is having a negative co-relation with other selected Variables such as monetary policy rate and GDP.

2. Base interest rate of central bank of repo & reverse repo rate where granger causality by the inflation during the inflation during the study period.

3. Index of industrial production has been observed that interest rates where influencing the IIP because of cost of capital Fluctuations.

4. The study found that inflation affected the iip and nifty during the analysis period. But GDP is not influenced by the inflation in the same analysis period.

5. The linear trend model indicates that iip growth rate has failed to influence the GDP along with the Indian exports & imports.

Conclusion:

By concluding the analysis of inflation impact on iip the study mainly stressed on Indian monetary policy rates & Economic factors where reacted with inflation. The study has considered 10years data of varies economic variables which were used for analysis purpose. The analysis found that inflation impact is observed on iip along with the Interest rates. The focus has been emphasized mainly on cost of capital influences on iip growth rate along with the inflation. Hence furthered study recommends in this area to measure the various economic factors influence iip apart from the inflation.

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