

SECTOR ROTATION WITH LEADING MACROECONOMIC INDICATORS

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ABSTRACT

In this study, an attempt has been made to examine whether the theory of sector rotation has been empirically valid in the Indian equity market, during the period April, 2000 to March, 2020. The time period has been divided into many sub-periods according to the real GDP growth rate and the annualized returns of eleven stock market indices have been analyzed in different periods. Going forward, leading macroeconomic indicators, which coincide with overall economy, have been taken and their association with stock market indices have been analyzed through statistical measures to assess any possible forecasting. In the first part of the study, cyclical and non-cyclical sectors have been found to beat the benchmark index during periods of growth and stagnancy, respectively, but no particular ordinality was observed. Amongst the leading economic variables, M3 Money Supply was found to have high degree of association with some indices, namely Sensex, Healthcare, CDGS, Consumer Durables and IT, but no linear relation was observed.

KEYWORDS: Sector Rotation, Real GDP Growth Rate, Stock Market Indices, Leading Macroeconomic Indicators, ADF Test, Granger Causality Test, Pearson Correlation.

INTRODUCTION

The theory of sector rotation portrays the movement of prices in capital markets in relation with economic cycle. It's an investment strategy in which funds are invested and liquidated, time-to-time, according to the succeeding economic cycle. Similar to an economic cycle, capital markets go through different phases which can be classified according to the returns generated for market participants in each of those phases (namely expansion, peak, contraction and trough). Since capital markets work on the principle of discounting the future, each phase of capital market cycle precedes the related phase of economic cycle and different industries emerge as best performers in different phases.

This theory divides business sectors into two categories – cyclical and non-cyclical. Cyclical sectors are those which experience huge volatility in their revenues and profitability, depending on the prevalent economic cycle. Non-cyclical sectors are those which are fairly consistent in this regard.

There are three different types of economic indicators – leading, coincidental and lagging. Leading indicators, as the name suggests, correspond with a future phase of an economic cycle, while lagging indicators are the ones that follow it. Coincidental indicators are those which change simultaneously with a phase of economic cycle. Both coincidental and lagging indicators are helpful for confirming one's narrative, but these are leading indicators which are used in forecasting.

The proposition of this theory makes complete sense. Different phases of economic cycles coupled with different policies of central banks provide opportunities for some sectors to outperform the rest. This theory has great relevance for investors operating with buy low, sell high strategy. Investors chase cyclical sectors during periods of high economic growth and deploy money in non-cyclical sectors (termed Safe Havens) during periods of recession. In-depth research on the economy, a deep understanding of businesses and a conviction to act prior to others are necessities for using this investment strategy.

The few drawbacks of using sector rotation as an investment strategy come from the cost associated with it in the form of trading commissions and taxes, and when an investor with huge capital uses this strategy, the movement of large sum of money can regularly hurt the entry and exit prices. The third drawback is that this strategy requires premium data for research and core knowledge of many subjects, and this might not be feasible for many investors.

OBJECTIVE

The aim of this study is to examine whether the conclusion from the theory of sector rotation holds relevance in Indian equity market. Further, any possible relation between leading macroeconomic variables and stock market indices for the purpose of forecasting has been pursued.

RESEARCH METHODOLOGY

This study has been carried as a descriptive research. Quarterly data of real GDP growth rate was taken and the time period has been divided into various parts, each representing either of the four periods – high growth, moderate growth, low growth and miniscule growth (Indian economy didn't go through any recessionary period). In these periods, annualized returns and weighted average among different periods of eleven stock market (BSE) indices – Sensex (benchmark), FMCG, Healthcare, Energy, Utilities, CDGS, Auto, Consumer Durables, IT, Capital Goods and Finance, have been calculated and ranked. Further, five macroeconomic variables – Bond Yield, Composite Leading Indicator, M3 Money Supply, Domestic Credit and IIP, have been mapped with overall economy and economic growth rate and their relation with all eleven indices have been analyzed using Augmented Dickey-Fuller test, Granger causality test and Pearson correlation test.

ANALYSIS

Table-1 shows the division of whole time period, ranging from April, 2000 to March, 2020, in twelve sub-periods. The differentiating factor is the rate of economic growth, which varies between high, moderate, low and miniscule. As it can be seen, we get three different cycles and growth periods are ranked relatively within each cycle. The least sub-period is of two quarters and highest is of seventeen quarters.

TABLE-1: DIVISION OF WHOLE TIME-PERIODS IN TWELVE SUB-PERIODS

Period No.	Start	End	Average GDP Growth Per Quarter	Characteristic
1	Apr 00	Dec 03	1.36%	Moderate
2	Jan 04	Dec 07	2.21%	High
3	Jan 08	Jun 08	0.82%	Low
4	Jul 08	Mar 09	-0.28%	Miniscule
5	Apr 09	Dec 09	3.49%	High
6	Jan 10	Sep 10	2.65%	Moderate
7	Oct 10	Mar 11	2.08%	Low
8	Apr 11	Sep 11	0.60%	Miniscule

9	Oct 11	Dec 13	1.55%	Moderate
10	Jan 14	Mar 18	1.85%	High
s11	Apr 18	Jun 19	1.25%	Low
12	Jul 19	Mar 20	0.79%	Miniscule

In Table-2, we look at the performance of all the indices during high growth periods. Both annualized returns in each high growth period and their weighted average of those three periods have been taken. As we can see, five out six cyclical sectors have beaten the benchmark index comprehensively, while the only one has missed out by a small margin. The point to be noted here is that during high economic growth rate periods, in the scenario of Indian economy, the sectors which contribute maximum through value addition (in both manufacturing and services) have outperformed, and this also applies to the two non-cyclical sectors – Energy and Utilities, which have beaten the benchmark by a large margin. IT sector, which has transformed many industry verticals, have historically been a sector facilitating the growth, and thus, its returns don't match that actually contribute in the growth.

TABLE-2: PERFORMANCE OF INDICES DURING HIGH GROWTH PERIODS

Index	Nature	Weighted Average of Returns in High Growth Periods	Period-wise Returns		
			Jan 04 - Dec 07	Apr 09 - Dec 09	Jan 14 - Mar 18
Consumer Durables	Cyclical	57.98%	55.96%	178.14%	38.67%
Capital Goods	Cyclical	50.73%	74.25%	116.52%	16.98%
Finance	Cyclical	45.90%	58.24%	112.18%	22.59%
Utilities	Non-Cyclical	41.69%	68.09%	70.74%	11.72%
Energy	Non-Cyclical	39.87%	65.79%	40.83%	15.31%
CDGS	Cyclical	35.63%	28.31%	133.47%	25.26%
Auto	Cyclical	33.43%	22.75%	173.30%	18.80%
Sensex	Benchmark	28.57%	37.38%	76.54%	11.81%
IT	Cyclical	25.68%	24.64%	143.17%	5.92%
FMCG	Non-Cyclical	18.94%	21.81%	46.63%	11.34%
Healthcare	Non-Cyclical	18.42%	17.27%	92.73%	6.40%

In Table-3, we look at the performance of all the indices during high growth periods. Overall, the returns have been far subdued than those in high growth periods. It again can be seen that five out of six sectors beat the benchmark index comfortably, with the one being beaten to be IT. The sectors which have delivered maximum returns during periods of moderate growth are the ones which are benefitted by increased disposable incomes during the high growth periods. With interest staying relatively low, people prefer to spend on comfort and luxury goods. Low interest rates also continue to stimulate business growth.

TABLE-3: PERFORMANCE OF INDICES DURING MODERATE GROWTH PERIODS

Index	Nature	Weighted Average of Returns in Moderate Growth Periods	Period-wise Returns		
			Apr 00 - Dec 03	Jan 10 - Sep 10	Oct 11 - Dec 13
Auto	Cyclical	26.41%	29.82%	52.20%	12.12%
Capital Goods	Cyclical	24.55%	39.89%	30.17%	-2.91%
Healthcare	Non-Cyclical	22.56%	19.00%	35.84%	24.05%
Finance	Cyclical	19.96%	-	64.57%	5.10%

Consumer Durables	Cyclical	14.63%	10.37%	95.99%	-5.39%
FMCG	Non-Cyclical	14.39%	2.42%	51.39%	22.02%
CDGS	Cyclical	12.07%	-	31.36%	5.64%
Sensex	Benchmark	9.69%	6.21%	31.34%	8.27%
Energy	Non-Cyclical	1.37%	-	7.14%	-0.56%
IT	Cyclical	1.17%	-16.32%	26.77%	21.79%
Utilities	Non-Cyclical	-4.64%	-	8.40%	-8.99%

In Table-4, we look at the performance of all the indices during low growth periods. Overall, returns have been negative across sectors, and interestingly enough, except for IT. As we can see, three out of four non-cyclical sectors have fallen less than the benchmark index. This happens because the projectivity of growth in those businesses is fairly stable, and when the whole market falls because of exogenous factors, these businesses experience a lower value erosion. Other point to note here is of the sectors that have experienced maximum value erosion. They are the same ones that delivered maximum returns during high and moderate growth periods, but during a period of low growth, the businesses in these sectors go through a volumetric fall in earnings and that is also reflected in their stock price. The performance of IT sector companies can be attributed to structural changes in their businesses as well as the overall sector.

TABLE-4: PERFORMANCE OF INDICES DURING LOW GROWTH PERIODS

Index	Nature	Weighted Average of Returns in Low Growth Periods	Period-wise Returns		
			Jan 08 - Jun 08	Oct 10 - Mar 11	Apr 18 - Jun 19
IT	Cyclical	14.91%	17.39%	19.39%	12.12%
Healthcare	Non-Cyclical	0.71%	33.55%	-12.33%	-7.21%
FMCG	Non-Cyclical	-1.64%	-7.87%	-0.50%	0.40%
Energy	Non-Cyclical	-2.76%	-27.27%	-13.46%	11.33%
Sensex	Benchmark	-5.29%	-41.82%	-5.78%	9.52%
Consumer Durables	Cyclical	-6.60%	-53.57%	-9.10%	13.19%
Finance	Cyclical	-12.38%	-66.92%	-15.03%	10.50%
Capital Goods	Cyclical	-19.77%	-62.16%	-30.01%	1.28%
Utilities	Non-Cyclical	-22.25%	-60.24%	-24.14%	-6.29%
Auto	Cyclical	-26.80%	-44.95%	-12.11%	-25.42%
CDGS	Cyclical	-26.81%	-56.96%	-27.90%	-14.31%

In Table-5, we look at the performance of all the indices during miniscule growth periods. Each of the index has lost considerable value across all three periods. This can be attributed to reasons nurturing from a high interest rate environment – people save more, investors pull their money out of stocks, a foreseen interest rate deduction make bond markets enticing and high borrowing cost reduces corporate profitability. Here too, non-cyclical sectors have fallen considerably lesser than the cyclical ones.

TABLE-5: PERFORMANCE OF INDICES DURING MINISCULE GROWTH PERIODS

Index	Nature	Weighted Average of Returns in Miniscule Growth Periods	Period-wise Returns		
			Jan 08 - Jun 08	Oct 10 - Mar 11	Apr 18 - Jun 19
FMCG	Non-Cyclical	-3.88%	-6.36%	8.44%	-9.61%
Healthcare	Non-Cyclical	-20.09%	-40.21%	-11.36%	-5.79%
Auto	Cyclical	-27.83%	-21.74%	-20.97%	-38.49%
Energy	Non-Cyclical	-28.70%	-37.68%	-30.49%	-18.52%
Consumer Durables	Cyclical	-31.67%	-66.43%	-0.98%	-17.37%
CDGS	Cyclical	-31.91%	-51.63%	-10.22%	-26.64%
Sensex	Benchmark	-32.04%	-40.64%	-26.07%	-27.44%
Utilities	Non-Cyclical	-32.50%	-31.41%	-30.83%	-34.70%
IT	Cyclical	-33.16%	-47.19%	-26.29%	-23.71%
Finance	Cyclical	-38.71%	-44.42%	-30.41%	-38.53%
Capital Goods	Cyclical	-45.93%	-54.56%	-32.10%	-46.52%

From the above data, it is clear that the concepts around performance of cyclical and non-cyclical sectors stay true across various cycles. But any consistency among sectors to outperform others, each time, couldn't be seen. Thus, it wouldn't be prudent to prognosticate economic cycles and phases and then choose sectors, since it would lack conviction.

Therefore, going forward, we select five leading macroeconomic indicators – Bond Yield, Composite Leading Indicator (CLI), M3 Money Supply, Domestic Credit and Index of Industrial Production (IIP). In the following line-charts, we see that these macroeconomic variables correspond to either GDP growth rate or whole GDP value across our time period, starting from April, 2000 till March, 2020. We further try to find relation between these macroeconomic variables and sectoral indices through some statistical methods.

CHART-1: MAPPING GDP GROWTH RATE AND BOND YIELD

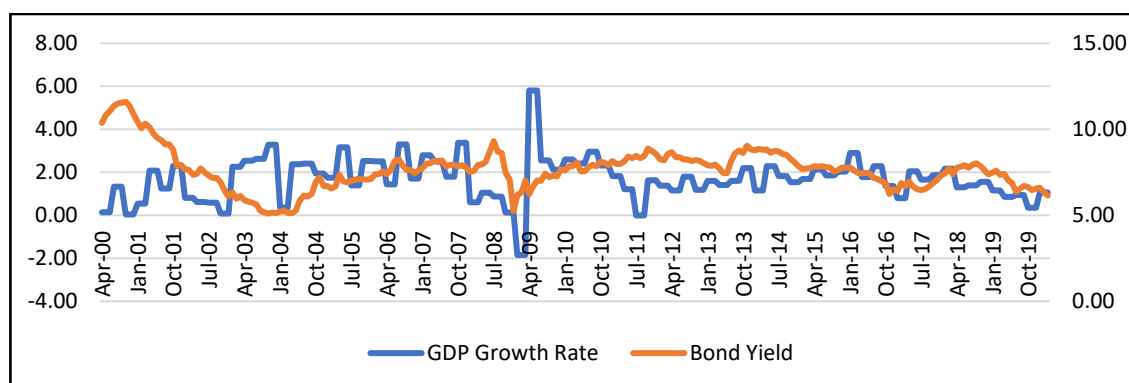


CHART-2: MAPPING GDP GROWTH RATE AND CLI

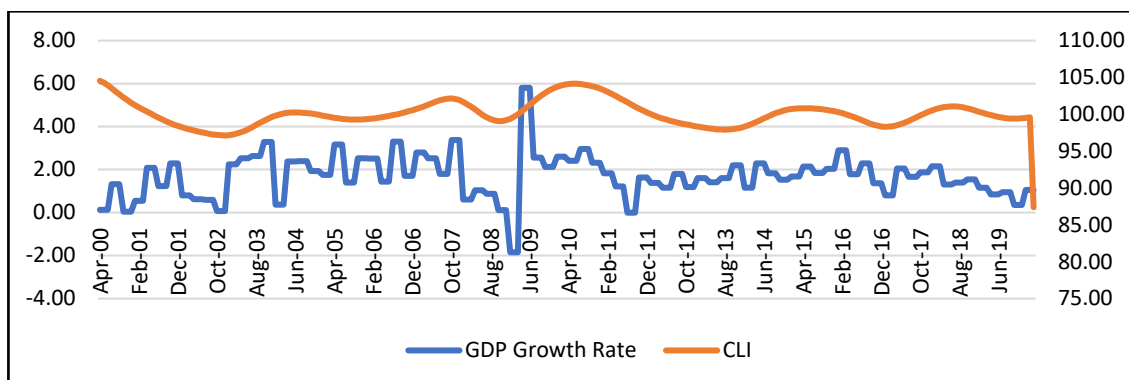


CHART-3: MAPPING GDP AND M3 MONEY SUPPLY

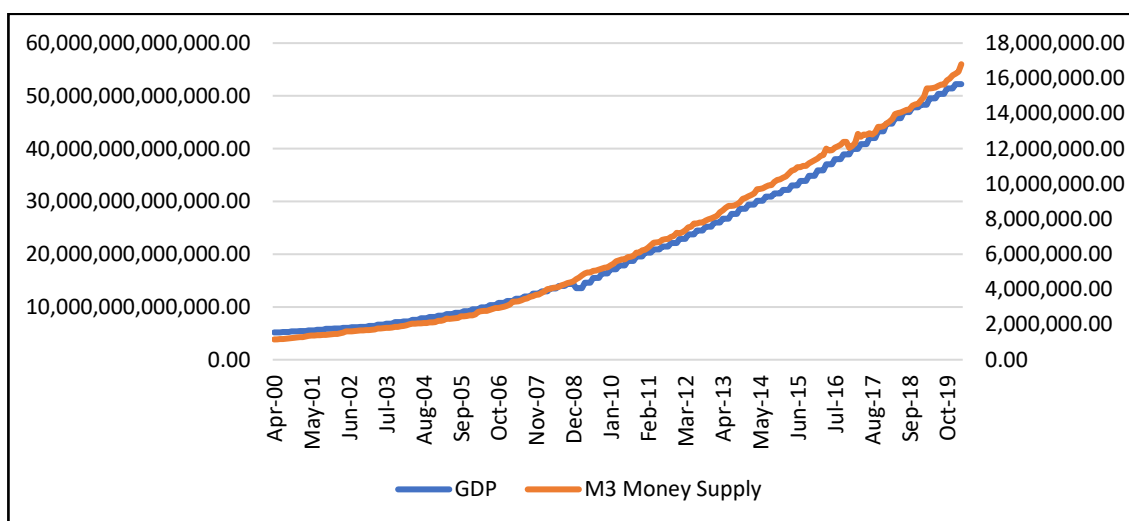


CHART-4: MAPPING GDP AND DOMESTIC CREDIT

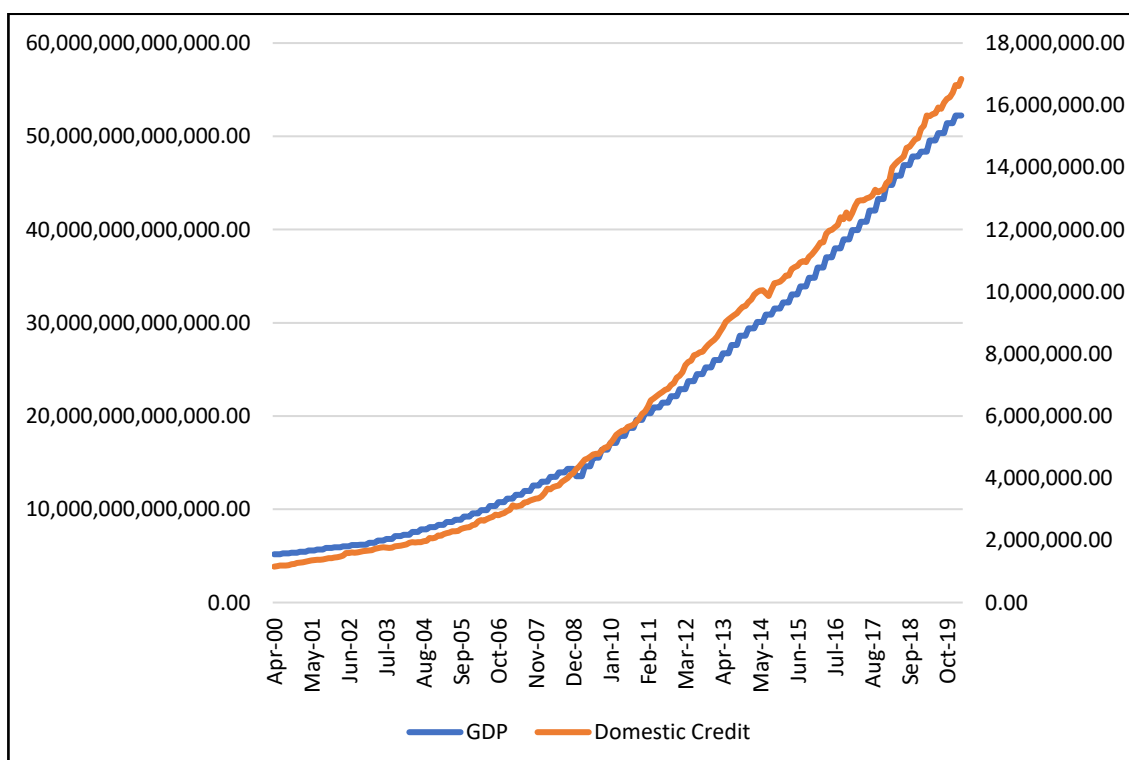
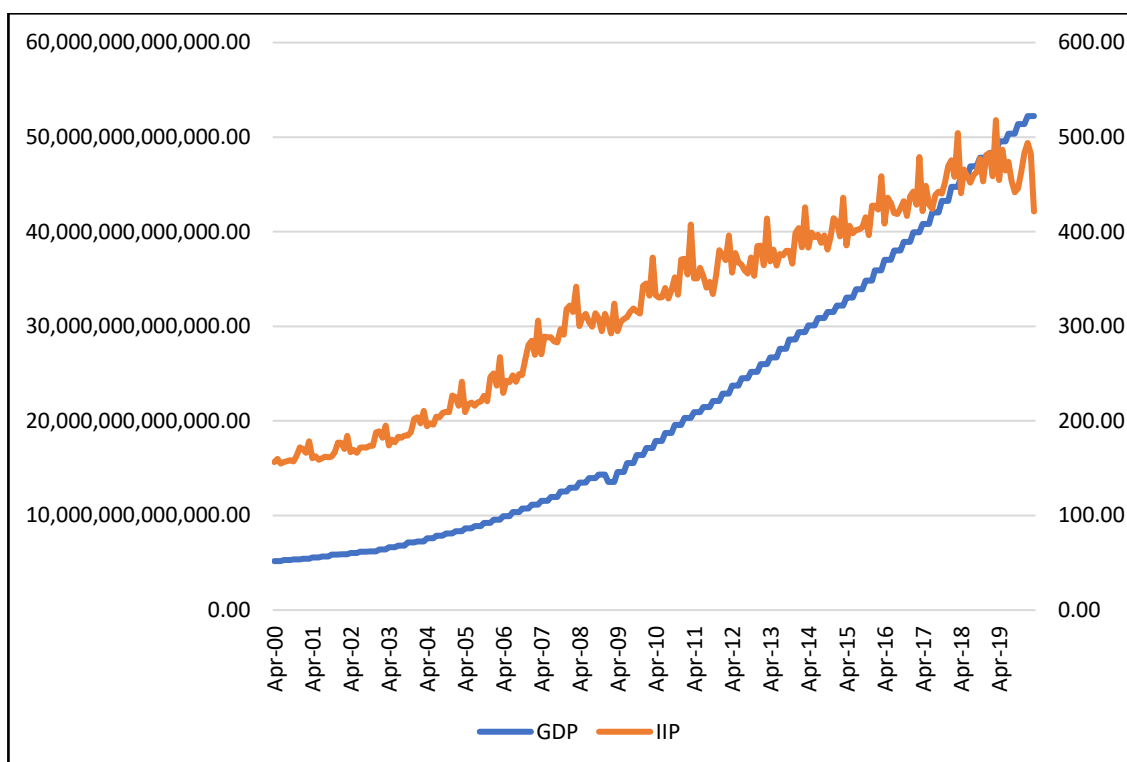


CHART-5: MAPPING GDP AND IIP



It can be seen in all the five charts above that these macroeconomic variables resonate well with GDP growth rate or GDP. Similar variations can be observed among both the variables in all of the five charts. Also, by carefully observing the patterns in all of these five charts, we can say that movements in macroeconomic variables precede those in GDP growth rate or GDP, and this gives conviction in them being leading variables.

We now study for any possible relation between these macroeconomic variables and stock market indices. The first statistical test that we use is Augmented Dickey-Fuller (ADF) test. All data related to stock market is fundamentally a time-series data and for drawing meaningful conclusions from this data, it is essential that data should be stationary. ADF test uncovers any farce regression between two unrelated variables.

In Table-6, we have the result of ADF test conducted on all eleven indices and five macroeconomic variables. The tests have been conducted with significance level of 5%, so any value greater than 0.05 means that the variable is not stationary, and as we can see, all but Bond Yield and non-stationary variables.

TABLE-6: ADF TEST RESULTS OF ALL VARIABLES

Variable	p-value	Inference
Sensex	0.06	The variable is not stationary
FMCG	> 0.1	The variable is not stationary
Healthcare	> 0.1	The variable is not stationary
Energy	> 0.1	The variable is not stationary
Utilities	> 0.1	The variable is not stationary
CDGS	> 0.1	The variable is not stationary
Auto	> 0.1	The variable is not stationary
Consumer Durables	> 0.1	The variable is not stationary

IT	0.09	The variable is not stationary
Capital Goods	> 0.1	The variable is not stationary
Finance	> 0.1	The variable is not stationary
Bond Yield	0.03	The variable is stationary
CLI	> 0.1	The variable is not stationary
M3 Money Supply	> 0.1	The variable is not stationary
Domestic Credit	> 0.1	The variable is not stationary
IIP	> 0.1	The variable is not stationary

In Table-7, we run ADF test on the first difference of all variables, and we see that Δ FMCG, Δ Auto, Δ CLI and Δ Domestic Credit are non-stationary. Therefore, we reject these variables for further analysis.

TABLE-7: ADF TEST RESULTS OF FIRST DIFFERENCE OF ALL ELEVEN INDICES

Variable	p-value	Inference
Δ Sensex	< 0.01	The variable is stationary
Δ FMCG	0.052	The variable is not stationary
Δ Healthcare	0.04	The variable is stationary
Δ Energy	< 0.01	The variable is stationary
Δ Utilities	< 0.01	The variable is stationary
Δ CDGS	< 0.01	The variable is stationary
Δ Auto	0.07	The variable is not stationary
Δ Consumer Durables	< 0.01	The variable is stationary
Δ IT	< 0.01	The variable is stationary
Δ Capital Goods	< 0.01	The variable is stationary
Δ Finance	< 0.01	The variable is stationary
Δ Bond Yield	< 0.01	The variable is stationary
Δ CLI	> 0.01	The variable is not stationary
Δ M3 Money Supply	0.04	The variable is stationary
Δ Domestic Credit	> 0.01	The variable is not stationary
Δ IIP	0.02	The variable is stationary

Now, we run Granger causality test on the selected variables out of ADF test. Granger causality test is used to determine whether one time series data is significant in predicting other or not. This test ascertains whether past value of one variable (independent or exogenous) can predict future value of another variable (dependent or endogenous).

In Table-8, Table-9 and Table-10, we conduct Granger causality test on selected indices (first difference), taking them as endogenous variables and having Δ Bond Yield, Δ Money Supply and Δ IIP as exogenous variables, respectively. The significance level is 5%, and any value greater than 0.05 suggests that the association between the variables is not significant. This test specifies the causal effect.

From the results, we can see that only Δ M3 Money Supply has significant association with Δ Sensex, Δ Healthcare, Δ CDGS, Δ Consumer Durables and Δ IT, rest all are insignificant.

TABLE-8: GRANGER CAUSALITY TEST RESULTS OF THE SELECTED INDICES (FIRST DIFFERENCE) WITH Δ BOND YIELD

x-Variable	y-Variable	p-Value	Inference
Δ Bond Yield	Δ Sensex	0.37	Not significant
Δ Bond Yield	Δ Healthcare	0.57	Not significant
Δ Bond Yield	Δ Energy	0.09	Not significant
Δ Bond Yield	Δ Utilities	0.07	Not significant
Δ Bond Yield	Δ CDGS	0.69	Not significant
Δ Bond Yield	Δ Consumer Durables	0.88	Not significant
Δ Bond Yield	Δ IT	0.83	Not significant
Δ Bond Yield	Δ Capital Goods	0.25	Not significant
Δ Bond Yield	Δ Finance	0.51	Not significant

TABLE-9: GRANGER CAUSALITY TEST RESULTS OF THE SELECTED INDICES (FIRST DIFFERENCE) WITH Δ M3 MONEY SUPPLY

x-Variable	y-Variable	p-Value	Inference
Δ M3 Money Supply	Δ Sensex	0.01	Significant
Δ M3 Money Supply	Δ Healthcare	0.00	Significant
Δ M3 Money Supply	Δ Energy	0.76	Not significant
Δ M3 Money Supply	Δ Utilities	0.69	Not significant
Δ M3 Money Supply	Δ CDGS	0.02	Significant
Δ M3 Money Supply	Δ Consumer Durables	0.04	Significant
Δ M3 Money Supply	Δ IT	0.00	Significant
Δ M3 Money Supply	Δ Capital Goods	0.06	Not significant
Δ M3 Money Supply	Δ Finance	0.27	Not significant

TABLE-10: GRANGER CAUSALITY TEST RESULTS OF THE SELECTED INDICES (FIRST DIFFERENCE) WITH Δ IIP

x-Variable	y-Variable	p-Value	Inference
Δ IIP	Δ Sensex	0.58	Not significant
Δ IIP	Δ Healthcare	0.06	Not significant
Δ IIP	Δ Energy	0.87	Not significant
Δ IIP	Δ Utilities	0.62	Not significant
Δ IIP	Δ CDGS	0.64	Not significant
Δ IIP	Δ Consumer Durables	0.82	Not significant
Δ IIP	Δ IT	0.85	Not significant
Δ IIP	Δ Capital Goods	0.43	Not significant
Δ IIP	Δ Finance	0.45	Not significant

Going forward, we only consider Δ M3 Money Supply, Δ Sensex, Δ Healthcare, Δ CDGS, Δ Consumer Durables and Δ IT and try to determine a relation among them.

In Table-11, we run Pearson correlation test which shows statistical dependency between two variables. As we can see, there is almost no bivariate correlation between Δ M3 Money Supply and the five selected indices. This implies that there is no linear relation between these variables.

TABLE-11: CORRELATION BETWEEN SELECTED INDICES (FIRST DIFFERENCE) AND Δ M3 MONEY SUPPLY

Variable-1	Variable-2	Pearson correlation
Δ M3 Money Supply	Δ Sensex	-0.04
Δ M3 Money Supply	Δ Healthcare	0.12
Δ M3 Money Supply	Δ CDGS	-0.08
Δ M3 Money Supply	Δ Consumer Durables	-0.05
Δ M3 Money Supply	Δ IT	-0.07

CONCLUSION

From whole analysis, we can conclude that the performance of sectors does relate to economic cycles and phases. Cyclical sectors do beat the benchmark during periods of high economic growth and non-cyclical perform better during periods of subdued growth. Since we didn't find any consistency in particular sector/s outperforming the rest each time, we can say that the returns generated during a period depend on many factors other than economic phase, but following sector rotation strategy in general can help an investor to generate an alpha. Also, nature of sectors isn't same across different economies, like we saw in the case of Utilities and IT, which performed opposite to their general perceived nature. The contribution of these sector towards an economy should determine their nature in that particular economy. Better inferences might have been drawn if not for the constraints due to availability and time period of data.

The relation between leading macroeconomic variables and BSE indices is not very direct, as we have seen above. Out of five, only one macroeconomic variable – M3 Money Supply could show dependency through the statistical tests that were conducted, and only five out of eleven indices, one being the benchmark index, could pass the statistical tests, and then also, the macroeconomic variable didn't show any linear relation with these indices. Concludingly, we can say that there might exist some non-linear relationship amongst them which hasn't been included in the scope of this study.