Journal of Contemporary Issues in Business and Government Vol. 27, No. 2,2021
https://cibg.org.au/

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

SECTORAL INDEX RETURN PREDICTABILITY –PREDICTING POWER OF INDEX VALUATION RATIOS

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ABSTRACT

The paper examines sectoral return predictability for eleven sectoral indices of National Stock Exchange (NSE). The article shows that investors can predict the movement of sectoral indices using the index valuation ratios of those sectors. A predictive regression using the index valuation ratios as predictor variables was run for each sector using Generalized Methods of Moments (GMM). Lagged dependent variables were used as instruments to solve the problem of endogeneity. The study also uses Newey-West (HAC) correction to get unbiased coefficients. The index valuation ratios predict the returns in nine out of eleven sectors for the sample period running from 2005 to 2019. The findings assist individual investors and fund managers to forecast the sectoral returns and develop an informed trading strategy to maximize returns and diversify their portfolio to minimize the loss.

Keywords: Sectoral Index Returns, Index Valuation Ratios, Predictive regression, Endogeneity, Persistency, Generalized Methods of Moments (GMM),

JEL Classification: G11, G12, G14.

Efficient Market Hypothesis states that markets are unpredictable and hence rules out the possibility of abnormal returns. Fama (1970) contented that in efficient markets prices adjust to reflect the available information as it flows to the markets and hence investors cannot make abnormal returns. However there has been growing evidence on the stock return

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

predictability. Stock return predictability was evidenced in the studies like Gupta et al.,2014, Devpura et al., 2018, Balcilar et al., 2019;). Researchers have used variety of factors like financial indicators, macroeconomic factors and policy uncertainties to establish the linkage. There have been many attempts to investigate as to which variable can be used as predictors. Several researchers have employed variety of variables to check whether they can be used as predictors to name few Patelis (1997) founds that shifts in monetary policy could be used as predictors of stock market returns in US. Further later studies also contended that interest rate and inflation as the predominant factors which can predict the market returns. Bekiros in the year 2016 established that economic policies can estimate stock price movements.

Indian markets are more volatile and study of Indian markets is important in the context of huge markets that it provides to international investors and growth of flow into Indian capital markets. As far as studies on Indian markets are concerned, there are many studies attempting to test the efficiency of the stock market and to prove that the investors cannot make abnormal gains (Fama, 1970; Elton & Edwin, 1990; Shiller, 1981; Malkiel, 2003; Fama & Kenneth, 2004). But the empirical findings of these studies have been inconclusive and no consensus has been arrived till date. This paper aims to address the question whether index valuation ratios can predict the sectoral stock index returns. The findings of the study would help the investors to better predict the sectoral index movement and maximize their portfolio returns. There are many research studies done taking financial and internal calculated ratios as predictors of stock returns (Fama and French, 1988; Lamont, 1998; Rapach *et al*., 2010; Lewellen, 2004; Gupta *et al*., 2014; Welch and Goyal, 2008;). But lately, the focus has shifted to using index valuation ratios to predict the sectoral index returns. Further It is observed that investors, by large, specialize in specific sectors and invest accordingly (Bannigidadmath & Narayan, 2016). Hence the study is highly relevant to investors who pick few stock in specific sectors and want to monitor the determining factors. Previous studies have contributed to wide range of econometric methodologies to test stock return predictability. The methodological issues discussed widely in the literature are heteroskedasticity, stationarity, auto-correlation, persistency and endogeneity of the predictor variable (Campbell and Yogo, 2006; Stambaugh, 1999). The current research proposes the application of Generalized Method of Moments (GMM) to solve the endogeneity problem of predictor variables and Newey-West (HAC) correction factor to account for the twin problem of heteroskedasticity and auto-correlation and to obtain robust coefficients.

The paper is divided into VI section. Section II discusses the related literature. The section III and IV describes the methodology and data respectively; section V explains the key findings of the paper and Part VI summarises the findings, discussions and concludes. Section VI deals with Scope for further research.

II. REVIEW OF RELATED LITERATURE

The prediction of stock returns has always been the area of interest for the researchers .There is a legion of literature available on stock return predictability. Early studies opined that markets follow a random walk and hence they prediction of stock returns are difficult ruling out the possibility of prediction of returns (Kendall,1953). But in Contrast to the result of

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

such studies researchers experimented used various factors like dividend yield, interest rates book-to-market, earnings yield and such other ratios to see whether they exert any influence on the stock price movements. While researchers investigated into various financial ratios and the degree of impact some studies also focussed on the broad macroeconomic aspects to check whether there stock markets responds to changes macro economic factors like interest rates, inflation rates, treasury bill rate, yield spread, unemployment, GDP . Early contributions include Malkiel & Fama (1970), Fama (1990, 1991), Mookerjee & Yu (1997), Kothari & Shanken (1997), Kwon & Shin (1999), Chen, Roll & Ross (1986), Chen (1991), and Wei and Wong (1992). Studies have also used monetary policy changes to predict stock return predictability (Patelis, 1997). Studies have largely concentrated on the market index as a whole, or have considered selected stocks. Such studies fail to capture the heterogeneity between the individual stocks and market index. The predictive power of the variables, be it macro variables or company fundamentals, vary across stocks, markets and sectors. It becomes highly important to consider this sector specific, company specific information to increase the forecasting power of the predictive variables (McLean & Pontiff, 2016). Recently, the focus has expanded to sectoral index returns predictability.

It is observed that investors, by large, specialize in specific sectors and invest accordingly (Bannigidadmath & Narayan, 2016). Reaction to stock market news differs among different sectors. Aslanidis and Sawa (2011) examined the extent to which the new EU members show signs of integration with Euro-zone. The study used DSTCC model allowing for more than one shift to STCC model. This model was embedded in the VAR-GJRGARCH framework to account for volatility clustering, asymmetric volatility. The findings of the study emphasize that investors sectoral indices provide greater diversification than the aggregate market index. Study by Bredin (2009) also reinstates that the surprise changes in monetary policies have heterogenous impact on sectoral indices. Investors preferring less volatility and lesser risk preference would prefer to invest in the sectoral index which would provide them a wider spread of risk. Hence, it is imperative to understand the movement of sectoral indices to create a diversified portfolio that would ensure maximum returns.

Majority of the studies on sectoral index returns use macroeconomic variables to predict the sectoral returns. Jayasinghe and Tsui (2008) finds that exchange rates impact the sector returns differently. The study uses bivariate GJR-GARCH model to examine the impact of exchange rate on fourteen sectors in Japan. The findings show that the exchange rate exerts a positive impact on returns of few sectors such as automobile and parts, electrical and electronic equipment, household goods and textiles and information technology and hardware. Whereas, returns in oil and gas, and construction and building materials sectors show a negative exposure to changes in exchange rates. Sehgal and Jain (2011) examine the impact of sectoral momentum patterns applying CAPM one factor and Fama and French four factor model on sectoral returns. Studies have also accounted for oil price changes in explaining the sectoral returns. Caporale et al., (2015) investigates the impact of oil price uncertainty on returns of ten sectoral indices in China. Sectoral returns were found to show a heterogeneous reaction to oil price uncertainties. Thus, it is important to identify the determinants of returns for each sector. In this regard, we find that very little attention has

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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been paid to sectoral index return predictability using index valuation ratios (Bannigidadmath & Narayan, 2016; Devpura, Narayan & Sharma, 2018). The three financial ratios – Dividend Yield, Book-to-market and Earnings-Price ratio have been found to have positive relation with the expected returns (Lewellen, 2004). Use of index valuation ratios as predictors for sectoral index returns predictability is new. Thus it is evident from the above literature that there is strong need to investigate the possible impact of the valuation ratios on the sectoral indices which would enable investors to take informed decisions. Though there have been attempts to establish link between stock returns and various financial ratios by the researcher we feel that our paper would contribute to the existing theory of knowledge on predictability of the sectoral returns.

Therefore, the present study tries to fill the gap in studies related to sectoral return predictability using index valuation ratios applying predictive regression.

III .METHODOLOGY

Predictive regressions are extensively used in the literature related to stock return predictability. This section discusses the properties, assumptions of predictive regressions. The statistical notation for predictive regression is

$$r_t = a + \beta x_{t-1} + \varepsilon_t \text{-------- eq (1)}$$

Here r_t is the expected sectoral index return and x_{t-1} is the value of predictor variable of previous day. The equation tries to see if the predictor variable of previous day be used to predict the returns of the next day. a is the constant and ε_t being the error term or residual value. In order to establish a relationship between predictor variable and expected returns, it is to be proved that β is not equal to zero. So, the null hypothesis $\beta = 0$ is tested to see if the predictor variable influences the stock returns. But, before proceeding with the tests, issues inherent in the model have to be addressed to ensure unbiased and reliable coefficients. One such issue affecting the strength of predictive regression model is persistency. The existence of persistency in the predictor variable can be checked by running first order autoregressive test on the following model

$$x_t = \phi + p x_{t-1} + \mu_t \text{------- eq (2)}$$

Where, p >1 or close to one indicates that the predictor variable is highly persistent.

The issue of endogeneity also renders the coefficient of predictive regression biased. The predictor variable is exogenous if the error terms of its predictive regression and error terms of its AR(1) model are uncorrelated. This can be tested by running an OLS test on the below equation

$$\varepsilon_t = y u_t + n_t \text{ ------ eq (3)}$$

Here, ε_t is the error term of the predictive regression model and μ_t is the error term of the first order autoregressive model of the predictor variable. The variable is endogenous if the null hypothesis of y =0 is rejected, i.e., if y is significantly different from 0. This proves that the error terms are correlated rendering the variable endogenous. The coefficient of such regression ceases to be efficient. It is important to test the endogeneity of the variable before running the predictive regression.

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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While endogeneity and persistency deal with the biasness of the coefficients; heteroskedasticity and autocorrelation affect the efficiency of the model. Autocorrelations are tested for squared residuals and null hypothesis of no ARCH effect is tested on the residuals of predictive regression. Lewellen (2014) discusses that logged difference of the variables shows no signs of persistency. So, the current paper uses log difference of predictor variables to solve the persistency issue. To solve the endogeneity problem, Generalized Methods of Moments (GMM) proposed by Hansen (1982) has been applied. Newey West (HAC) correction factors have been used to account for the heteroskedasticity and autocorrelation and get robust coefficients.

IV. DATA

Daily index prices for all the eleven sectoral Nifty indices are collected from the official website of National Stock Exchange (NSE). There was no specific intent behind choosing the specific indices. We have selected all the available sectoral indices during the period of the study. The Indices which have been added recently which falls outside the scope of the study period like Nifty Consumer durable index, Nifty Health Care Index, Nifty Financial services 25/50 Index, Nifty Oil and Gas Index was not considered for the study. Hence out of the existing fifteen sectors constituted by the NSE eleven are taken for the study. The eleven sectors considered for study are Auto, Bank, Financial Services, FMCG, Media, Metal, Pharma, PSU Bank, PVT Bank, Realty and IT. The index valuation ratios for each sectoral index are downloaded from the NSE website. The index valuation ratios available are dividend yield ratio, price-to-earnings ratio and price-to-book ratio. The data is collected from the 01/01/2005 to 26/07/2019. The sample period varies from sector to sector depending upon the availability of data. The data for automobile, financial services and media sector was available from 03/04/2006 to 31/07/2019. The data for bank and IT sector is collected from 03/01/2005 to 31/07/2019. The data for FMCG and Pharma sector was available only from 31/01/2011 to 31/07/2019. The data for realty sector is available from 02/01/2007 to 31/07/2019. The data for metal sector was collected from 12/7/2011 to 31/07/2019. The data for PSU bank was available from 11/09/2007 to 31/07/2019. The private bank sector was the only sector for which the data is available only from 04/01/2016. Sectoral returns are calculated as log difference of sectoral index prices and log difference for each of the index valuation ratios are used for the entire analysis.

A. DESCRIPTIVE STATISTICS OF THE DATA

Table I
Descriptive statistics

	FMCG				**IT**				**Media**			
	DY	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**
Mean	-0.000	0.000	0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	0.000
Me	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

P-ISSN: 2204-1990; E-ISSN: 1323-6903
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dian	0	0	0	0	0	0	0	0	0	0	0	0
Max	0.224	0.110	0.284	0.052	0.408	0.358	0.354	0.117	0.829	0.351	0.390	0.125
Min	-0.102	-0.201	-0.278	-0.069	-0.350	-0.224	-0.377	-0.012	-0.392	-0.229	-0.414	-0.178
SD	0.014	0.013	0.015	0.010	0.025	0.019	0.019	0.015	0.030	0.021	0.027	0.017
Skew	3.499	-2.817	1.895	-0.244	3.440	0.778	-1.452	-0.131	6.513	0.158	-0.559	-0.479
Kurt	62.162	40.306	146.00	5.876	85.768	48.025	81.484	8.401	217.59	38.201	63.290	10.748
JB	311294.7	124854.8	17950299	746.650	10358488	304789.4	925662.4	4402.219	63555220	170394.7	499982.3	838650.4
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Self Computed

	Auto				**Bank**				**Financial Service**			
	DY	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**
Mean	0.000	-0.002	-0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000	0.000	0.000	0.000
Median	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Max	0.402	0.138	0.257	0.140	0.747	0.171	0.747	0.172	0.479	0.177	0.177	0.178
Min	-0.216	-0.146	-0.123	-0.103	-0.666	-0.788	-0.660	-0.134	-0.394	-0.178	-0.135	-0.126
SD	0.020	0.015	0.017	0.014	0.030	0.023	0.030	0.018	0.025	0.019	0.018	0.017
Skew	3.702	-0.704	0.757	-0.157	0.624	-10.442	0.062	0.076	1.188	-0.688	0.093	0.084
Kur	83.4	10.9	27.1	8.63	213	340.0	213.	8.61	85.4	13.7	10.0	9.64

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

t	76	17	74	5	.9	4	93	1	13	81	98	3
JB	8980 59.4	8892 .687	8076 3.54	4382 .648	669 547	1715 3083	669 2547	4743 .380	9352 38.3	1625 2.90	6937 .404	6076 .972
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Metal				**Pharma**				**PSU Bank**			
	DY	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**
Mean	0.000	-0.000	-0.000	-0.000	0.000	-0.000	0.000	0.000	-0.001	-0.000	0.000	0.000
Median	0.000	0.000	0.000	-0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Max	0.302	0.178	0.384	0.093	0.555	0.069	0.398	0.050	1.791	0.257	0.641	0.259
Min	-0.187	-0.283	-0.446	-0.073	-0.305	-0.264	-0.239	-0.072	-4.406	-0.208	-0.803	-0.126
SD	0.023	0.020	0.029	0.016	0.022	0.013	0.022	0.011	0.009	0.024	0.040	0.022
Skew	2.493	-0.932	-0.501	0.044	6.344	-4.434	2.173	-0.310	-28.688	0.202	0.116	0.695
Kurt	42.588	31.359	70.996	4.333	211.86	80.219	79.924	5.2882	1384.1	14.46	157.84	12.065
JB	131814.4	66674.55	38273.3	148.2461	384048 6	52989 6.0	52065 3.8	493.1303	2.33e+08	16092.16	232688 0	10257.16
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

	Realty				**Pvt Bank**			
	DY	**PB**	**PE**	**returns**	**DY**	**PB**	**PE**	**returns**
Mean	0.000	-0.001	-0.000	-0.000	-0.001	0.000	0.000	0.000
Med	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

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Max	2.159	0.337	0.290	0.212	0.810	0.043	0.105	0.041
Min	-1.335	-0.686	-0.708	-0.270	-1.019	-0.054	-0.068	-0.040
SD	0.072	0.036	0.039	0.027	0.060	0.011	0.012	0.010
Skew	7.097	-3.624	-2.983	-0.471	-1.177	-0.284	1.082	0.066
Kurt	373.727	70.896	60.918	10.479	172.45	5.322	15.388	4.346
JB	1781871 6	6035958.6	4388788	7372.530	1058142	210.6495	5824.471	67.42315
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table I reports the descriptive statistics for all the eleven sectors of NSE for all the variables under study. The mean and median of the sectoral index returns is equal except for PB of auto, realty and Pvt bank sector and DY of Pharma sector. SD of DY of realty sector is the highest as compared to all other variables of remaining sectors. A significant Jarque-Bera shows that data is not normal for all the variables of all the sectors. This is in line with previous studies. Stock returns are generally known to show signs of non-normality. Stationarity of the variables is more important for further analysis rather than normality. As, the mean and median are equal for most of the variables and a lower standard deviation renders the data fit for analysis.

B. UNIT ROOT TESTS

Time series data needs to be stationary to conducted further tests and analysis. This section tests the null hypothesis of no unit root for all the eleven sectoral indices and three index valuation ratios for each sector. The unit root test is conducted using Augmented Dickey-Fuller (1981) with intercept only. Log difference of each variable is tested for stationarity. Test statistics and optimum lag length calculated values using Schwarz Information Criterion method is mentioned in Table II. The lag length is reported in the square brackets. It can be seen from the results that null hypothesis of no unit root is strongly rejected for returns and predictor variables for all the eleven sectors.

Table II

Unit root results

	Returns Test statistic	**DY Test statistic**	**PB Test statistic**	**PE Test statistic**
Auto	-50.729*** [0]	-55.168*** [0]	-52.157*** [0]	-52.424*** [0]

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

Bank	-53.242*** [0]	-31.466*** [0]	-65.481*** [0]	-62.064*** [0]
Financial services	-51.222*** [0]	-51.943*** [0]	-51.623*** [0]	-51.251*** [0]
FMCG	-44.256*** [0]	-45.396*** [0]	-45.292*** [0]	-45.407*** [0]
Media	-52.739*** [0]	-56.629*** [0]	-52.908*** [0]	-55.376*** [0]
Metal	-42.680*** [0]	-45.107*** [0]	-43.063*** [0]	-45.835*** [0]
Pharma	-42.570*** [0]	-46.836*** [0]	-43.559*** [0]	-42.531*** [0]
PSU bank	-49.252*** [0]	-54.766*** [0]	-50.303*** [0]	-18.418*** [0]
Pvt Bank	-27.930*** [0]	-14.842*** [2]	-28.318*** [0]	-28.187*** [0]
Realty	50.253*** [0]	55.866*** [0]	-52.741*** [0]	-52.870*** [0]
IT	-44.525*** [1]	-60.017*** [0]	-44.395*** [1]	-43.413*** [1]

Source: Self Computed

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

Note: Significant at *10%, **5% and ***1% levels

C. HETEROSKEDASTICITY

Heteroskedasticity is tested by running the predictive regression for each predictive variable for each sector. ARCH test was applied to test for the null hypothesis of homoskedasticity of residuals. The results are reported in Table III. The results indicate that the coefficients of OLS regression are biased as the residuals are heteroskedasticity.

Table III
Heteroskedasticity test results

	DY Test statistic	**PE Test statistic**	**PB Test statistic**
Auto	22.053***	22.280***	21.513***
Bank	39.901***	40.151***	40.559***
Financial services	43.338***	44.210***	43.858***
FMCG	4.757***	4.715***	4.676***
Media	28.132***	28.292***	29.186***
Metal	7.486***	7.649***	7.550***
Pharma	3.888***	3.742***	3.860***
PSU bank	4.092***	2.951***	3.886***
Pvt Bank	5.030***	5.043***	5.173***
Realty	28.142***	30.229***	31.135***
IT	38.741***	34.854***	36.569***

Source: Self Computed
Note: Significant at *10%, **5% and ***1% levels

D. AUTOCORRELATION

The residuals of the predictive regression are tested for the presence for autocorrelation. The autocorrelation is tested by conducting Ljung-Box Q-test. The test statistic is reported in the

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

Table IV. The lags used is twelve for all the sectors. Mixed results are obtained. The null hypothesis of no autocorrelation is strongly rejected for all the predictor variables of bank, financial services, PSU bank, IT and realty sector. On the contrary, the predictor variables of FMCG, Metal, Pharma and PVT bank show signs of no autocorrelation. For the auto sector and media sector, PB and PE variables indicate the presence of autocorrelation whereas DY doesn't show autocorrelation.

Table IV
Autocorrelation test results

	DY Test statistic	**PE Test statistic**	**PB Test statistic**
Auto	30.623***	19.956*	16.384
Bank	52.222***	32.537***	35.252***
Financial services	44.282***	31.14***	36.094***
FMCG	17.861	18.193	17.756
Media	23.525**	19.409*	15.618
Metal	17.871	17.065	14.575
Pharma	8.101	6.964	4.528
PSU bank	41.439***	34.585***	18.203
Pvt Bank	11.161	8.9486	8.7431
IT	26.248***	50.399***	41.753***
Realty	47.412***	26.937***	22.318**

Source: Self computed
Note: Significant at *10%, **5% and ***1% levels

E. PERSISTENCY TEST

The rejection of unit root doesn't necessarily mean that the variables are not persistent. A first order autoregressive model is run for returns and predictor variables of each sector to check for the problem of persistency. The variables are considered to be persistent if the coefficients are close to 1. Literature is divided in their approach to find persistency. Bannigidadmath and Narayan (2016) reports that the returns and predictor variables are persistent as the first order

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

regressive model on raw data is conducted. Lewellen (2004) reports the existence of persistency of financial ratios and returns of individual stocks, but the first-order auto regressive model run on natural log of the variables does not show sign of persistency. The current study however deviates from these approaches and conducts first-order auto regressive model on log difference of predictor variables as the predictive regression model used in the entire study uses log difference of variables and hence persistency is checked on log difference. The coefficients are reported in Table V. The results indicate that the predictor variables are free from persistency problem for each and every sector. In unreported results, the variables showed signs of persistency with coefficients close to 1 in their raw form. However, the log difference of the variables showed no signs of persistency as the coefficients are much lesser than 1. These results are also supported by strong rejection of unit root tests reported in the previous section.

Table V
Persistency test results

	DY Test statistic	**PB Test statistic**	**PE Test statistic**	**Returns Test statistic**
Auto	0.040	0.095***	0.090***	0.123***
Bank	-0.015	0.096***	0.080***	0.120***
Financial services	0.100***	0.106***	0.113***	0.114***
FMCG	0.008	0.034	0.009	0.035
Media	0.013	0.080***	0.036**	0.084***
Metal	-0.016	0.033	-0.029	0.043*
Pharma	-0.022	0.050**	0.071***	0.074***
PSU bank	-0.012	0.072***	0.027	0.093***
Pvt Bank	-0.107***	0.046	0.051	0.060*
IT	-0.003	0.018	0.046***	0.027*
Realty	-0.002	0.054***	0.051***	0.103***

Source: Self Computed

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

Note: Significant at *10%, **5% and ***1% levels

F. ENDOGENEITY TEST

The predictive regression often suffers from endogeneity problem. Previous studies have argued that as the stock prices of an individual stock increases DY of that company would decrease. This would apply to other predictor variables as well. Thus, the predictor variables are not truly exogenous but suffer from a simultaneity bias problem and are endogenous. This affects the efficiency of coefficients of the predictive regression. The presence of endogeneity is tested using eq (3) which checks if the error terms of eq (1) and eq (2) are correlated. A significant coefficient, rejecting null hypothesis of $y = 0$ proves the existence of endogeneity problem. The coefficients of eq (3) are reported in Table VI. All the predictor variables across eleven sectors show endogeneity problem except for PE of Financial service sector.

Table VI
Endogeneity test results

	DY Test statistic	**PB Test statistic**	**PE Test statistic**
Auto	-0.482***	0.823***	0.676***
Bank	-0.346***	0.815***	0.755***
Financial services	-0.517***	0.847***	0.90***
FMCG	-0.556***	0.619***	0.443***
Media	-0.314***	0.594***	0.359***
Metal	-0.506***	0.683***	0.307***
Pharma	-0.250***	0.673***	0.236***
PSU Bank	-0.033***	0.628***	0.251***
Pvt bank	-0.036***	0.816***	0.677***
IT	-0.337***	0.596***	0.570***
Realty	-0.131***	0.518***	0.415***

Source: Self Computed
Note: Significant at *10%, **5% and ***1% levels

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G.PREDICTIVE REGRESSION RESULTS

This section discusses the results of predictive regression. As the data used for the study suffers from only endogeneity Generalized Methods of Moments is used instead of Ordinary Least Square (OLS) and popular Generalized Least Square (GLS) Method.

GMM approach solves the endogeneity problem of the predicting variable arising from the simultaneity bias. It also yields heteroskedasticity and autocorrelation corrected robust estimates (Hansen, 1982; Gwilym *et al*., 1999). The GMM gives more robust estimates when the regression suffers from heteroskedasticity. In the absence of heteroskedasticity IV estimator would give more efficient estimates than GMM (Baum, Schaffer & Stillman, 2003). The presence of heteroskedasticity is proved in the earlier tests in the predictive regression used for the study and therefore, GMM would be the most suitable test. As the predictor variables are not persistent GLS is not suitable for this regression model. The data used in the study suffers from heteroskedasticity and autocorrelation. To solve the heteroskedasticity and autocorrelation biasness Newey West bias correction is used. The results are reported in Table VII.

Table VII

Predictive regression results

	DY		PE		PB	
	Test statistic	J statistic [p-value]	Test statistic	J statistic [p-value]	Test statistic	J statistic [p-value]
Auto	-0.124***	0.319 [0.852]	0.128***	0.197 [0.905]	0.125***	0.212 [0.899]
Bank	-0.108***	7.026 [0.029]	0.116***	5.034 [0.081]	0.115***	4.665 [0.097]
Financial services	-0.102***	2.919 [0.232]	0.105***	3.200 [0.201]	0.103***	2.912 [0.233]
FMCG	-0.014*	5.026 [0.081]	0.035	0.808 [0.667]	0.038*	3.899 [0.142]
Media	-0.085***	1.048 [0.591]	0.094***	0.077 [0.961]	0.088***	0.273 [0.872]
Metal	-4.039***	79.693 [0.000]	10.937***	3.750 [0.153]	14.663***	19.651 [0.000]
Pharma	-0.075***	0.123 [0.939]	0.077***	0.492 [0.781]	0.0743***	0.113 [0.944]
PSU Bank	-0.097***	3.948 [0.138]	0.136***	2.292 [0.317]	0.087***	5.672 [0.058]
Pvt bank	-0.022	2.767 [0.251]	0.045	1.154 [0.561]	0.054	0.154 [0.925]
IT	-0.015	5.994 [0.049]	0.013	6.026 [0.049]	0.015	5.959 [0.051]

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Realty	-0.098***	7.573 [0.022]	0.121***	2.535 [0.281]	0.117***	4.715 [0.094]

Source: Self Computed
Note: Significant at *10%, **5% and ***1% levels

The results indicate that the predictor variable DY i.e dividend yield ratio for the sector is a significant indicator in predicting the sectoral index returns. The negative sign of the coefficient implies that increase in dividend yield ratio leads to lower returns. A lower dividend yield would send a positive signal to the traders as this implies that the company has plans for expansion and thereby reducing the dividend payout. DY predicts the returns in nine out of eleven sectors. The findings are in agreement with the findings of the previous studies by Avramov and Chordia (2006), Kothari and Shanken (1997) and Campbell and Yogo (2006). The studies indicate that the DY predicts the returns. However the study reveals that DY does not predict the stock returns in both Private bank index and IT sectors. This implies for these sectors other variables affect the sectoral index returns more than DY.

PE turns out to be a significant predictor of sectoral returns for eight out of eleven sectors. PE shows a positive impact on the returns of the Auto, Bank, Financial services, Media, metal, pharma and Realty sectors. The results are in line with Hjalmarsson (2010). The findings indicate that an increase in the PE ratio would increase the returns the following day. The quantum of impact differs from sector to sector. Metal sectors shows that one percent change in PE causes approximately 11 percent increase in returns. Pharma sector shows least influence, one percent change in PE in this sector causes approximately 8 percent increase in returns. Three sectors, FMCG, Private bank and IT do not show a significant influence of PE on the returns. There could be various other factors which could have significant impact on the returns of these sectors.

The last predictor variable PB i.e price to book ratio influences returns for nine out of eleven sectors. The findings show that an increase in PB ratio causes an increase in index returns the following day. The influence is highest in Metal sector with one percent change in PB casues 14 percent increase in returns. FMCG shows a very less influence of PB on retunrs of only 4 percent. However PB ratios are found to be weak predictors of the returns of IT and Private Bank index. The results are in consistent with findings from the previous studies on Chinese market suggesting PB ratio is a weak predictor (Jiang *et al*., 2011; Wang and Xu, 2004)

IV. KEY FINDINGS OF THE STUDY

- The three index valuation ratios DY, PE and PB predicts the returns of the eight out of eleven sectoral indicies. Hence ratios in these sectors can be used to predict the index returns guiding the investment decisions.
- DY predicts returns for nine out of eleven sectors except Private Bank and IT index. Hence the DY ratio annouced by NSE can be used to gauge the market sentiments before making the investment and also to predict the returns of the markets.

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- The use of index valuation ratios in prediction of the returns of the Private bank and IT index is not advisable since the study reveals that the DY, PE and PB have very little impact on the returns.
- Further the predictive abilities of the ratios vary across different sectors. The results highlight that the return predictions are sector specific and not to the market as a whole. Further the result that the predictive capabilities vary across the sectors is in alignment with the previous studies (Narayan *et al*., 2011; Narayan and Sharma, 2011; Hong *et al*., 2007b).

V. SUMMARY AND CONCLUSION

The paper examines the sectoral index return predictibility for eleven sectors of the market. The study uses monthly data from National Stock Exchange. Three index valuation ratios such as Dividend yield (DY), Price-Earning (PE) and Price to Book ratio (PB) are used to test the predictive capability of these ratios on the sectoral index returns. To summarise, the paper reveals that not all the three index valuation ratios predict returns in all eleven sectors. Some index valuation ratios are strong predictors for few sectors, while prediction of returns in other sectors using index valuation ratios may not be feasible. However most of the index valuation ratios are found to be strong predictors for majority of the sectors in varying degrees. The investors can use the index valuation ratios published on NSE webite to predict the sectoral indices except for FMCG, Pvt bank and IT sector. These valuation ratios - dividend yield, price-earning and price to book ratio should be closely monitored by investors investing in metal sectoral indices as the findings show a strong association between the ratios and returns for this sector. The findings indicate that one per cent decrease in dividend yield would cause 4 per cent increase in returns, one percent change in PE ratio would result in 11 per cent increase in returns and one per cent change in PB ratio would increase returns by 15 per cent. The probable reasons for the inverse relationship particluarly with the dividend yield and index returns may emanate from the belief that companies which pay higher dividend may not be able to sustain such dividend payouts in the future and the investors perception that the company has little left to reinvest in the expansion plans. Therefore, investors are advised to invest in metal sectoral indices when the DY is declining and PE and PB ratios are increasing. Thus the paper attmepts to investigate the impact of the index valuation ratios on the the stock returns.It is evident from the results that majority of the sectors have a greater role in the stock indices. This simply means the the investors need to pay close attention to Index valuation ratios as they have the power to drive and change the direction of the index values which in turn can affect the individual stocks. The paper provides insights and avenues for the investors and fund managers to focus on the these strong predictor ratios while investing in sectoral funds and to guage the market sentiments about these sectors.

VI. SCOPE FOR FUTURE RESEARCH

The current study has contributed towards the emerging line of studies of establishing the role of index valuation ratios in predicting sectoral returns. However, there is a need to study the

P-ISSN: 2204-1990; E-ISSN: 1323-6903
DOI: 10.47750/cibg.2021.27.02.468

comprehensive influence of all the variables influencing sectoral retunrs. The current study shows that the log difference of the variable help in solving the persistency problem and therefore, deals with only the endogeneity problem. Hence, this paper deviates from a legion of studies that have used the popluar GLS method. The future research in this area needs to identify stronger instruments than the lagged varibles used in the study as instruments. Future research is required to test the forecasting ability of the index valuation ratios.There is a also scope to use more robust and sophisticated statistical tools to validate the findings of our results.

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