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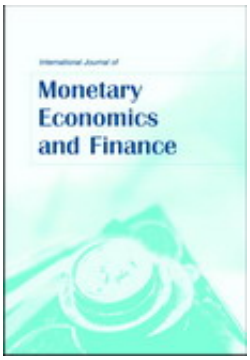

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Indian stock market sensitivity to macroeconomic and non-macroeconomic factors: an industry-level analysis

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Abstract: This paper examines the impact of macroeconomic factors and non-macroeconomic factors on the ten stock indices of the National Stock Exchange using the quantile regression methodology and the monthly dataset from April 2010 to May 2022. We find that the exchange rate has less influence on IT, infra, pharma, FMCG and realty stock returns. Further, all the sectors except energy are not sensitive to inflation. Moreover, financial services, infra, pharma, private banks and realty are the sectors where the impact of interest rates is not visible. The sectors that are not affected by geopolitical risk include auto, infra, IT, pharma, private and public sector banks. Furthermore, the financial services, infra, pharma, private bank sectors are affected by economic policy uncertainty. The volatility has a negative impact and the Nifty has a positive impact on all the sectors. Our results are useful for investors and portfolio managers to make informed investment decisions and manage their portfolio risk.

Keywords: macroeconomic; non-macroeconomic; stock returns; quantile regression; India.

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Pravin Jadhav is an accomplished scholar and educator with expertise in international business and infrastructure planning. He obtained his PhD from the Indian Institute of Foreign Trade (IIFT) and completed his post-graduation in Economics from the University of Pune. He has conducted extensive research for the Indian government and the European Union, focusing on areas such as foreign direct investment and technology intensity in India's manufacturing exports. He has published numerous research papers, participated in international conferences, and served as a reviewer for esteemed journals. He currently works as an assistant professor at the Institute of Infrastructure, Technology, Research, and Management (IITRAM) and is recognised for his contributions to the field.

1 Introduction

The stock market and macroeconomic and non-macroeconomic factors are closely related to each other. The stock market's performance is often seen as a barometer of the economy's overall health, and macroeconomic and non-macroeconomic factors can affect the stock market in various ways. The previous studies reveal that exchange rates, interest rates, and inflation are some of the most important macroeconomic factors that affect stock markets. (Chkili and Nguyen, 2014; Jareño et al., 2016; Winarto et al., 2017) The changes in interest rates can impact the cost of borrowing money and can affect the profitability of companies and vice versa. Further, high inflation can increase the cost of goods and services, leading to reduced consumer spending and lower corporate profits. This can lead to lower stock prices. Exchange rates can have a significant impact on the stock market as the countries are closely linked to global markets.

Along with the macro variables, the previous literature also supports the non-macro variables' influence on stock returns (Li et al., 2016; Hoque and Zaidi, 2020; Nandini et al., 2023; Salisu et al., 2022). Geopolitical events can create uncertainty and fear among investors, leading to market volatility and a decrease in stock prices. In this paper, we use the Geopolitical risk index, constructed by Caldara and Iacoviell (2022) as one tool to assess the potential impact of geopolitical risk on the stock market. The Economic Policy Uncertainty Index (EPU Index), proposed by Baker et al. (2016), measures the level of uncertainty in the economy, based on news coverage of economic policy issues. Volatility refers to the degree of fluctuation in the stock market. The impact of volatility on stock returns can be both positive and negative, depending on the investment strategy and the level of risk that an investor is willing to take. Further, industries in any economy do not have similarities due to a variety of factors that differentiate them from one another. India is one of the fastest-growing economies in the world. India's economy has experienced significant growth over the past few decades, making it one of the fastest-growing major economies in the world (Shamsi et al., 2014). In this context, we expect that macro and non-macroeconomic factors may have diverse impacts on industries in the Indian stock market.

The above discussion motivated us to undertake this study for several reasons. First, diverse sectors in India are exposed to different risks stemming from economic

fluctuations. Knowledge of varying impacts can aid in building a more diversified portfolio and risk management practices. Second, understating the effect of macro and non-macroeconomic factors across sectors in India helps policymakers formulate more targeted and effective sector-specific policies.

We ask the following unanswered questions.

1 Is the impact of the macro and non-macroeconomic factors heterogeneous across different sectors in India? We raise this question because the Indian industries are diversified significantly in size and scale, technology intensity, global presence, growth rate, export contribution, government support and regulations, capital intensity and market competition.

2 Is there any symmetric or asymmetric dependence between the variables?

We address this question to understand whether or not the relationship between the variables is the same in both directions. In this context, our paper examines the impact of macroeconomic and non-macroeconomic factors on stock returns of 10 National Stock Exchange (NSE) indices in India.

Our contributions to the existing literature to the best of found knowledge in various ways. First, this is the first attempt to investigate the impact of macro and non-macroeconomic factors on different sectors in India context. Second, using the quantile regression (QR) methodology, we find a complex and dynamic relationship between macroeconomic and non-macroeconomic factors and stock returns across different sectors in India. Our results can be helpful for investors to make informed investment decisions and manage their portfolio risk.

The rest of the paper is organised as follows. Section 2 highlights the review of relevant literature. Section 3 shows data and explains the QR methodology. Section 4 illustrates empirical results. Finally, Section 5 gives the paper's conclusion.

2 Review of literature

The previous studies establish the theoretical linkages of macroeconomic and non-macroeconomic factors with stock returns. For example, high inflation tends to lower stock returns and vice versa. High inflation erodes the value of money over time, reducing the purchasing power of investors' returns. This leads investors to demand higher returns on their investments to compensate for the loss of purchasing power, driving down stock prices. However, some companies may be better able to pass on higher costs to consumers during inflationary periods, which help to mitigate the adverse effects on their stock prices (Jareño et al., 2016; Ray, 2012; Singh and Padmakumari, 2020). Further, a depreciation of the Indian rupee against other major currencies, such as the US dollar, increases the cost of imports for Indian firms, such as raw materials and capital goods, which leads to higher production costs and lower profitability (Chkili and Nguyen, 2014). Additionally, higher interest rates increase the borrowing cost for companies, reducing their profitability and lowering stock prices. Further, when interest rates are high, fixed-income investments become more attractive relative to stocks, which reduces demand for stocks and lower their prices (Bhanumurthy et al., 2019; Jareño et al., 2016; Kinoshita, 2006). Moreover, when there is high economic policy uncertainty and

geopolitical risk, investors become more cautious, which leads to a decrease in investment and consumption, which negatively affects the overall economy and the stock market and vice versa (Balcilar et al., 2018; Hoque and Zaidi, 2020; Škrinjarić and Orloví, 2020; Salisu et al., 2022). The previous studies show that when the Nifty performs well, it typically indicates that the Indian stock market is performing well. It leads to increased investor confidence and optimism, boosting stock prices and vice versa (Karthigai Prakasam Chellaswamy et al., 2021; Nandan et al., 2016; Shanthi and Thamilselvan, 2019). Regarding volatility in the stock market, when volatility is high, stock prices tend to fluctuate more, which leads to increased risk for investors and lower stock prices (Akdağ et al., 2019; Bagchi, 2012; Chandra and Thenmozhi, 2015).

The latest study by Salisu et al. (2022) finds that the stock market volatility in emerging economies responds more positively to GPR using GARCH – MIDAS approach. Further (Rawat and Arif, 2018) find no homogeneity between BRIC (Brazil, Russia, India, China) equity returns and their country GPR using Quantile on quantile regression. This result is in similar line with Balcilar et al. (2018), who reveals that the effects of GPR on the BRICS (Brazil, Russia, India, China and South Africa) stock markets return and volatility are not a uniform way using nonparametric causality-in-quantiles tests. The findings of Hoque and Zaidi (2020) detect that the stock returns of Brazil, India, Indonesia, South Africa, and Turkey are influenced by global and country-specific GPR employing a three-regime Markov-switching approach.

Several studies examine the effects of EPU on stock markets. (Škrinjarić and Orloví, 2020) examine how the EPU shocks affect Central and Eastern European stock market returns using vector autoregression (VAR). Czech Republic, Lithuania, Slovenia, and Poland react significantly to EPU compared to other countries. Balcilar et al. (2019) analyse the role of inland and global (China, the European Area, Japan, and the US) EPU to predict volatility and stock return of Hong Kong, Malaysia, and South Korea.

Ashwani and Sheera (2018) explain that exchange rate, money supply, and treasury bills rate create stock market volatility using the MIDAS GARCH approach. Faniband et al. (2022) find a heterogeneous relationship between sugar industry-specific factors and sugar companies' stocks. Nayak and Barodawala (2021) reveal the association between significant macroeconomic variables and Sensex using the ARDL model. Paul and Mallik (2003) find cointegration between bank and finance stock prices and macroeconomic variables proxied by inflation, interest rate and real gross domestic product (GDP) growth in Australia. They also find that interest rate negatively affects whereas GDP growth positively influences stock prices and inflation does not affect stock prices. (Gay, 2016) find no significant relationship of stock market prices with currency rates and oil prices for Brazil, Russia, India, and China using the Box-Jenkins ARIMA model. (Faniband and Karthigai Prakasam, 2019) notice a heterogeneous impact of a stock index, volatility index (VIX) and EPU of India and US on differential voting rights and ordinary stocks in India. (Chen, 2007) studies the linkages of between hotel stock returns with macro and non-macro variables in China. Further Rehman et al. (2016) find that industrial production and foreign inflow in equity are the determinants of stock market liquidity. Jareño et al. (2016) apply quantile regression and find that the US stock market has a significant association with inflation and interest rates. (Chellaswamy et al., 2020) show that stock markets in India and China react to their interest and inflation rates.

Quite a few studies examine the impact of stock market volatility on stock returns. (Bagchi, 2012) find that stock returns significantly and positively react to India VIX. On the other hand (Chandra and Thenmozhi, 2015) reveals that Nifty returns respond negatively to the India VIX. (Shanthi and Thamilselvan, 2019) find that BSE Sensex and Nifty volatility is caused by foreign capital inflow, balance of payment, currency and interest rates.

The previous studies mainly focus on the effect of various macro and non-macroeconomic variables on the stock market in general. Against this background, this study investigates the impact of macro and non-macroeconomic variables (considered for this study) on different sectors in the Indian stock market because they share differences size and scale, liquidity and expansion opportunities.

3 Data and variables

As noted earlier, we examine the impact of macroeconomic and non-macroeconomic factors on 10 sectors which are proxied by 10 stock indices of NSE in India. We consider exchange rate (expressed as US dollar to Indian rupee), interest rate ((less than 24 h: call money/interbank rate) and inflation (proxied by consumer price index) as macroeconomic variables. The selection of these variables is supported by Ashwani and Sheera (2018), Chellaswamy et al. (2020), Gay (2016), Jareño et al. (2016) and Nayak and Barodawala (2021). In addition to macroeconomic variables, we include non-macroeconomic variables as proxied by EPU, GPR, VIX and Nifty (index of NSE). The selection of non-macro variables is supported by Li et al. (2016), Bagchi (2012), Chandra and Thenmozhi (2015), Hoque and Zaidi (2020), Salisu et al. (2022) and Sohail Rawat and Arif (2018). We include 10 indices of NSE, namely Nifty auto, Nifty financial services, Nifty FMCG, Nifty infra, Nifty IT, Nifty energy, Nifty Pharma, Nifty private bank, Nifty PSU bank and Nifty realty as dependent variables. The impact of macro and non-macroeconomic factors on each variable is examined.

In this paper, we consider a monthly dataset from April 2010 to May 2022. Thus, the total number of observations are 146.

The data on all macroeconomic factors are obtained from the FRED database. The data of EPU and GPR are collected from policyuncertainty.com. Volatility index data are gathered from the website of nseindia.com and the data of various nifty indices are captured from niftyindices.com.

Table 1 indicates the descriptive statistics and unit root results of dependent and independent variables. In the case of dependent variables, the mean values of all the stock indices except auto, IT and private banks are more than the median values. Thus, these variables are turned (skewed) on the right. Moreover, the kurtosis value for all the variables is more than the baseline value, which is equal to 3, revealing the state of heavy tails compared with the Gaussian distribution (leptokurtic distributions). The Jarque-Bera (JB) test strongly rejects the hypothesis of normality for all the variables. All the variables under investigation are found to be stationary at the level. Furthermore, in the case of independent variables, all the variables except EPU and nifty are skewed to the right because mean values are more than the median values. All the independent variables have no unit root at the level. Figure 1 shows the historical time series returns of the stock indices.

Table 1 Descriptive statistics and unit root tests

	Auto	*Energy*	*Financial services*	*FMCG*	*Infra*	*IT*	*Pharma*	*Private Bank*	*PSU Bank*	*Realty*	*CPI*	*IR*	*ER*	*EPU*	*GPR*	*Nifty*	*VIX*
Mean	0.046	0.037	0.050	0.054	0.014	0.049	0.039	0.053	–0.006	–0.001	0.544	0.126	0.399	–0.082	0.176	0.737	0.024
Median	0.074	0.012	0.049	0.044	–0.001	0.050	0.037	0.058	–0.024	–0.030	0.538	–0.172	0.208	1.571	0.161	1.584	–0.006
Maximum	1.228	0.931	1.028	0.465	0.915	0.882	1.456	1.086	1.384	1.449	3.379	27.536	5.998	113.046	0.478	9.583	1.772
Minimum	–1.799	–0.975	–1.789	–0.560	–1.159	–0.885	–0.717	–2.142	–1.830	–2.234	–1.660	–21.588	–3.634	–80.303	0.064	–23.593	–0.472
Std. Dev	0.346	0.300	0.350	0.205	0.321	0.297	0.271	0.393	0.519	0.537	0.738	5.893	1.699	36.367	0.078	4.147	0.245
Skewness	–1.027	0.030	–0.885	–0.112	–0.050	–0.326	0.745	–1.033	0.025	–0.378	0.140	0.982	0.526	0.076	1.347	–1.552	2.723
Kurtosis	8.250	3.593	7.431	2.634	3.820	3.641	7.035	8.765	3.593	4.542	4.599	11.106	3.776	3.213	5.114	9.926	19.556
JB	193.359***	2.160***	138.483***	1.118***	4.153***	5.092***	112.540***	228.125***	2.153***	17.933***	16.028***	423.199***	10.385***	0.415***	71.364***	350.425***	1847.926
ADF	–11.78***	–13.27***	–12.88***	–12.54***	–12.69***	–13.21***	–12.78***	–13.17***	–11.41***	–11.73***	–6.92***	–8.73***	–9.22***	–11.69***	–8.07***	–9.75***	–14.03***
KPSS	0.11	0.37	0.04	0.36	0.22	0.10	0.19	0.07	0.04	0.21	0.40	0.43	0.19	0.17	0.54	0.09	0.16

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

4 Methodology

QR methodology, proposed by Koenker and Bassett (1978), is a statistical technique used to estimate the effects of independent variables across different parts of the distribution of the dependent variable. Unlike traditional linear regression, which estimates the conditional mean of the dependent variable, quantile regression estimates the conditional quantiles of the dependent variable. It can be useful for identifying heterogeneous effects, where the relationship between variables may differ across different parts of the distribution. Further, quantile regression can also be used to model tail risk or the risk of extreme events in the distribution of the dependent variable. By estimating the conditional quantiles of the dependent variable, quantile regression can provide insights into the likelihood and severity of extreme events. In this context, we use this method to examine the relationship between macroeconomic and non-macroeconomic variables and stock returns across different quantiles of the stock return distribution and the likelihood and severity of extreme events.

The QR model of Koenker and Bassett (1978) can be written as

$$y_i = x_i^{'}\beta_\theta + u_{\theta i} \text{ with } Q_\theta\left(y_t|x_t\right) = x_t^{'}\beta_\theta \tag{1}$$

where $x_t^{'}$ indicates a vector of regressors, β_θ denotes the vector of parameters to be estimated, and $u_{\theta i}$ represents a vector of residuals. $Q_\theta\left(y_t|x_t\right)$ refers the θth conditional quantile of y_i given $x_i^{'}$.

The θth regression quantile solves the following problem:

$$\begin{aligned} &\underset{\beta}{min} = \sum_i \theta\left|y_i - x_i\,\beta\right| + \sum_i (1-\theta)\left|y_i - x_i\,\beta\right| \\ &= \underset{\beta}{min} \sum_i \rho_\theta u_{\theta it},\ \theta \in (0,\ 1) \end{aligned} \tag{2}$$

where ρ_θ is known as the 'check function' and defined as:

$$\rho_\theta\ (\varepsilon) = \theta\ \varepsilon \text{ if } \varepsilon \geq 0$$

$$(\theta - 1)\ \varepsilon \text{ if } \varepsilon < 0$$

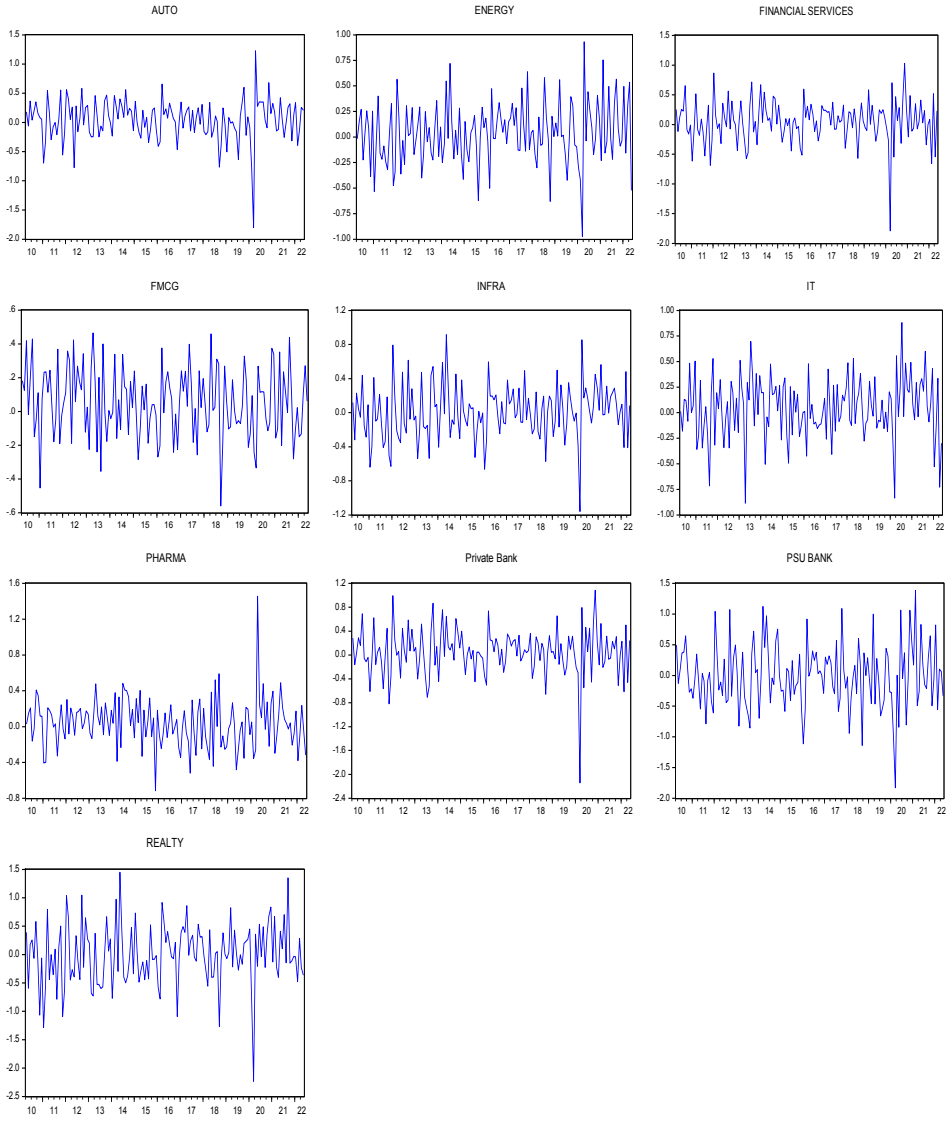
The linear programming technique is used to solve equation (2). The median regression is obtained by setting $\theta = 0.5$. Other quantiles of the conditional distribution can be found through variations of θ. This paper uses the bootstrap method illustrated in Buchinsky (1995) to obtain estimates of the standard errors for the coefficients in QR.

Before running the model, we test the multi-collinearity in the variables using the variance inflation factor. We demonstrate that we do not have variables that are correlated with one another.

The following equation is the basic model of this empirical study:

$$\begin{aligned} SR_{it} = {} & \alpha_i + \beta_1 ER_t + \beta_2 CPI_t + \beta_3 IR_t + \beta_4 GPR_t + \beta_5 EPU_t + \beta_6 VIX_t \\ & + \beta_7 Nifty_t + \varepsilon_{it} \end{aligned} \tag{3}$$

Figure 1 Historical time series stock returns (see online version for colours)



5 Results and discussion

In this section, Tables 2–11 present the results of the impact of macro and non-macroeconomic variables on different sectors in India.

Table 2 QR estimates for auto stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	0.002	0.004	0.004	0.013	0.026	0.022	0.023	–0.001	–0.001
	(0.020)	(0.020)	(0.021)	(0.017)	(0.019)	(0.020)	(0.022)	(0.022)	(0.026)
CPI	0.003	0.004	0.021	–0.004	–0.004	–0.022	–0.023	–0.051	–0.072
	(0.040)	(0.038)	(0.040)	(0.033)	(0.035)	(0.038)	(0.042)	(0.042)	(0.050)
IR	0.002	0.002	0.003	0.007*	0.007	0.009*	0.007	0.004	0.004
	(0.001)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
GPR	0.110	0.110	0.238	0.368	0.272	0.212	0.006	0.098	0.566
	(0.340)	(0.344)	(0.366)	(0.298)	(0.324)	(0.344)	(0.386)	(0.382)	(0.454)
EPU	0.004	0.004	0.003	–0.002	–0.001	–0.002	–0.003	–0.001	–0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.354***	–0.346***	–0.334**	–0.463***	–0.460***	–0.442***	–0.553***	–0.502***	–0.631***
	(0.120)	(0.120)	(0.128)	(0.104)	(0.113)	(0.120)	(0.135)	(0.134)	(0.159)
Nifty	0.041***	0.043***	0.045***	0.041***	0.045***	0.049***	0.045***	0.027***	0.034***
	(0.010)	(0.009)	(0.009)	(0.007)	(0.008)	(0.009)	(0.010)	(0.010)	(0.011)
Constant	–0.194***	–0.185***	–0.163**	–0.095	–0.043	0.022	0.151**	0.248***	0.264***
	(0.070)	(0.068)	(0.072)	(0.059)	(0.064)	(0.068)	(0.076)	(0.075)	(0.089)

Standard errors in parentheses. *$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Table 3 QR estimates for energy stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	–0.012	–0.001	–0.010	–0.009	–0.010	–0.028	–0.031	–0.021	–0.029
	(0.016)	(0.020)	(0.023)	(0.025)	(0.021)	(0.019)	(0.019)	(0.024)	(0.039)
CPI	–0.017	–0.051	–0.019	–0.020	–0.010	0.036	0.035	0.081*	0.086
	(0.030)	(0.038)	(0.044)	(0.047)	(0.039)	(0.037)	(0.037)	(0.045)	(0.073)
IR	–0.009**	–0.004	0.000	–0.005	–0.003	0.002	0.001	–0.003	–0.002
	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)	(0.005)	(0.009)
GPR	0.507*	0.517	0.584	0.591	0.736**	0.793**	0.590*	0.841**	0.484
	(0.276)	(0.352)	(0.399)	(0.433)	(0.355)	(0.336)	(0.337)	(0.409)	(0.670)
EPU	–0.001	–0.003	0.004	0.001	0.002	0.002	–0.001	–0.003	–0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
VIX	–0.296***	–0.264**	–0.369***	–0.132	–0.244*	–0.283**	–0.283**	–0.290**	–0.247
	(0.097)	(0.123)	(0.140)	(0.151)	(0.124)	(0.118)	(0.118)	(0.143)	(0.234)
Nifty	0.035***	0.041***	0.032***	0.030***	0.026***	0.023***	0.019**	0.019*	0.026
	(0.007)	(0.009)	(0.010)	(0.011)	(0.009)	(0.008)	(0.008)	(0.010)	(0.017)
Constant	–0.366***	–0.293***	–0.206***	–0.138	–0.094	–0.034	0.041	0.029	0.196
	(0.054)	(0.069)	(0.079)	(0.085)	(0.070)	(0.066)	(0.066)	(0.081)	(0.132)

See notes of Table 2.

Table 4 QR estimates for financial services stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	–0.019	0.015	0.007	0.020	–0.002	–0.003	–0.012	–0.025	–0.041
	(0.037)	(0.025)	(0.020)	(0.016)	(0.018)	(0.019)	(0.022)	(0.025)	(0.035)
CPI	–0.029	0.009	0.008	0.013	0.014	0.012	0.031	0.025	0.068
	(0.070)	(0.047)	(0.038)	(0.030)	(0.034)	(0.035)	(0.041)	(0.048)	(0.066)
IR	–0.003	0.000	–0.000	–0.001	0.001	0.005	0.002	–0.001	–0.003
	(0.009)	(0.006)	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.008)
GPR	0.584	0.350	0.062	0.218	0.128	0.087	0.495	0.750*	0.667
	(0.645)	(0.430)	(0.344)	(0.272)	(0.312)	(0.322)	(0.373)	(0.439)	(0.605)
EPU	0.002	0.001	0.001	–0.001	–0.001	–0.001	–0.001*	–0.002**	–0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.430*	–0.531***	–0.470***	–0.507***	–0.492***	–0.563***	–0.609***	–0.612***	–0.495**
	(0.226)	(0.151)	(0.120)	(0.095)	(0.109)	(0.113)	(0.131)	(0.154)	(0.212)
Nifty	0.031*	0.038***	0.038***	0.039***	0.038***	0.035***	0.030***	0.028**	0.033**
	(0.016)	(0.011)	(0.009)	(0.007)	(0.008)	(0.008)	(0.009)	(0.011)	(0.015)
Constant	–0.370***	–0.206**	–0.100	–0.068	0.001	0.061	0.065	0.093	0.208*
	(0.127)	(0.085)	(0.068)	(0.054)	(0.062)	(0.063)	(0.074)	(0.086)	(0.119)

See notes of Table 2.

Table 5 QR estimates for FMCG stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	0.003	–0.007	–0.002	0.016	0.027*	0.032*	0.034*	0.029*	0.023
	(0.020)	(0.014)	(0.014)	(0.015)	(0.015)	(0.017)	(0.019)	(0.017)	(0.018)
CPI	–0.030	–0.007	0.004	–0.020	–0.007	0.010	0.021	0.011	0.016
	(0.038)	(0.026)	(0.026)	(0.028)	(0.029)	(0.031)	(0.036)	(0.032)	(0.033)
IR	0.001	0.003	0.006*	0.007*	0.008**	0.007*	0.004	0.004	0.001
	(0.005)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
GPR	0.339	0.399*	0.354	0.370	0.240	0.126	0.007	–0.262	–0.334
	(0.345)	(0.237)	(0.239)	(0.260)	(0.264)	(0.285)	(0.329)	(0.296)	(0.306)
EPU	–0.001	–0.001	–0.002	–0.002	–0.004	0.001	–0.001	–0.001	–0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.383***	–0.377***	–0.285***	–0.342***	–0.375***	–0.385***	–0.364***	–0.249**	–0.103
	(0.121)	(0.083)	(0.084)	(0.091)	(0.092)	(0.100)	(0.115)	(0.104)	(0.107)
Nifty	0.009	0.010	0.013**	0.019***	0.023***	0.026***	0.024***	0.017**	0.021***
	(0.009)	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.008)
Constant	–0.192***	–0.167***	–0.113**	–0.062	–0.020	0.038	0.122*	0.239***	0.310***
	(0.068)	(0.047)	(0.047)	(0.051)	(0.052)	(0.056)	(0.065)	(0.058)	(0.060)

See notes of Table 2.

Table 6 QR estimates for infra stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	–0.023	–0.027	–0.005	–0.029	–0.021	–0.021	–0.028	–0.036	–0.073**
	(0.024)	(0.017)	(0.017)	(0.019)	(0.021)	(0.024)	(0.024)	(0.029)	(0.037)
CPI	–0.043	–0.029	–0.021	0.009	0.008	–0.013	0.021	0.027	0.080
	(0.045)	(0.032)	(0.032)	(0.036)	(0.039)	(0.045)	(0.045)	(0.055)	(0.069)
IR	0.007	0.005	0.003	0.004	–0.003	–0.002	–0.002	–0.004	–0.004
	(0.005)	(0.004)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.007)	(0.008)
GPR	0.264	0.117	0.263	0.418	0.441	0.438	0.220	0.385	–0.012
	(0.412)	(0.290)	(0.292)	(0.326)	(0.359)	(0.410)	(0.409)	(0.499)	(0.633)
EPU	0.002	0.004	–0.003	–0.001	0.001	0.002	–0.004	–0.001	–0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.373**	–0.378***	–0.408***	–0.370***	–0.331***	–0.349**	–0.402***	–0.430**	–0.510**
	(0.144)	(0.102)	(0.102)	(0.114)	(0.126)	(0.144)	(0.143)	(0.175)	(0.222)
Nifty	0.042***	0.034***	0.033***	0.019**	0.025***	0.029***	0.028***	0.018	0.010
	(0.010)	(0.007)	(0.007)	(0.008)	(0.009)	(0.010)	(0.010)	(0.013)	(0.016)
Constant	–0.304***	–0.220***	–0.181***	–0.161**	–0.104	–0.022	0.087	0.146	0.371***
	(0.081)	(0.057)	(0.058)	(0.064)	(0.071)	(0.081)	(0.081)	(0.098)	(0.125)

See notes of Table 2.

Table 7 QR estimates for IT stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	0.062*	0.054**	0.061**	0.045**	0.040*	0.036	0.022	0.022	0.033
	(0.035)	(0.023)	(0.025)	(0.019)	(0.021)	(0.023)	(0.022)	(0.024)	(0.029)
CPI	–0.088	–0.030	–0.058	–0.018	–0.005	–0.035	–0.030	0.007	0.064
	(0.067)	(0.044)	(0.048)	(0.035)	(0.040)	(0.043)	(0.041)	(0.045)	(0.055)
IR	0.012	0.007	–0.001	0.001	0.006	0.009*	0.006	0.004	0.006
	(0.008)	(0.005)	(0.006)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.007)
GPR	–0.322	–0.534	0.021	–0.307	–0.467	–0.528	–0.199	0.015	–0.378
	(0.609)	(0.404)	(0.437)	(0.322)	(0.362)	(0.389)	(0.378)	(0.409)	(0.501)
EPU	0.001	0.001	0.003	0.002	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.397*	–0.229	–0.162	–0.161	–0.143	–0.144	–0.242*	–0.285**	–0.258
	(0.213)	(0.142)	(0.153)	(0.113)	(0.127)	(0.136)	(0.132)	(0.143)	(0.175)
Nifty	0.023	0.022**	0.031***	0.031***	0.035***	0.037***	0.030***	0.028***	0.035***
	(0.015)	(0.010)	(0.011)	(0.008)	(0.009)	(0.010)	(0.010)	(0.010)	(0.013)
Constant	–0.206*	–0.096	–0.103	0.006	0.112	0.189**	0.218***	0.245***	0.376***
	(0.120)	(0.080)	(0.086)	(0.063)	(0.071)	(0.077)	(0.074)	(0.081)	(0.099)

See notes of Table 2.

Table 8 QR estimates for pharma stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	0.015	0.050**	0.044**	0.038**	0.031*	0.028	0.004	0.004	–0.009
	(0.033)	(0.024)	(0.017)	(0.017)	(0.018)	(0.019)	(0.022)	(0.024)	(0.031)
CPI	0.062	0.032	0.005	0.014	–0.002	–0.004	0.059	0.029	0.023
	(0.063)	(0.045)	(0.032)	(0.031)	(0.034)	(0.036)	(0.042)	(0.045)	(0.059)
IR	–0.000	–0.006	–0.005	–0.004	–0.001	–0.001	–0.005	–0.005	–0.010
	(0.008)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)	(0.006)	(0.007)
GPR	–0.636	0.131	0.252	0.366	0.230	–0.048	–0.226	0.047	–0.624
	(0.579)	(0.408)	(0.294)	(0.286)	(0.310)	(0.327)	(0.385)	(0.414)	(0.537)
EPU	0.001	0.002	0.001	0.001	0.001	0.001	0.002**	0.002**	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.245	–0.456***	–0.411***	–0.402***	–0.376***	–0.308***	–0.169	0.026	–0.186
	(0.203)	(0.143)	(0.103)	(0.100)	(0.109)	(0.114)	(0.135)	(0.145)	(0.188)
Nifty	0.015	0.022**	0.024***	0.023***	0.020**	0.017**	0.018*	0.023**	0.010
	(0.015)	(0.010)	(0.007)	(0.007)	(0.008)	(0.008)	(0.010)	(0.010)	(0.014)
Constant	–0.197*	–0.207**	–0.144**	–0.105*	–0.031	0.072	0.158**	0.178**	0.437***
	(0.114)	(0.080)	(0.058)	(0.056)	(0.061)	(0.064)	(0.076)	(0.082)	(0.106)

See notes of Table 2.

Table 9 QR estimates for private bank stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	–0.018	0.026	0.006	0.004	0.010	0.008	–0.015	–0.020	–0.034
	(0.052)	(0.023)	(0.022)	(0.016)	(0.023)	(0.023)	(0.026)	(0.033)	(0.038)
CPI	0.027	0.005	–0.012	0.019	0.021	0.015	0.024	0.025	0.051
	(0.099)	(0.044)	(0.041)	(0.030)	(0.043)	(0.043)	(0.050)	(0.062)	(0.071)
IR	–0.011	–0.005	–0.001	0.003	0.004	0.005	0.002	0.003	0.000
	(0.012)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.008)	(0.009)
GPR	0.255	0.650	0.329	0.432	0.148	–0.061	0.498	0.678	0.629
	(0.906)	(0.399)	(0.372)	(0.272)	(0.395)	(0.391)	(0.455)	(0.570)	(0.651)
EPU	0.001	0.001	0.001	–0.001	–0.001	–0.001	–0.002*	–0.002*	–0.003*
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
VIX	–0.372	–0.591***	–0.567***	–0.672***	–0.702***	–0.655***	–0.706***	–0.658***	–0.620***
	(0.317)	(0.140)	(0.130)	(0.095)	(0.138)	(0.137)	(0.159)	(0.199)	(0.228)
Nifty	0.047**	0.052***	0.045***	0.038***	0.038***	0.034***	0.032***	0.035**	0.040**
	(0.023)	(0.010)	(0.009)	(0.007)	(0.010)	(0.010)	(0.011)	(0.014)	(0.016)
Constant	–0.361**	–0.309***	–0.158**	–0.107**	–0.013	0.072	0.092	0.146	0.232*
	(0.178)	(0.079)	(0.073)	(0.054)	(0.078)	(0.077)	(0.090)	(0.112)	(0.128)

See notes of Table 2.

Table 10 QR estimates for PSU bank stock returns

	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	–0.011	0.035	0.005	0.020	0.013	–0.015	–0.035	–0.079	–0.085
	(0.045)	(0.043)	(0.036)	(0.032)	(0.030)	(0.033)	(0.038)	(0.049)	(0.064)
CPI	–0.020	0.046	0.043	–0.003	–0.021	0.011	0.054	0.089	0.038
	(0.085)	(0.081)	(0.069)	(0.061)	(0.057)	(0.062)	(0.071)	(0.092)	(0.121)
IR	0.020*	0.012	0.005	0.001	0.002	–0.005	–0.003	0.006	–0.001
	(0.010)	(0.010)	(0.008)	(0.007)	(0.007)	(0.008)	(0.009)	(0.011)	(0.015)
GPR	0.526	–0.107	0.083	0.022	–0.070	0.382	0.168	0.674	0.047
	(0.774)	(0.738)	(0.630)	(0.555)	(0.526)	(0.569)	(0.651)	(0.842)	(1.110)
EPU	–0.001	–0.001	–0.001	–0.001	–0.002	–0.001	0.003	–0.001	–0.002
	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)
VIX	–0.466*	0.009	–0.326	–0.370*	–0.218	–0.307	–0.180	–0.320	–0.032
	(0.271)	(0.258)	(0.221)	(0.194)	(0.184)	(0.199)	(0.228)	(0.295)	(0.389)
Nifty	0.070***	0.075***	0.061***	0.071***	0.060***	0.053***	0.063***	0.047**	0.061**
	(0.019)	(0.019)	(0.016)	(0.014)	(0.013)	(0.014)	(0.016)	(0.021)	(0.028)
Constant	–0.674***	–0.408***	–0.287**	–0.187*	–0.050	–0.016	0.116	0.181	0.510**
	(0.152)	(0.145)	(0.124)	(0.109)	(0.104)	(0.112)	(0.128)	(0.166)	(0.219)

See notes of Table 2.

Table 11 QR estimates for realty stock returns

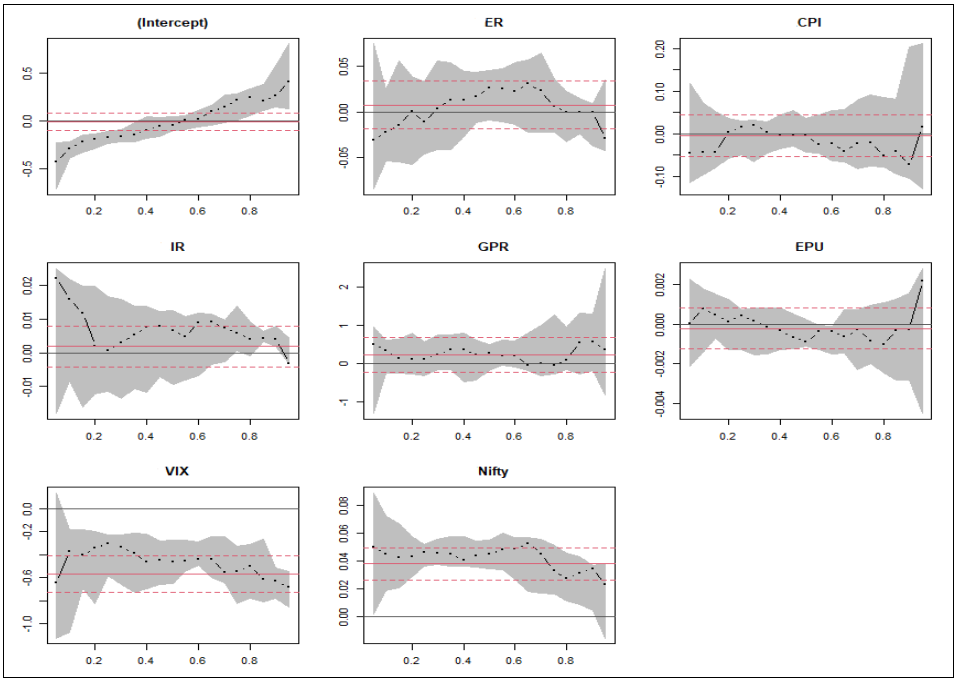
	0.1	*0.2*	*0.3*	*0.4*	*0.5*	*0.6*	*0.7*	*0.8*	*0.9*
ER	–0.068**	–0.040	–0.043	–0.041	–0.026	–0.034	–0.021	–0.010	–0.075
	(0.033)	(0.040)	(0.032)	(0.033)	(0.033)	(0.033)	(0.033)	(0.043)	(0.063)
CPI	–0.074	–0.081	–0.037	0.023	–0.010	0.026	0.019	–0.036	0.073
	(0.062)	(0.076)	(0.060)	(0.063)	(0.063)	(0.062)	(0.063)	(0.081)	(0.118)
IR	–0.005	–0.004	0.005	0.006	–0.002	–0.004	0.003	0.007	–0.004
	(0.008)	(0.009)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.010)	(0.014)
GPR	0.686	1.254*	0.794	0.398	0.087	0.237	0.613	1.157	1.371
	(0.571)	(0.694)	(0.553)	(0.573)	(0.573)	(0.568)	(0.578)	(0.745)	(1.081)
EPU	0.001	–0.001	0.001	–0.002	0.001	0.001	0.002	–0.001	–0.001
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
VIX	–1.094***	–0.574**	–0.488**	–0.499**	–0.447**	–0.435**	–0.368*	–0.438*	–0.427
	(0.200)	(0.243)	(0.194)	(0.201)	(0.201)	(0.199)	(0.202)	(0.261)	(0.379)
Nifty	0.042***	0.048***	0.044***	0.050***	0.063***	0.057***	0.068***	0.070***	0.059**
	(0.014)	(0.017)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.019)	(0.027)
Constant	–0.605***	–0.536***	–0.325***	–0.207*	–0.051	0.009	0.052	0.121	0.286
	(0.112)	(0.137)	(0.109)	(0.113)	(0.113)	(0.112)	(0.114)	(0.147)	(0.213)

See notes of Table 2.

5.1 Sensitivity of auto stock returns to macro and non-macroeconomic factors

As shown in Table 2 and Figure 2, interest rate barely affects the auto sector at 0.4 and 0.6. Further, exchange rate, inflation, geopolitical risk and economic policy uncertainty do not impact auto stock returns because all the quantile regression estimates are insignificant. The Indian auto stocks are not exposed to these variables may be because the Indian auto industry is primarily driven by domestic demand, with domestic sales accounting for the majority of sales. It means that the sector is less exposed to global macroeconomic factors such as international trade, currency fluctuations, and global economic conditions. Further, the Indian consumer is highly price-sensitive, and affordability is critical when purchasing. The above factors may not significantly impact the auto industry, as consumers may be more focused on the overall cost of the vehicle. These findings do not align with (Kannadhasan and Das, 2020) who show the impact of these two factors on stock returns. In contrast (Sohail Rawat and Arif, 2018) reveal no effect of geopolitical risk on stock returns. It is important to note that volatility and the market portfolio proxied by Nifty are the only variables that significantly affect auto stock returns across all the quantiles. The auto sector had, in general, a substantial exposure only to these variables. The auto stocks react inversely to volatility because volatility has a negative sign that is when volatility increases in the market, auto stock returns go down (and vice versa). This finding is consistent with (Akdağ et al., 2019; Chandra and Thenmozhi, 2015; Qadan et al., 2019). The market portfolio proxied by Nifty positively influences the auto sector, implying that auto stock returns surge with the increase in Nifty (and vice versa).

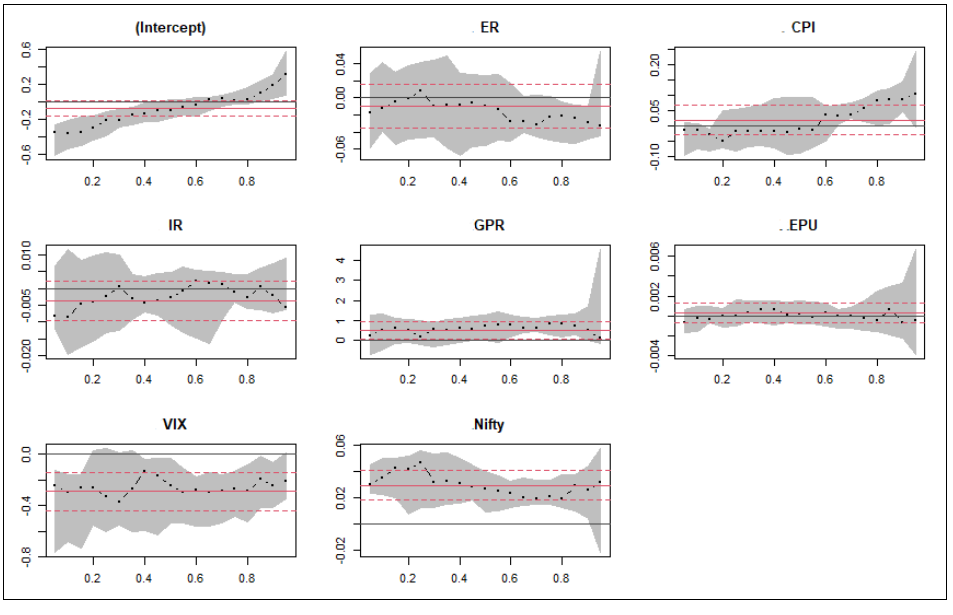
Figure 2 QR plots for auto stock returns (see online version for colours)



5.2 Sensitivity of energy stock returns to macro and non-macroeconomic factors

Table 3 and Figure 3 reports the results for energy stock returns. Inflation has a positive influence and significance solely in the 0.8 quantile. Further, the interest rate has a substantial and negative impact only in the first quantile. Energy stocks are not sensitive to exchange rates and EPU because all the QR estimates are insignificant. The result of the exchange rate is supported by the fact that India is a net importer of crude oil, but it also has a significant domestic production of oil and gas. It means that changes in the exchange rate may not significantly impact the cost of domestic energy production. Further, many energy companies in India have long-term contracts to supply crude oil and natural gas. These contracts are often denominated in US dollars, meaning that changes in the exchange rate may take time to impact the cost of energy imports. Further, inflation and interest rate barely affect energy stocks at 0.8 (positive) and 0.1 (negative) quantiles. The geopolitical risk has a considerable positive impact on energy stocks for 0.1 and median to 0.8 quantiles. This finding is inconsistent with (Kannadhasan and Das, 2020), who reveal the adverse effects of geopolitical risk on stock returns. Energy stock returns are negatively and significantly affected by the volatility for all the quantiles (except 0.4 and 0.9), meaning that energy stock returns go down when volatility increases. Energy stocks are susceptible to Nifty because all the quantile regression coefficients are significant except 0.9.

Figure 3 QR plots for energy stock returns (see online version for colours)

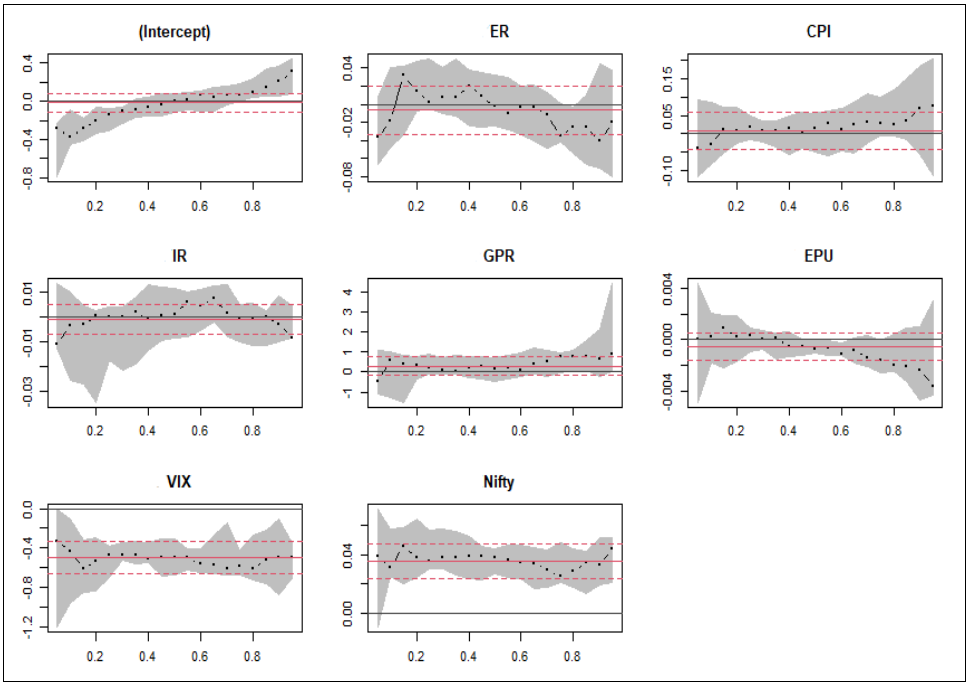


5.3 Sensitivity of financial services stock returns to macro and non-macroeconomic factors

As visible in Table 4 and Figure 4, all the macroeconomic factors, namely, exchange rate, inflation and interest rate, have no impact on financial services stock returns because all

the quantile coefficients are insignificant. These results are plausible because the financial services sector in India has a diversified portfolio of products and services. Further, the Indian government has taken various measures to support the financial services sector and implement policies to encourage growth and investment, which can help mitigate fluctuations in exchange rates, interest rates, and inflation in individual businesses. We detect that geopolitical risk hardly affects financial services stocks only in a single quantile (0.8). The impact of economic policy uncertainty on financial services stocks is asymmetric because our estimates are significant for the higher quantiles and insignificant for the bottom and middle quantiles, which indicate independence in the bottom tail and dependence in the higher tail. We observe that the volatility is significant and negative, and the Nifty has a substantial and positive influence on energy stocks across all the quantiles.

Figure 4 QR plots for financial services stock returns (see online version for colours)

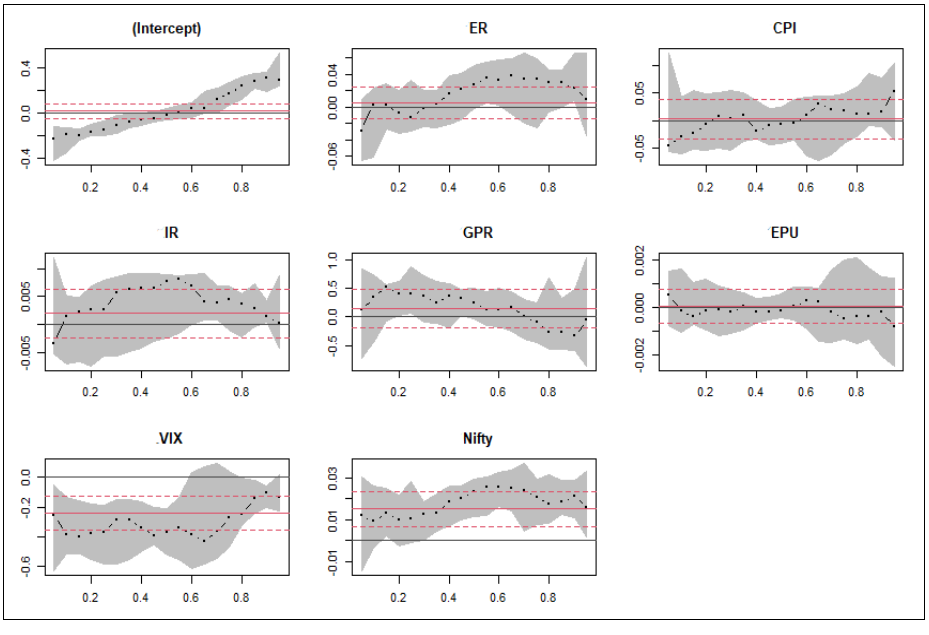


5.4 Sensitivity of FMCG stock returns to macro and non-macroeconomic factors

Table 5 and Figure 5 presents the results for the FMCG sector. We detect that exchange and interest rates have a less positive impact on the different quantiles. For the exchange rate, 0.5 to 0.8 and the interest rate, 0.3 to 0.6 quantiles are significant. The result of the exchange rate indicates that the weaker Indian rupee makes Indian FMCG products more competitive in the global market, as they become relatively cheaper for foreign buyers, and it boosts export revenues for Indian FMCG companies. The effect of geopolitical risk

is positive but negligible only in a single quantile (0.2). Inflation and economic policy uncertainty are the factors that do not affect FMCG stock returns because all quantile coefficients are insignificant. The positive and substantial dependence between volatility and FMCG stock returns is observed for all the quantiles except 0.9. Further, we note Nifty's significant and positive impact on FMCG stock returns for the 0.3, middle and higher quantiles.

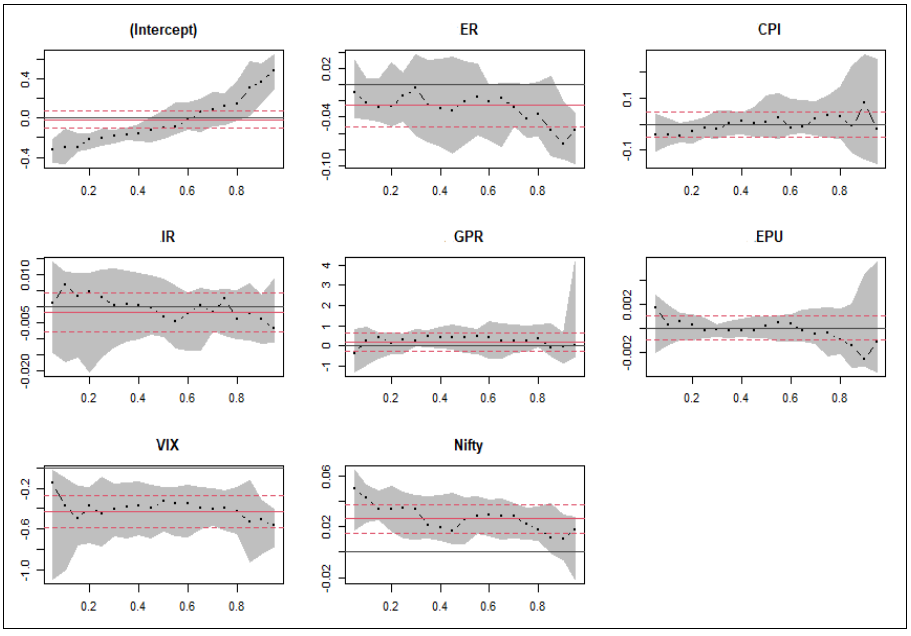
Figure 5 QR plots for FMCG stock returns (see online version for colours)



5.5 Sensitivity of infra stock returns to macro and non-macroeconomic factors

Table 6 and Figure 6 documents that the impact of exchange rate and economic policy uncertainty is negative and significant only in the end quantile (0.9). This finding indicates that the effect of these two factors tends to be more influential in extreme market conditions. Similar to other sectors, the impact of volatility is negative and significant across all the quantiles. However, Nifty positively and significantly influences all the quantiles except end quantiles (0.8 and 0.9). The infra stocks are not sensitive to inflation, interest rate and geopolitical risk in any quantiles. Inflation and interest rates do not impact infra stocks because infrastructure projects typically have a long gestation period, and the financing for such projects is usually long-term. Interest rate fluctuations may not have an immediate impact on infrastructure projects. The project companies often secure long-term loans, which can help mitigate the effect of interest rate fluctuations. Further, infrastructure development and funding for infrastructure projects in India are often driven by government initiatives and policies, which means that changes in inflation and interest rates may have little impact on the infra sector.

Figure 6 QR plots for infra stock returns (see online version for colours)



5.6 Sensitivity of IT stock returns to macro and non-macroeconomic factors

Table 7 and Figure 7 depicts that the effect of the exchange rate on IT stock returns is positive and significant in the bottom, 0.4 and 0.5 quantiles. In contrast, we observe no impact in the higher quantiles, which show bottom-tail dependence and higher tail independence. It is important to note that IT stock returns increase when the rupee depreciates against the US dollar. This result is plausible because the Indian IT sector is export-oriented. IT companies get more contracts (and ultimately profit) when the rupee depreciates because it becomes cheaper for foreign clients to get their things done from Indian IT firms. Further, we observe that inflation, geopolitical risk and economic policy uncertainty do not affect IT stocks. These results are applicable because the Indian IT industry is primarily export-oriented, with a significant portion of its revenue from exports to other countries. It means the sector is less dependent on the domestic market and less affected by domestic macro and non-macro factors. Our findings of geopolitical risk and economic policy uncertainty get support from (Kannadhasan and Das, 2020). The volatility has a negligible negative effect on the IT stock returns because the quantile coefficients are significant only in 0.1, 0.7 and 0.8. In the case of IT stocks, the finding of volatility is not similar to other sectors where it has a significant impact almost in all the quantiles. However, the effect of Nifty on IT stocks is positive and effective for all the quantiles except 0.1.

5.7 Sensitivity of pharma stock returns to macro and non-macroeconomic factors

Table 8 and Figure 8 compiles the results for the pharma sector. Inflation, interest rate and geopolitical risk have an insignificant impact on pharma stock returns for all the

quantiles. However, the effect of the exchange rate is significant and positive for 0.2 to 0.5 quantiles, implying that a weaker Indian rupee increases the stock returns. This result is plausible because the pharmaceutical industry in India is a significant producer and exporter of generic medicines, and a weaker Indian currency can make Indian pharmaceutical products more competitive in the global market as they become relatively cheaper for foreign buyers. It can boost export revenues for Indian pharmaceutical companies. The volatility causes a significant adverse effect at 0.2, 0.3 and middle quantiles. On the other hand, Nifty causes a positive and significant impact on pharma stock returns across all the quantiles except the first and the end quantile. We find that the dependence between economic policy uncertainty and pharma stock returns is significant and positive only in the upper tail, which reveals asymmetric support having the bottom tail independence and higher tail dependence.

5.8 Sensitivity of private bank stock returns to macro and non-macroeconomic factors

As shown in Table 9 and Figure 9, it is significant to note that all macroeconomic factors, namely, exchange rate, inflation and interest rate have no impact on private bank stock returns in any quantiles. These results are plausible because many private banks in India have a diversified portfolio spread across various sectors and industries. This diversification can reduce the impact of macroeconomic factors affecting one particular sector. Moreover, private banks in India tend to be conservative in their lending practices and are generally cautious about taking on excessive risk. This traditional approach can help to reduce the impact of economic downturns and prevent loan defaults. Further, geopolitical risk also does not influence private banks. However, the interest rate only has a negligible positive impact in the first quantile. The dependence between economic policy uncertainty and private bank stocks is asymmetric because the effect is insignificant for the bottom and middle quantiles. In contrast, we find a significant impact for the higher quantiles, which indicates the bottom tail independence and higher tail dependence. Further, the volatility also has a negligible but negative effect only in 0.1 and 0.4 quantiles which shows that private bank stocks are less sensitive to volatility than other sector stocks. However, the results of Nifty are consistent with other sectors meaning that Nifty has a significant and positive impact on private bank stocks across all the quantiles.

5.9 Sensitivity of PSU bank stock returns to macro and non-macroeconomic factors

Table 10 and Figure 10 indicates that the reactions of PSU bank stocks to the exchange rate, inflation and geopolitical risk are similar to private bank stocks because the factors mentioned above do not influence PSU bank stocks at any quantiles. The exchange rate and inflation do not affect PSU banks because PSU banks in India are owned by the government, which provides a certain degree of financial backing and stability. This government backing can help to insulate these banks from the impact of fluctuations in exchange rates and inflation. Further, these banks in India tend to focus more on the domestic market, meaning they are less exposed to changes in exchange rates. However, the interest rate and economic policy uncertainty results are inconsistent with the private banks because the interest rate has a significant and positive impact (only in the first

quantile) and economic policy uncertainty has an insignificant effect across all the quantiles. But it is interesting to note that volatility has a negligible negative impact only at 0.1 and 0.3 quantiles. The finding of Nifty is precisely similar to the private bank because Nifty has a significant and positive effect on PSU bank stock returns for all the quantiles.

Figure 7 QR plots for IT stock returns (see online version for colours)

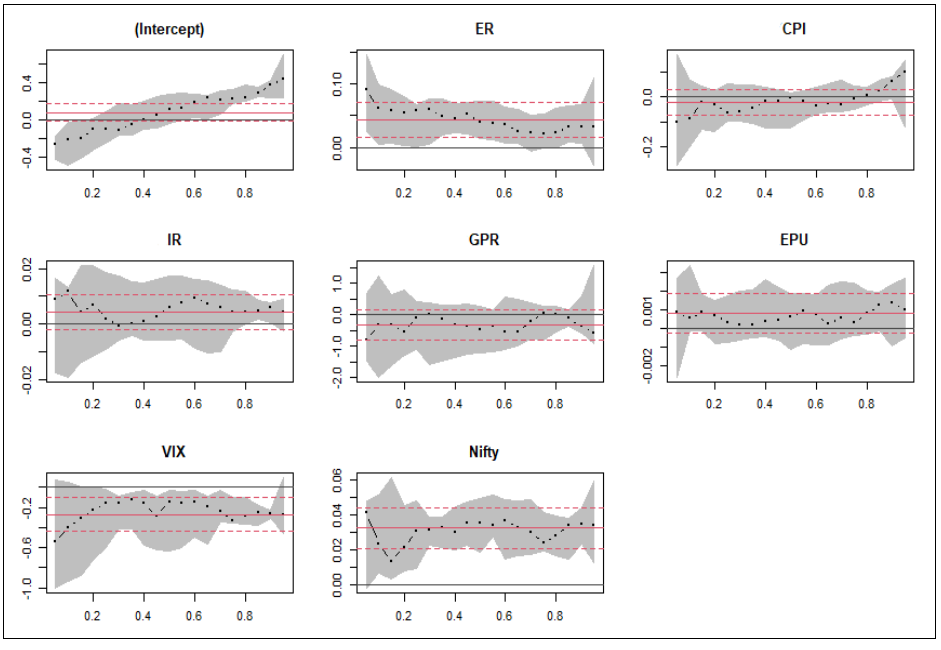


Figure 8 QR plots for pharma stock returns (see online version for colours)

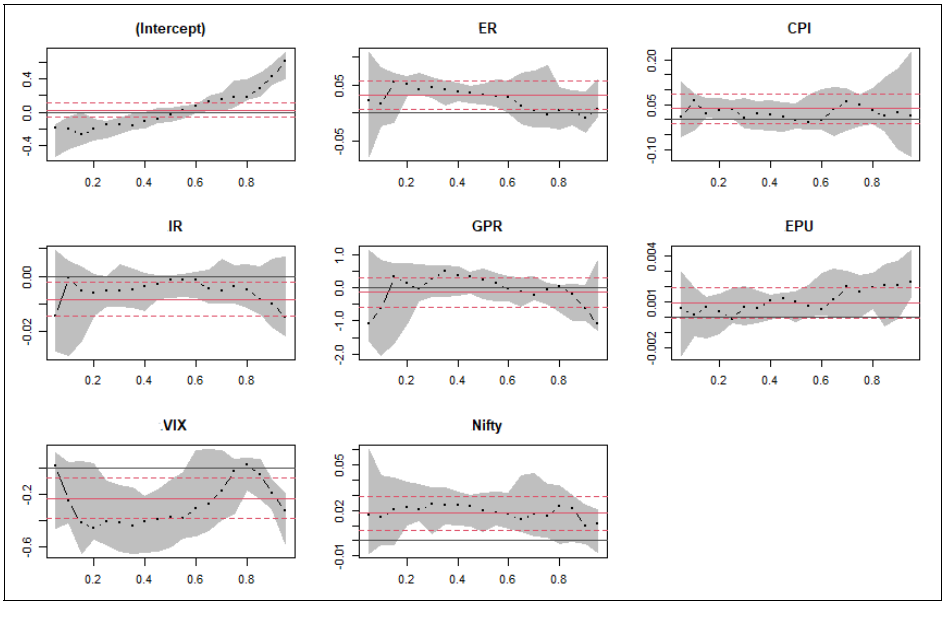


Figure 9 QR plots for private bank stock returns (see online version for colours)

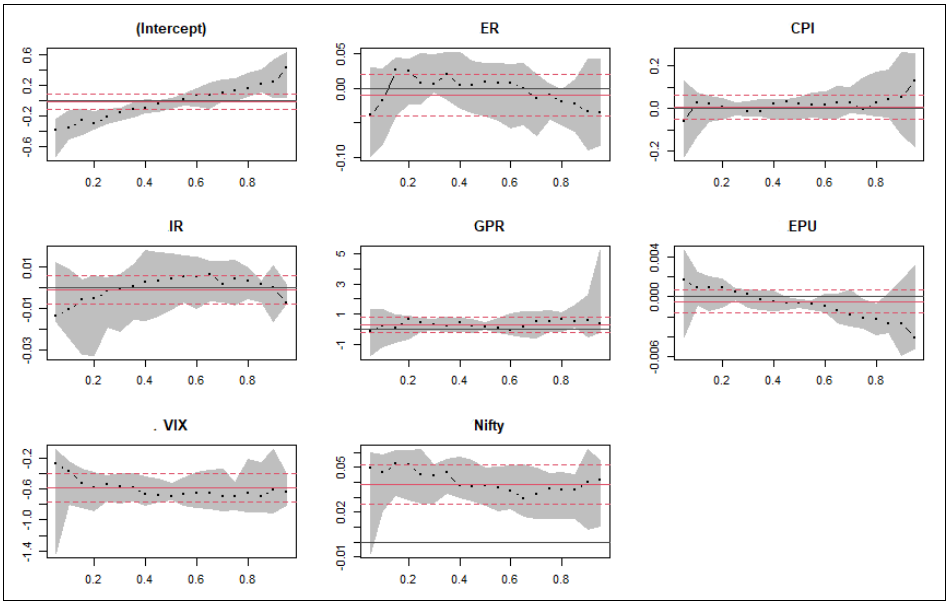
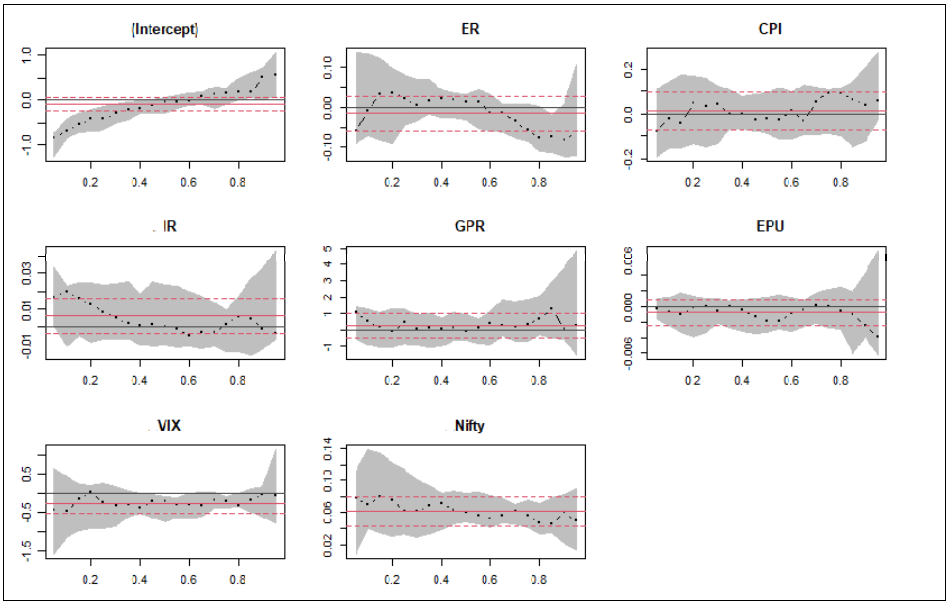


Figure 10 QR plots for PSU bank stock returns (see online version for colours)

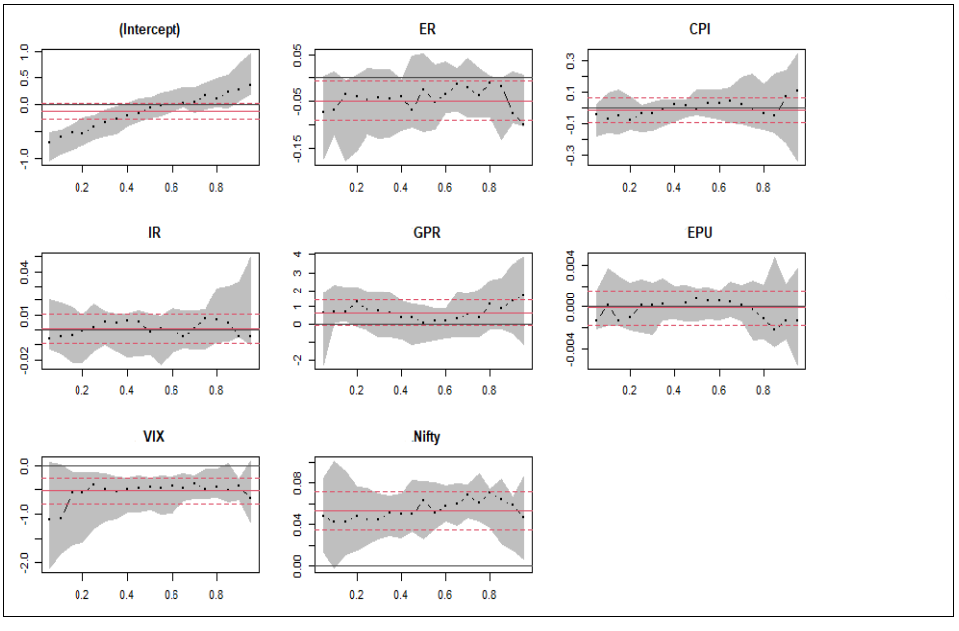


5.10 Sensitivity of realty stock returns to macro and non-macroeconomic factors

Table 11 and Figure 11 reveals the results for the realty sector. It is surprising to note that the effects of inflation and interest rate have no impact on realty stocks because all the quantiles are insignificant. The realty sector in India is highly driven by demand-supply dynamics, with supply primarily responding to changes in demand. Developers will

continue to build if demand for real estate remains strong, regardless of interest rates or inflation. Real estate investments in India are often considered long-term investments; therefore, interest rate fluctuations may take time to impact the sector. The exchange rate has a negligible negative effect only at the first quantile. Similarly, the impact of geopolitical risk is little but positive only at 0.2 quantile. We also note an insignificant impact of economic policy uncertainty across different quantiles. The dependence between volatility and realty stock returns is significant and negative for all the quantiles except 0.9. Furthermore, there is a positive dependence between realty stocks and Nifty with a high degree of significance across all quantiles.

Figure 11 QR plots for realty stock returns (see online version for colours)



6 Conclusion

We study the impact of macro and non-macroeconomic factors on stock returns of different sectors in India using the QR approach. We draw stylised facts based on analysis. First, the exchange rates do not influence on auto, energy, financial services, private and PSU banks. However, the remaining sectors have less sensitivity to the exchange rates. Second, all the sectors except energy are not at all sensitive to inflation because all quantiles are insignificant. Third, financial services, infra, pharma, private banks and realty are the sector where the impact of interest rates is not visible. However, we observe a negligible effect of interest rates on auto, energy, FMCG, IT and PSU banks. Fourth, the sectors that are not affected by GPR include auto, infra, IT, pharma, private and PSU banks. On the other hand, we notice that energy, financial services, FMCG and realty are less affected by GPR. Fifth, financial services, infra, pharma and private bank sectors are affected by EPU at different quantiles. However, the EPU has no impact on the auto, energy, FMCG, IT, PSU banks and realty sectors. Sixth, we detect

that VIX has a significant and negative impact on all the sectors except PSU banks where we find a negligible effect. Seventh, all the sectors show a positive and significant reaction to Nifty.

Our results are significantly useful for investors and portfolio managers who want to make informed investment decisions and manage their portfolio risk. Our results can help investors identify market trends, manage their portfolio risk, anticipate potential changes in the stock market and adjust their investment strategy accordingly. By incorporating our results into their investment strategy, investors can potentially generate higher returns or reduce risk, which can improve their overall investment performance.

Although this study covers the impact of domestic macro and non-macroeconomic variables on different sectors in India, our study can be further extended to the impact of international factors on different sectors in India. Further, the effect of COVID-19 on industries in Indian stock market can also be a research topic. Moreover, the findings of our study may have direct applications to stock market field. These applications can be formally evaluated in future research.

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