Determinants of Differential Voting Rights Share Prices and Ordinary Share Prices : Evidence from Dual-Class Companies in India

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Abstract

We analyzed the effects of Indian factors namely, Nifty index, Volatility index (VIX), and Economic Policy Uncertainty Index (EPUI) and United States of America (USA) factors such as S&P 500 Index, CBOE VIX, and EPUI on differential voting rights (DVRs) share prices and ordinary share prices of three dual-class companies in India during the monthly period from January 2012 – August 2019 using quantile regression approach. We found quite interesting and useful results. In case of dual - class shares of Jain Irrigation Systems, DVR share prices were significantly influenced by Nifty and S&P 500. In contrast, USA VIX and Indian & USA EPUI had less impact on DVRs. We noticed an insignificant dependence between India VIX and DVRs across different quantiles. Further, impact of Nifty, S&P 500, India VIX, USA VIX, and USA EPUI on ordinary share prices varied across the quantiles ; whereas, India EPUI had no influence on ordinary shares' prices. Regarding dual - class shares of Tata Motors, Nifty and S&P 500 had a significant impact on DVRs. However, DVRs were less sensitive to rest of the factors. For ordinary share prices, S&P 500 had a significant influence. However, the effects of other variables on ordinary share prices were not uniform across the quantiles. With respect to dual-class shares of Future Enterprises, both DVRs and ordinary share prices were highly affected by all the variables, except ordinary share prices were not exposed to India VIX.

Keywords : **differential voting rights shares, ordinary shares, share prices, volatility, economic policy uncertainty, quantile regression, India**

JEL Classification : C21, D53, G11, G12

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The board of Securities and Exchange Board of India (SEBI) approved a "Framework for companies to issue Differential Voting Rights (DVR) shares (Securities and Exchange Board of India, 2019) on June 27, 2019. In this approval, it was noted that there is an increasing debate about the need to enable issuance and listing of shares with differential voting rights, commonly known as DVRs in India (dual class shares or DCS in the international context). Such shares have rights disproportionate to their economic ownership. It indicates that the issuance and listing of DVRs shares in India is still at a budding stage. Tata Motors is one of the first Indian companies to issue DVRs in the year 2008 which was later followed up by Pantaloon Retail (currently Future Enterprises Ltd.), Gujarat NRE Coke Ltd., and Jain Irrigation Systems Ltd., who also issued DVRs. DVRs of Tata Motors carried 1/10th voting rights and 5% higher dividend than ordinary shares.

This research is motivated by the fact that there are only four dual-class companies in India, who have issued

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DVRs. A wide range of studies have been done in India and worldwide on determinants of ordinary share prices. However, it is crucial to study how the DVRs and ordinary share prices of three Indian dual class companies react to their possible determinants. Therefore, we analyze the impact of Indian factors, namely, Nifty index, Volatility index (VIX), Economic Policy Uncertainty Index (EPUI), and United States of America (USA) factors, that is, S&P 500 Index, Chicago Board Options Exchange (CBOE) Volatility Index, and EPUI on dual class shares prices of three dual-class companies in India. In this research paper, we have taken the share prices and have not considered stock returns. The stock market participants consider economic, industry, and company specific factors while taking financial decisions on where to put their money. Even though company specific factors give information about company's fundamentals, economic uncertainty in a country and its reflections in stock market indices, the implied volatility of stock market indices as represented by the Volatility Index cannot be ignored.

This concern may lead to frame the following unanswered questions : Do Indian and USA factors under consideration impact dual class shares? Do dual class shares react in the same way to the variables under consideration? Is there any symmetric or asymmetric dependence of the three dual-class companies on each of the variables ?

In this paper, we have studied dependence using the quantile regression (QR) approach (Koenker & Bassett, 1978). We adopted a different approach in this paper than the one used in the previous literature. The QR allows examining the conditional dependence of specific quantile of dual-class companies with respect to the conditioning factors. The QR approach also provides specific insights on the impacts of Indian and U.S. factors on the dual class shares prices under different market circumstances, including bearish (lower quantile) and bullish (upper quantile).

In this paper, we contribute to the existing literature in the following way ; first, we study the determinants of dual class shares prices. Second, we analyze whether the dual-class companies follow symmetric or asymmetric distribution. Third, we examine whether the dual class shares prices of the same company react in a same way to the variables under consideration, and fourth, this is the first application of the QR method to analyze the impact of Indian and U.S. factors on the dual class shares prices to the best of our knowledge.

Review of Literature

In the literature that specifically focuses on the DVRs, Lease, Mcconnell, and Mikkelson (1984) examined six companies' two publicly traded share classes and found that average price difference was statistically significant. Cornett and Vetsuypens (1989) observed that abnormal stock prices increased due to the public announcement creation of dual classes of common stocks. Shum, Davidson, and Glascock (1995) showed that negative returns were generated if a second class stock issue had no compensation for the lost voting rights and vice versa. Taylor and Whittred (1998) noticed that a higher proportion of dual class firms' value was determined by the expected realization of growth options rather than assets-in-place in Australia. Fatemi and Krahnen (2000) found that the voting premium of German common shares was in excess of 40%. Bauguess, Slovin, and Sushka (2012) revealed how the change to DVRs permitted dominant shareholders to hold control even after selling substantial economic ownership and diversifying their wealth.

Considerable research has also been conducted on determinants of stock market returns using the QR method. Mensi, Hammoudeh, Reboredo, and Nguyen (2014) analyzed the impact of global economic factors' performance of Brazil, Russia, India, China, and South Africa's (BRICS) markets. For India, the crude oil prices had no impact on the Indian stock returns. The impact was only in the upper quantiles. USA VIX and EPUI impacted the Indian stock market. Jareño, Ferrer, and Miroslavova (2016) detected that the interest rates and inflation significantly affected the stock market and differences across sectors. Ni, Wang, and Xue (2015) found that the influence of investor sentiment was significant from 1 month – 24 months and its effect was found to be asymmetric and reversal. Pala (2014) studied the effects of gold, petroleum prices, and valuation ratios on equity

returns of companies in the Istanbul Stock Exchange. Gebka and Wohar (2013) analyzed the causality between past trading volume and index returns in the Pacific Basin countries.

Furthermore, researchers like Ainapure and Iyer (2017), Das and Megaravalli (2017), Mitra (2018), and Pal and Mittal (2011) confirmed the impact of macroeconomic factors on the Indian stock market. In the other context, several studies supported the impact of company specific financial or accounting factors on share prices of Indian companies (see, eg. Babu & Kasilingam, 2013 ; Sharma, Mahendru, & Singh, 2015 ; Syed & Bajwa, 2018).

Certain applications of the EPUI in stock market research include studies conducted by Mensi et al. (2014), Liu and Zhang (2015), and Colombo (2013). There are many empirical papers that have studied the relationship between movements in stock indices, VIX, and stock returns or volatility (eg. Bagchi, 2012 ; Chandra & Thenmozhi, 2015 ; Mensi et al., 2014). Savadatti (2018) displayed the existence of volatility spillover from USA to the Indian stock market.

Nonetheless, the survey of relevant literature suggests the dearth of studies that explore the determinants of dual class share prices of dual-class companies in India. Moreover, the QR methodology is not used to address such research area. Thus, we fill these gaps in this research paper and extend the literature.

Data and Research Methodology

(1) Description of Data and Variables : We empirically examine the determinants of dual class shares using the monthly data from January 2012 – August 2019. We prefer monthly frequency to daily or weekly because daily volatility is higher than weekly volatility; in turn, weekly volatility is higher than monthly volatility. Indian factors include: (a) Nifty index; (b) Volatility index; and (c) Economic Policy Uncertainty Index. The USA factors contain: (a) S&P 500 Index; (b) CBOE Volatility Index; and (c) Economic Policy Uncertainty Index. The data of Indian and USA Economic Policy Uncertainty Index were taken from Economic Policy Uncertainty (2019). The data of rest of the variables were collected from the website : Investing.com (n.d.). Gujarat NRE Coke Ltd. stock trading was suspended by stock exchanges from February 12, 2018 because of liquidation proceedings (insolvency). Therefore, we do not consider this company for this study.

The Indian economy is increasingly exposed to global markets post the LPG Policy of 1991. India has business interests with USA and the USA economy is the largest economy in the world. Therefore, we assume that USA stock markets reflect the health of the economy of America and that health is going to impact the dual shares of dual-class Indian companies. Many segments of the financial markets are interlinked with stock prices of individual companies. Therefore, movements in stock indices and the implied volatility of stock market indices as represented by VIX are likely to affect the prices of dual class shares. The EPUI is now widely used as a risk indicator to investigate the effects on stock returns or volatility. For more details about the construction of this index, see Baker, Bloom, and Davis (2016). The Indian EPUI is a news-based index, constructed from seven Indian newspapers, while the USA EPUI is a news-based index, constructed from newspaper archives from the News Bank Access World News Database. Therefore, it is expected to have the influence of Indian and USA factors on prices of dual class shares of Indian dual class companies.

(2) Econometric Methodology : This section indicates the QR methodology. The dependence between the variables is widely measured using the correlation coefficient. However, the distinction between the dependence during up and down markets or movements between large and small investment products cannot be found by employing correlation. Moreover, it considers only symmetric linear associations between the variables of interest. Thus, in order to find the complex dependence structure between financial time series, a much effective method is required. The ordinary least squares (OLS) regression cannot be useful to approximate the conditional mean and conditional median. It gives an incomplete description of a conditional distribution (Mosteller &

Tukey, 1977). OLS regression is not much effective when the analysis attempts to extend towards the extremes of a dataset or beyond median. Hence, a more sophisticated tool is required to capture the complex dependence between the variables.

The QR methodology, introduced by Koenker and Bassett (1978), is used in modeling dependence as it can cover a set of regression curves that differ across different quantiles (e.g. median) of the conditional distribution of the dependent variable. For more information on the model specification of quantile regression, refer to Koenker and Bassett (1978). QR is non OLS regression. QR gives accurate and more precise results of the impact of conditional variables on the dependent variable. Therefore, a better explanation regarding the impact of Indian and USA factors on dual class shares can be studied. The entire distribution of the dual class share prices conditional on Indian and USA factors is revealed using QR. The estimator may vary from 0 to 1 with each quantile.

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

$$y_i = x_i'\beta_\theta + \mu_{\theta i} \text{ with } Q_\theta(y_t \mid x_t) = x_t'\beta_\theta \qquad (1)$$

where, x_t' indicates a vector of regressors, β_θ denotes the vector of parameters to be estimated, and $\mu_{\theta i}$ represents a vector of residuals. $Q_\theta(y_t \mid x_t)$ denotes the θ^{th} conditional quantile of y_i given x_i'.

The estimation of β_θ is based on the following optimization problem :

$$\min_{\beta_\theta} \left\{ \sum_{t:yt>x_t'\beta} \theta \left| y_i - x_i'\beta \right| + \sum_{t:yt<x_t'\beta} (1-\theta) \left| y_i - x_i'\beta \right| \right\} = \text{argmin } \beta \qquad (2)$$

A linear programming representation via the simplex algorithm or the generalized method of moments framework can be used to solve the optimization problem (Brooks, 2014). The median regression is obtained by setting $\theta = 0.5$. Other quantiles of the conditional distribution can be found through variations of θ. The results for the 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, and 0.9 quantiles convey a sense for the relationship of selected explanatory variables across the entire conditional dual class shares prices distributions. In this paper, we apply the bootstrap method illustrated in Buchinsky (1995) to obtain estimates of the standard errors for the coefficients in quantile regression. In addition, it is useful for a relatively small sample size.

Empirical Analysis and Results

(1) Descriptive Statistics and Results of Unit Root Tests : The results of descriptive statistics and unit root tests are shown in Table 1. The mean value of all the variables (except Tata Motors OS and Nifty) is more than the median. Therefore, these variables appear to be skewed to the right. Kurtosis value for Jain Irrigation Systems's differential voting rights (JISDVR), Tata Motors's differential voting rights (TMDVR), Tata Motors's ordinary shares (TMOS), Future Enterprises's differential voting rights (FEDVR), Future Enterprises's ordinary shares (FEOS), Nifty, and S&P 500 is less than the reference value of normal distribution that is equal to 3. It indicates that there is lighter tails than a normal distribution (less in the tails). However, kurtosis value for Jain Irrigation Systems's ordinary shares (JISOS), India VIX, USA VIX, India EPUI, and USA EPUI is more than the reference value. The Jarque-Bera test for normality strongly rejects the normality of the unconditional distributions for all the variables (Except JISDVRs and JISOS).

Finally, the stationarity of the series are tested. The null hypothesis of a unit root is tested using the conventional Augmented Dickey - Fuller (ADF) and Phillips and Perron (PP) statistics and the stationarity property under the null using the Kwiatkowski - Phillips - Schmidt - Shin (KPSS) test. All the variables except India VIX, USA VIX, India EPUI, and USA EPUI have a unit root; therefore, we include these variables in the first differences and confirm the stationarity.

Table 1. Descriptive Statistics and Unit Root Tests

	Mean	Median	Max.	Min.	Std. Dev.	Skewness	Kurtosis	JB	ADF	PP	KPSS Stationary
JISDVRs	46.22826	42.875	84.75	15.25	15.16592	0.451107	2.654661	3.577457	-1.633336	-1.783829	0.366907
JISOS	77.4	71.275	139.95	19.55	22.36015	0.219713	3.279804	1.040312	-1.624798	-1.723705	0.127143
TMDVRs	215.8189	211.675	373.35	53.5	84.14032	0.03705	1.893387	4.715323***	-0.891740	-0.891740	0.286507
TMOS	358.2677	374.48	587.05	116.7	115.7022	-0.06744	2.078339	3.326002**	-0.966416	-0.970401	0.270127
FEDVRs	19.21087	13.595	52.2	3.43	13.50539	0.732384	2.275422	10.23714***	-1.172990	-1.218288	0.900502
FEOS	22.83815	16.995	54.15	9.02	11.93991	0.912314	2.637072	13.2671***	-1.564346	-1.564838	0.930185
Nifty	8252.314	8253.6	11922.8	4924.25	2022.828	0.067091	1.85708	5.076368***	-0.900721	-0.849214	1.181115
S&P500	2119.612	2073.625	2980.38	1310.33	476.2832	0.088428	2.011869	3.862776***	-0.426045	-0.468379	1.209788
IVIX	16.55851	16.05625	30.5925	10.86	3.808647	1.390599	5.192152	48.07229***	-5.207200***	-5.127545***	0.560415
USVIX	15.48935	15.075	28.43	9.51	3.53712	0.998128	4.42829	23.09603***	-6.128371***	-6.177532***	0.189976
IEPUI	95.68852	79.64013	283.6891	32.88369	49.8404	1.306883	4.888248	39.85612***	-3.607698***	-3.607698***	1.047491
USAEPUI	139.8383	129.2253	285.4849	63.87733	46.28418	1.01095	3.756191	17.86298***	-5.091080***	-5.040059***	0.441242

Note. ** $p < 0.05$ and *** $p < 0.01$.

(2) Impact of Indian and USA Factors on DVRs and Ordinary Shares of Jain Irrigation Systems : Table 2 and Table 3 indicate the estimates of the QR for JISDVRs and JIOS. The changes in the QR coefficients are also shown in Figures 1 and 2 (QR graphs). The prefix *'X'* in graphs indicates the explanatory variable. Nifty has a positive and significant impact on DVR prices for lower and intermediate quantiles. But the impact is absent for the upper quantiles. This implies the asymmetric dependence structure is having lower tail dependence and upper tail independence. On the other hand, the effect of Nifty on ordinary share prices is positive and significant only for the lower quantiles. But there is no impact at the lower and upper quantiles. This result also indicates asymmetric dependence structure. The S&P 500 has a same impact on dual- class share prices. This effect is significant and negative only for the lower quantiles. It is important to note that dual class share prices increase with the increase in Nifty index and vice versa. In contrast, there is an inverse relationship between dual class

Table 2. Quantile Regression Estimates for DVR Share Prices of Jain Irrigation Systems

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
α	72.59886***	2757.057***	41.14234**	33.84329	15.74196	36.32368	60.98934***
	(0.000)	(0.002)	(0.013)	(0.050)	(0.366)	(0.201)	(0.009)
Nifty	.0129231***	.0138333***	.0112103***	.0103482**	.0086057**	.0012753	.0046066
	(0.000)	(0.000)	(0.007)	(0.017)	(0.049)	(0.856)	(0.418)
*S&P*500	–.0580887***	–.059887***	–.0412569**	–.0252357	–.0064404	.0173683	.0045788
	(0.000)	(0.000)	(0.020)	(0.169)	(0.729)	(0.566)	(0.851)
IVIX	.3155685	.3927031	–.2581096	–.5576216	–.6062819	.1503358	.3544078
	(0.261)	(0.332)	(0.612)	(0.297)	(0.265)	(0.865)	(0.619)
USAVIX	–1.52444***	–.6768586	.2884267	–.578602	–.4167865	–.9788359	–1.786057**
	(0.000)	(0.109)	(0.586)	(0.298)	(0.461)	(0.288)	(0.018)
IEPUI	–.0536183**	–.0258057	–.0068716	.0632787	.0961212*	.0063867	–.0048761
	(0.042)	(0.492)	(0.884)	(0.203)	(0.059)	(0.938)	(0.941)
USAEPUI	–.0172677	–.0493372*	–.0610713**	–.0629241	–.0847188**	–.0784575	–.138342***
	(0.391)	(0.091)	(0.097)	(0.103)	(0.032)	(0.218)	(0.008)

Note. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Table 3. Quantile Regression Estimates for Ordinary Share Prices of Jain Irrigation Systems

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
α	120.2647***	139.8637***	99.79528***	102.2505***	15.74196	45.72137	48.80488***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.366)	(0.259)	(0.001)
Nifty	.0146137***	.0150713**	.0087965	. 0063777	.0145217	.0076276	.0011902
	(0.000)	(0.019)	(0.208)	(0.367)	(0.201)	(0.448)	(0.727)
*S&P*500	–.0819358***	–.0809626***	–.0395291	–.019983	–.0333194	.0022968	.0237265
	(0.000)	(0.004)	(0.189)	(0.511)	(0.494)	(0.958)	(0.109)
IVIX	.3225189	.8525021	–1.012383	–1.017433	.2554763	1.973741	2.191515***
	(0.515)	(0.286)	(0.248)	(0.252)	(0.857)	(0.120)	(0.000)
USAVIX	–.7878693	–2.665522	–.1819951	–1.528332*	–2.244235	–1.590254	–1.585972***
	(0.128)	(0.002)	(0.841)	(0.099)	(0.131)	(0.227)	(0.001)
IEPUI	–.0695124	–.0829811	.0275992	.0767224	.1423629	.0492388	.0064699
	(0.133)	(0.263)	(0.734)	(0.352)	(0.282)	(0.674)	(0.871)
USAEPUI	–.0232197	–.0231649	–.0647278	–.0396337	–.0574063	–.1277083	–.0699078**
	(0.514)	(0.685)	(0.303)	(0.533)	(0.573)	(0.160)	(0.025)

Note. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

shares prices and S&P 500. Further, India VIX has no significant impact on the dual class shares, except 0.95 quantile for ordinary shares. Moreover, an insignificant dependence structure with the USAVIX is revealed for across the different quantiles except at the tails for DVRs ; whereas, for ordinary shares, it is at 0.5 and 0.75 quantiles. This evidence suggests that, in general, there is no co-movement between the dual- class shares and USA VIX. In case of India EPUI, we observe an insignificant dependence across different quantiles for ordinary shares, with the exception for the DVRs where the impact is negative and significant for 0.05 and 0.75 quantiles. The structure of dependence between USA EPUI and dual- class shares changes across the different quantiles.

In a nutshell, there is strong evidence that among the determinants, the DVR share prices are most sensitive to Nifty and S&P 500. Therefore, if investors want to buy or sell DVR shares, we recommend them to consider these

Figure 1. Changes in QR Coefficient for Differential Voting Rights Shares of Jain Irrigation Systems

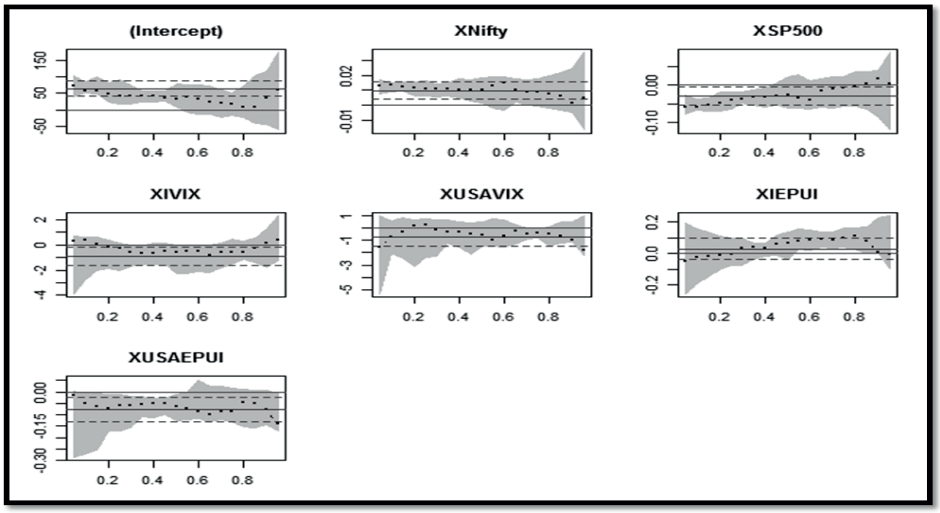
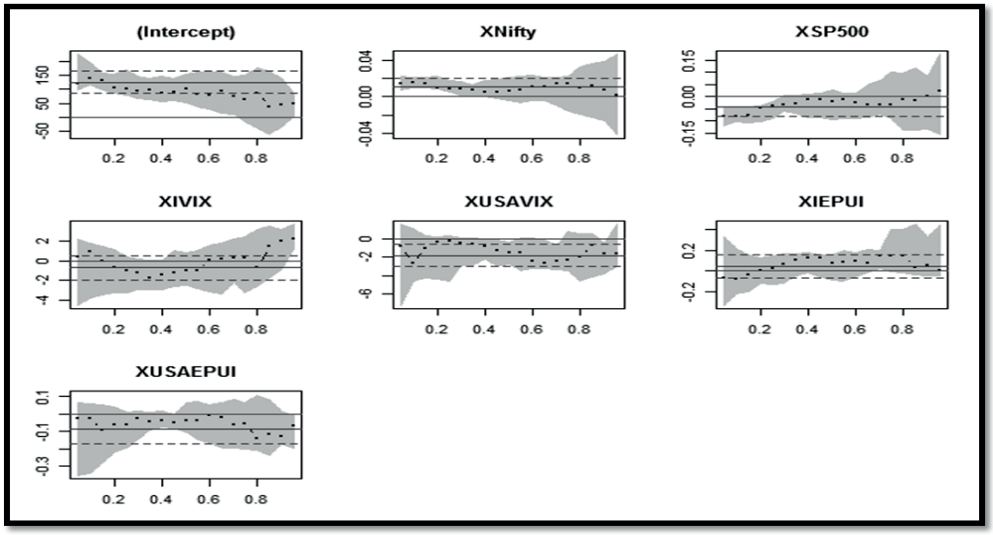


Figure 2. Changes in QR Coefficient for Ordinary Shares of Jain Irrigation Systems



two indices. In contrast, DVRs are less sensitive to USA VIX and India & USA EPUI. Thus, we advise investors to trade DVR shares carefully using these factors. On the other hand, we urge investors to avoid buying or selling DVR shares using India VIX because this factor does not influence DVRs. Regarding ordinary share prices, investors should be careful while trading ordinary shares using Nifty, S&P 500, India VIX, USA VIX, and USA EPUI. It is recommended that trading of ordinary shares should not be made using India EPUI.

(3) Impact of Indian and USA Factors on DVRs and Ordinary Shares of Tata Motors : The QR results regarding TMDVRs and TMOS are presented in Table 4 and Table 5. Further, changes in the QR coefficient for DVRs and ordinary shares are shown in Figure 3 and Figure 4. We find the positive and significant dependence between the

Table 4. Quantile Regression Estimates for DVR Share Prices of Tata Motors

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
α	842.5909***	651.565***	654.5423***	605.9872***	685.7739***	487.5188***	378.5539***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nifty	.0459262***	.0268608	.0317565*	.0700916**	.0931659***	.0814252***	.0766994***
	(0.006)	(0.147)	(0.080)	(0.017)	(0.003)	(0.008)	(0.000)
*S&P*500	–.3278412***	–.1999257**	–.2189335***	–.3430947***	–.4593825***	–.3374813**	–.2534629***
	(0.000)	(0.013)	(0.006)	(0.007)	(0.001)	(0.010)	(0.001)
IVIX	–7.827945***	–5.475044**	–3.269686	–1.238094	–2.433614	–3.338261	–2.81372
	(0.000)	(0.020)	(0.150)	(0.732)	(0.521)	(0.376)	(0.180)
USAVIX	–1.465769	–3.554452	–4.264223*	–1.027524	–3.369832	–3.105565	–5.869739***
	(0.493)	(0.142)	(0.072)	(0.785)	(0.393)	(0.428)	(0.008)
IEPUI	–1.397971***	–.9385827***	–.8985108***	–.8654853**	–.6365881*	–.2012163	.0584792
	(0.000)	(0.000)	(0.000)	(0.011)	(0.073)	(0.566)	(0.763)
USAEPUI	–.8320417***	–.4832044***	–.6085535***	–.8780233***	–.508974*	–.1296213	–.1289008
	(0.000)	(0.004)	(0.000)	(0.001)	(0.064)	(0.632)	(0.391)

Note. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Table 5. Quantile Regression Estimates for Ordinary Share Prices of Tata Motors

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
α	997.3637***	1014.022***	994.4325***	938.2131***	1015.413***	752.1182***	494.527***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Nifty	.0191293	.0147108	.0356209*	.0631211	.1094259***	.1049734***	–.3086484***
	(0.469)	(0.549)	(0.085)	(0.101)	(0.009)	(0.007)	(0.004)
*S&P*500	–.196968**	–.2160263**	–.2817148***	–.3370661**	–.5479849***	–.4148344**	5.345705*
	(0.086)	(0.043)	(0.002)	(0.043)	(0.003)	(0.013)	(0.085)
IVIX	–10.21601***	–3.65955	–1.204099	–1.979589	–2.225765	–2.284945	–7.031689**
	(0.003)	(0.236)	(0.641)	(0.680)	(0.666)	(0.633)	(0.030)
USAVIX	–2.484505	–7.000986**	–6.103792**	–8.937797*	–9.781666*	–11.70258**	–.263529
	(0.472)	(0.031)	(0.025)	(0.075)	(0.071)	(0.021)	(0.359)
IEPUI	–1.115029***	–1.723701***	–1.483288***	–.6900547	–.7550229	–.3423805	–.2665425
	(0.000)	(0.000)	(0.000)	(0.124)	(0.118)	(0.442)	(0.230)
USAEPUI	–1.28608***	–.5491508**	–1.014815***	–1.043381***	–.4818113	–.0968351	–.1289008
	(0.000)	(0.015)	(0.000)	(0.003)	(0.195)	(0.778)	(0.391)

Note. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Nifty index and DVRs across the quantiles, except 0.1 quantile. However, the lower tail independence and the upper tail dependence are observed for ordinary shares. The effect of S&P500 index on DVRs and ordinary shares is found to be negative and significant for all quantiles. The co-movement between the dual class shares and the S&P 500 index intensifies from the lower to the upper quantiles. It indicates that the dependence decreases during the bearish market and vice versa. There is no significant impact of India VIX on DVRs for the intermediate and upper quantiles. The effect of India VIX on the ordinary shares is negligible for all quantiles, except significant and negative impact for the quantiles 0.05 and 0.95. Hence, there is tail dependence, meaning that extreme India VIX movements have an impact on ordinary share prices. The USA VIX has a negligible impact on DVRs ; whereas, we observe tail independence, meaning that except 0.05 and 0.95 quantiles, there is an impact of USA VIX on ordinary share prices. USA and India EPUI have a significant and negative impact on DVRs for the lower and the intermediate quantiles. Overall, this means that the dependence with respect to changes in the EPUI is

Figure 3. Changes in QR Coefficient for Differential Voting Rights Shares of Tata Motors

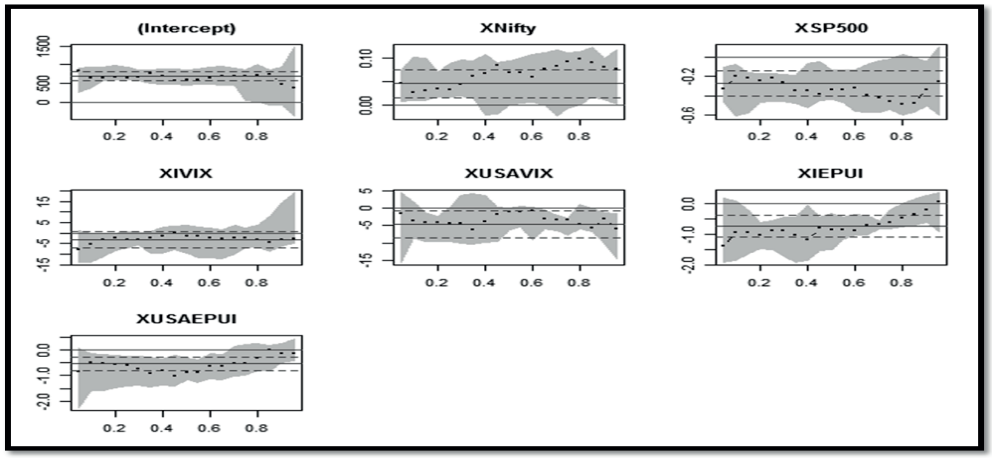
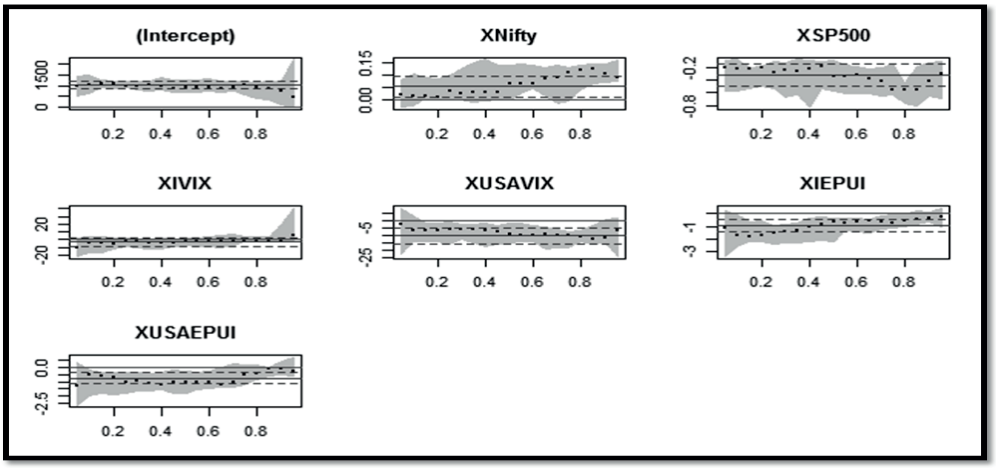


Figure 4. Changes in QR Coefficient for Ordinary Shares of Tata Motors



asymmetric for DVRs. We show that India EPUI has a significant and negative impact on ordinary shares for the lower and 0.25 quantile. The impact of USA EPUI on ordinary share prices is significant and negative for the lower, 0.25 and 0.5 quantiles.

In summary, DVRs are most sensitive to Nifty and S&P 500. Hence, we recommend share market participants to consider these two indices while buying or selling DVRs. On the other hand, DVRs are less sensitive to rest of the factors. Thus, investors should take their positions in the market carefully while trading DVRs. In case of ordinary share prices, investors can trade this company considering S&P 500 without any worry because of its high level of association with S&P 500 across the quantiles. But investors should be cautious while trading ordinary shares because of their less sensitivity to the other variables.

(4) Impact of Indian and USA Factors on DVRs and Ordinary Shares of Future Enterprises : The results regarding

Table 6. Quantile Regression Estimates for DVR Share Prices of Future Enterprises

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
α	–33.53904***	–27.29832***	–43.86473***	–32.2955***	–42.32152***	–53.83543***	–43.51793***
	(0.000)	(0.002)	(0.005)	(0.007)	(0.000)	(0.000)	(0.002)
Nifty	–.0007494	–.000217	.0012312	.0055475*	.0048831*	.007629**	.0095127***
	(0.161)	(0.919)	(0.745)	(0.061)	(0.083)	(0.034)	(0.007)
*S&P*500	.0186586***	.0146443	.0176382	.0031352	.0077398	.0054347	–.0009787
	(0.000)	(0.111)	(0.280)	(0.804)	(0.520)	(0.721)	(0.948)
IVIX	.0735846	–.1507442	–.0062609	–.6783754*	–.5645992	–.3782368	–.5016986
	(0.271)	(0.572)	(0.989)	(0.068)	(0.110)	(0.396)	(0.252)
USAVIX	.1822599**	.1044956	.0667146	–.0084551	.0398849	–.5450505	–.7696125*
	(0.010)	(0.706)	(0.892)	(0.982)	(0.913)	(0.240)	(0.092)
IEPUI	.0102849	.0157138	.0367286	.092806***	.1064749***	.1822742***	.1869597***
	(0.100)	(0.526)	(0.405)	(0.008)	(0.002)	(0.000)	(0.000)
USAEPUI	.0206847***	.0421009**	.0354811	.0159621	.0591648*	.0345189	.00139
	(0.000)	(0.030)	(0.299)	(0.546)	(0.021)	(0.281)	(0.965)

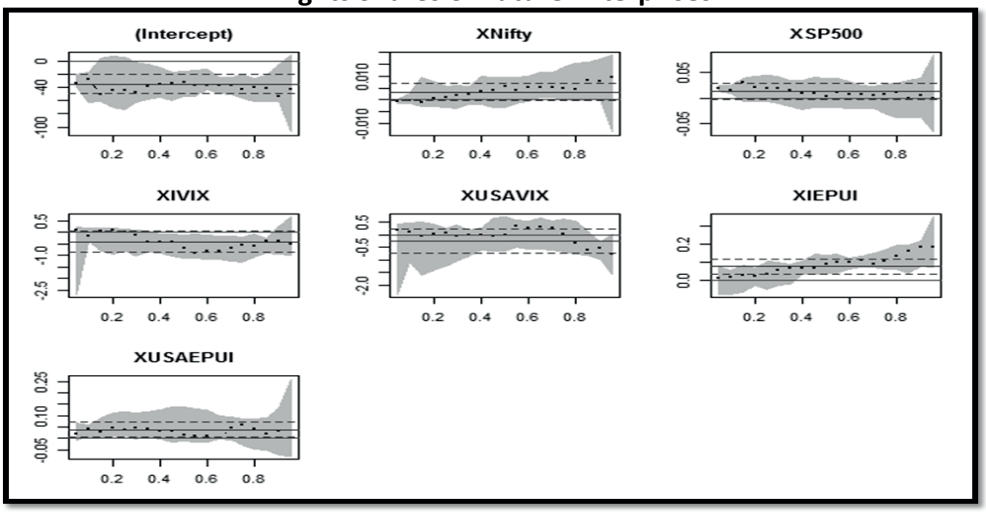
Note. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Table 7. Quantile Regression Estimates for Ordinary Share Prices of Future Enterprises

	0.05	0.10	0.25	0.50	0.75	0.90	0.95
α	−13.04558*	−11.51088	−23.73799***	−22.26765**	−27.84163**	−27.91011**	−12.09809
	(0.019)	(0.101)	(0.006)	(0.012)	(0.026)	(0.013)	(0.259)
Nifty	.000312	.0023018	.0017379	.0038105*	.0064338**	.0087411***	.0082596***
	(0.819)	(0.186)	(0.414)	(0.083)	(0.038)	(0.002)	(0.002)
*S&P*500	.0098799*	.0044479	.0106932	.0055419	−.0011385	−.0038324	−.0046885
	(0.086)	(0.551)	(0.244)	(0.555)	(0.931)	(0.746)	(0.682)
IVIX	−.0064103	.0552499	−.1519263	−.4426504	−.1548618	−.0955254	−.3688299
	(0.970)	(0.799)	(0.569)	(0.108)	(0.687)	(0.782)	(0.270)
USAVIX	.1565973	−.3225504	−.0044143	.1191563	−.3309644	−.8915658**	−.9193129***
	(0.379)	(0.156)	(0.987)	(0.675)	(0.408)	(0.015)	(0.009)
IEPUI	.0027478	.0198427	.0343909	.05279**	.0677473**	.1109692***	.093942***
	(0.863)	(0.327)	(0.167)	(0.040)	(0.060)	(0.001)	(0.003)
USAEPUI	.0060136	.0046173	.0330354*	.0156518	.0351137	.0003823	−.0089107
	(0.624)	(0.767)	(0.087)	(0.426)	(0.205)	(0.988)	(0.710)

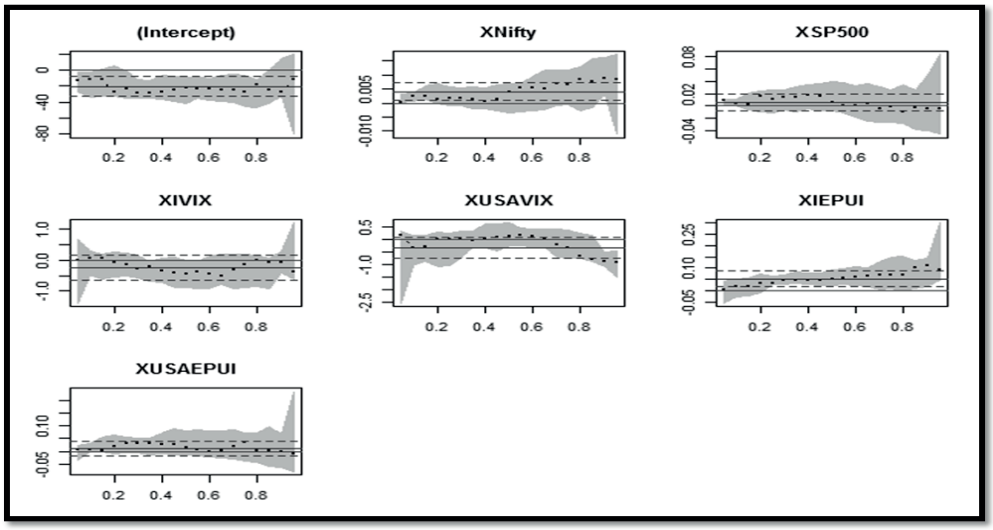
Note. * Significant at 10% level. ** Significant at 5% level. *** Significant at 1% level.

Figure 5. Changes in QR Coefficient for Differential Voting Rights Shares of Future Enterprises



FEDVRs and FEOS are reported in Table 6 and Table 7 and changes in the QR coefficient are presented in Figures 5 and 6. We observe a significant and positive impact of Nifty index on both dual class shares only for the median, 0.75 and upper quantiles ; whereas, for the lower quantiles, we find no impact. This implies asymmetric dependence structure. In case of S&P 500, both dual class shares are influenced only at the first quantile. It is important to note that both dual class shares react in the same way to Nifty and S&P 500. In considering the effects of India VIX, no significant changes in dependence are observed (except for the median for DVRs) ; thus, the structure of dependence remains unaltered. The impact of USA VIX on DVRs is significant and positive only for the tail of the distribution (0.05 and 0.95). However, the impact of USA VIX is significant only for the upper quantiles, meaning that the dependence structure is asymmetric. In case of India EPUI, both dual class shares

Figure 6. Changes in QR Coefficient for Ordinary Shares of Future Enterprises



have the same reactions to India EPUI. The impact is found to be significant and positive for intermediate and upper quantiles. This shows asymmetric dependence structure. USA EPUI has a significant and positive impact on DVRs only for the lower quantiles. This evidence suggests the asymmetric dependence structure (the lower tail dependence and upper tail independence). Regarding ordinary share prices, we detect an insignificant dependence across different quantiles, except the 0.25 quantile.

In short, both dual class shares are less sensitive to all the variables. However, ordinary share prices are not at all sensitive to India VIX. Hence, investors should be very careful while trading dual class shares.

Conclusion

This study examines the response of dual class shares prices of three dual-class companies in India to Indian and U.S. factors. Modeling dependence between share prices and its determinants is of a great importance for the stock market participants to take the financial decisions. To measure the co-movements, various empirical methods such as the multivariate GARCH class models, copulas and quantile regressions, among others, have been widely employed. The QR approach is the more sophisticated approach to address this research issue among the cited methods as it allows studying the impact of conditional variables on the dependent variable. We find that dual class shares prices of three dual-class companies are not highly sensitive to stock indices, namely, Nifty and S&P 500. Further, we show that VIX of two countries have a negligible impact. Similarly, the effect of India and USA EPUI is also minimal.

Implications of the Study

In this study, how Indian and U.S. factors affect dual-class share prices of three dual class companies are shown. Discussion and results of this paper will be mainly useful to stock market participants to take investment decisions on where and how to put money in these three stocks using factors considered in this study. We have taken share prices for this study and have not considered stock returns. Hence, this research will be handy only for trading purposes and not for earnings returns. The reason is that the investors can understand whether the DVRs and ordinary share prices of three dual-class companies will go up or down.

Limitations of the Study and Scope for Further Research

Finally, this research is the first attempt in analyzing the impact of Indian and U.S. specific factors under study on dual class shares prices using the QR methodology in the Indian context. However, this study can be further extended with other possible determinants. The impact of dividend on dual class shares prices can also be another possible extension of this study. Moreover, the volatility in dual class shares can also be the possible line of research.

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