Economic Policy Uncertainty and Government Bond Prices

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Abstract

Purpose : This paper investigated the impact of economic policy uncertainty (EPU) in the US, UK, Japan, Italy, India, Germany, France, China, Canada, and Brazil on Indian government bond prices using a new dataset of the Clearing Corporation of India Limited Broad Total Return Index (BTRI) and Liquid Total Return Index (LTRI).

Methodology : We used the quantile regression approach and monthly dataset from January 2004 – December 2020 for the analysis.

Findings : We found that the top 20 government bond prices decreased due to EPU in India, Japan, the US, and the UK. In contrast, the EPU of Canada, China, and the UK had a statistically significant positive impact on BTRI. Further, a negative relationship was found between the top five government bond prices and the EPU of three economies: India, Japan, and the US.

Practical Implications : The analysis will help identify potential risks and vulnerabilities in government bonds. It assists regulators and policymakers in implementing effective risk management measures to safeguard financial stability. The findings will also be useful for investors and market participants to make informed investment decisions.

Originality : From a data standpoint, this is the first study that used CCIL's BTRI and LTRI data for the first time to canvass the impact of EPU on Indian government bonds as far as we know. Further, we took into account the unique characteristics of the EPU of the top 10 economies and directly compared the reaction of these economies' EPU to the government bond price fluctuations.

Keywords : **economic policy uncertainty, EPU, Clearing Corporation of India Limited, broad return index, liquid return index, total return index, government bonds, bond prices, India, quantile regression**

JEL Classification Codes : C31, G11, G12

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The perturbation in the financial and economic systems in one economy could be transmitted in a significant way to other economies in the globe, whether indirectly or directly. Several studies have proposed the relationship between economic policy uncertainty (hereafter, EPU) and the markets (Balcilar et al., 2019; Colombo, 2013; Dakhlaoui & Aloui, 2016; Fang et al., 2017; Zhang et al., 2019). Since the global economies are interconnected due to international business activities, EPU in one country has an impact on the other country. The anchor of the fixed and risk-free income is the government securities market and also the main government

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funding source. In a singular manner, the government securities markets dominate the transactions in the fixed-income market in India. The Indian bond market has gained in an exponential manner over the last few years and takes the fourth rank concerning outstanding government debt in Asian markets after Japan, China, and South Korea. Uncertainty concerning economic policy decisions, regardless of their origin, would deter the confidence of investors and companies from investing, and, therefore, have a state of profound shock to the bond market.

The previous studies revealed that the returns on government bonds are influenced by a complex interplay of factors, including interest rates, inflation, exchange rate, economic policy uncertainty, geopolitical risk, volatility in the stock market, and stock market performance (Abakah et al., 2022; Faniband, 2021; Li et al., 2022; Lithin et al., 2023; Panigrahi et al., 2022; Sharma et al., 2020; Zaremba & Schabek, 2017). However, these studies have ignored the impact of economic policy uncertainty on the top 10 economies on government bonds in India.

Based on the above discussion, this paper gives attention to the following uncovered questions. Does dependence exist between EPU and Indian government bond prices? Is there any symmetric and asymmetric impact of EPU on government bond prices?

Our research is in demand for the following reasons. First, analyzing the impact of global economic policy uncertainty on Indian government bonds helps identify potential risks and vulnerabilities in financial markets. It assists regulators and policymakers in implementing effective risk management measures to safeguard financial stability. Further, understanding the relationship between economic policy uncertainty and government bonds can contribute to the development of appropriate policies and interventions to mitigate risks and manage potential market disruptions. Second, understanding how global economic policy uncertainty affects government bonds in India is essential for assessing the stability and risk associated with these investments. It helps policymakers, investors, and market participants make informed decisions and manage potential risks.

Against this background, there is a pressing need for rigorous research on the effects of the EPU on the government bonds market. This paper applies quantile regression (QR) methodology to investigate the impact of EPU in the United States (US), United Kingdom (UK), Japan, Italy, India, Germany, France, China, Canada, and Brazil on the top 20 and top five traded Indian government bond prices. These top 10 economies are selected by gross domestic product. The EPU is measured using Economic Policy Uncertainty Index (Baker et al., 2016). The contribution of this research is as follows. Firstly, from a data standpoint, this is the first study that uses CCIL's BTRI and LTRI data for the first time to canvass the impact of EPU on Indian government bonds as far as we know. Secondly, we take into account a unique characteristic of the EPU of the top 10 economies and directly compare the reaction of these economies' EPU to the government bond price fluctuations.

Previous Research Background

Various studies have been undertaken on the consequences of macro and non-macroeconomic variables on government bond yields in developed and developing countries. These studies have shown that the impact of macro and non-macroeconomic factors on government bonds is not homogeneous. Chernov et al. (2019) analyzed the impact of macroeconomic data, industrial production's inflation growth rate, and exchange rate on yields of China, Indonesia, Korea, and Singapore. Altavilla et al. (2017) showed that the changes in long-term yields of treasury bonds are explained by macroeconomic surprises. Poghosyan (2014) analyzed the effects of long-run factors such as potential growth, debt-to-GDP ratio, and short-run variables, that is, interest rates and inflation on 22 advanced economies' sovereign bond yields. Akram and Das (2014) examined the relationship of Japanese yields with its few macroeconomic factors. The main cause for low nominal yields is low short-term interest rates. Andritzky (2012) noticed that non-residents, banks, and other institutional investors, as well as the public sector, are the largest investor groups to invest in government securities for the advanced G20 countries and the Euro area. Claessens et al. (2007) found that the currency and depth composition of government bond markets are

related to institutional and macroeconomic factors. Ardagna et al. (2007) confirmed that long-term yields increased with the surge in the debt-to-GDP ratio. Kinoshita (2006) studied 10-Euro countries and found that long-term government bond yields have not been influenced by public debt in an individual country. Akram and Das (2019) found that interest rate (short-term) is the main factor influencing long-term Indian yields. However, long-run yields are adversely influenced by the government debt and nominal income ratio.

Considerable studies on the effect of macroeconomic factors on government bond prices include Francová (2017), who studied the determinants of bond prices by following the international arbitrage pricing theory. The bond prices are influenced by exchange risk. Thumrongvit et al. (2013) noticed that economic growth is positively associated with bonds. Green (2004) found the news related to macroeconomic factors affecting bond prices. The asymmetrical information in the government bond market increases following economic announcements. Fleming and Remolona (1999) observed that announcements of producer price index, employment, and fed funds' target rate strongly impacted US Treasury bond prices. Barr and Campbell (1997) found a negative correlation between changes in expected inflation and real rates and nominal and index-linked UK bond prices at short horizons.

Some Indian-specific studies include Lithin et al. (2023), who analyzed the sovereign bond yield volatility using a univariate GARCH model. The yield showed volatility clustering. They also found that money market volatility influences bond yield volatility. Panigrahi et al. (2022) noticed that the 10-year Indian government bond yield was sensitive to global, macroeconomic, and monetary policy variables using the autoregressive distributive lag model and structural vector autoregression. Sharma et al. (2020) found that the exchange rate, stock market returns, and volatility affected bond yields.

Further, Darbha et al. (2002) confirmed that liquidity premiums in developed economies significantly affected bond prices. In the case of Indian government bonds, variation in pricing errors off an estimated term structure is because of residual maturity, time since issuance, current yield, and issue size. Sahoo et al. (2019) found the return and volatility spillovers between exchange rate and bonds using BEKK-GARCH. Rangotra (2020) found that the government bond yield significantly impacted the various economic parameters in India. Faniband and Faniband (2021) noticed the volatility spillover between stock and government bond markets.

Further, studies related to public debt and corporate bonds, like Patel et al. (2023), detected the integration between the MSCI Emerging Markets and the USA bond markets. Gurinovich and Smirnikova (2021) analyzed the debt policy of Russia. Yakean (2013) found that corporate bonds are influenced by the spread between yield to maturity and market rate and exchange rate in Thailand. Saini and Muniyoor (2022) noticed that economic development affected the public debt in India.

Based on the above discussion, it is noticed that the impact of EPU in the top 10 countries on the top twenty and top five traded Indian government bond prices is not studied in previous studies. Therefore, this research issue has been uncovered in this paper.

Data Point and Variable Quantity

We considered the monthly data from January 2004 – December 2020. The total number of observations is 204. The BTRI and LTRI data were caught from the CCIL website. The EPU data were extracted from the policyuncertainty.com website. Multiple studies have used economic policy uncertainty in research related to financial markets (Faniband, 2020; Kalra & Gupta, 2023). The analysis is carried out in STATA and R. For the bond markets, CCIL Broad Total Return Index (BTRI) and Liquid Total Return Index (LTRI) are used to evaluate the performance of the government bond markets. The top 20 and top 5 traded bonds are included in BTRI and LTRI, respectively. The Total Returns Index (TRI) gives the change due to both the price movements and accrued interest.

Table 1. ***Description of Data***

	BTRI	LTRI	Brazil	Canada	China	France	Germany	India	Italy	Japan	UK	US
Observations	192	192	192	192	192	192	192	192	192	192	192	192
Mean	1704.783	1636.765	2.149	2.171	2.156	2.255	2.111	1.916	2.012	2.005	2.271	2.067
Median	1528.842	1496.802	2.151	2.200	2.126	2.292	2.132	1.913	2.018	2.020	2.302	2.059
Maximum	3071.849	2884.136	2.831	2.695	2.930	2.759	2.657	2.453	2.382	2.378	3.058	2.454
Minimum	935.197	912.526	1.348	1.607	1.609	1.658	1.454	1.397	1.501	1.689	1.484	1.651
Std. Dev.	623.442	560.489	0.236	0.266	0.291	0.226	0.211	0.228	0.158	0.133	0.310	0.169
Skewness	0.568	0.562	–0.041	–0.243	0.492	–0.530	–0.402	0.067	–0.408	0.148	–0.194	–0.035
Kurtosis	2.083	2.125	3.587	2.032	2.650	2.828	3.115	2.431	3.301	2.760	2.337	2.604
Jarque–Bera	17.063***	16.219***	2.805	9.389***	8.732***	9.242***	5.271	2.732	6.060**	1.167	4.714	1.297

Note. **, *** indicate significance at 5% and 1% severally.

Table 1 shows that the mean values of BTRI, LTRI, India, and the UK are more than the median values. Thus, these variables are turned (skewed) on the right. In contrast, the other variables have moved left because the values of the median were found to be more than the values of the mean. The kurtosis value for all the variables (except Brazil, Germany, and Italy) is less than the baseline value, which is equal to 3. The Jarque-Bera (JB) test strongly rejects the normality of the factors except for Brazil, Germany, India, Japan, the UK, and the US. Further, we find that all the variables are stationary.

Methodology

This paper considers the QR methodology proposed by Koenker and Bassett Jr. (1978) because it helps to cover different characteristics of a bunch of regression curves of different quantiles (e.g., median) of the conditional distribution of the dependent variable. This method covers the problems of the ordinary least square (OLS) regression. Therefore, a better explanation regarding the impact of EPU in 10 economies on BTRI and LTRI can be studied using QR methodology.

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

$$y_i = x'_i \beta_\theta + u_{\theta i} \text{ with } Q_\theta(y_t \mid x_t) = x'_t \beta_\theta \qquad (1)$$

where, x'_t indicates a vector of regressors, β_θ denotes the vector of parameters to be estimated, and $u_{\theta i}$ represents a vector of residuals. $Q_\theta(y_t \mid x_t)$ refers to the θ^{th} conditional quantile of y_i given x'_i. The θ^{th} regression quantile solves the following problem:

$$\min_{\beta} = \sum_i \theta \, |y_i - x_i \beta| + \sum_i (1-\theta) \, |y_i - x_i \beta|$$

$$\min_{\beta} = \sum_i \rho_\theta \, u_{\theta it}, \theta \epsilon (0, 1) \qquad (2)$$

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 Eq. (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.

Analysis and Results

This part discusses the QR results of BTRI and LTRI in Tables 2 and 3, respectively. The graphical presentation is also illustrated for all the quantiles and conditioning variables in Figure 1 and Figure 2.

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The results shown in Table 2 and Figure 1 indicate that Germany and Italy have no impact on bond prices across the different quantiles. EPU in Brazil has a significant and positive impact only for 0.4, 0.6, 0.7, and 0.9 quantiles. Canada and China's EPU are positively related to bond prices with a high degree of significance. Further, the EPU in the UK has a substantial positive effect on BTRI. These findings may be plausible because when there is uncertainty in economic policies in China, Canada, and the UK, investors may seek safer investment options to mitigate risk. Indian government bonds, particularly those with longer maturities, are considered relatively safe investments due to the stability of the Indian economy and the government's creditworthiness. As a result,

Table 2. ***Quantile Regression Results of BTRI***

	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Constant	907.068***	–233.422	–218.451	–212.036	–399.151	–680.357*	–898.411*	–1087.620**	–1612.513***
	(0.001)	(0.528)	(0.610)	(0.597)	(0.294)	(0.052)	(0.053)	(0.025)	(0.000)
Brazil	203.877	103.751	107.153	192.504*	170.137	206.853**	236.474*	209.762	304.120**
	(0.256)	(0.304)	(0.360)	(0.080)	(0.102)	(0.031)	(0.062)	(0.113)	(0.010)
Canada	649.097*	734.207***	902.778***	1164.731***	1055.899***	966.863***	1111.688***	1157.955***	1184.380***
	(0.051)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
China	1182.676***	1129.778***	950.252***	908.549***	1009.962***	968.901***	933.397***	946.096***	988.850***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
France	–221.843	–139.691	–79.891	112.138	199.8816	194.094	228.578	329.174	371.634*
	(0.494)	(0.444)	(0.706)	(0.571)	(0.288)	(0.260)	(0.318)	(0.169)	(0.081)
Germany	–230.211	–44.463	–102.027	–108.441	–64.132	–97.160	–137.928	–220.287	19.392
	(0.452)	(0.796)	(0.609)	(0.561)	(0.717)	(0.549)	(0.522)	(0.327)	(0.923)
India	–619.799***	–490.066***	–395.544***	–324.436**	–367.207***	–460.648***	–477.157***	–442.696***	–197.040
	(0.003)	(0.000)	(0.004)	(0.011)	(0.002)	(0.000)	(0.001)	(0.004)	(0.145)
Italy	17.489	–155.782	–148.825	–192.798	–183.538	–154.037	–128.332	–61.339	–20.838
	(0.953)	(0.348)	(0.440)	(0.285)	(0.283)	(0.326)	(0.537)	(0.777)	(0.914)
Japan	–861.142**	–817.062***	–787.552***	–721.082***	–788.447***	–508.914**	–470.275	–452.736	–799.248***
	(0.042)	(0.001)	(0.005)	(0.005)	(0.001)	(0.024)	(0.114)	(0.145)	(0.004)
UK	907.068***	840.570***	874.613***	613.475***	487.519***	573.438***	587.073***	487.161**	295.758
	(0.001)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.003)	(0.019)	(0.107)
US	–272.483	–538.185**	–671.270**	–969.662***	–729.415***	–737.329***	–801.066***	–748.576**	–616.243**
	(0.494)	(0.017)	(0.010)	(0.000)	(0.002)	(0.001)	(0.005)	(0.011)	(0.019)

Note. *, **, *** indicate significance at 10%, 5%, and 1% severally.

Figure 1. ***QR Plot for BTRI***

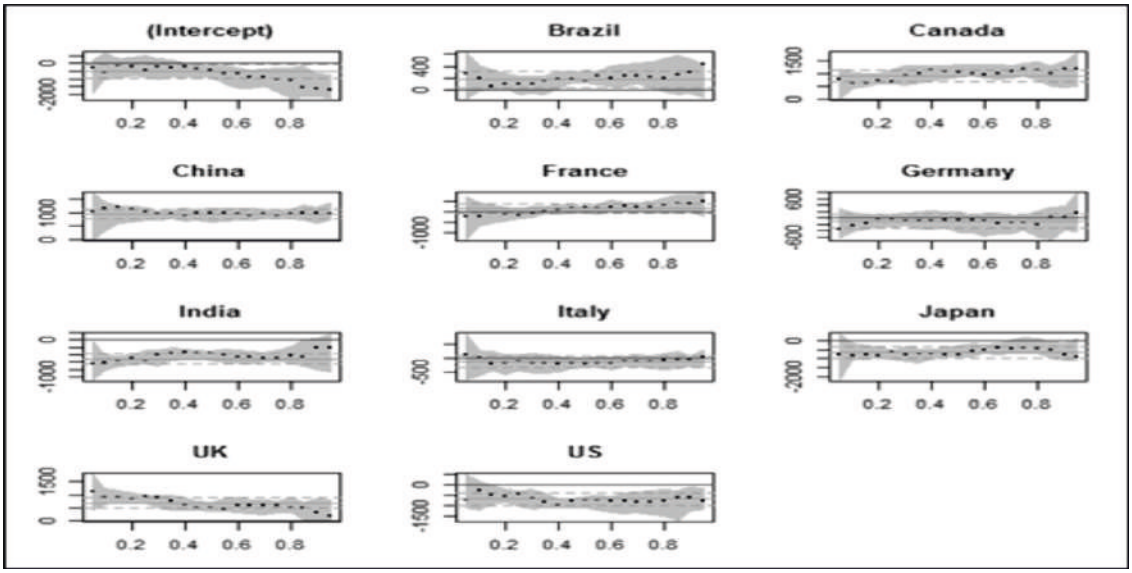
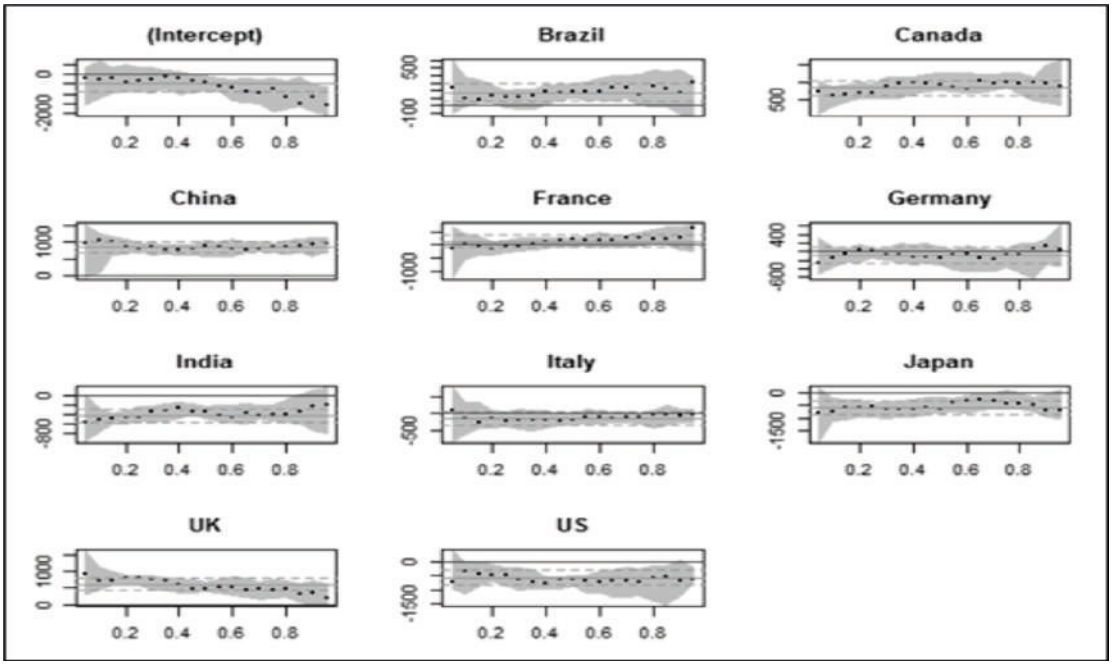


Table 3. ***Quantile Regression Results for LTRI***

	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
Constant	–296.871	–425.119	–239.590	–226.242	–420.859	–652.525**	–931.510**	–1155.814***	–1135.522***
	(0.630)	(0.204)	(0.497)	(0.509)	(0.244)	(0.039)	(0.019)	(0.006)	(0.003)
Brazil	97.649	136.490	114.364	182.594*	188.555*	175.572**	240.461**	247.087**	168.154
	(0.561)	(0.135)	(0.235)	(0.052)	(0.056)	(0.042)	(0.026)	(0.030)	(0.105)
Canada	617.665**	694.535***	874.197***	1002.814***	911.222***	817.534***	963.883***	957.176***	975.557***
	(0.048)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
China	1043.085***	874.568***	840.703***	787.448***	881.182***	830.964***	801.179***	845.971***	930.646***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
France	30.383	–146.582	–56.766	112.503	207.022	186.459	268.842	204.249	301.635
	(0.920)	(0.374)	(0.744)	(0.506)	(0.245)	(0.231)	(0.167)	(0.169)	(0.108)
Germany	–148.140	34.687	–97.609	–117.205	–131.366	–35.2890	–173.780	–88.715	133.548
	(0.605)	(0.823)	(0.552)	(0.462)	(0.433)	(0.809)	(0.342)	(0.646)	(0.449)
India	–509.127***	–455.768***	–358.225***	–270.003**	–338.209***	–454.360***	–430.491***	–396.226***	–228.223*
	(0.009)	(0.000)	(0.001)	(0.013)	(0.003)	(0.000)	(0.001)	(0.003)	(0.056)
Italy	–146.614	–153.411	–172.556	–196.906	–180.782	–108.471	–98.967	–24.125	–58.489
	(0.596)	(0.307)	(0.276)	(0.202)	(0.265)	(0.326)	(0.575)	(0.897)	(0.731)
Japan	–740.774*	–575.932***	–624.389***	–638.832***	–614.128***	–299.672	–311.037	–401.918	–672.569***
	(0.062)	(0.008)	(0.006)	(0.004)	(0.008)	(0.138)	(0.218)	(0.132)	(0.006)
UK	729.162***	789.281***	756.041***	602.293***	477.167***	530.894***	485.966***	462.213**	374.938**
	(0.006)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.004)	(0.010)	(0.021)
US	–360.674	–473.011**	–618.486***	–790.704***	–610.208***	–715.723***	–661.048***	–576.443**	–664.821***
	(0.334)	(0.020)	(0.004)	(0.000)	(0.006)	(0.000)	(0.006)	(0.023)	(0.004)

Note. *, **, *** indicate significant at 10%, 5% and 1% severally.

Figure 2. ***QR Plot for LTRI***



increased demand for Indian government bonds drives up their prices. The quantile approximated coefficients across the bottom, middle, and higher quantiles are found to be significant. The co-movement between the two countries' EPU and the bond prices escalates from the bottom to higher quantiles. It indicates that the state of reliance decreases during the bearish market and the other way around. France also shows a significant and positive impact only for the 0.9 quantile, indicating that extreme movements in France's economic policy affect the BTRI. In short, these results reveal that EPU in Brazil, Canada, China, and France increase the bond prices of the top 20 government bonds.

Further, India, Japan, and the US have significant and negative consequences on bond prices. The results for the US and Japan are reasonable because investors tend to become risk-averse and seek safer assets during periods of economic policy uncertainty in major economies like the US and Japan. Therefore, investors move their funds into safe-haven assets such as US treasury bonds and Japanese government bonds. This shift in investor sentiment away from riskier emerging markets like India can lead to a decrease in demand for Indian government bonds, which in turn can lower their prices. The finding related to India is not consistent with Faniband (2020), who found that the Indian EPU had a positive effect on government bond prices. In a nutshell, the top 20 government bond prices fall due to EPU in India, Japan, and the US.

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Table 3 and Figure 2 present the results of EPU and LTRI. The EPU in Brazil has no impact on LTRI for bottom quantiles. However, the impact is significant and positive for middle and higher quantiles (except 0.9). In the case of Canada, China, and the UK, the EPU in both these economies has a significant and positive effect for the bottom, middle, and higher quantiles. This takes to a surge in the bond prices of the five top-traded bonds. In contrast, the EPUs in Italy, Germany, and France have no impact on LTRI because the quantile estimated coefficients of these three economies are insignificant.

The quantile estimated coefficients of EPU in India are significant and negative for the bottom, middle, and higher quantiles. Japan's EPU has a substantial and negative influence on LTRI for the bottom, median, and 0.9 quantiles. The results of the US EPU are similar to India and Japan. The EPU in the US has a statistically significant and unfavorable impact on India's top five traded bond prices across all the quantiles (except 0.1). In short, the EPU in India, Japan, and the US leads to a decrease in the prices of bonds in LTRI as the coefficients of these economies are negative.

Conclusion

This paper analyzes the effect of EPU of the top 10 economies on India's government bond market using the QR approach for the monthly January 2004–December 2020 data. Our extensive analyses have come out with the following significant results. First, the top 20 government bond prices decrease due to EPU in India, Japan, the US, and the UK. On the other hand, the EPU of Canada, China, and the UK have a statistically significant positive impact on BTRI. Second, it is evident that the top five traded government bond prices have a long-term negative association with the EPU of three economies, namely, India, Japan, and the US.

The results of this study are of direct interest to investors who wish to invest and evaluate the role of EPU in the bond market. The top 20 traded bonds are highly sensitive to the EPU of Canada and China. Therefore, investors should invest in these 20 bonds considering these two economies. On the other hand, investors should carefully put their money in the top 20 bonds using the EPU of India, Japan, the UK, and the US, as these economies show less sensitivity to BTRI. Further, the EPU of Canada, China, India, and the UK have a significant association with the top five traded bonds. Thus, these economies' EPU should be considered while investing in these bonds.

Limitations of the Study and Scope for Further Research

This study is the first attempt to investigate the relationship between EPU and bond prices in the Indian context. However, further studies can be extended to the impact of other economies on government bond yield. Research can also be conducted on the impact of EPU of the top 10 economies by GDP on corporate bond prices and yield.

Authors' Contribution

Muhammadriyaj Faniband and Dr. Pravin Jadhav conceived the idea and developed a quantitative design to undertake the empirical study. Muhammadriyaj Faniband extracted research papers with high repute, filtered these based on keywords, and identified the research gap. Dr. Pravin Jadhav verified the analytical methods and supervised the study. The analysis of the data was carried out by Muhammadriyaj Faniband using STATA and R. Muhammadriyaj Faniband wrote the manuscript in consultation with Dr. Pravin Jadhav.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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