Management Dynamics

Volume 20 | Number 1 Article 4

June 2020

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Recommended Citation

Rosario, Shireen (2020) "Impact of Economic Policy Uncertainity on Key Economic Indicators of India," *Management Dynamics*: Vol. 20: No. 1, Article 4.
DOI: https://doi.org/10.57198/2583-4932.1015
Available at: https://managementdynamics.researchcommons.org/journal/vol20/iss1/4

IMPACT OF ECONOMIC POLICY UNCERTAINITY ON KEY ECONOMIC INDICATORS OF INDIA

Shireen Rosario*

ABSTRACT

Purpose: With the help of the newly developed Economic Policy Uncertainty (EPU) index, this paper attempts to find the influence if any, of the EPU on stock markets and certain key economic indicators in India.

Methodology /Approach: The focus is on the influence of EPU on the stock markets, industrial production, new capital issues, exports and bank credit to commercial sector. Monthly data of economic indicators is collected for 66 months from January 2014 and tested with OLS and Quantile regression.

Findings: It is observed that stock market, Industrial Production, new capital issues and bank credit are negatively related to EPU. Also, that impact of EPU is more on higher quantiles.

Limitations / Implications: The study examines and proves the overall impact of EPU on selected economic indicators and the impact at different quartiles. This opens up vistas for further exploration of the findings to prove / disprove the same in other economic indicators and against certain specific events that spur the EPU index.

Practical Implications: The paper has strong theoretical foundations. The methodology adopted has been research tested. There is a need to look at the EPU index closely and frequently to feel the pulse of the EPU and how it affects the economy.

Originality Value: This is one of the attempts to evaluate the behavior of EPU and its implication on certain economic indicators. As EPU index is newly developed, this paper adds to the existing literature, especially in the Indian context.

Keywords: *Economic, financial, Policy, Uncertainty, Indicators*
JEL Classification: O12,M15, L60

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INTRODUCTION

There is an increasing concern around the world about the economic policy uncertainty, following the Global Financial Crisis, the Eurozone Crisis and the slow recovery thereafter. These events are believed to be the outcome of the uncertainty of fiscal policies in the United States and Europe. A lot of curiosity has been around to examine the financial decisions in the light of policy uncertainty, while researchers have used cumbersome and strenuous methods to calculate the policy uncertainty and evaluate its impact on various financial decisions (payouts and investments being quite popular).

Economic Policy Uncertainty (henceforth EPU) may be defined as "The probability of changes in the existing economic policies that determine the rules of the game for economic agents" (Baker et al., 2013). In 2016 a new index that was published by Prof Scott R Baker (Northwestern University), Prof. Nicholas Bloom (Stanford University) and Prof Steven J Davis (University of Chicago) to measure the EPU. The unique feature of this index is that it is based on the newspaper articles that contain certain terms (explained under "data & variables") that depict the economy. Higher value of EPU index indicates higher degree of policy uncertainty. Baker, Bloom & Davis (henceforth BBD) developed this index not only for the United States but also for 26 other countries including Japan, EU, India and China. The EPU index has increasingly become popular with researchers who study the economic uncertainty and its impact on various facets of economy.

EPU and economic indicators

BBD have shown through their research that, policy uncertainty to a large extent can damage the economy and the economic recovery process. This is possible as high level of uncertainty can discourage the intended capital expenditure, employment growth and spending on the whole. Similar argument is also put forth by Bonaime et.al (2018). The publication of EPU index by BBD has led to a lot of research in recent years. Unlike firm level uncertainty, economic policy uncertainty largely stems from events that are out of the control of managers like political elections, financial turmoil, natural calamities etc.

Yong (2016) studied the Japanese investments in the US and the UK during the US presidential elections and Brexit Referendum respectively. It was noticed that the US EPU index spiked in June, 2016 when presidential nominees for Democrat and Republicans were announced. The EPU was seen to have spiked again in November, 2016 when the ballots were cast but dropped in December, 2016. When President Trump took charge in January, 2017 the EPU spiked again. While comparing the EPU index with Japanese FDI, it was observed that the FDI staggered from April 2016, with FDI falling as compared with 2014 and 2015 figures. Similarly, in the UK, the run up for the Brexit in 2016 pushed up the EPU index, which fell significantly once the results were announced. The FDI from Japan in the UK spiked suddenly. It can be concluded that decreased uncertainty helped the companies in their decisions. It is evident that during high EPU, firms postpone their FDI as the investments are irreversible or have high cost of adjustment, unlike investment in securities.

The results shown by the studies done on the EPU of the US and the UK and the influence on the FDI from Japan, are consistent with the studies of Julio & Yook (2012) who studied the data on FDI flows from the US and the elections related data in the destination countries. The findings revealed that the US FDI dropped by nearly 13% in the destination countries in the quarters where elections were held, as compared to other normal quarters. The researchers concluded that increase in the EPU negatively impacted the FDI flows into that country.

The spike in EPU in China resulting from the disputed territories row with Japan regarding Senkaku Islands in 2012, was studied by Chen et al, 2016. The authors base their study on the data released by Ministry of Economy, Trade & Industry. The authors focused on the behavior of Japanese companies when faced by enormous adverse shock. There were wide spread anti-Japan protests in China in 2012 regarding the islands. As the demonstrations grew in scale, the Chinese EPU index spiked and the sales of Japanese companies nose- dived only to bounce back in 2013.

Qiu and Li (2016) studied the impact of news based EPU index on the capital structure of the firms in the market-based US economy and bank based German economy. The researchers concluded that the market value based and book value based financial ratios are positively related to EPU in tranquil times and negatively related in crisis period. This behavior indicates caution exercised by the US companies. On the other hand, in the bank-based economy of Germany the financial ratios reacted negatively with the EPU both in tranquil and crisis periods, indicating that German firms borrow less when the EPU index is high. The authors also noted that in both economies, size and tangible assets have a positive effect on leverage, while, profitability, Market to book ratio, capital expenditure ratio and cash dividend ratios have negative effect on leverage.

A study on the nexus between EPU and Indian economic indicators was carried out by Bhagat et al, 2013 who concluded that GDP and fixed investments are negatively associated with EPU. Further, the researchers also observed that the magnitude of these relations to be quite significant. The study also confirmed a negative relation between EPU and BSE sensitive index.

Researchers have also dwelt on the subject whether stock prices are affected by EPU. Quite a few recent studies in this dimension point that EPU is negatively associated with stock returns and increase in EPU would increase the stock volatility (Bhagat et al., 2013).

Arouri & Roubaud (2016) take on the case of USA, India and China and study the relevant EPU indices against the stock market returns and volatility. Their study indicates that stock markets returns in India and the USA behave negatively with the increase in the EPU and the volatility in the stock market spikes with the EPU spike. However, in the case of China the stock market returns or volatility are not affected by changes in the EPU. The effect of stock markets was found to be negative and persistent in the US. For India, it was found to be negative with some persistence. However, it was non-significant for China.

Stock prices play an important role for portfolio management and capital budgeting as they are a direct reflection of firms' health and future growth. Stock prices, adjusted at appropriate risk adjusted discount rates, are also an indicator of future dividends.

The EPU impact on stock markets may show up in different ways, such as on financial decisions concerning investment, consumption, savings and employment taken by economic agents (Gulen & Ion 2014; Kang et al., 2014). Uncertainty is inclined to push up production and finance costs thereby affecting demand & supply, which in turn may lead to disinvestment and economic slowdown, especially in developing countries. (Julio 2002; Fernandez et al., 2014). EPU also tends to increase risks particularly in financial markets by denting the government protection for markets (Pastor & Veronesi 2012).

The phenomena of policy uncertainty were studied in 7 OECD countries by Chang et al., (2015). However, their findings were not in consonance with the findings of the past literature that showed impact of EPU on stock returns and increase in EPU being a cause for stock volatility. This is, in addition to the affect that economic uncertainty has on firm specific characteristics and macro-economic fundamentals. The study revealed different results for different countries. While in Italy and

Spain the stock prices were affected by political & economic uncertainty, the effect of stock prices on political uncertainty was seen in UK and USA. Remaining countries (Canada, France & Germany) maintained neutrality. The authors doubt that political and economic uncertainty decrease returns from stocks, which is the result of lower production, higher production costs and slower economic growth.

The impact of EPU on other aspects like GDP, Investments, Firm capital structure, firm borrowing has also been studied by researchers. Aizenman & Marion (1993) studied the relationship between EPU and real capital GDP of 46 developing countries between 1970 and 1985 and were among the first ones to do so. Their study reveals that EPU can influence economic growth by investment.

Corporate investment policy has been under study for considerable time. Traditionally, large expected cash flows have a positive correlation with the investments while uncertainty of large corporate cash flows have a negative impact on corporate investments. In a real-life scenario where, capital expenditures are irreversible and taking on and firing employees is expensive, businesses are better off with deferring the capital expenditure or hiring employees when confronted with increased economic uncertainty (Bernanke, 1983).

OBJECTIVE

This paper attempts to examine the influence if any and the extent of influence, of the EPU on the Indian Stock Exchanges and certain other aspects of the Indian economy. The parameters selected are:

1. Stock market indices
2. Industrial production indices
3. New issues of capital other than government companies
4. Exports
5. Net inflow of Foreign Institutional Investments
6. Bank credit

DATA & VARIABLES

The data used in this research paper is collected from secondary sources. India specific EPU index is obtained from www.policyuncertainty.com. For stock exchange behavior, the data from the National Stock Exchange (NSE) of India is used. Apart from the NSE 50 index, as banking and auto sectors are prominent sectors in India, NSE Bank index and NSE Auto index are also used. The data is obtained from www.nse.com. The source of data on the Industrial Production Indices is the National Statistical Office (NSO), Government of India. All other data on economic indicators is obtained from the Reserve Bank of India www.rbi.org. Monthly data is collected for 66 months i.e. from 1.1.2014 to 30.6.209.

Independent Variable: Economic Policy Uncertainty Index (EPU)

The Economic Policy Uncertainty is measured with the index developed by BBD. The basis of the construction of the index is as follows:

Computer driven search of major newspapers is done in each country. The search specifically counts the articles that contain the terms: (E) “economic” or “economy”, (P) “tax”, “govt spending”, “regulation”, “central bank” and (U) “uncertain” or “uncertainty”. The count of articles so obtained is scaled by the total number of articles in the same newspaper in the same month. BBD then standardize each newspaper's scaled EPU frequency count to unit standard deviation, average across the number of

newspapers used in that country by month to obtain their EPU index of each country and then normalize the resulting monthly series over the coverage period of that country to achieve a mean of 100. It is to be noted that the terms set for E, P, U are country specific and are chosen by consulting people who know the local language and economy very well and hence may vary from country to country. It is not necessary that the index correlates with all political events of lesser significance that will have little consequence on the economy. Given the concern that the newspaper - based index could have a political bias and hence may not be correct, BBD conduct various validations, including human audits of newspapers under close supervision and confirm that the computer - generated index correlates with human generated index.

The BBD index is also used by data providers like Reuters, Bloomberg and Haver Analytics which only shows that BBD index is of relevance to all those who subscribe to their services. The use of EPU index in this paper, follows that by Bhagat et al (2013), Gulen & Ion (2015); Brogaard & Detzel, (2015) and Bonaime et.al., (2018).

Dependent Variables

- NSE 50 index monthly averages: based on daily closing index. Base year 1995=1000. Source: www.nseindia.com
- NSE Bank Index monthly averages: The monthly average of the daily closing index of the NSE banking index. Base year 1995=1000. Source: www.nseindia.com
- NSE Auto Index monthly averages: The monthly average of the daily closing index of the NSE auto index. Base year 1995=1000. Source: www.nseindia.com
- Monthly Industrial production index (Primary goods): Base year 2011-12 = 100. Source: National Statistical office (NSO), Government of India
- Monthly Industrial Production Index (Capital goods): Base year 2011-12 = 100. Source: National Statistical office (NSO), Government of India
- Monthly Industrial Production index (Infrastructure): Base year 2011-12 = 100. Source: National Statistical office (NSO), Government of India
- Monthly Industrial Production index (Consumer durables): Base year 2011-12 = 100. Source: National Statistical office (NSO), Government of India
- Monthly Industrial Production Index (consumer non-durables): Base year 2011-12 = 100. Source: National Statistical office (NSO), Government of India
- New issues of capital by public limited companies other than government companies. This is the total of Equity capital + preference capital + debentures. Source: www.rbi.org
- Exports: The monthly total of exports out of India. Source: Directorate General of Commercial Intelligence & Statistics.
- Net Foreign Institutional Investments inflow: The net of Foreign Institutional Investment inflow and outflow. Source: www.rbi.org
- Bank credit to commercial sector: Total of bank credit (all banks including RBI) given to commercial sector in India. Source www.rib.org

METHOD OF ANALYSIS

Descriptive statistics, Correlation analysis, OLS regression and Quantile regression are used to analyze the data. First the influence of EPU on various economic indicators is analyzed with the help of OLS regression. Further, quantile regression is used to check the degree of relationship in 25th, 50th and 75th quantiles. The results of OLS and Quantile regression are then compared. The study follows the methodology of Bhagat et al (2013).

EMPIRICAL RESULTS AND DISCUSSION

Table 1 shows the Summary Statistics of the data. It is noted that the stock indices have moved quite steeply between Jan 2014 and June 2019. The NSE index reached a high of 11,839 on 30th June, 2019 from a low of 6098 in February 2014. Similar was the case with Bank index and auto index which moved from 10394 to 30916 and from 1591 to 11771 respectively in the same period. The lowest for EPU was in Sept 2016 at 32.88 and highest at 144.27 in June, 2016. A steep increase in bank credit is observed from Rs.62,347 billion (around US$ 890 b) in Jan 2014 to Rs.103,841 billion (around US$1,483 b) in March, 2019.

Table 1 - Summary Statistics

		Nifty Index			Industrial Production Index								
	EPU	1	2	3	1	2	3	4	5	NI	EX	FII	BC
Mean	73.15	9,045.31	20,671.49	8,858.14	116.96	102.00	127.61	122.19	128.74	37.12	1,636.19	39.15	80,364.87
Median	71.35	8,652.24	19,071.16	8,685.24	116.60	99.75	125.10	121.45	127.30	21.59	1,581.61	41.30	78,383.60
Std. Dev	26.54	1,464.94	5,062.19	1,842.34	9.15	10.69	11.01	7.75	15.19	43.14	208.04	114.64	11,532.82
Range	111.38	5,740.28	20,522.01	10,180.84	39.60	52.50	48.00	31.40	63.10	186.97	979.99	663.50	41,454.80
Minimum	32.88	6,098.74	10,394.00	1,591.02	100.40	82.20	109.40	108.30	100.30	0.07	1,293.31	(257.74)	62,347.00
Maximum	144.27	11,839.02	30,916.01	11,771.86	140.00	134.70	157.40	139.70	163.40	187.04	2,273.30	405.76	103,801.80

Nifty Index	Industrial Production Index (IPI)	
Nifty 1: Monthly closing Average	1 = Primary goods	NI = New Issues (Rs. Billion)
Nifty 2: Bank Closing Average	2= Capital goods	EX = Exports (Rs. Billion)
Nifty 3: Auto Closing Average	3= Infrastructure goods	FII = Net FII inflow (Rs. Billion)
	4= Consumer durables	BC= Bank credit to Commercial sector (Rs. Billion)
	5= Consumer non-durables	

Table 2 shows the correlation analysis of the variables. It is observed that all variables are negatively correlated with EPU, excepting Foreign Institutional Investments (FII) which has no correlation with EPU. Nifty indices are positively correlated with Industrial Production Indices, Exports, New Issues and Bank credit. There is no correlation between Nifty indices and FII.

Table 2 - Correlation Analysis

		NIFTY			Industrial Production Index								
	EPU	1	2	3	1	2	3	4	5	NI	EX	FII	BC
EPU	1.00												
NIFTY 1	(0.36)	1.00											
NIFTY 2	(0.36)	0.99	1.00										
NIFTY 3	(0.41)	0.64	0.65	1.00									
IPI: 1	(0.35)	0.73	0.75	0.52	1.00								
IPI: 2	(0.19)	0.38	0.36	0.32	0.65	1.00							
IPI: 3	(0.36)	0.81	0.82	0.47	0.90	0.59	1.00						
IPI: 4	(0.43)	0.63	0.61	0.47	0.67	0.64	0.70	1.00					
IPI: 5	(0.30)	0.78	0.80	0.56	0.85	0.63	0.85	0.59	1.00				
NI	(0.35)	0.36	0.34	0.46	0.20	0.20	0.29	0.41	0.28	1.00			
EX	(0.09)	0.62	0.60	0.16	0.65	0.56	0.76	0.59	0.67	0.15	1.00		
FII	0.00	(0.02)	(0.03)	(0.21)	0.11	0.24	0.14	(0.01)	0.09	(0.02)	0.24	1.00	
BC	(0.40)	0.91	0.92	0.56	0.85	0.48	0.90	0.69	0.85	0.31	0.67	(0.02)	1.00

Nifty Index	Industrial Production Index (IPI)	
Nifty 1: Monthly closing Average	1 = Primary goods	NI = New Issues (Rs. Billion)
Nifty 2: Bank Closing Average	2= Capital goods	EX = Exports (Rs. Billion)
Nifty 3: Auto Closing Average	3= Infrastructure goods	FII = Net FII inflow (Rs. Billion)
	4= Consumer durables	BC= Bank credit to Commercial sector (Rs. Billion)
	5= Consumer non-durables	

OLS regression results are shown in Table 3. It is clear from the results that EPU is negatively related to all dependent variables. If one considers the stock markets, uncertainty may put selling pressure on investors who may want to get out of the market to avoid further loss. Firms may postpone / put off capital expenditure and slow down the growth process, thereby sending negative signals to the investors and in turn to the stock market. NSE, NSE bank and NSE auto indices show a negative relation of (19.702), (69.566) and (28.197) points with every increase in EPU. This indicates that the EPU does have an effect on the stock market. The effect on industrial production too is negative, though, to a much smaller extent. This is brought about by uncertainty slowing down the demand, which in turn slows down the production. Bank credit shows a decline of Rs.173.244 billion (around US$ 2.5 b) with every point increase in EPU. During times of uncertainly, firms would hesitate to expand capacities, cut down production and decrease stock holding of raw materials and finished products. New ventures would be postponed in order to wait and watch for improvement and better signals. This obviously would slow down the need for bank credit. However, the regression results indicate that the effect of EPU on Industrial Production Index (capital goods), Exports and Net FII inflow is not significant.

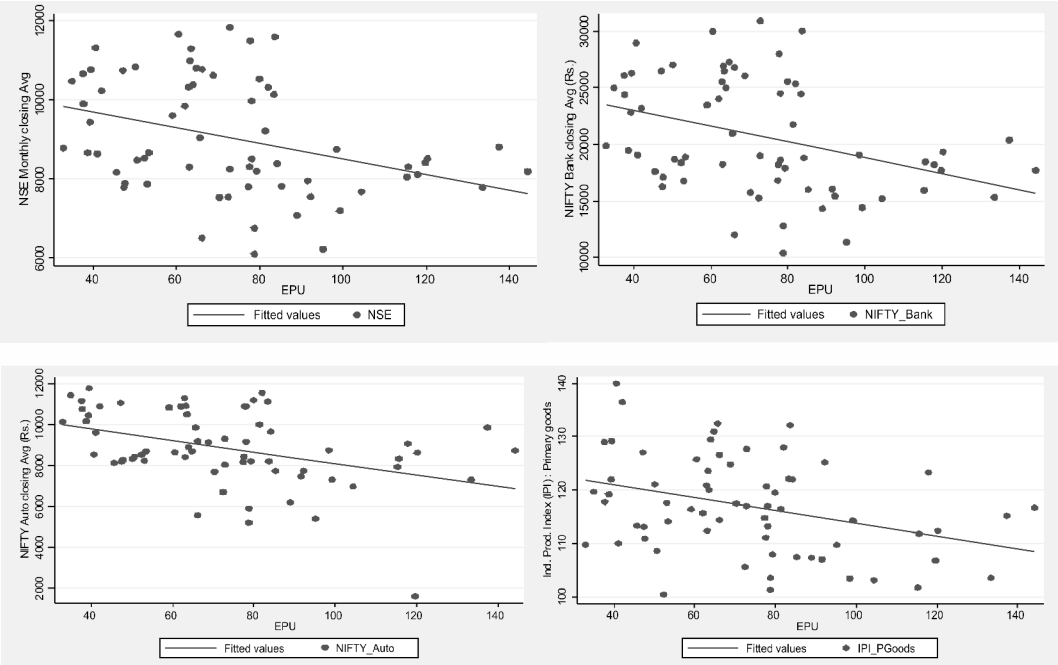
Table 3 – OLS Regression Results

Variable	R^2	Adjusted R^2	Unstandardized Coefficient	T Stat	Significance
NSE daily closing Average	0.128	0.115	(19.702)	(3.067)	0.003
NSE Bank Closing Average	0.133	0.119	(69.566)	(3.133)	0.003

Variable	R^2	Adjusted R^2	Unstandardized Coefficient	T Stat	Significance
NSE Auto Closing Average	0.165	0.152	(28.197)	(3.556)	0.001
Industrial Production Index (IPI) Primary Goods	0.121	0.107	(0.120)	(2.970)	0.004
IPI Capital Goods	0.035	0.02	(0.075)	(1.523)	0.133
IPI Infrastructure goods	0.130	0.116	(0.149)	(3.086)	0.003
IPI Consumer durables	0.185	0.173	(0.126)	(3.817)	0.000
IPI Consumer Non-Durables	0.088	0.074	(0.170)	(2.481)	0.016
New Capital Issues other than Government	0.120	0.106	(0.552)	(2.887)	0.005
Exports	0.009	(0.007)	(0.737)	(0.755)	0.453
Net FII inflow	0.000	(0.016)	0.007	0.013	0.989
Bank Credit	0.159	0.146	(173.244)	(3.477)	0.001

It is observed from Figure 1 that the dependent variables as depicted in the graphs are negatively correlated with EPU.

Figure 1 - Relationship between EPU and various Economic Indicators



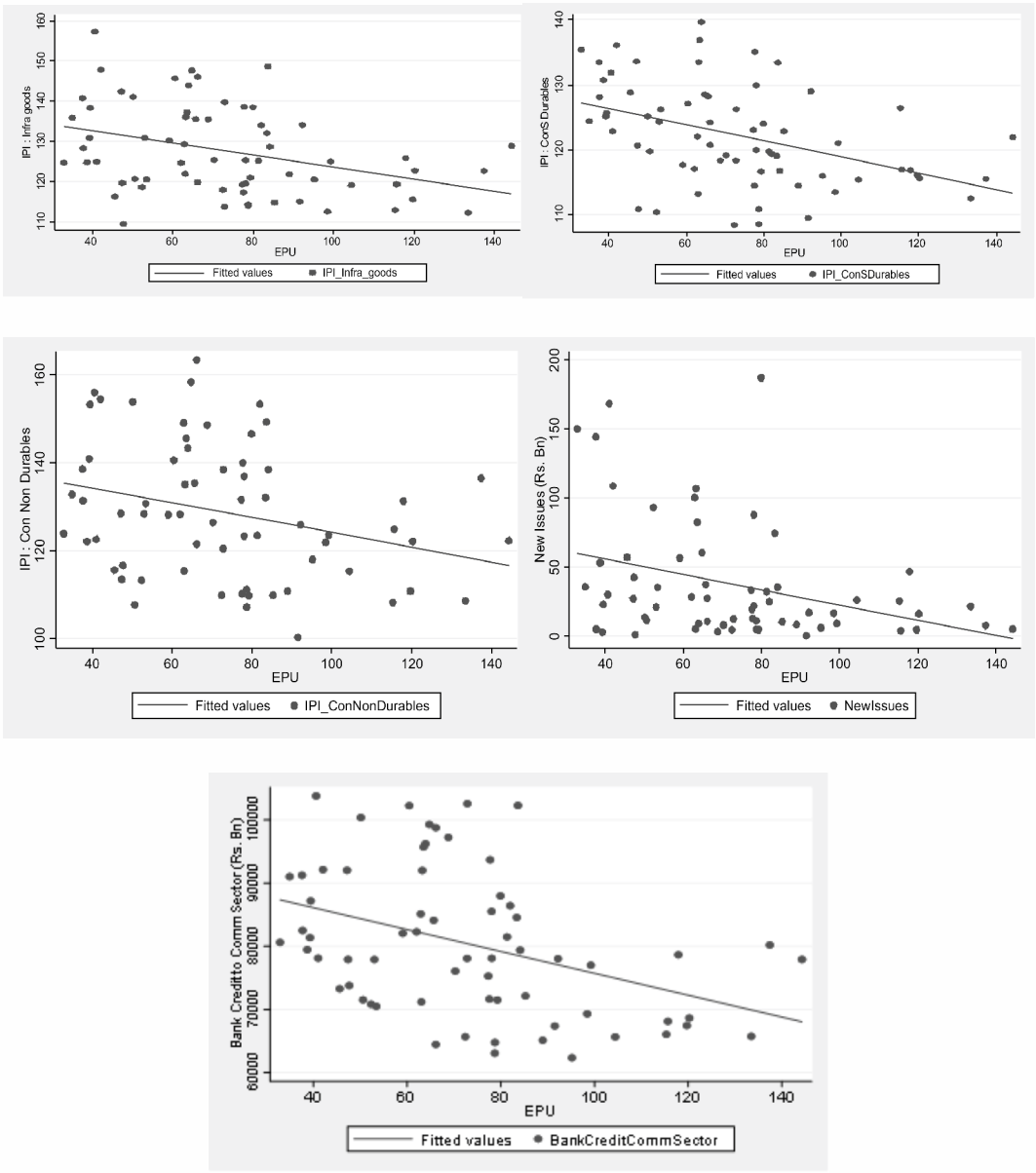


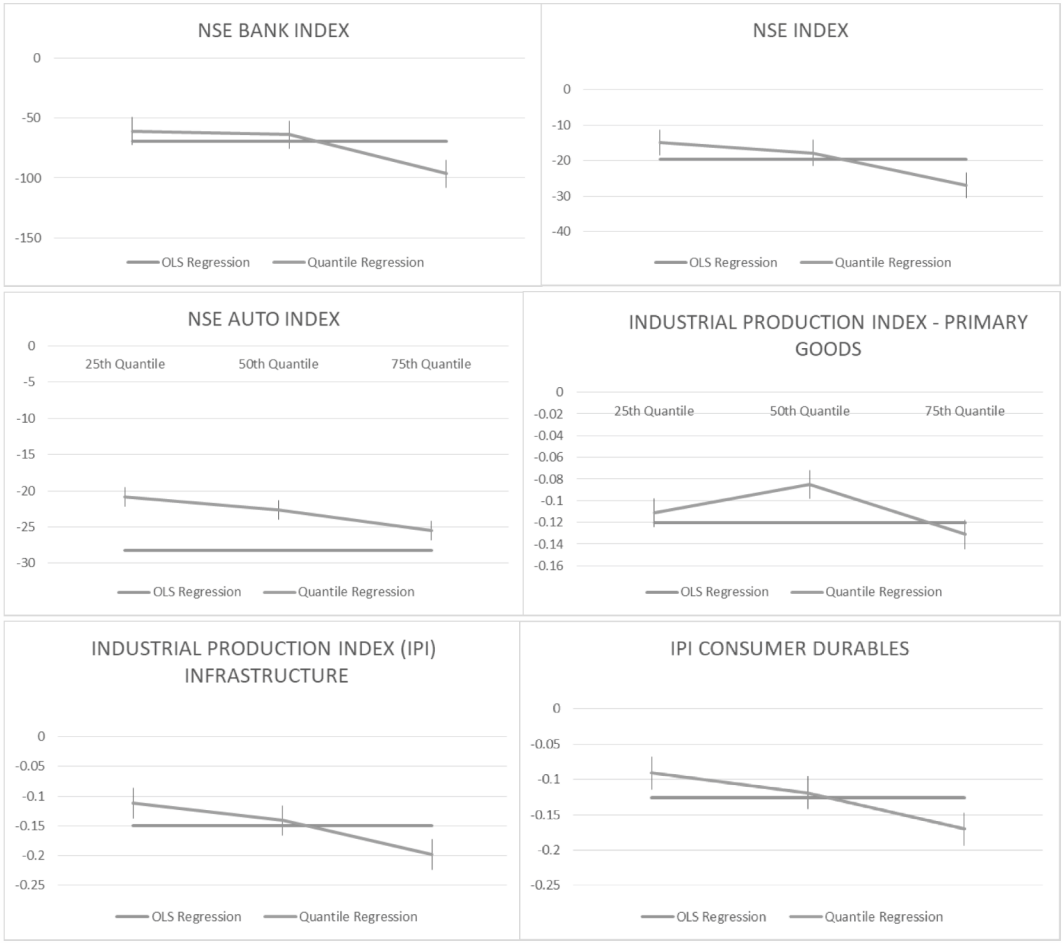
Table 4 shows the quantile regression results that is done in 25th, 50th and 75th quantiles. It is observed that EPU is negatively related to all indicators in all quantiles. Further, it becomes steeply negative in the 75th quantile. Results in the first two quantiles i.e. 25th and 50th are lower than OLS regression. However, in the 75th quantile, the inverse relationship exceeds the OLS regression and becomes steeply negative. However, this is excepting NSE Auto index, where the negative correlation is lower than OLS regression. Figure 2 shows the relationship between EPU and various economic indicators.

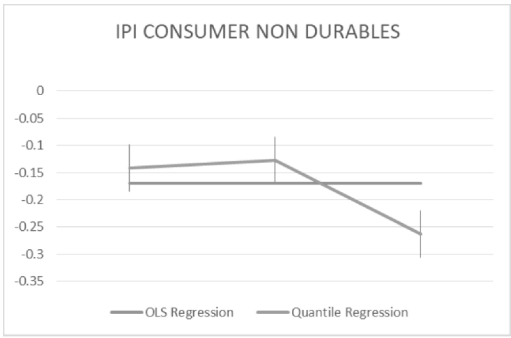
Table 4 – Quantile Regression Results

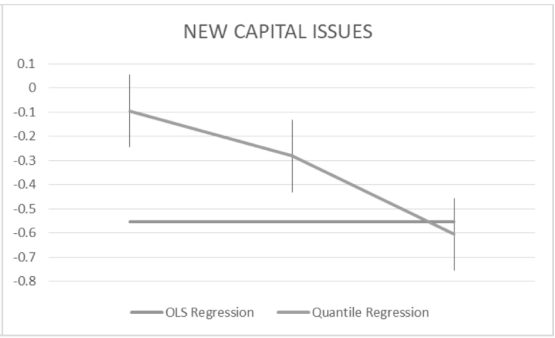
Variable	OLS Regression	0.25 Quantile	t stat	p value	0.50 Quantile	t stat	p value	0.75 Quantile	t stat	p value
NSE daily closing Average	**(19.702)**	**(14.917)**	(2.370)	0.021	**(17.870)**	(1.920)	0.059	**(26.975)**	(3.370)	0.001
NSE Bank Closing Average	**(69.566)**	**(60.798)**	(3.170)	0.002	**(63.760)**	(1.880)	0.065	**(96.456)**	(3.730)	0.000
NSE Auto Closing Average	**(28.197)**	**(20.829)**	(1.610)	0.113	**(22.647)**	(2.030)	0.047	**(25.447)**	(2.490)	0.015
IPI Primary Goods	**(0.120)**	**(0.111)**	(2.230)	0.029	**(0.085)**	(1.310)	0.195	**(0.131)**	(1.870)	0.066
IPI Infrastructure goods	**(0.149)**	**(0.112)**	(2.230)	0.029	**(0.141)**	(1.950)	0.056	**(0.198)**	(2.210)	0.030
IPI Consumer durables	**(0.126)**	**(0.091)**	(1.620)	0.110	**(0.119)**	(3.040)	0.003	**(0.170)**	(3.190)	0.002
IPI Consumer Durables	**(0.170)**	**(0.142)**	(1.650)	0.104	**(0.127)**	(1.120)	0.265	**(0.263)**	(2.540)	0.013
New Capital Issues	**(0.552)**	**(0.095)**	(0.950)	0.347	**(0.281)**	(1.540)	0.130	**(0.605)**	(1.440)	0.154
Bank Credit	**(173.244)**	**(151.020)**	(2.730)	0.008	**(219.296)**	(3.050)	0.003	**(143.115)**	(1.590)	0.117

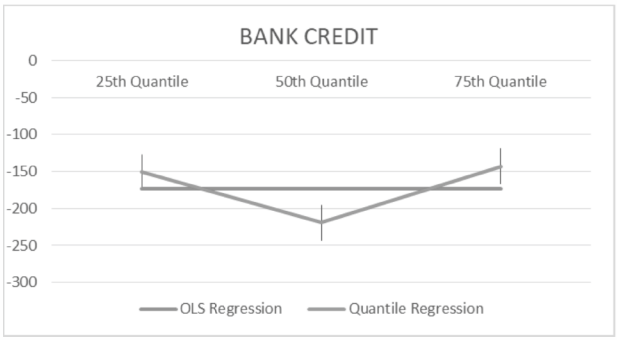
IPI = Industrial Production Index.

Figure 2 - Comparison of Quantile Regression Results with OLS Regression









The quantile regression is represented by bars"l" which represent the estimated values of the parameters at different quantiles (25th, 50th & 95th) for which regression has been performed. The orange line only connects the bars. The blue line is an extrapolation of the OLS regression coefficient, in order to visually compare with the quantile regression results.

CONCLUSION

Literature has demonstrated that increase in the EPU has been instrumental in the slowdown of the US economy and also the increase in unemployment. The slowdown in the Indian economy has been a matter of concern for many. In this context, it becomes very interesting to find if there is a relationship between EPU and various economic indicators of the Indian economy. The recently developed EPU index by Baker, Bloom & Davis (2016) has been used in this study to evaluate the impact of EPU on stock exchange, Industrial production, new capital issues, exports, net FII inflow and bank credit. Monthly data of 66 months i.e. from 1.1.2014 till 30.6.2019 is collected and analyzed with the help of OLS regression and quantile regression.

The study finds that stock markets, industrial production, new capital issues and bank credit are negatively related to EPU. It is observed that EPU is negatively related to various indicators in all quantiles. However, the negative relationship sharply increases in the 75th quantile. While compared with OLS regression, it was observed that 25th and 50th quantile results were lower than the OLS regression results. However, it sharply increases and surpasses OLS regression in the 75th quantile. This is, excepting NSE auto index, which is lower than OLS regression in all quantiles. From this study it is evident that the EPU does have an influence on the stock markets, industrial production, new capital issues and bank credit.

The study examines and proves the overall impact of EPU on selected economic indicators and the impact at different quartiles. This opens up vistas for further exploration of the findings to prove /

disprove the same in other economic indicators. More economic parameters could be examined to find the impact of different events that altered the EPU index e.g. change in the government, impact of Global Financial Crisis, impact of introduction of GST etc. This is left to future research.

The paper has strong theoretical foundations. The methodology adopted has been research tested. There is a need to look at the EPU index closely and frequently to feel the pulse of the EPU and how it affects the economy. This is one of the attempts to evaluate the behavior of EPU and its implication on certain economic indicators. As EPU index is newly developed, this paper adds to the existing literature, especially in the Indian context.

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