Sensitivity of economic policy uncertainty to investor sentiment: evidence from Asian, Developed and European markets

Mobeen Ur Rehman

Shaheed Zulfikar Ali Bhutto Institute of Science and Technology

Islamabad, Pakistan

Mobeen.rehman@szabist-isb.edu.pk

Nicholas Apergis

University of Piraeus, Greece

napergis@unipi.gr

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Abstract

A series of global financial crises in 21st century, steep economic decline and slow recoveries have intensified the concern of regulatory bodies for economic policy certainty. This study explores the effect of investor sentiment on economic policy uncertainty (EPU), spanning the period 1995-2015. The analysis is carried out for Asian, Developed and the European market samples by applying the method of quantile regressions. The findings document the presence of a negative impact of investor sentiment on EPU. Robustness analysis illustrates the validity of the results for the cases of Asian and Developed markets.

Keywords*:* Economic policy uncertainty; investor sentiment; Asian, Developed and European market; quantile regression

JEL Classification*:* E60; G18

1. Introduction

A series of various economic and financial crises, followed by steep declines and slow recoveries, raised significant concerns of the role of regulatory bodies regarding

economic policy uncertainty through a comparatively new proxy for economic uncertainty intensified over the last couple of decades (Baker, Bloom and Davis, 2016). According to Arouri et al. (2014), economic policy defines certain parameters for decisions, hence, it causes delays in economic activity and decision making attributable to higher uncertainty levels. However, the reactions to any changes in economic uncertainty are weak if anticipated earlier. Increasing levels of uncertainty not only cause firms to delay their investments decisions, but also results in the reversion of preliminary spending patterns (Leduc and Liu, 2015; Pastor and Veronesi, 2012). Although evidence in the relevant literature is available as the main locus of macroeconomic variables affecting economic policy uncertainty (Ali, 2001; Jones and Olson, 2013), the current literature also documents its effect on household savings (Giavazzi and McMahon, 2012), delays in firms' entry (Handley and Limao, 2015), equity market volatility (Pastor and Veronesi, 2013), and returns on assets (Brogaard and Detzel, 2015). This paper, however, is analyzing this relationship in the reverse direction, i.e. the sensitivity of Economic Policy Uncertainty due to investor sentiments in the presence of other macroeconomic and market variables. The motivation for including macroeconomic control variables comes from the previous literature: Arouri et al. (2014) report the sensitivity of economic policy uncertainty to international oil prices in general, and for the cases of the U.S., China, Europe and Gulf Countries in particular.

The effect of policy uncertainty on the real economy has been an important topic of discussion over the last years; however, the interest has been revived substantially after the turbulence in financial markets caused by the 2008 financial crisis. Previous studies focus on the effect of policy uncertainty on macroeconomic variables (Bachmann et al.,

2013). This work contributes by exploring the predictability of investor sentiment for EPU. The analysis also considers the momentum effect, stock market returns volatility and equity pricing inefficiencies across markets, which, to the best of our knowledge, has not been addressed in the literature. The role of these control variables has collectively been considered to have important behavioral implications for international investors. The literature highlights different definitions and interpretations of EPU. Bams et al. (2017) suggest that uncertainty arises from various sources, i.e. future equity returns, uncertain future stock prices, inflationary uncertainty, while according to Colombo (2013), Antonakakis et al. (2013), Klobner and Sekkel (2014), and Karnizova and Li (2014), this measure has been used as an index by Baker et al. (2016).

The link between the macroeconomy and equity markets has an intuitive appeal. According to Chau et al. (2016), a higher VIX index causes fear and uncertainty, with lower values signaling bullishness and complacency. Gulen and Ion (2015) study the effect of EPU on both firm- and industry-level capital investments and find that it can seriously affect investments. Liu and Zhang (2015) find EPU to be a decent predictor of stock market volatility. Investor sentiment induces large swings in business cycles; however, understanding its ability to cause changes in EPU helps policymakers to predict and minimize such fluctuations. The literature discusses the effect of EPU on equity market volatility, along with other macroeconomics; however, no study has investigated the inverse relationship, i.e. whether EPU is sensitive to other factors, such as investor sentiment, proxied by stock market volatility, the momentum effect and equity pricing inefficiencies. To measure the sensitivity of EPU to stock market volatility, both the momentum effect and international equity pricing inefficiencies are considered, while the

analysis uses the method of quantile regressions, which have the advantage to identify the underlying relationship that could not have been otherwise revealed through the overall distribution. Quantile regression provides a clear way of understanding how the relationship between market returns and other conditioning variables or risk factors changes across the distribution of conditional returns. Quantile regressions identify points in the conditional distribution where omitted variables are favorably and/or unfavorably influencing returns. We may think of these omitted factors as representing idiosyncratic shocks, or as the receipt of bad news during the sample period by firms located in the lower quantiles. By using quantile regression, researchers can explore whether the market prices firms' underlying characteristics consistently given different degrees of good versus bad news. Such idiosyncratic shocks likely influence idiosyncratic volatility, which Campbell et al. (2001) and Goyal and Santa-Clara (2002) find to be a major component of the volatility of individual stock returns.

The contribution of this paper is threefold. First, existing literature highlights and empirically tests the impact of economic policy uncertainty on different market, macro-economic and global control variables. The analysis, however, performs it in the reverse order, i.e. analyzing the impact of the momentum effect (investor sentiment variables), equity market inefficiencies and volatility (market variables), and exchange rates and Brent oil (control variables). Second, to check the sensitivity of economic policy uncertainty, the analysis analyzes a wide range of markets, segregated as emerging, developed and European regions over the sample period to generate region-wise implications. Finally, the analysis explores the relationship of aforementioned variables with economic policy uncertainty keeping in view the non-linear structure, as well as

prior evidence and investor sentiments and economic policy uncertainty in the regression model.

The results for quantile regressions provide robust and more efficient estimates rather than those coming from the traditional regression model. The momentum effect is negative and significant only at higher quantiles, while oil prices are positive and significant across all quantiles. The exchange rate exerts a negative and significant effect on EPU, whereas equity price volatility (i.e., investor sentiment) exerts a negative and significant impact on EPU in most of the quantiles.

2. Data and ethodology

The proposed model consists of economic policy uncertainty as the dependent variable, sensitive to the momentum effect, equity pricing volatility and pricing differences in the presence of international Brent oil prices and spot exchange rates. EPU represents the economic risk for a country, because of an uncertain path of government policy, leading towards an escalating risk premium and causing delays in individual and business spending until the uncertainty resolves. This EPU can interchangeably refer towards fiscal or monetary policy uncertainty, uncertain electoral outcomes, or tax regimes. Data on EPU are based on three main components: the newspaper coverage of economic uncertainty in relevance to policy issues, the provision set for the federal tax code for future years, and the disagreement across economic forecasters. China, India and Japan represent the major Asian economies whereas, for the case of developed economies, indices from the US, the UK and Europe (represented by a composite index) are used.

Data for economic policy uncertainty are sourced from http://www.policyuncertainty.com/. The analysis uses the Market Integration index-MI (Connor and Korajczyk, 1989), which captures pricing differences across equity markets based on systematic risks across countries. They postulate that pricing errors, represented by an intercept term in the International Capital Asset Pricing Model, measure the extent of market segmentation; if all assets are priced according to their similar systematic risk, there is a perfect integration across stock markets and the value of the intercept equals zero. Pricing errors increase with higher official barriers, transaction costs and taxes to international asset trading. The MI index (equation 2 as an extension of equation 1), therefore, measures equity pricing differences across markets, represented by an absolute value of the intercept as:

$$\boldsymbol{R_{i,t} - RF_{i,t} = \alpha_{i,t} + \beta_{i,t}(RW_{i,t} - RF_{i,t}) + \varepsilon_{i,t}} \quad (1)$$

$$\boldsymbol{R_{i,t} = \alpha_{i,t} + \beta_{i,t} RW_{i,t} + \varepsilon_{i,t}} \quad (2)$$

where $R_{i,t}$ is the returns on international indices, $RF_{i,t}$ is the risk free rate, β represents the systematic risk of the market proxied by S&P1200. The absolute value of α proxies pricing differences of equity returns. A zero value implies no mispricing. For equity market volatility, we source daily pricing data to take monthly averages and calculate as $[\log P_t - \log P_{t-1}]$, where P denotes equity prices. The momentum effect is calculated by the stock markets' trading volume. Data on equity prices for volatility and the stocks trading volume for the momentum effect are sourced from Datastream. Exchange rates data are sourced from the IMF and are relative to the US dollar. Global oil prices are closing spot prices (converted to a monthly basis by taking their daily average) measured as the West

Texas Intermediate (WTI) crude oil prices. Data span the period 1995-2015 and are on a monthly basis.

Figures 1a-1c represent the economic policy uncertainty trend over the sample period for three markets segments, i.e. Asian, Developed and European markets, respectively. Figure 1a highlights more turbulence in the economic policy uncertainty of China compared with India throughout the period. Figure 1b displays the economic policy uncertainty trend between the US and the UK, with UK exhibiting a more inconsistent pattern, especially after 2000. Finally, Figure 1c compares the economic policy uncertainty across the European markets and highlights that France is following a rather comparatively inconsistent behavior. This high uncertain behavior emerges during the global financial crisis of 2008-09 and continues afterwards. Few uncertainty spikes are also visible for the case of Spain in 2003, which, however, follows a normal course ahead. Table 1 provides descriptive statistics for selected sub-sampled as well as complete markets.

[Insert Figures 1a-1c and Table 1 about here]

Table 2 presents the panel unit root properties of the model variables, with the results indicating various degrees of stationarity across the variables included in the modeling approach, as well as across the countries included in the sample analysis. Next, the analysis explains the suitability of the quantile regression model by first testing the presence of non-linearity in economic policy uncertainty using the BDS test (Brock et al., 1996). The results are reported in Table 3 and provide strong evidence of non-linearity for different embedding dimensions of the BDS test. The results suggest that linear

regression models might not be able to capture the sensitivity of economic policy uncertainty to included variables (i.e., the momentum effect, equity pricing volatility, pricing differences, Brent oil prices and spot FX rates) and, therefore it could be a necessity to use the contemporary quantile regression testing methodology.

[Insert Tables 2 and 3 about here]

3. Methodology and empirical analysis

3.1 Quantile regression

To analyze the sensitivity of economic policy uncertainty to the momentum effect, equity pricing volatility and pricing differences in the presence of international Brent oil prices and spot exchange rates, the empirical analysis focuses not only on the conditional mean, but also on the tails of the conditional distribution by estimating through a quantile regression framework. To this end, the analysis makes use of both OLS (mean results) and the quantile regression methodology, introduced by Koenker and Basset (1978), as the relationship between economic policy uncertainty and the momentum effect, equity pricing volatility, pricing differences needs not be the same across the conditional distribution of oil returns (Du et al., 2015), especially in the presence of international Brent oil prices and spot exchange rates. The advantage of this methodological approach is that it is a semi-parametric method, which does not make any pre-suppositions about the parametric distribution of the error process. The τ^{th} conditional quantile is defined as the value $Q_\tau(y_t|y_{t-1}, ..., y_{t-q})$, such that the probability that economic policy uncertainty is

conditional on its determinants will be less than $Q_\tau(y_t|y_{t-1}, ..., y_{t-q})$ is τ. By estimating at different quantiles, $\tau \in (0,1)$ we can get a set of estimates of the impact of determinants in different quantiles, running from 0.10 to 0.90.

Table 4 reports both the mean and the quantile regression results for the full sample at different quantiles (0.10-0.90). Estimations based on the entire distribution focus on the mean and information about the tails of the distribution is lost. By contrast, quantile regressions provide robust and more efficient estimates. The momentum effect is negative and significant; pricing differences are positive and significant, only at higher quantiles. Among the control variables, the exchange rates remain insignificant across the majority of the quantiles. Stock price volatility (i.e., investor sentiment) exerts a negative and significant impact on EPU across all quantiles, except in the 0.90 quantile, with the overall distribution estimates highlighting the effect as statistically significant. WTI Crude oil prices are positive and significant across all quantiles, suggesting a major influence on economic policy uncertainty. These results suggest that the levels of economic policy uncertainty are sensitive to the raising global oil prices in the full sample; however, sub-sample findings are reported in the forthcoming discussion.

[Insert Table 4 about here]

Table 5 presents the results of quantile regression for the case of Asian economies i.e. China and India. The momentum effect changes from negative in the full sample to positive in the Asian sub-sample; however, the significant coefficients are observed in the middle (0.40-0.50) and higher (0.80-0.90) quantiles. Pricing differences previously

insignificant in the full country sample now become positive and significant in the case of Asian markets. The results in Table 4or 5??? highlight, therefore, the significance of the momentum effect, price volatility and pricing difference, but at varying quantile arrangements. Among the control variables, we can illustrate the significant coefficient values of exchange rates, along with Brent oil towards the economic policy uncertainty of Asian markets. This changing behavior of the exchange rates from the insignificant (in the full sample) towards significantly positive (the Asian market sub-sample) highlights its importance for the Asian countries that might be attributed to the higher sensitivity of their respective currencies compared with the US dollars, as well as to the increasing volume of foreign inwards remittances.

[Insert Table 5 about here]

Table 6 reports the results for the quantile regression framework for the case of the Developed markets sample. These results are somewhat different from the two previous country samples. They document that among all the variables, stock market volatility remains significant as before; however, the remaining variables remain insignificant. The momentum effect remains insignificant across all quantiles, while pricing differences document significant negative coefficients across the majority of the quantiles (specifically, from 0.50-0.90). Likewise, a disparity is also observed for the control variables where except in the higher quantiles, both the Brent oil and exchange rates remain insignificant. However, we can witness significant positive coefficients for the

case of Brent oil and significant negative coefficients for the case of exchange rates in higher quantiles.

[Insert Table 6 about here]

Finally, we report in Table 7 the results for the European market sample, where different results are reported for equity pricing volatility. Unlike all other sample countries, pricing volatility exhibits an insignificant behavior across all quantiles. Similar results are also reported for the momentum effect (except for the last quantile). Equity pricing differences remain insignificant in lower quantiles; however, they exhibit a significant negative role in upper quantiles. In contrast, exchange rates render an insignificant behavior in the majority of the quantiles, except in the last two quantiles.

[Insert Table 7 about here]

4. Conclusion

This paper investigated the impact of investor sentiment on EPU. We proxied the investor sentiment through equity pricing volatility, while the momentum effect was captured through the trading volume and equity pricing inefficiencies. We also included global control factors, as WTI Crude oil and exchange rates. Keeping in view the non-linear structure of economic policy uncertainty and the current literature on behavioral finance, the analysis applied the quantile regression approach through which the evidence

suggested a negative impact of investor sentiment on EPU. The analysis also divided the sampled markets into three different sub-samples, i.e. Asian, Developed and European markets. The full sample results suggested that equity price volatility remained as the most significant driver of economic policy uncertainty, along with Brent oil prices, implying that economic policy uncertainty was sensitive to international oil prices; however, exchange rate remained statistically insignificant. Pricing differences and exchange rates became significant for the case of Asian countries, along with pricing volatility. This may be attributed to the fact that the emerging markets of Asia receive huge remittance inflows from the developed countries, due to which their exchange rate variable per US dollar renders itself as a significant driver. The significance of equity pricing differences is due to the fact that the emerging status of Asian countries leads the equity pricing inefficiencies from their developed counterparts. The results from the developed markets resemble with the complete sample results, where economic policy uncertainty shows sensitivity only to equity price volatility in almost all quantiles, while both Brent oil prices and exchange rates only in higher quantiles. The results in the case of European countries sample differentiate from other markets, as equity pricing differences negatively influence economic policy uncertainty in these countries, with the remaining of the variables remaining statistically insignificant. However, Brent oil retains its position as an important determinant of economic policy uncertainty.

The results have important implications for international investors and policymakers, especially in terms of the breakdown of economic policy uncertainty across different sample markets. The breakdown of complete sample period into sub-samples acts as a robust analysis and documents the similarity of the results for the Asian

and Developed markets cases, but not in the case of the European markets. The findings imply the importance of financial stability that impacts the accumulation of systemic risks and add smoothness to the financial cycle in particular geographical areas.

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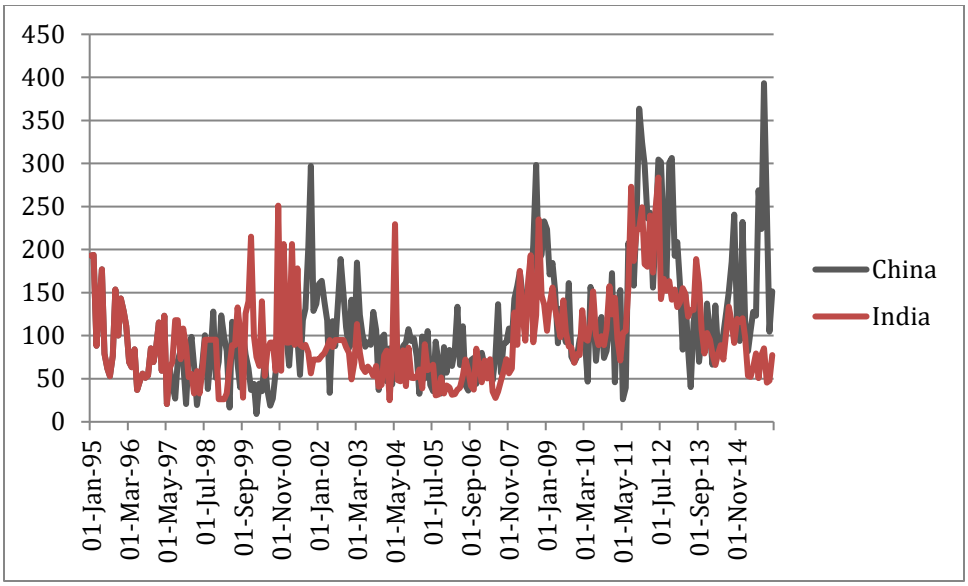


Figure 1a

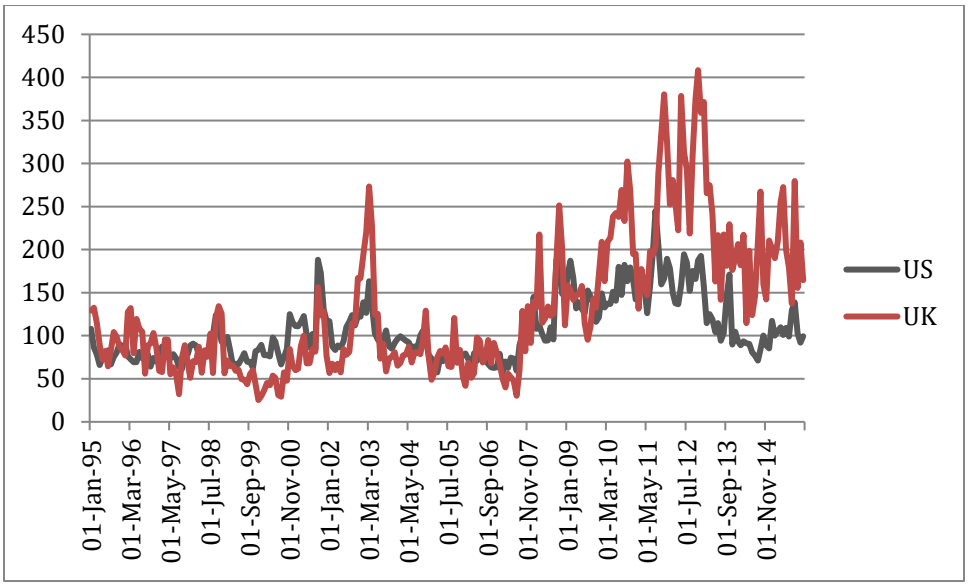
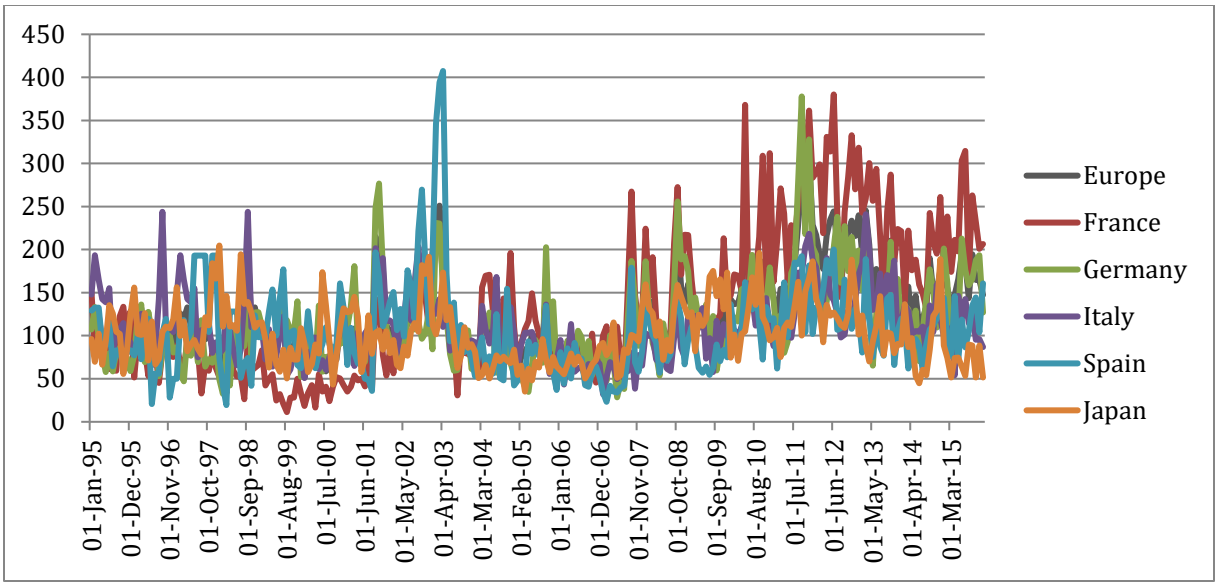


Figure 1b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01-May-02
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01-Jan-06
01-Dec-06
01-Nov-07
01-Oct-08
01-Sep-09
01-Aug-10
01-Jul-11
01-Jun-12
01-May-13
01-Apr-14
01-Mar-15
Europe
France
Germany
Italy
Spain
Japan

Figure 1c

Table 1: Descriptive statistics

Statistic	Economic policy uncertainty	Momentum effect	Price volatility	Equity pricing inefficiencies	Brent oil prices	Exchange rates
Complete sample:						
Mean	1774.914	10.517	0.128	378.435	53.146	80.618
Std. dev.	101.946	7.627	0.016	100.864	46.840	1.432
Skewness	437.000	0.217	3.973	4.983	13.880	2.499
Kurtosis	11.287	1.670	-3.579	-81.668	11.350	0.753
JB Stat.	69.420*	184.861	0.366*	81.757*	31.354*	37.416*
Emerging Asian market sample:						
Mean	99.082	10.929	0.504	59.824	53.243	39.438
Std. dev.	44.002	3.852	0.503	70.080	31.369	29.814
Skewness	1.046	0.510	-0.032	2.948	0.454	0.275
Kurtosis	4.444	5.469	1.029	14.767	1.918	1.462
JB Stat.	134.940*	149.867*	81.180*	36.760*	41.625*	55.688*
Developed market sample:						
Mean	112.579	18.224	0.048	906.843	53.051	52.629
Std. dev.	56.351	34.356	0.231	12.540	31.366	73.399
Skewness	1.799	-0.808	2.453	1.337	0.462	0.755
Kurtosis	7.425	1.745	21.525	3.526	1.924	1.631
JB Stat.	104.483*	131.957*	11.210*	23.950*	63.369*	130.801*
European market sample:						
Mean	3862.880	4.532	0.002	139.283	53.169	122.243
Std. dev.	98.498	5.365	0.208	18.238	31.367	498.859
Skewness	2.465	1.953	1.477	1.847	0.456	4.228
Kurtosis	7.985	6.267	23.530	8.062	1.920	19.081
JB Stat.	26.637*	189.398	277.120*	12.556*	83.562*	13.670*

Table 2: Unit root tests

	Economic policy uncertainty				Momentum effect				Price volatility			
	Level		1st Differences		Level		1st Differences		Level		1st Differences	
	D	DT	D	DT	D	DT	D	DT	D	DT	D	DT
China	0.5532	1.8814	2.3575	1.0722	47.6744	37.8485	0.2941	0.7202	0.3146	0.8442	34.0737	65.6093
India	4.4714	7.4805	0.1485	0.5381	1.1093	8.9150	1.2080	4.6577	0.2686	0.9966	4.2085	3.9013
US	0.7454	2.6940	0.0471	0.0976	61.4658	12.9864	0.1224	0.4512	36.0964	22.3395	0.2097	0.7732
UK	1.5091	4.4178	0.2581	0.8619	8.8831	26.1975	0.9620	2.2604	43.6229	38.9401	74.5752	65.3688
Japan	0.5532	1.8814	0.3575	1.0722	8.4635	9.5893	0.0583	0.2078	24.4433	22.0863	59.5054	57.1080
Germany	0.4857	1.1231	0.3922	0.9512	2.3786	9.0581	0.2122	0.7891	30.7117	28.7438	80.0625	69.9011
Italy	18.8168	20.0832	0.2376	0.8408	1.7852	10.3226	0.0417	0.1550	3.8061	9.1686	21.7323	59.0384
France	4.0463	3.6297	0.2581	0.5254	1.1449	9.8355	0.2173	0.8082	93.2599	85.9657	17.5714	15.4777
Spain	0.3825	1.3234	0.0416	0.1435	1.1122	9.5670	0.2586	0.8788	24.6518	24.3981	68.6865	60.4397

	Equity pricing inefficiencies				Brent oil prices				Exchange rates			
	Level		1st Differences		Level		1st Differences		Level		1st Differences	
	D	DT	D	DT	D	DT	D	DT	D	DT	D	DT
China	4.4417	3.6794	0.1953	0.7254	6.6977	6.0905	0.2722	0.9017	29.3176	12.0528	0.4259	1.0954
India	1.9738	6.5173	0.1946	0.7232	6.6977	6.0905	0.2722	0.9017	67.0221	6.5360	0.2068	0.7563
US	24.5972	5.3361	0.1992	0.7311	6.6977	6.0905	0.2722	0.9017	3.4142	12.0453	0.3020	0.9281
UK	2.2976	3.9576	8.1881	31.0558	6.6977	6.0905	0.2722	0.9017	4.6284	16.1184	0.3070	0.9020
Japan	4.5760	3.7948	0.1952	0.7250	6.6977	6.0905	0.2722	0.9017	2.9485	9.5990	0.2435	0.8640
Germany	0.9958	3.6533	0.2051	0.7317	6.6977	6.0905	0.2722	0.9017	27.6262	12.6187	0.3005	0.9903
Italy	2.5470	4.8416	54.0592	200.4114	6.6977	6.0905	0.2722	0.9017	30.4015	16.2132	0.2892	1.0196
France	5.2058	1.4332	15.2972	56.8709	6.6977	6.0905	0.2722	0.9017	46.9670	24.8870	0.1453	0.5342
Spain	1.7642	6.1568	0.2003	0.7285	6.6977	6.0905	0.2722	0.9017	30.4015	16.2132	0.2892	1.0196

Table 3: BDS test statistics

Economic Policy Uncertainty	m				
	2	3	4	5	6
China	0.0805*	0.1350*	0.1662*	0.1780*	0.1797*
	(0.0057)	(0.0090)	(0.0107)	(0.0112)	(0.0108)
India	0.0670*	0.1177*	0.1517*	0.1694*	0.1762*
	(0.0054)	(0.0086)	(0.0103)	(0.0107)	(0.0104)
US	0.1284*	0.2152*	0.2690*	0.2973*	0.3107*
	(0.0049)	(0.0078)	(0.0093)	(0.0097)	(0.0094)
UK	0.1172*	0.2058*	0.2698*	0.3051*	0.3304*
	(0.0051)	(0.0081)	(0.0097)	(0.0101)	(0.0098)
Europe	0.1029*	0.1738*	0.2147*	0.2345*	0.2437*
	(0.0044)	(0.0070)	(0.0083)	(0.0087)	(0.0084)
France	0.0890*	0.1681*	0.2145*	0.2420*	0.2592*
	(0.0042)	(0.0067)	(0.0080)	(0.0083)	(0.0081)
Germany	0.0663*	0.1061*	0.1213*	0.1286*	0.1294*
	(0.0052)	(0.0083)	(0.0099)	(0.0103)	(0.0099)
Italy	0.0586*	0.0965*	0.1128*	0.1164*	0.1125*
	(0.0047)	(0.0075)	(0.0089)	(0.0093)	(0.0090)
Spain	0.0447*	0.0780*	0.0969*	0.1049*	0.1054*
	(0.0047)	(0.0074)	(0.0088)	(0.0092)	(0.0089)
Japan	0.0433*	0.0732*	0.0815*	0.0838*	0.0770*
	(0.0043)	(0.0068)	(0.0081)	(0.0084)	(0.0080)

Notes: m denotes the parameter m in the embedding dimension and ε is the epsilon values. Standard errors values are reported in parenthesis. * denotes significance level at 5% or better.

Table 4: Quantile regressions-full sample

	Mean Results	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Intercept	89.383	40.500***	53.733***	66.721***	75.883***	81.787***	91.862***	101.386***	125.94***	166.63
	(212.147)	(3.198)	(3.042)	(2.978)	(3.194)	(3.579)	(4.249)	(4.684)	(8.222)	(1876.180)
Momentum	-88.411***	0.263	0.093	-0.152	-0.358*	-0.208	-0.336	-0.642***	-1.733***	-792.632***
	(9.731)	(0.169)	(0.169)	(0.181)	(0.185)	(0.205)	(0.236)	(0.271)	(0.423)	(85.740)
Price volatility	-41.049	-11.213**	-10.159**	-12.309**	-12.705**	-16.534**	-22.389**	-28.155***	-36.314***	-219.663
	(-45.105)	(4.965)	(3.265)	(5.326)	(5.236)	(5.068)	(7.220)	(3.368)	(5.216)	(198.283)
Pricing differences	-0.000	0.004**	0.001	0.000	0.001	-0.001	-0.004*	-0.007**	-0.012***	0.0169
	(-0.011)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.003)	(0.085)
Brent oil	3.181***	0.299***	0.314***	0.350***	0.427***	0.556***	0.744***	1.011***	1.502***	23.430***
	(0.640)	(0.040)	(0.038)	(0.037)	(0.042)	(0.049)	(0.071)	(0.071)	(0.166)	(5.250)
Exchange rate	-0.390	0.002	0.000	0.002	0.002	-0.000	0.005	0.008	0.003	-3.531***
	(0.059)	(0.026)	(0.003)	(0.004)	(0.004)	(0.042)	(0.006)	(0.005)	(0.004)	(0.435)

Note: * $p \leq 0.10$; ** $p \leq 0.05$; *** $p \leq 0.01$. Values in parenthesis represent standard errors

Table 5: Quantile regressions-Asian markets

	Mean Results	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Intercept	68.044***	37.143**	51.653***	55.926***	58.042***	69.895***	87.669**	86.346***	89.334***	76.388***
	(10.008)	(12.229)	(7.998)	(7.234)	(7.320)	(7.355)	(7.726)	(10.199)	(14.091)	(15.921)
Momentum	1.205*	0.738	0.354	0.518	0.910**	0.835**	0.335	0.728	1.549*	4.881***
	(0.699)	(0.958)	(0.551)	(0.482)	(0.414)	(0.399)	(0.446)	(0.731)	(1.064)	(1.255)
Price volatility	-35.484	-48.277**	-37.361**	-38.056**	-34.009**	-45.671***	-57.304***	-50.057**	-28.486	19.869
	(38.859)	(15.923)	(14.666)	(13.603)	(14.390)	(15.976)	(18.082)	(21.664)	(24.977)	(30.453)
Pricing differences	0.028	0.088***	0.081***	0.057***	0.059***	0.033	0.021	-0.004	-0.043	-0.038
	(0.027)	(0.029)	(0.018)	(0.019)	(0.021)	(0.021)	(0.023)	(0.031)	(0.037)	(0.040)
Brent oil	0.200**	0.061	0.142***	0.151***	0.200***	0.166**	0.121*	0.257**	0.312**	0.392**
	(0.091)	(0.089)	(0.075)	(0.072)	(0.070)	(0.074)	(0.076)	(0.089)	(0.097)	(0.173)
Exchange rate	0.523	0.556*	0.3845	0.494**	0.437	0.617***	0.829***	0.813**	0.616	-0.041
	(0.330)	(0.253)	(0.239)	(0.229)	(0.249)	(0.280)	(0.323)	(0.385)	(0.427)	(0.580)

Note: Similar to those in Table 1.

Table 6: Quantile regressions-developed markets

	Mean Results	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Intercept	84.464***	65.076**	64.085**	86.101***	91.200***	62.658***	55.673**	89.854***	107.70***	137.83***
	(25.205)	(24.377)	(21.134)	(22.233)	(22.623)	(23.786)	(20.105)	(22.587)	(24.420)	(45.5836)
Momentum	0.408	-0.677	-0.258	-0.907	-0.784	0.949	1.943**	1.153	1.121	1.129
	(1.156)	(1.164)	(0.993)	(1.056)	(1.075)	(1.124)	(0.940)	(1.033)	(1.088)	(1.927)
Price volatility	-24.376	9.740**	3.677	-1.661	-8.659*	-16.502**	-27.459***	-41.612***	-56.175***	-80.731***
	(26.119)	(3.345)	(3.677)	(3.823)	(4.433)	(5.212)	(5.673)	(7.234)	(8.600)	(13.078)
Pricing differences	-0.007	0.004*	0.001	-0.000	-0.001	-0.004*	-0.007**	-0.012*	-0.017**	-0.025*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Brent oil	0.578	0.148	0.269*	0.336	0.392	0.560	0.667	0.794***	0.928***	1.109
	(0.098)	(0.087)	(0.079)	(0.065)	(0.063)	(0.082)	(0.086)	(0.104)	(0.121)	(0.194)
Exchange rate	-0.112*	-0.028	-0.037	-0.096	-0.101	-0.054	-0.041	-0.136*	-0.199**	-0.313**
	(0.075)	(0.067)	(0.057)	(0.061)	(0.063)	(0.067)	(0.062)	(0.070)	(0.080)	(0.145)

Note: Similar to those in Table 1.

Table 7: Quantile regressions-European markets

	Mean Results	Q10	Q20	Q30	Q40	Q50	Q60	Q70	Q80	Q90
Intercept	90.032	39.359***	50.742***	59.393***	64.531***	72.182***	83.452***	81.481***	216.276	142.870
	(118.145)	(5.762)	(6.364)	(7.282)	(7.767)	(8.907)	(10.165)	(15.249)	(665.329)	(336.476)
Momentum	-60.726***	0.333	0.346	0.372	0.770	0.719	0.462	0.304	-17.914	-531.93***
	(-16.429)	(0.370)	(0.410)	(0.433)	(0.440)	(0.469)	(0.519)	(0.763)	(29.679)	(114.778)
Price volatility	41.193	-7.238	-2.863	0.529	1.355	-3.525	-10.565	-11.317	389.467	14.892
	(125.571)	(6.828)	(8.488)	(4.394)	(4.655)	(9.972)	(10.231)	(10.878)	(409.527)	(665.165)
Pricing differences	-7.407***	-0.023	-0.044	-0.048	-0.052	-0.098***	-0.157**	-0.366***	-23.520***	-42.354***
	(0.783)	(0.031)	(0.032)	(0.032)	(0.033)	(0.039)	(0.049)	(0.138)	(1.629)	(5.066)
Brent oil	39.789***	0.397*	0.546***	0.703**	0.857***	1.187***	1.695**	3.889***	177.154***	171.673***
	(5.328)	(0.081)	(0.090)	(0.096)	(0.107)	(0.151)	(0.232)	(1.256)	(11.05)	(34.893)
Exchange rate	-0.573***	0.002	0.002	0.002	-0.000	0.002	0.001	-0.008	-1.335**	-3.825***
	(0.112)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.008)	(0.189)	(0.786)

Note: Note**:** Similar to those in Table 1.