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The Effects of Economic Policy Uncertainty on Common Stock and American Depository Receipts

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THE EFFECTS OF ECONOMIC POLICY UNCERTAINTY ON COMMON STOCK AND AMERICAN DEPOSITORY RECEIPTS

by

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ABSTRACT

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Uncertainty can have profound implications on both firms and individuals who hope to optimally make decisions in their best interest. In this research, I seek to examine the impact that economic policy uncertainty has on domestic and foreign stock. In particular, I take a market microstructure perspective focused on stock liquidity and volatility measures in response to changes in economic policy uncertainty. Understanding the directional flow of economic policy uncertainty and the magnitude of the consequences at home and abroad can both help prepare agents to make good decisions about the future and exhort policy makers to be more efficient in their political activity which often has a global effect. In lieu of using foreign stocks on global markets, I use American Depository Receipts from companies abroad to compare with US common stock sold in American markets. Primarily, ADRs from Great Britain will be considered. Uncertainty for each country is captured by the Economic Policy Uncertainty Index from the seminal paper by Baker, Bloom, and Davis (2016). Historical market data is collected from the Center for Research in Security Prices and Compustat spanning 19 years from 1997 until 2016. I estimate multivariate time series using a vector autoregressive framework to assess the impact of an innovation in economic policy uncertainty on liquidity variables of each country. Both Granger causality and impulse response will be considered. It will be shown that economic policy uncertainty has negative effects on liquidity from EPU shocks originating in the securities country of origin. ADRs look more attractive, however, with a USA EPU shock as liquidity worsens in US common stock.

Section I: Introduction

Economic agents in financial markets are generally averse to uncertainty in the political, economic, and environmental sphere. When previous expectations are jeopardized in the wake of increased likelihood of uncertain outcomes, agents must wait for the waves of uncertainty to clear in order to make sound financial decisions. This paper evaluates the effect of economic policy uncertainty captured in the index of Baker, Bloom, and Davis (2016) on the liquidity of financial markets.

Specifically, I examine spillover effects captured in financial markets from economic policy uncertainty in a global context from one nation to another. I use impulse response functions generated from structural multivariate time series vector auto-regressive (VAR) models. Using the case of Great Britain, policy uncertainty shocks from the United States should improve the liquidity and volatility of British American Depository Receipts (ADRs), and shocks from the UK should hurt them.

This research seeks to not only evaluate the effect of EPU on market returns and volatility, but also to assess potential cross-country spillover effects. Although much work has been done looking at these spillover effects, few, if any, have specifically looked at spillover effects in a market microstructure context. This research uniquely assesses the impact of innovations in economic policy uncertainty in the United States on the liquidity and volatility of foreign stocks. In lieu of foreign stock exchange data, the response of American Depository Receipts to innovations in USA and Great Britain EPU are used. Given that ADRs are cointegrated with their underlying foreign common share counterparts (Ely and Salehizadeh 2001), they

should closely represent how uncertainty in the United States distinctly affects microstructure variables of foreign markets. By using vector autoregressions, this research shows that uncertainty in the United States matters for company shares in the United Kingdom listed on American markets. Liquidity improves in ADRs when uncertainty occurs in the United States, and liquidity worsens for them with subsequent British uncertainty shocks.[1] This finding shows that Great Britain markets may be more appealing and safer for investors who are fearful of uncertainty in the United States. Although this may be the trend, it is not the rule. Such results hold true for most liquidity variables, but not all. Despite some aberrations, it appears that British ADRs better in wake of United States uncertainty.

Section II: Literature Review

Previous literature is rich in exploring the impact of various forms of policy uncertainty on market microstructure. This research should both reflect and augment earlier work showing the deterioration of market quality following uncertainty shocks. Liu and Zhang (2015) use the same economic policy uncertainty (EPU) index employed here and assess its effect on stock market volatility. Both their in-sample and out-of-sample forecasting reveal that EPU is a significant predictor of market volatility. Pastor and Veronesi (2012) examine the relationship between government policy and stock prices. They find that changes in

[1] Value weighted portfolios of US common stock and British ADRs tell a weaker story than their equal weighted representations. Only British EPU shocks matter and liquidity worsens with fewer variables during an innovation in uncertainty. This may be due, in part, to the dominate effect of larger companies, the larger amount of US common stock relative to British ADRs, or other reasons. Complete tables of all impulse response functions can be found in Appendix B.

policy generally decrease the value of a stock, increase volatility, and cause firms to cut investment. Pasquariello and Zafeiridou (2014), looking specifically at political uncertainty, find a deterioration in market quality in months preceding presidential elections. Cox and Griffith (2017) also find that political uncertainty leads to greater market volatility, but after, not before, major unexpected political outcomes such as Brexit. Using the EPU index, VIX, and S&P 500 returns, Antonakakis, Chatziantoniou, and Filis (2013) find negative time-varying correlations of policy uncertainty and stock market returns using Engle's dynamic conditional correlation model. Lastly, Brogaard and Detzel (2012) show that policy uncertainty decreases market returns and increases market volatility. Given these previous findings, I reasonably expect to discover similar results. Uncertainty shocks within a given country ought to affect that country's financial markets adversely. However, these articles above do not consider how shocks in one nation affect the financial markets in others.

Most research exploring spillover effects of uncertainty are within the context of macroeconomics. Little, if any studies, depart from this general framework. Mumtaz and Theodoridis (2012) look at volatility shocks from the US to macroeconomic variables in the UK using a structural vector autoregressive framework, and they find large, negative responses in GDP and CPI to an innovation in US volatility. Looking specifically at policy uncertainty shocks capture by the S&P 100 volatility index, Carriere-Swallow and Cespedes (2013) find emerging economies are significantly more adversely affected by US uncertainty shocks. Specifically, they find corporate investment and private consumption decline. Caggiano, Castelnuovo, and Figueres (2017) use distinct United States and Canadian

EPU indexes to look at spillovers from the US to Canada with innovations in the United States EPU using a non-linear vector autoregression to account for expansion and retraction in the business cycle. In particular, they look at the response of Canadian macroeconomic variables such as unemployment and inflation whereas this paper considers market microstructure. Unsurprisingly, they find asymmetric spillovers from the US to Canada. Ballie, Uddin, Mudassar, and Yoon (2017) see trade relationships and common language as the most important determinants of higher exposure to uncertainty spillover risk. Colombo (2013), like this paper, uses structural VAR's to show that a shock to United States EPU has large negative consequences on macroeconomic indicators in the Eurozone. Biljanovska, Francesco, Hengge (2017) find that real output, private consumption, and private investment in the Eurozone are reduced with a shock to US EPU. Lastly, Diebold and Yilmaz (2008, 2012) and Kloβner and Sekkel (2014) create and implement, respectively, a new spillover index rooted in forecast error variance decomposition to show the degree of uncertainty spillovers across both advance and emerging economies. The latter find that the United States and the United Kingdom are net exporters of policy uncertainty, whereas Canada, France, Germany, and Italy are most prone to spillover abroad. Perhaps consistent with their findings, however in contrast with others listed here, I find that British ADRs improve instead of worsening following a shock to United States uncertainty.

Section III: Data

The monthly economic policy uncertainty index of Baker, Bloom, and Davis (2016) is obtained for both the US and Great Britain for the period of January 1997 to December 2016. This index is constructed by analyzing major newspapers in each nation for key words that are indicative of uncertainty, such as "policy", "the Fed", "economy", or "deficit", among others. These words are counted and normalized to form a unique index where a higher magnitude expresses a higher amount of uncertainty.

Summary statistics for the EPU indexes are shown in Table 1. Additionally, these series are not stationary. Analysis using structural vector auto-regressions described in Section III employ first differences of these variables to ensure stationarity. Lastly, there is a significant correlation between the EPU indexes, as shown in Table 2. To disentangle the potential spillovers of these two indexes, the Great Britain EPU Index was regressed on the USA EPU index, and vice versa. The residuals from these regressions isolate the domesticated EPU index of each nation and exclude spillover from one nation to another. These residual indexes are stationary, and are thus not differenced for subsequent analysis.

Table 1: Summary Statistics for the EPU Indexes

Variable	Mean	Median	Std Dev	Minimum	Maximum
EPU USA	116.149104	106.725895	45.0256349	44.782753	283.665588
EPU GBR	169.527829	123.955624	147.776119	25.340952	1141.8

Table 2: Pearson Correlation Coefficients for EPU Indexes

	EPUUSA	EPUGBR
EPUUSA	1	0.504 <.0001
EPUGBR	0.504 <.0001	1

Daily and monthly stock data for US common stock and Great Britain American Depository Receipts were gathered from both Compustat and the Center for Research in Security Prices (CRSP) spanning January 1997 to December 2016. The monthly Compustat data was used to provide a concrete location for each company's headquarters and was merged into the daily CRSP data. Negative prices were corrected, and prices under a dollar were excluded. Additionally, observations with volatility less than zero were also excluded.

At the daily level, closing spread is calculated as the midpoint of the closing bid-ask spread. Illiquidity is defined as the absolute value of the daily return divided by price times volume. Following standard conventions (Amihud 2002) this illiquidity metric is also scaled up by a factor of 10^6. Return volatility is measured as the standard deviation of daily returns over a particular month. Price volatility is range based volatility using the log difference between the monthly high and low prices. Market capitalization is the monthly closing price multiplied by shares outstanding. I then formed distinct monthly portfolios of British ADRs and United States common stock, adding the EPU index for each country alongside the data set as well.

The prices, market capitalizations, trading volumes, and illiquidity measures between the US and UK portfolios appear to be similar. Tables 3 and 4 outline the basic summaries of these variables. Comparing the means between the two groups confirms that the statistical validity of their equality. For example, common stock price only differs from the British ADR by $3.00. Also, volatilities, illiquidity, and closing spreads look almost identical. Table 4 highlights the statistical insignificance of the differences in means. However, US common stock dominates the British ADRs in terms of observations. Whereas the latter contains 144 securities, the former possesses 10963.

Table 3: Summary Statistics of Securities

Variable	Mean	Median	Std Dev	Minimum	Maximum
GBR Price	$24.99	$18.39	$20.80	$1.19	$106.49
USA Price	$27.99	$12.81	$1047.45	$1.00	$109655.36
GBR Market Capitalization	$1,572,840,785	$141,128,430	$4,907,767,399	$376,796	$48,136,722,807
USA Market Capitalization	$1,796,152,716	$191,516,998	$9,964,449,671	$1,000,125	$326,170,180,815
GBR Trading Volume	415,881.83	64,097.56	876,320.27	782.31	5,362,189.58
USA Trading Volume	500,984.63	103,334.39	2,048,534.17	100.00	83,260,382.5
GBR Return Volatility	3.75294	2.7923608	2.5319561	0.7458787	13.6386197
USA Return Volatility	3.9971222	3.5055509	2.2405839	0.2929268	60.9837966
GBR Price Volatility	21.0487999	16.6728527	13.8518004	2.481199	97.107368
USA Price Volatility	21.8546643	19.5019674	11.8506616	0.8605694	210.4134154
GBR Illiquidity	4.855392	0.1967866	10.0882455	0.000076762	49.477719
USA Illiquidity	4.5064809	0.1565875	39.0201851	0	3550.64
GBR Closing Spread	$2.8107774	$1.7803703	$3.2835492	$0.0305889	$23.2090578
USA Closing Spread	$2.6175487	$1.6112762	$3.1938779	$0.0188881	$50.6512876

Table 4: Means Comparison t-test Results

Variable	GBR Mean	USA Mean	Difference	Variance Equality	95% CL Mean		t-stat	Pr>|t|
Price	24.9907	27.9883	-2.9976	Not Equal	-22.8991	16.9039	-0.3	0.7678
Market Cap	1.57E+09	1.80E+09	-2.23E+08	Not Equal	-1.05E+09	6.06E+08	-0.53	0.5956
Volume	415882	500985	-85102.8	Not Equal	-234380	64174.5	-1.13	0.2619
Return Volatility	3.7453	3.9971	-0.2518	Not Equal	-0.671	0.1673	-1.19	0.237
Price Volatility	21.0488	21.8547	-0.8059	Not Equal	-3.0982	1.4864	-0.69	0.4883
Illiquidity	4.1855	4.5065	-0.3209	Not Equal	-2.134	1.4921	-0.35	0.7274
Closing Spread	2.8108	2.6175	0.1932	Equal/Pooled	-0.3321	0.7186	0.72	0.4709

Section IV: Methods

To more closely evaluate the directional impact of EPU shocks on ADRs, the difference between illiquidity measures of British ADRs and US common stock are used. Therefore, all results can then be interpreted as the widening or narrowing of and ADR over a US common stock. In this manner, the response of the ADR can be uniquely ascertained. Furthermore, the differenced EPU indexes are scaled down by a factor of ten due to their larger magnitude whereas EPU residuals are not. Using these illiquidity measures and indexes, the following reduced form vector autoregressions (VARs) are fitted:

$$Y_t = \sum_{i=1}^{n} A_i Y_{t-i} + E_t$$

Where:

$$Y_t = [EPU_{t,j} L_{t,k}]^T$$

And *n* implies the lag length selected by the AIC. Sixteen distinct bivariate models are fitted. For each EPU index *j* comprising of EPU USA, EPU GBR, EPU USA

Residuals, and EPU GBR Residuals, a model is fitted for each liquidity measure *k* including price volatility, return volatility, closing spread, and illiquidity. EPU is always listed first and thereby considered the more exogenous variable of the two. When the reduced form is transformed into the structural form of the VAR to compute orthogonalized impulse responses, it is assumed EPU exerts itself upon the liquidity measure, but not vice versa.

Before measure the impulse response functions for an innovation in policy uncertainty and liquidity, the Granger causality tests were implemented to examine predictive causality. As can be seen in Table 5, Granger causality is neither consistent nor plentiful based on the VAR models. Generally, both USA EPU and USA EPU residuals Granger cause closing spreads and illiquidity. Only Great Britain's EPU residuals show any Granger causality, and on the opposite two variables including return volatility and price volatility.

Section V: Results

Table 7 shows the results of all sixteen VAR models grouped by EPU indexes. A complete index of IRF plots can be found in Appendix A. The impulse responses are monthly. In Table 7, the number within parenthesis denotes the month of statistically significant response(s) from a one standard deviation innovation in economic policy uncertainty. Table 7 also considers the case of a one standard deviation shock to the EPU indexes from the liquidity variables.

It appears some of the strongest effects in these models are followed by an innovation in the US EPU index. On the whole, ADRs seem to be a safer security following an increase in US uncertainty. For example, a one shock innovation in EPU USA is followed by a decrease of price volatility, closing spreads, and illiquidity of an ADR relative to domestic common stock by -0.4422, -0.0543, and -0.7469 respectively within the first few months. Such a result overall should be intuitive. As uncertainty increases in the US, the liquidity measures improve in a less uncertain UK.

Table 5: Results of Granger Causality Tests

Group	EPU USA on Liquidity Measure Differences	
Null Hypothesis	F-Stat	P-Value
EPU USA does not Granger Cause Return Volatility	1.6550	0.1760
Return Volatility does not Granger Cause EPU USA	0.5270	0.6640
EPU USA does not Granger Cause Price Volatility	1.6033	0.1190
Price Volatility does not Granger Cause EPU USA	1.8750	0.0539
EPU USA does not Granger Cause Closing Spreads	2.1473	0.0305*
Closing Spreads do not Granger Cause EPU USA	1.1853	0.3062
EPU USA does not Granger Cause Illiquidity	1.9694	0.0414*
Illiquidity does not Granger Cause EPU USA	0.6555	0.7492
Group	EPU GBR on Liquidity Measure Differences	
EPU GBR does not Granger Cause Return Volatility	1.0690	0.3713
Return Volatility does not Granger Cause EPU GBR	1.9312	0.1042
EPU USA does not Granger Cause Price Volatility	2.1245	0.0768
Price Volatility does not Granger Cause EPU GBR	1.8297	0.1220
EPU GBR does not Granger Cause Closing Spreads	0.5391	0.7071
Closing Spreads do not Granger Cause EPU GBR	1.0177	0.3978
EPU GBR does not Granger Cause Illiquidity	0.6810	0.6054
Illiquidity does not Granger Cause EPU GBR	1.4985	0.2016
Group	EPU USA Residuals on Liquidity Measure Differences	
EPU USA Residuals do not Granger Cause Return Volatility	1.7569	0.1546
Return Volatility does not Granger Cause EPU USA Residuals	0.9828	0.4000
EPU USA Residuals do not Granger Cause Price Volatility	1.6342	0.1495
Price Volatility does not Granger Cause EPU USA Residuals	1.0649	0.3791
EPU USA Residuals do not Granger Cause Closing Spreads	3.5900	0.0133*
Closing Spreads do not Granger Cause EPU USA Residuals	0.3378	0.7980
EPU USA Residuals do not Granger Cause Illiquidity	2.4800	0.0605
Illiquidity does not Granger Cause EPU USA Residuals	0.2487	0.8623
Group	EPU GBR Residuals on Liquidity Measure Differences	
EPU GBR Residuals do not Granger Cause Return Volatility	2.6388	0.0334*
Return Volatility does not Granger Cause EPU GBR Residuals	2.9151	0.0211*
EPU GBR Residuals do not Granger Cause Price Volatility	3.5137	0.0077*
Price Volatility does not Granger Cause EPU GBR Residuals	2.2565	0.0622
EPU GBR Residuals do not Granger Cause Closing Spreads	1.0743	0.3686
Closing Spreads do not Granger Cause EPU GBR Residuals	0.7698	0.5452
EPU GBR Residuals do not Granger Cause Illiquidity	0.4452	0.7759
Illiquidity does not Granger Cause EPU GBR Residuals	1.5587	0.1843

Table 6: Standard Deviations of EPU Indexes

Index	EPU USA Difference	EPU GBR Difference	EPU USA Residuals	EPU GBR Residuals
Std Dev	36.35832	76.02313	39.02691	113.8993

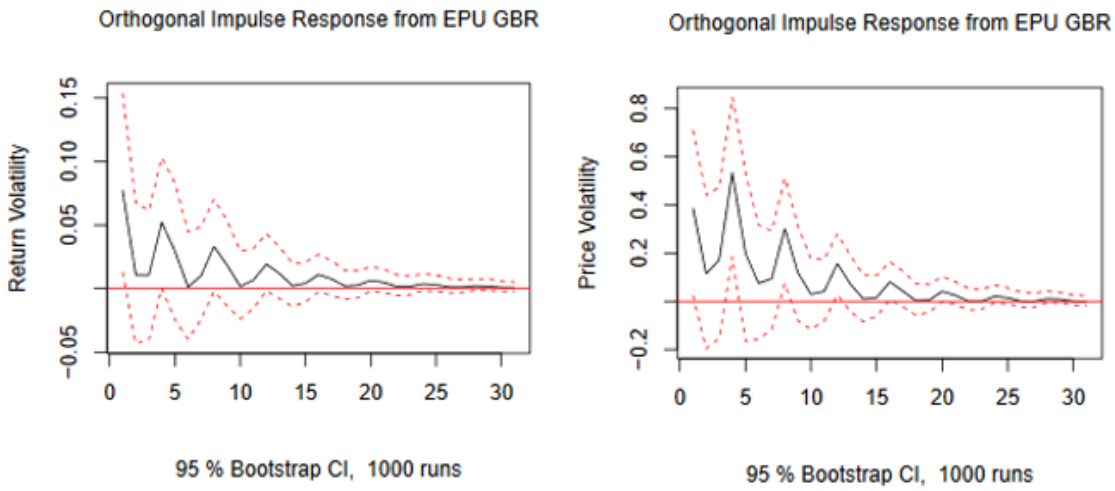
However, this picture is not entirely consistent. As can be seen, return volatility increases in the ADR relative to the common stock, and this is almost instantaneous as it occurs sooner than the benefits listed above. It is also interesting to note is the fact that a shock to price volatility and closing spreads in an ADR are followed by a significant response of 5 to 6 points on the US EPU index by month 8. However, it is strikingly odd that such a foreign shock would affect domestic EPU so many months after the shock. Although the result is significant, the lower bound of the confidence interval is still very close to zero for both of these cases.

Table 7: Results from the Impulse Response Functions

Impulse Response Functions using EPU USA			
Impulse to	**Response**	**Impulse from**	**Response**
Return Volatility	(1) 0.0718	Return Volatility	0
Price Volatility	(8) -0.4422	Price Volatility	(8) 6.37
Closing Spread	(3) -0.0543	Closing Spread	(8) 5.3 (9) -3.8
Illiquidity	(5) -0.5919 (7) -0.8711 (8) -0.7469	Illiquidity	0
Impulse Response Functions using EPU GBR			
Impulse to	**Response**	**Impulse from**	**Response**
Return Volatility	(1) 0.0772 (4) 0.0521	Return Volatility	(2) 9.44 (3) -8.93
Price Volatility	(1) 0.3861(4) 0.5337 (8) 0.3017	Price Volatility	(2) 8.439
Closing Spread	0	Closing Spread	(2) 8.39
Illiquidity	0	Illiquidity	(3) -9.64
Impulse Response Functions using EPU USA Residuals			
Impulse to	**Response**	**Impulse from**	**Response**
Return Volatility	0	Return Volatility	0
Price Volatility	(1) 0.0909	Price Volatility	0
Closing Spread	(3) -0.0476	Closing Spread	0
Illiquidity	(4) -0.6639	Illiquidity	0
Impulse Response Functions using EPU GBR Residuals			
Impulse to	**Response**	**Impulse from**	**Response**
Return Volatility	0	Return Volatility	(2) 12.37
Price Volatility	(5) -0.3035	Price Volatility	(2) 9.40
Closing Spread	0	Closing Spread	0
Illiquidity	0	Illiquidity	0

In considering the impact of a shock to the British EPU, the results also appear to be sensible overall. Although there is no significant effect in closing spread or liquidity, price volatility and closing spread show strong, continuous response. Furthermore, shocking each of the individual variables shows a nontrivial increase in response to the British EPU. Therefore, ADRs, despite being traded in the United States exchanges, are still quite sensitive to their own domestic uncertainty.

Figure 1: IFR Plot of Return and Price Volatilities after an EPU GBR Shock

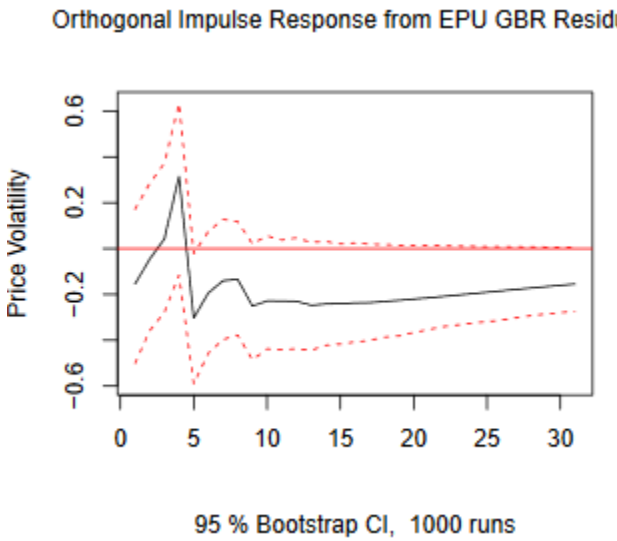


When isolating the distinct aspects of uncertainty in the United States through the EPU USA residuals, a similar story is had just as in the normal US EPU case. For example, closing spread and illiquidity improves in ADRs relative to common stock. However, one notable difference is that price volatility worsens compared with the stand-alone index. Therefore, it appears that at least the bettering of the closing spread and illiquidity of ADRs are robust following a shock to the United States EPU.

Lastly, the impact of the Great Britain EPU index show a different story compared with the general British EPU index. Surprisingly, price volatility appears to get better after month 5. However, this is preceded by a large and positive, although not significant, shock to the residual index as seen in Figure 2. Subsequent robustness testing, found in Appendix B, show that for two other configurations of

the portfolio, including value weighting the index, there is a significant worsening of price volatility before an insignificant recovery at month 5.

Figure 2: IRF Plot with Shock to Price Volatility from UK Residual EPU Index



Not surprisingly, shocks to these liquidity measures in ADRs cause some impact in the British EPU residual index. Notably, this comes chiefly from price and return volatility, and also in a much stronger magnitude than the normal index alone. This shows that changes in these ADRs do matter for foreign uncertainty. Using a trimmed equal weighted portfolio as found in Appendix B only strengthen this result.

Section VI: Conclusions

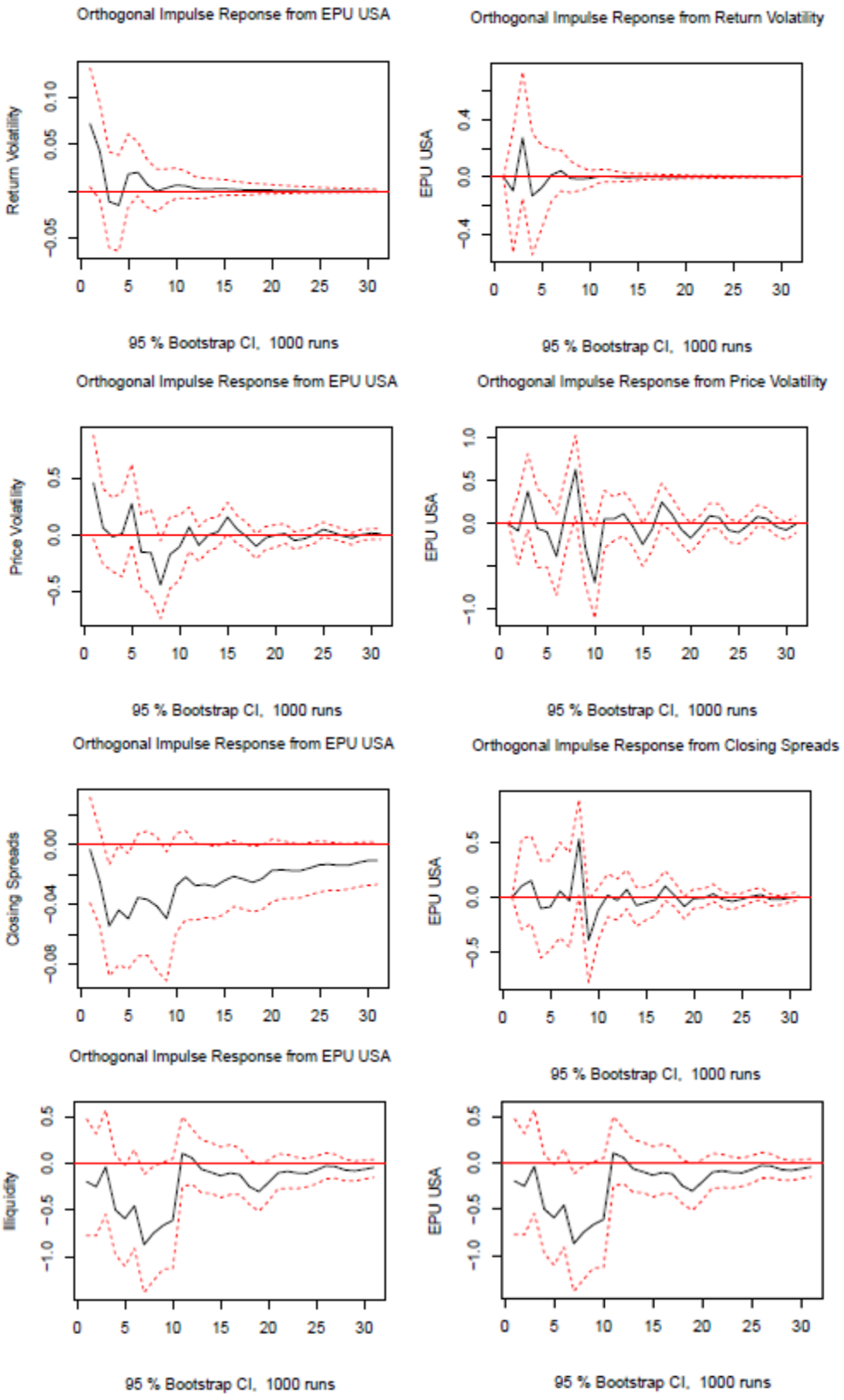
Shocks from different nations affect ADRs in distinct ways. This research has shown that, on the whole, innovations in the United States better the liquidity of ADRs while innovations from the United Kingdom hurt them. Furthermore, shocks in worsening liquidity in an ADR relative to US common stock are followed by a slight increase in British economic policy uncertainty. Although equal weighted portfolios show this to be the case, employing value weighted portfolios weaken these findings. Rather, they only show that fewer liquidity measures from British ADRs relative to common stock deteriorate following a shock in only British EPU.

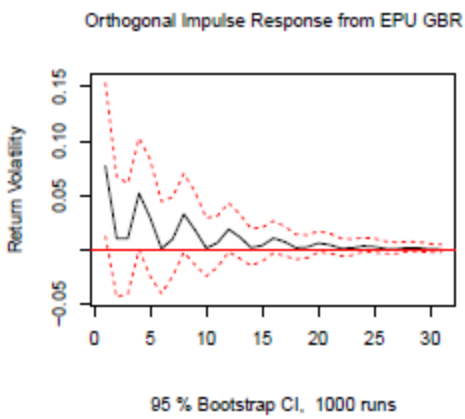
Subsequent analysis could take into consideration distinct sectors of companies, such as tech firms, firms producing consumer based goods, etc., to further isolate the unique effects of uncertainty between nations. Ideally, future studies will have better access to actual foreign market data, such as data on the London Stock Exchange unlike this study. Additionally, one might consider the use of panel data in place of monthly averaged time series data.

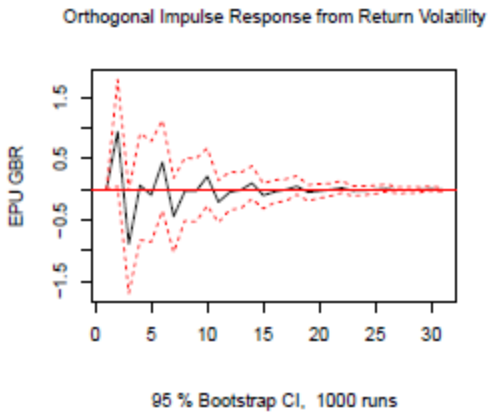
Understanding the overarching effects of policy uncertainty through this study and more should be of interest to policy makers worldwide, and especially in the United States. Pushing out extended periods of political suspense adversely affect financial markets and thereby the well-being of all who participate in the economy. Growing, strong, and bullish markets don't like uncertainty, so policy makers ought to curb it where they can.

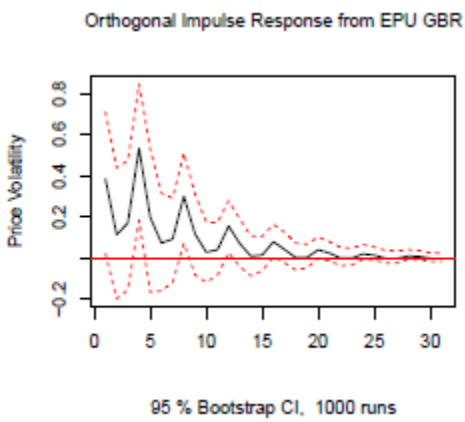
APPENDICES

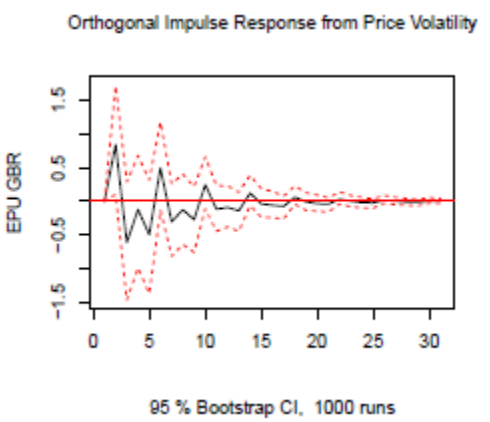
Appendix A: IRF Plots for all Bivariate VAR Models

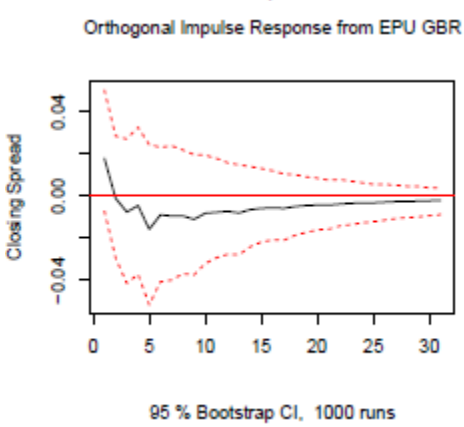


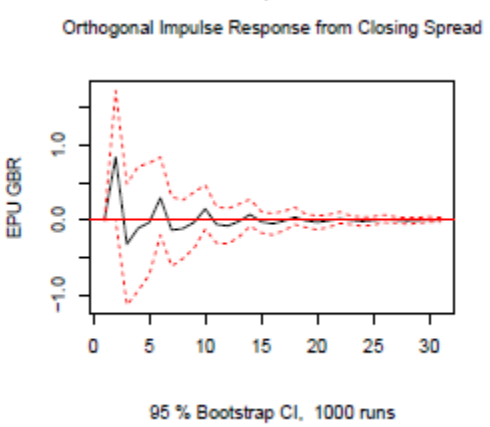

Orthogonal Impulse Response from EPU GBR
Return Volatility
95 % Bootstrap CI, 1000 runs

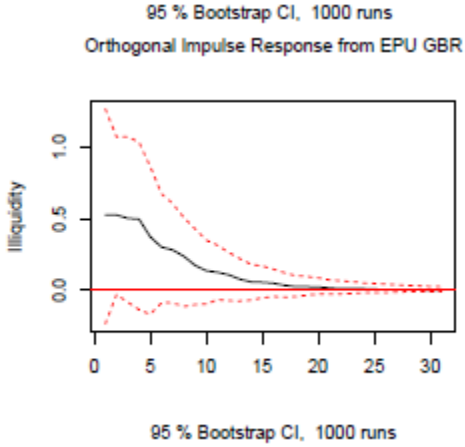

Orthogonal Impulse Response from Return Volatility
EPU GBR
95 % Bootstrap CI, 1000 runs

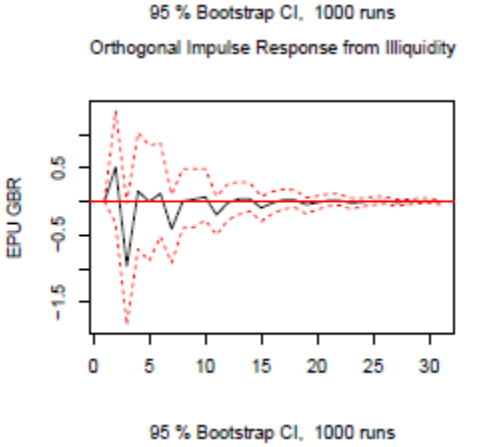

Orthogonal Impulse Response from EPU GBR
Price Volatility
95 % Bootstrap CI, 1000 runs

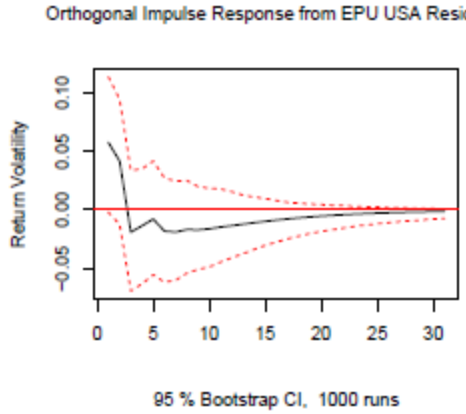

Orthogonal Impulse Response from Price Volatility
EPU GBR
95 % Bootstrap CI, 1000 runs

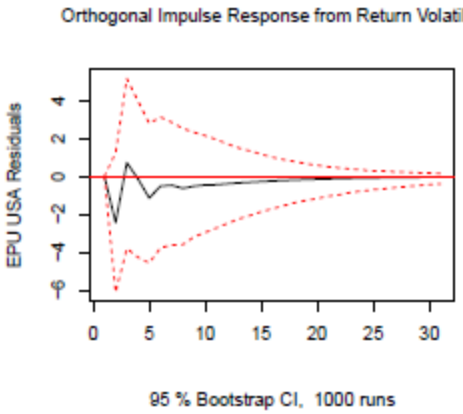

Orthogonal Impulse Response from EPU GBR
Closing Spread
95 % Bootstrap CI, 1000 runs

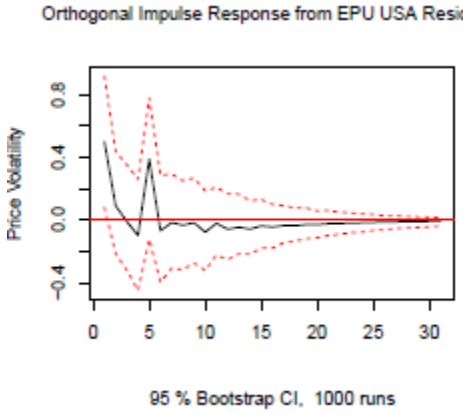

Orthogonal Impulse Response from Closing Spread
EPU GBR
95 % Bootstrap CI, 1000 runs

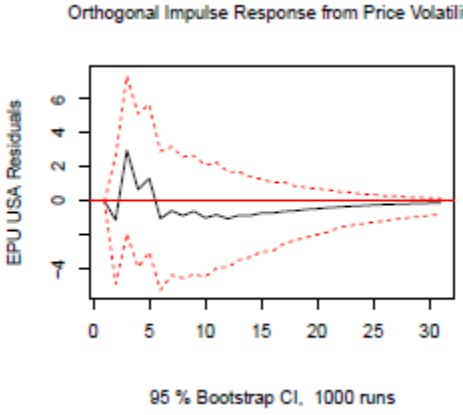

Orthogonal Impulse Response from EPU GBR
Illiquidity
95 % Bootstrap CI, 1000 runs

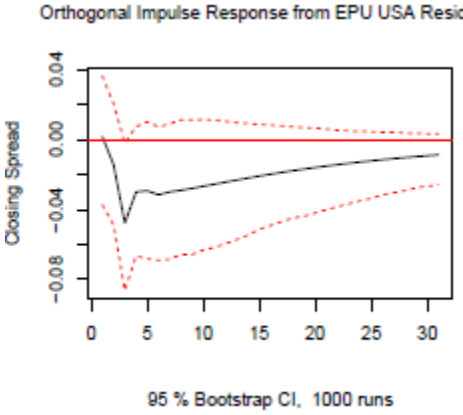

Orthogonal Impulse Response from Illiquidity
EPU GBR
95 % Bootstrap CI, 1000 runs

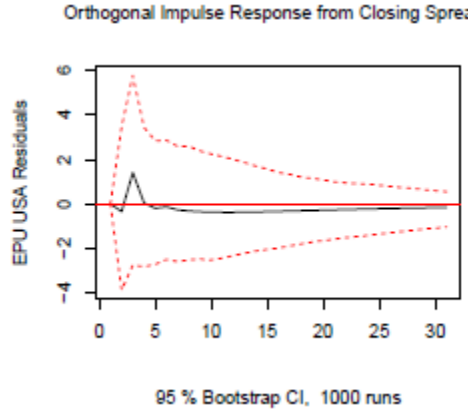

Orthogonal Impulse Response from EPU USA Residuals
Return Volatility
95 % Bootstrap CI, 1000 runs

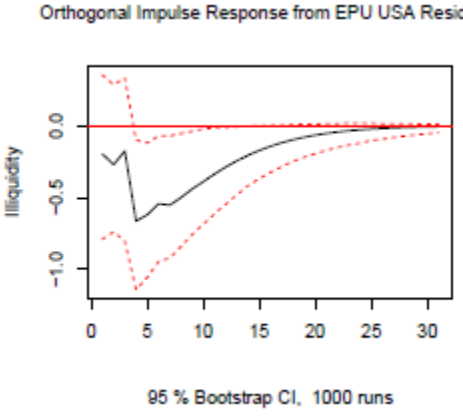

Orthogonal Impulse Response from Return Volatility
EPU USA Residuals
95 % Bootstrap CI, 1000 runs

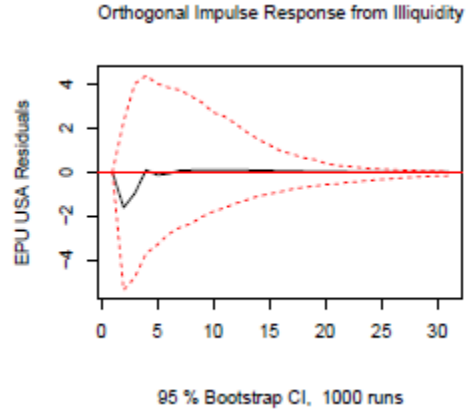

Orthogonal Impulse Response from EPU USA Residuals
Price Volatility
95 % Bootstrap CI, 1000 runs

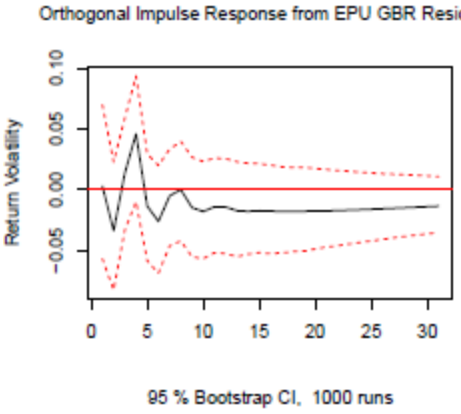

Orthogonal Impulse Response from Price Volatility
EPU USA Residuals
95 % Bootstrap CI, 1000 runs

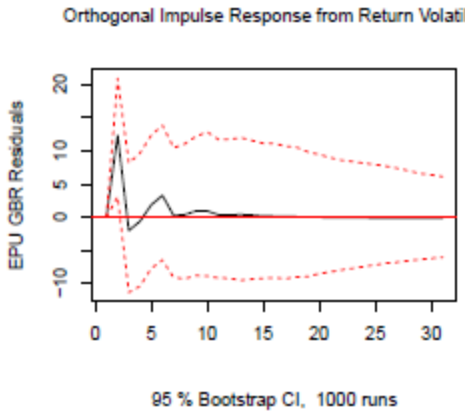

Orthogonal Impulse Response from EPU USA Residuals
Closing Spread
95 % Bootstrap CI, 1000 runs

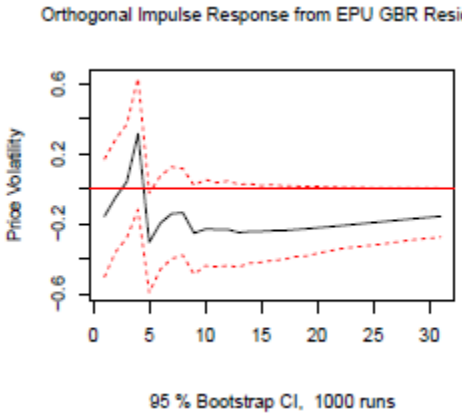

Orthogonal Impulse Response from Closing Spreads
EPU USA Residuals
95 % Bootstrap CI, 1000 runs

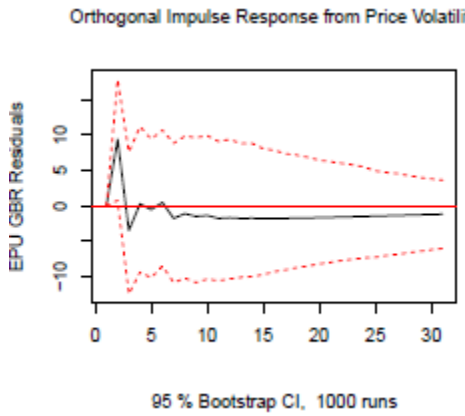

Orthogonal Impulse Response from EPU USA Residuals
Illiquidity
95 % Bootstrap CI, 1000 runs

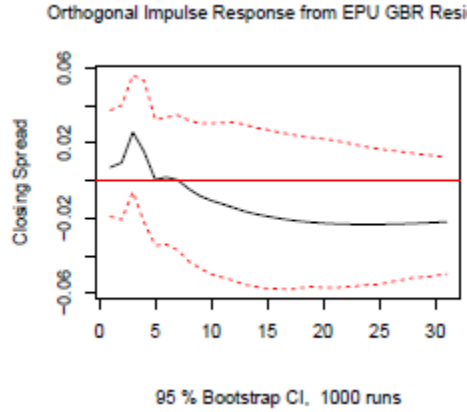

Orthogonal Impulse Response from Illiquidity
EPU USA Residuals
95 % Bootstrap CI, 1000 runs

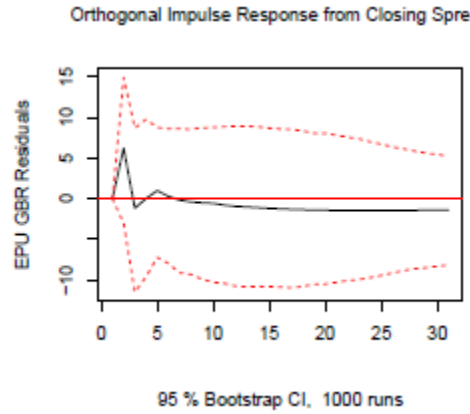

Orthogonal Impulse Response from EPU GBR Residuals
Return Volatility
95 % Bootstrap CI, 1000 runs

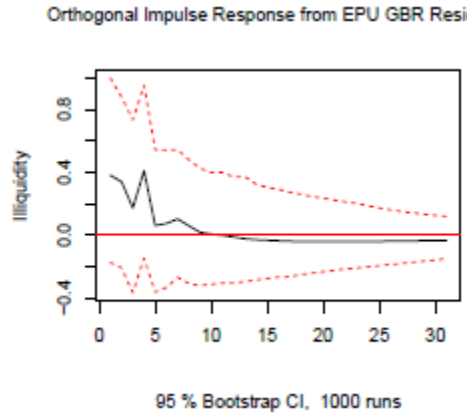

Orthogonal Impulse Response from Return Volatility
EPU GBR Residuals
95 % Bootstrap CI, 1000 runs

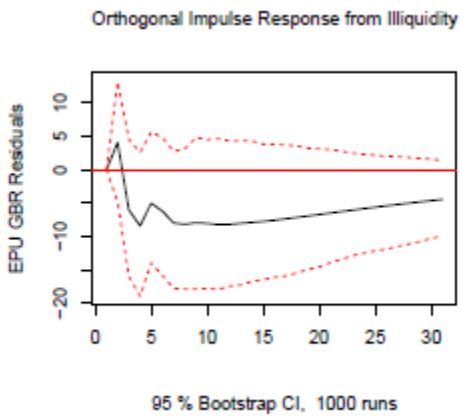

Orthogonal Impulse Response from EPU GBR Residuals
Price Volatility
95 % Bootstrap CI, 1000 runs


Orthogonal Impulse Response from Price Volatility
EPU GBR Residuals
95 % Bootstrap CI, 1000 runs


Orthogonal Impulse Response from EPU GBR Residuals
Closing Spread
95 % Bootstrap CI, 1000 runs


Orthogonal Impulse Response from Closing Spread
EPU GBR Residuals
95 % Bootstrap CI, 1000 runs


Orthogonal Impulse Response from EPU GBR Residuals
Illiquidity
95 % Bootstrap CI, 1000 runs


Orthogonal Impulse Response from Illiquidity
EPU GBR Residuals
95 % Bootstrap CI, 1000 runs

Appendix B: Robustness Checks Using 1st/99th Percentile Trimmed Equal Weighted Portfolios and Value Weighted Portfolios.

Impulse from EPU USA to Liquidity			
Impulse to	EW	EW Trimmed	VW
Return Volatility	(1) 0.0718	(1) 0.0721	0
Price Volatility	(8) -0.4422	(8) -0.2912	0
Closing Spread	(3) -0.0543	0	0
Illiquidity	(5) -0.5919 (7-8) -0.8711,-0.7469	0	0

Impulse from Liquidity to EPU USA			
Impulse from	EW	EW Trimmed	VW
Return Volatility	0	0	(2) -5.56
Price Volatility	(8) 6.37	(8) 5.9 (10) 8.11	0
Closing Spread	(8) 5.3 (9) -3.8	0	(6) -6.90
Illiquidity	0	0	0

Impulse from EPU GBR to Liquidity			
Impulse to	EW	EW Trimmed	VW
Return Volatility	(1) 0.0772 (4) 0.0521	(1) 0.0806	0
Price Volatility	(1) 0.3861(4) 0.5337 (8) 0.3017	(1) 0.3860(4) 0.4763 (8) 0.2973	0
Closing Spread	0	0	0
Illiquidity	0	0	(1) 0.0157 (4) 0.0126

Impulse from Liquidity to EPU GBR			
Impulse from	EW	EW Trimmed	VW
Return Volatility	(2) 9.44 (3) -8.93	(2) 11.78 (3) -8.47	0
Price Volatility	(2) 8.439	(2) 11.27 (6) 7.40	0
Closing Spread	(2) 8.39	(2) 10.3	0
Illiquidity	(3) -9.64	(5) 11.81	(2) 23.84 (3) -33.15

Impulse from EPU USA Residuals to Liquidity			
Impulse to	EW	EW Trimmed	VW
Return Volatility	0	(2) 0.0610	0
Price Volatility	(1) 0.0909	(1) 0.3122	0
Closing Spread	(3) -0.0476	0	0
Illiquidity	(4-8) -0.6639	0	0

Impulse from Liquidity to EPU Residuals USA			
Impulse from	EW	EW Trimmed	VW
Return Volatility	0	0	(2) -5.17
Price Volatility	0	0	0
Closing Spread	0	0	0
Illiquidity	0	0	(2) -6.87

Impulse from EPU GBR Residuals to Liquidity			
Impulse to	EW	EW Trimmed	VW
Return Volatility	0	0	(1) 0.0494
Price Volatility	(5) -0.3035	(4) 0.3438	(1) 0.3764
Closing Spread	0	0	0
Illiquidity	0	0	(2) 0.0074 (4) 0.0118

Impulse from Liquidity to EPU GBR Residuals			
Impulse from	EW	EW Trimmed	VW
Return Volatility	(2) 12.37	(2) 15.54	(2) 12.83
Price Volatility	(2) 9.40	(2) 14.46	0
Closing Spread	0	(2) 10.30	0
Illiquidity	0	0	(2) 31.00

REFERENCES

Ahimud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets*, 5(1), 31-56.

Antonakais, N., Chatziantoniou, I., & Filis, G. (2013). Dynamic co-movements of stock market returns, implied volatility and policy uncertainty. *Economic Letters*, 120, 87-92.

Baker, S., Bloom, N., & Davis, S. (2016). Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics,* 131(4), 1593-1636.

Balli, F., Uddin, G., Mudassar, H., & Yoon, S. (2017). Cross-country determinants of economic policy uncertainty spillovers. *Economic Letters*, 156, 179-183.

Biljanovska, N., Grigoli, F., & Hengge M. (2017). Fear Thy Neighbor: Spillover from Economic Policy Uncertainty. International Monetary Fund Working Paper.

Brogaard, J. and Detzel, A. (2015). The Asset-Pricing Implications of Government Economic Policy Uncertainty. *Management Science*, 61(1), 3-18.

Caggiano, G., Castenuovo, E., & Figueres, J. (2017). Economic Uncertainty Spillovers in Booms and Busts. Melbourne Institute Working Paper. Melbourne Institute Working Paper No. 13/17. Available at SSRN: https://ssrn.com/abstract=2972967 or http://dx.doi.org/10.2139/ssrn.2972967

Carriere-Swallow, Y. and Cespedes, L. (2013). The impact of uncertainty shocks in emerging economies. *Journal of International Economics*, 90, 216-325.

Colombo, V. (2013). Economic policy uncertainty in the US: Does it matter for the Euro area? *Economic Letters*, 121(1), 39-42.

Cox, J. and Griffith, T. (2018), Political Uncertainty and Market Liquidity: Evidence from the Brexit Referendum and the 2016 U.S. Presidential Election. Available at SSRN: https://ssrn.com/abstract=3092335 or http://dx.doi.org/10.2139/ssrn.3092335

Diebold. F. and Yilmaz, K. (2008). Measuring Financial Asset Return and Volatility Spillovers, with Application to Global Equity Markets. *The Economic Journal*, 119(534), 158-171.

Diebold. F. and Yilmaz, K. (2012). Better to give than to receive: Predictive directional measurement of volatility spillovers. *International Journal of Forecasting*, 28(1), 57-66.

Ely, D. and Salehizadeh, M. (2001). American Depository Receipts: An analysis of international stock price movements. *International Review of Financial Analysis*, 10(4), 343-363.

Klößner, S. and Sekkel, R. International Spillovers of Policy Uncertainty. *Economic Letters*, 124(3), 508-512.

Liu, L. and Zhang, T. (2015). Economic policy uncertainty and stock market volatility. *Finance Research Letters*, 15, 99-105.

Mumtaz, H. and Theodoridis, K. (2015). The International Transmission of Volatility Shocks: An Empirical Analysis. *Journal of the European Association*, 13(3), 512 – 533.

Pasquariello, P. and Zafeiridou, C. (2014). Political Uncertainty and Financial Market Quality. Pasquariello, Paolo and Zafeiridou, Christina, Political Uncertainty and Financial Market Quality (April 2014). Ross School of Business Paper No. 1232. Available at SSRN: https://ssrn.com/abstract=2423576 or http://dx.doi.org/10.2139/ssrn.2423576

Pastor, L. and Veronesi, P. (2012). Uncertainty about Government Policy and Stock Prices. *The Journal of Finance*. 67(4), 1219-1264.