

Economic Policy Uncertainty and the Energy Stock Market: Evidence From China

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This paper focuses on the relation between China's economic policy uncertainty and the energy stock market. Based on monthly data from July 2007 to June 2021, we use a structural vector autoregression model to investigate the effect of economic policy uncertainty. We find that economic policy uncertainty has a negative effect on the energy stock market in China. In addition, the energy stock market is positively affected by the country's overall stock market.

I. Introduction

Economic policy is an important measure of government intervention, and economic policy uncertainty (EPU) has broad and profound impacts at the macro and micro levels. It can affect household consumption and investment decisions, unemployment, and economic growth (Bernanke, 1983; Bloom, 2009). At the corporate level, EPU affects corporate behaviors (Gulen & Ion, 2015), such as risk management (Kelly et al., 2016), capital investment, and spending (Kahle & Stulz, 2013; Kim & Kung, 2016), then transmitting to the stock market. The findings from prior research show that the EPU index has a significantly negative relation with stocks (Ko & Lee, 2015) and can be used to predict future returns in the financial market (Brogaard & Detzel, 2015). Volatility in the financial market is often accompanied by changes in economic activities. An efficient and stable stock market is indispensable for industrial development and economic growth. Therefore, a study of the impacts of EPU on the stock market should be of great significance.

This study focuses on the relation between EPU and the energy stock market in China. According to previous literature, the effect of EPU depends on the country, the strength of the economy, the size of the stock market (Christou et al., 2017), and the type of industry (Boutchkova et al., 2012; Yu et al., 2017). The increasingly severe global energy problem has received unprecedented attention. Energy is the life-line of the national economy and national security. Countries attach great importance to the formulation of an energy economy strategy. Based on the close relation between the energy market and economic growth, it is very important to understand the impact of EPU on the energy stock market.

Theoretically, the energy market is more sensitive to EPU than to other forms of uncertainty. Energy companies are characterized by their large scale and long payback period, which entail higher risks than in other industries. EPU can not only affect the behavior of enterprises mentioned above, but also directly cause fluctuations in energy prices (oil, coal, and renewable energy), further causing fluctua-

tions in the energy market supply and demand and changing energy consumption and production activities. Shafiullah et al. (2021) show a long-term negative correlation between US EPU and renewable energy consumption. Qin et al. (2020) show that the uncertainty of US economic policy is closely related to the oil market. However, Appiah-Otoo's (2021) findings indicate that EPU has a nonsignificant negative effect on renewable energy growth. Therefore, the effect of EPU is related to national conditions. As an important country in terms of energy, the impact of China's EPU on the energy market cannot be ignored. This study aims to address this issue.

In this study, we use a structural vector autoregression (SVAR) model to examine the effect of EPU on the energy market. We use the CSI 300 Index and the CSI Energy Index as proxy variables for China's stock market and energy stock market, respectively. In addition, we adopt the widely used EPU index constructed by Baker et al. (2016) to measure the degree of EPU in China.

Our study provides more empirical evidence of the impact of EPU on the stock market and supplements the research. We innovatively examine the impacts of EPU from the perspective of China's energy market, which is an important part of the world's energy market. Furthermore, our study provides a more accurate reference benchmark for market investors, financial regulators, and policy makers for investment portfolio decisions, risk management, and policy formulation and evaluation. In addition, in future research, the difference between the effects of EPU on traditional energy enterprises and renewable energy enterprises is worth further discussion, because the two different types of enterprises differ greatly in technology and industrial growth. Moreover, the transmission mechanism of the effect of EPU on the energy market is worthy of further discussion in future research.

This paper is organized as follows. Section II introduces the data and methodology. Section III discusses the results, and Section IV concludes the paper.

Table 1. Descriptive Statistics

Variable	Mean	SD	Min	P50	Max
<i>EPU</i>	305.513	247.697	26.144	213.549	970.830
<i>dEPU</i>	1.709	99.167	-280.348	7.662	257.773
<i>CSI300</i>	3346.436	869.504	1800.775	3280.889	5624.885
<i>dCSI300</i>	7.390	228.454	-700.865	16.048	817.780
<i>ESI</i>	2525.190	1188.442	1201.678	1997.384	7204.880
<i>dESI</i>	-17.017	262.623	-817.860	-6.830	1413.660

This table presents descriptive statistics of all variables. In addition, *dEPU*, *dCSI300* and *dESI* are the first-order difference sequences of *EPU*, *CSI300* and *ESI*, respectively, which are stationary.

II. Data and Methodology

A. Data and Variables

We adopt the EPU index constructed by Baker et al. (2016) to measure the EPU for China. Baker et al. constructed a scaled frequency count of articles on policy-related economic uncertainty in the *South China Morning Post*, Hong Kong's leading English-language newspaper. Our method follows their news-based indexes of EPU for the United States and other countries, which provides convenient conditions for research. In addition, we use the China Shanghai–Shenzhen 300 index (*CSI300*) and energy stock index (*ESI*) to measure the price levels of China's stock market and energy stock market, respectively. The sample data in this article include monthly data from July 2007 to June 2021.

B. SVAR

To test the relation between EPU and the energy stock market in China, we use a structural vector autoregressive (SVAR) model for estimation. Before the SVAR analysis, we first test the stationarity of the variables, and find that each variable is stable after first difference. After a unit root test, we perform first differencing on the variables to ensure that the time series variables ultimately used in the model are stable, to avoid a false regression. The SVAR model is as follows:

$$Y_t = \sum_{i=1}^p A_i Y_{t-i} + A u_t \quad (1)$$

$$A u_t = B \varepsilon_t \quad (2)$$

where Y_t denotes a vector of three variables (EPU_t , $CSI300_t$, ESI_t); A_i is the unknown coefficient matrix to be estimated; and u_t and ε_t , respectively, denote a simplified perturbation term and a structural disturbance term for Y_t . Thus, given these restrictions on the A and B matrices, the model can be written in matrix form as follows:

$$= \begin{bmatrix} 1 & 0 & 0 \\ a_{21} & 1 & 0 \\ a_{31} & a_{32} & 1 \end{bmatrix} \begin{bmatrix} dEPU \\ dCSI300 \\ tdESI \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 \\ 0 & b_{22} & 0 \\ 0 & 0 & b_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_{dEPU} \\ \varepsilon_{dCSI300} \\ \varepsilon_{dESI} \end{bmatrix} \quad (3)$$

$$dEPU = b_{11} \varepsilon_{dEPU} \quad (4)$$

$$dCSI300 = -a_{21}dEPU + b_{22} \varepsilon_{dCSI300} \quad (5)$$

$$dESI = -a_{31}dEPU - a_{32}dCSI300 + b_{33} \varepsilon_{dESI} \quad (6)$$

Specifically, a_{21} and a_{31} reflect the impacts of EPU on the CSI 300 Index (*CSI300*) and the energy stock market index (*ESI*), respectively. Moreover, considering that the energy stock market is affected by the overall stock market level, we set the coefficient a_{32} to test the effect of *CSI300* on the energy stock market.

III. Results

[Table 1](#) reports the descriptive statistics of all the variables, where *dEPU*, *dCSI300*, and *dESI* are the first difference sequences of *EPU*, *CSI300*, and *ESI*, respectively. [Table 1](#) shows that the mean of the EPU index (*EPU*) is 305.513, the maximum and minimum are, respectively, 26.144 and 970.830, and the standard deviation is 247.697, indicating that strong EPU volatility, which is consistent with reality. Furthermore, the maximum, minimum, and standard deviation of *dESI* are larger than for *dCSI300*, which suggests that the monthly energy stock index data fluctuate more than the CSI 300 data.

[Table 2](#) reports the optimal lag order selected based on the final prediction error (FPE) criterion, Akaike information criterion (AIC), Hannan–Quinn information criterion (HQIC), and Bayesian information criterion (BIC). It is important to construct the SVAR model with a reasonable lag order: if the lag order is too small, the estimation results will be inconsistent, and if the lag order is too large, too many parameters will be estimated, which will affect the effectiveness of the model estimation. According to the HQIC and BIC, the optimal lag order of the model is one; however, the AIC and FPE criterion show that the optimal lag order of the model is two. Furthermore, according to likelihood ratio statistics, the optimal lag order is two and the impact of EPU cannot be fully reflected in the short term; therefore, we choose an optimal lag order of two.

[Table 3](#) reports the estimation results of the SVAR model (Panel A) and robustness test (Panel B). The key coefficient a_{31} is significantly positive at the 5% level ($-a_{31}$ is negative), indicating that EPU has a negative impact on the energy stock market. EPU can affect the consumption and investment behavior of micro-subjects through expected effects and then be transmitted to stock prices. Specifically, EPU

Table 2. Results of the optimal lag order selection

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-3120.77				8.9e+12	38.3284	38.3515	38.3854
1	-3089.3	62.924	9	0.000	6.7e+12	38.0528	38.1453*	38.2806*
2	-3075.67	27.269*	9	0.001	6.4e+12*	37.9959*	38.1578	38.3945
3	-3071.33	8.6763	9	0.468	6.7e+12	38.0531	38.2843	38.6225
4	-3064.36	13.932	9	0.125	6.9e+12	38.0781	38.3786	38.8183

This table reports the selection results of the optimal lag order, mainly referring to FPE, AIC, HQIC and SBIC.

Table 3. Estimation results of SVAR model

Panel A: SVAR results							
		Coef.	St. Err.	z	P>z	[95% Confidence Interval]	
Matrix A							
	a_{21}	0.265	0.180	1.47	0.141	-0.087	-0.616
	a_{31}	0.214	0.106	2.01	0.044	0.005	0.422
	a_{32}	-0.729	0.046	-15.93	0.000	-0.819	-0.639
Matrix B							
	b_{11}	97.928	5.391	18.17	0.000	87.362	108.493
	b_{22}	225.869	12.434	18.17	0.000	201.499	250.239
	b_{33}	132.781	7.309	18.17	0.000	118.455	147.107
Panel B: Robustness test							
Matrix A							
	a_{21}	-1.201	0.351	-3.42	0.001	-1.889	-0.513
	a_{31}	0.156	0.086	1.81	0.070	-0.013	0.326
	a_{32}	-0.314	0.019	-16.18	0.000	-0.352	-0.276
Matrix B							
	b_{11}	103.471	5.994	17.26	0.000	91.723	115.219
	b_{22}	443.584	25.696	17.26	0.000	393.220	493.947
	b_{33}	105.091	6.088	17.26	0.000	93.159	117.022

This table reports the estimated coefficients of A and B matrices. The statistics, Coef., St. Err., z, and P>z, denote, respectively, coefficient, standard error, z-statistic, and p-value.

has an impact on the stock market by affecting investors' and companies' future expectations. Investors' future expectations will change with policy uncertainty. When the degree of uncertainty increases, investors will require more risk premiums in the future, which will affect stock market prices. In addition, the coefficient a_{32} is positive, which indicates that the overall stock market has a positive impact on the energy stock market.

Finally, we conduct a robustness test to ensure the credibility of our results. We replace the energy stock index variable *ESI* with *SZESI*, an alternative proxy for the Chinese energy stock price, and we obtain results similar to those presented in Table 3.

IV. Conclusion

From the perspective of the energy market and based on China's policy environment, this paper examines the impact of EPU on the stock market. We use the EPU index constructed by Baker et al. (2016) and data from China's stock market to empirically test the relation between EPU and the energy stock market. Based on a SVAR model, we find that an increase in EPU will reduce energy stock prices and that the overall stock market situation has a positive effect on the energy stock market.

Future research on China's policy environment should further explore the mechanism of the impact of EPU on the stock market.



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