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Research on the Impact of Economic Policy Uncertainty on China's Stock Market Returns

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Abstract: The development of China's securities market has been relatively short, and the stock market has been developed from scratch, and the relevant market system and theory are not mature enough, graduallyshowing the characteristics of "policy market". In order to achieve different macroeconomic goals at different stages of economic development, the government constantly adjusts the direction and intensity of the implementation of macroeconomic policy tools in a timely manner. Frequent adjustments in economic policies are bound to affect the development of capital markets. Especially since 2015, the supply-side reform, the Sino-US trade war, the establishment of the science andtechnology innovation board, the new crown epidemic and other internal and external factors overlapping makes China's economic policy uncertainty index fluctuates sharply, which will certainly have an impact on the stock market. In this paper, monthly data from 2010 to 2022 are used as the study interval, and the SSE and SZSE indices are selected as the samples to studythe relationship between them and the Shanghai and Shenzhen market returns using the economic policy uncertainty index developed by Baker etal. It is found that in the short run, economic policy uncertainty causes drastic negative feedback in the stock market; in the long run, the impact of economic policy uncertainty on the stock market gradually tends to level off after investors return to rationality. By market segment, economic policy uncertainty hit the small-cap segment more sharply, and equity market yields were more volatile.

Keywords: Economic policy uncertainty, Stock market returns, EPU, VAR model.

1. Introduction

1.1. Background of the selected topic

After 2010, in the face of the complex and ever-changing domestic and international situations, China's economic policy uncertainty index fluctuated sharply, as shown in Figure 1, which is a trend chart made fromChina's monthly EPU index data and can better show the changes of economic policy uncertainty. Since the beginning of 2015 our EPU index has started to fluctuate significantly. The reasons for the change can be divided into two aspects: domestic and foreign, mainly due to our government's "supply-side reform", "three to go, one to reduce, one to make up", "promote the registration system reform", "the establishment of the Northern Stock Exchange" and many other policies. "The establishment of the Northern Stock Exchange (NSE) and other policies have led to sharp price fluctuations in the stock market. The foreign side ismainly the stock market volatility caused by external factors, including the"Sino-US trade war" and the "new crown epidemic". These internal and external factors together determine the magnitude of the economic policy uncertainty index affecting our country, which is further transmitted to thecapital market.

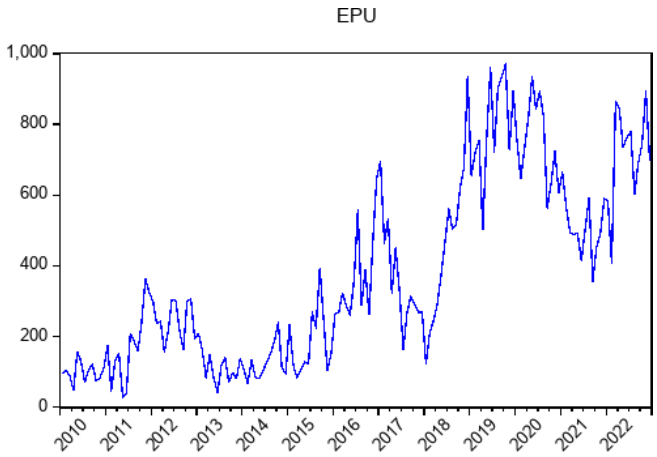

Figure 1. Change in EPU Index of Economic Policy Uncertainty

1.2. Significance of the selected topic

So far, the literature on economic policy uncertainty has focused on the effects on the economy, such as on output, on investment, and on consumption. However, there is a lack of research on the impact of economic policy uncertainty on asset prices, especially on the returns of different market segments.

This paper studies the impact of China's economic policy uncertainty on Shanghai and Shenzhen markets, and analyzes the impact of SSE and SZSI returns in terms of macro

influences, with the explanatory variables being economic policy uncertainty and the control variables being gold price and broad money volume. The time series data were analyzed using a vector autoregressive VAR model. The research in this paper can help investors to control risk and invest rationally. It is important to strengthenthe supervision of China's capital market and regulate the market order.

1.3. Literature Review

1.3.1. Foreign studies

Many foreign scholars have used the economic policy uncertainty index EPU to study the relationship between it and stock market returns, and most of them conclude that fluctuations in the EPU index lead to worse stock market and lower returns. Sum (2012)[2] did a related study using a VAR model based on the EPU index and the study showed the finding of a negative variation relationship between economic policy uncertainty and stock market returns in the US. Antonakakis et al. (2013) [3], on the other hand, use a DDC-GARCH model based on the EPU index and find that there can be a bidirectional effect between economic policy uncertainty and stock market returns, confirming that stock market volatility can also affect the EPU index in turn. Gulen. (2016) [4] studied the impact of the EPU index of U.S. economic policy uncertainty on 11 stock market indices in Asia and found that the impact of EPU index volatility on stock prices is negative and asymmetric.

1.3.2. Domestic research

Domestic scholars have also conducted more research on economic policy uncertainty. Using the FAVAR method based on the EPU index, Xuejun Jin et al. (2014) [6]show that policy uncertainty has a negative effect on GDP, investment, consumption, exports, and price changes. Xia Ting and Wen Yuechun (2018)[7] based on the GARCH-MIDAS model,concluded that the impact of China's economic policy uncertainty on the volatility of China's stock market is limited and there is a significant difference in the impact on A and B shares. Wenhui Chen and Weijie Duan(2020)[8] study the impact of economic policy uncertainty on stock market returns and real estate prices in China, and conclude that the impact of economic policy uncertainty on both is negative in the short run, but alternates between positive and negative impacts on the stock market and stable negative impacts on real estate over time.

1.3.3. Literature Review

In summary, the current research on economic policy uncertainty has yielded many results, but there are also shortcomings, namely, the lack of comparative impact studies on two different market segments. The differences and similarities between Shanghai and Shenzhen markets, a comparative analysis of the different impacts of economic policy uncertainty on the two markets, can provide a theoretical basis for us to differentiate the formulation of investment advice and regulatory policies.

In this paper, we first construct vector autoregressive (VAR) models and use impulse response analysis and analysis of variance to study the effects of EPU on the returns of Shanghai and Shenzhen markets in China. By selecting the EPU index and the Shanghai and Shenzhen market data, we examine whether there are differences in the impact of EPU on the market sectors. Finally, it provides reasonable suggestions for policy makers and investors, and enriches investors' investment basis and investment strategies. Another shortcoming of this paper is that the modeling is done using monthly frequency data, so it is not possible to capture more detailed fluctuations in economic policy uncertainty.

2. Empirical Analysis

2.1. Model construction

In this paper, a VAR model is constructed to study the impact of economic policy uncertainty on the SSE and SZSE returns, and the genericVAR model of order P is as follows.

$$y_t = \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \ldots + \alpha_p y_{t-p} + \mu_t \quad (1)$$

where, y_t is a dimensional endogenous variable, $\alpha_1,\alpha_2 \ldots \alpha_p$ is the corresponding matrix of coefficients to be estimated, p denotes the order of the lag of the endogenous variable, μ_t is the random perturbation vector, and $\mu_t \sim N(0,\delta^2)$.

The model developed from the SSE return and the economic policy uncertainty index is as follows.

$$\begin{bmatrix} EPU \\ SH \end{bmatrix} = \alpha_1 \begin{bmatrix} EPU_{t-1} \\ SH_{t-1} \end{bmatrix} + \ldots \alpha_1 \begin{bmatrix} EPU_{t-P} \\ SH_{t-P} \end{bmatrix} + \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} \quad (2)$$

The model developed by the index of real estate returns and economic

policy uncertainty is as follows:

$$\begin{bmatrix} EPU \\ SZ \end{bmatrix} = \alpha_1 \begin{bmatrix} EPU_{t-1} \\ SZ_{t-1} \end{bmatrix} + \ldots \alpha_1 \begin{bmatrix} EPU_{t-P} \\ SZ_{t-P} \end{bmatrix} + \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} \quad (3)$$

2.2. Variables and Data

This paper studies the impact of economic policy uncertainty on China's stock market returns, so the SSE and SZSE indices are selected, and economic policy uncertainty is used to construct a VAR model, with the amount of broad money and the closing price of gold as control variables. In order to classify the impact of economic policy uncertainty onSSE and SZSE, this paper constructs VAR models of economic policy uncertainty and SSE index, broad money volume, and gold closing price, respectively, as model 1; VAR models of economic policy uncertainty andSZSE index, broad money volume, and gold closing price, as model 2.

Based on the availability of data, the study period chosen for this paper is January 2010 to December 2022. In order to eliminate the possibleheteroskedasticity of the time series and to avoid the drastic fluctuations caused by data changes, the data are dimensionless by the logarithmic method. A summary of the variables in this paper is detailed in Table 1.

Table 1. Summary of variables

Variable Name	Variable Symbols	Data source
Economic Policy Uncertainty	EPU	Choice Database
SSE Index	SH	Choice Database
SSE Index	SZ	Choice Database
Broad money volume	M2	Choice Database
Gold Closing Price	GOLD	Choice Database

2.3. Descriptive statistics

Table 2 shows the results of descriptive statistics for the data selected for this paper. From the results, there is little difference between the maximum and minimum values of the data, and the data is smooth overallwithout extreme values, which is suitable for modeling and analysis.

Table 2. Descriptive statistics

	DLNEPU	DLNGOLD	M2	SH	SZ
Average	0.014323	0.003222	12.11122	0.136928	0.115134
Median	0.041769	0.002149	11.80000	0.096500	0.392550
Maximum	1.656059	0.123668	25.98000	20.56970	22.35440
Minimum	-1.766888	-0.148975	8.000000	-22.64870	-25.63530
SD	0.438265	0.042294	3.514486	5.931172	7.153565
Observations	156	156	156	156	156

2.4. Data smoothness test

A smooth data base is a prerequisite for building a VAR model, and the ADF unit root test is chosen to verify the smoothness of the data in thispaper. The test results are shown in Table 3.

As can be seen from Table 3, the values of the t-statistics for each variable are less than the critical value of 1% of the significance level, so the original hypothesis of the existence of a unit root can be rejected at the1% significance level, indicating that the series is smooth, so the variablesobey first-order single integer. The results of the ADF test indicate that thevariables have roughly comparable smoothness conditions with each other.

Table 3. ADF test results

Variables	Form (C,T,K)	1% level	5% level	10% level	t-value	p-value	Stable?
DLNEPU	(0,0,1)	-2.58007	-1.94291	-1.61533	-16.4071	0	Stable
DLNGOLD	(0,0,0)	-2.57997	-1.9429	-1.61534	-13.6349	0	Stable
M2	(c,0,0)	-3.47281	-2.88009	-2.57674	-4.48805	0.0003	Stable
SH	(0,0,0)	-2.57997	-1.9429	-1.61534	-10.9378	0	Stable
SZ	(0,0,0)	-2.57997	-1.9429	-1.61534	-11.0091	0	Stable

Note: C,T,K in the test form (C,T,K) denotes the constant term, the time trend term and the lag order, respectively.

2.5. Hysteresis order selection

The construction of the VAR model requires first determining the optimal lag order p. Several common tests for lag order determination arethe LR (likelihood ratio) test, the AIC information criterion, and the SC criterion. The results of the lag order selection for model 1 are detailed inTable 4, and the lag order selection for model 2 is detailed in Table 5.

The lag order selected from each column of criteria is indicated by "*" inthe table.

The results show that both model 1 and model 2 have 3 informationcriteria AIC are chosen to be optimal at lag order 2, so the optimal lag order chosen for both model 1 and model 2 is 2.

Table 4. Model 1 lag order judgment results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-652.4415	NA	0.083687	8.870831	8.951836	8.903743
1	-428.3029	433.1325	0.005025	6.058148	6.463177*	6.222710
2	-396.5746	59.59790	0.004065*	5.845602*	6.574654	6.141814*
3	-390.3978	11.26838	0.004648	5.978349	7.031424	6.406211
4	-382.5449	13.90183	0.005201	6.088444	7.465542	6.647956
5	-374.9861	12.97253	0.005850	6.202515	7.903635	6.893676
6	-361.9183	21.72074	0.006119	6.242140	8.267283	7.064951
7	-342.6296	31.01839*	0.005897	6.197697	8.546863	7.152158
8	-336.6834	9.240733	0.006823	6.333559	9.006748	7.419670

Table 5. Model 2 lag order judgment results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-678.9429	NA	0.119726	9.228958	9.309964	9.261870
1	-455.7872	431.2332	0.007286	6.429557	6.834586*	6.594120
2	-423.7759	60.12948	0.005871*	6.213187*	6.942239	6.509399*
3	-419.4648	7.864882	0.006884	6.371145	7.424220	6.799007
4	-412.2963	12.69014	0.007774	6.490490	7.867588	7.050002
5	-404.4879	13.40078	0.008716	6.601188	8.302309	7.292350
6	-390.5309	23.19893	0.009008	6.628796	8.653939	7.451607
7	-370.4764	32.24971*	0.008592	6.574006	8.923172	7.528467
8	-364.7574	8.887742	0.009971	6.712937	9.386127	7.799048

2.6. Model stability test

Only a smooth VAR model is convergent and the analysis is meaningful. Before conducting the impulse response function analysis, thispaper applies the unit root estimation method to test the smoothness of theVAR model (AR test). If all the eigenvalues fall within the unit circle, it means the model is stable, otherwise it means the model is unstable.

As shown in Figures 2 and 3, all eigenvalues of models 2 and 3 lie within the unit circle, indicating that the VAR model is smooth and can be analyzed by impulse response function.

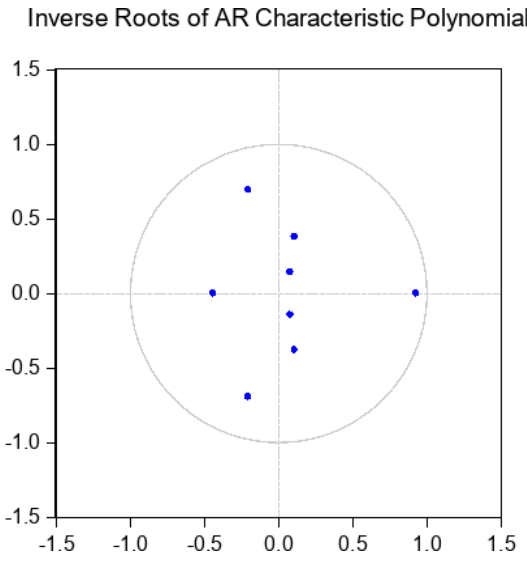

Figure 2. Model 1 AR Root

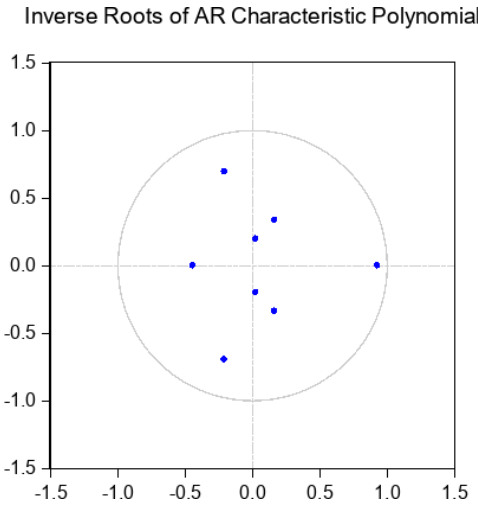

Figure 3. Model 2 AR Root

3. Empirical Results

3.1. Impulse response analysis

The impulse response function analysis provides a dynamic understanding of the short-term impact and long-term impact of economicpolicy uncertainty on the SSE and SZSE indices. The horizontal axis of theimpulse response plot indicates the number of lags of the effect of shocks, the vertical axis indicates the degree of response of the explained variableto the explanatory variable, the solid line indicates the impulse response function, and the dashed line indicates the positive and negative two timesstandard deviation deviation bands.

The impulse response function of economic policy uncertainty on the SSE is shown in Figure 4. As can be seen

from Figure 4, when economic policy uncertainty Dlnepu is shocked, the fluctuation of the SSE index SHis larger, and the effect on the SSE index has been negative in the first 2 periods, then the negative effect starts to turn positive in period 3, and thispositive effect has been present between period 3 and period 4, and then gradually oscillates and weakens, and after about period 11, the effect of the shock weakens to 0. This suggests that a given shock to economic policy uncertainty is transmitted to the SSE and that there is an interactive turnover of positive and negative responses over the period examined. In the short term it will have a significant negative effect on the SSE, i.e., rising economic policy uncertainty will cause a decline in the SSE in the short term, while tending to a stable sign of convergence in the long term.

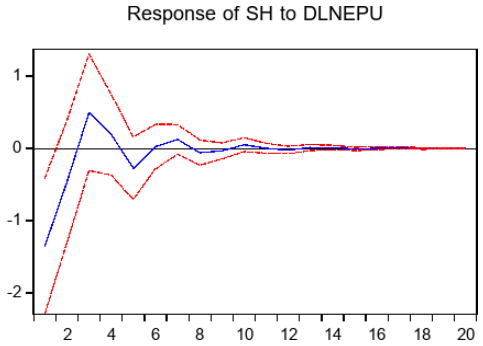

Figure 4. Model 1 impulse response function

The impulse response function of economic policy uncertainty on theSZSE is shown in Figure 5. After receiving a standard deviation shock to economic policy uncertainty, the SZSE alternates positively and negatively in the first 10 periods and gradually converges to zero after the 11th period. The specific response trajectory is as follows: a strong negative shock to the SZSE in the first 2 periods, a positive impact starts to appear in the 3rdperiod, and thereafter the shock gradually weakens and finally stabilizes at

0. This indicates that the impact of economic policy uncertainty on SZSE first shows a significant negative impact, then the market returns to rationality and shows positive volatility, while the impact gradually smoothes out in the long run, which is consistent with the conclusion of the impulse response analysis of economic policy uncertainty on SZSE.

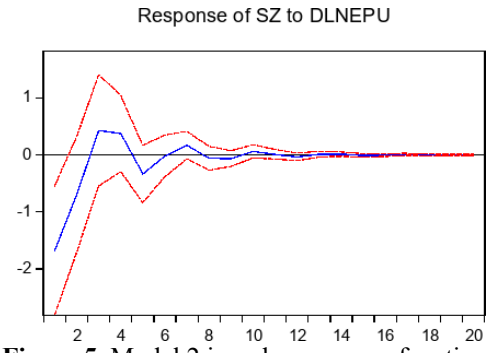

Figure 5. Model 2 impulse response function

3.2. Analysis of variance decomposition

Impulse response analysis cannot reflect the magnitude of the effectof explanatory variables on the explained variables, while variance decomposition can specifically analyze the contribution of economic policy uncertainty to the volatility of stock market returns, so this paper uses variance decomposition for further analysis. The variance decomposition results of model 1 are shown in Table 6, and the variancedecomposition results of model 2 are shown in Table 7.

According to the results of variance decomposition in Table 6, it is clear that the movement of SSE index is mainly influenced by its own shocks. It reached 100% in the first period and then tended to decline over time, but the decline was not significant and basically stabilized at 98% after the 10th period. The contribution of economic policy uncertainty to the change in the SSE index is only 0.18% in the second period, which indicates that the impact of the change in economic policy uncertainty on the growth rate of the SSE index is small, and this impact changes slightly over time and finally stabilizes at about 0.89%. From theabove analysis, it is clear that economic policy uncertainty will play a role in the volatility of the SSE, but to a lesser extent, and the SSE is affected by its own movements to a greater extent.

Table 6. Model 1 variance decomposition

Period	S.E.	SH	DLNEPU	DLNGOLD	M2
1	5.916036	100.0000	0.000000	0.000000	0.000000
2	6.022255	98.93070	0.183602	0.241302	0.644396
3	6.065473	98.53224	0.554990	0.267636	0.645134
4	6.073095	98.47437	0.602576	0.274386	0.648668
5	6.079539	98.26575	0.812320	0.274223	0.647706
6	6.080291	98.24560	0.815717	0.279899	0.658782
7	6.081950	98.19478	0.865240	0.280933	0.659045
8	6.082311	98.18339	0.875970	0.280992	0.659650
9	6.082559	98.17594	0.879811	0.281690	0.662563
10	6.082852	98.16661	0.887902	0.281667	0.663825
11	6.082872	98.16600	0.887918	0.281733	0.664346
12	6.082961	98.16321	0.889516	0.281808	0.665468
13	6.083008	98.16168	0.890005	0.281847	0.666467
14	6.083036	98.16079	0.890380	0.281848	0.666979
15	6.083058	98.16008	0.890535	0.281852	0.667530

According to Table 7, it can also be seen that the second period of the impact of economic policy uncertainty rate of change on the fluctuation of SZSI growth rate accounts for only 0.4% of the total forecast error, and then gradually increases, with the relative contribution remaining stable at around 1%. This indicates that there is a significant impact of economic policy uncertainty on the SZSE index and to a greater extent than the SSE index, i.e., the SZSE index is more sensitive to economic policy uncertainty compared to the SSE index.

Table 7. Model 2 variance decomposition

Period	S.E.	SZ	DLNEPU	DLNGOLD	M2
1	7.124248	100.0000	0.000000	0.000000	0.000000
2	7.250011	98.73148	0.403242	0.029694	0.835582
3	7.301240	97.88364	0.585236	0.677399	0.853725
4	7.315263	97.71047	0.759005	0.679582	0.850944
5	7.323932	97.48333	0.988560	0.677986	0.850119
6	7.324976	97.45593	0.988525	0.694652	0.860895
7	7.327544	97.39077	1.054037	0.694617	0.860579
8	7.327825	97.38331	1.060867	0.695170	0.860654
9	7.328264	97.37212	1.069403	0.695465	0.863012
10	7.328622	97.36264	1.077624	0.695516	0.864223
11	7.328645	97.36204	1.077917	0.695618	0.864429
12	7.328762	97.35898	1.080247	0.695621	0.865147
13	7.328807	97.35780	1.080532	0.695685	0.865984
14	7.328841	97.35691	1.081101	0.695680	0.866313
15	7.328861	97.35638	1.081290	0.695677	0.866654

4. Summary

In this chapter, VAR models are developed from different perspectives, and the relationship between economic policy uncertainty and stock market returns is investigated through impulse response analysisand variance decomposition, and the following conclusions are drawn.

First, in the short term, economic policy uncertainty can cause drasticnegative feedback in the stock market, which may be due to investors' declining investment confidence and more pessimistic expectations for the future in the face of unstable economic policies, leading to panic sentimentor even stampede trading in the market, and therefore a corresponding decline in stock market returns in the short term. And in the long run, the impact of economic policy uncertainty on stock market yields eventually leveled off after investors returned to rationality.

Secondly, economic policy uncertainty has a more dramatic impact on the small-cap segment. The results of the variance decomposition show that the factors affecting the SSE and SZSE indices are firstly their own and secondly economic policy uncertainty. The contribution of economic policy uncertainty to the SSE index is about 0.89%, while the contribution to the SZSE index is around 1.08%, which indicates that SZSE-listed stocks are more vulnerable to economic policy uncertainty. This is mainlybecause the SZSE is home to many innovative growth companies, which are more susceptible to policy influence than mature companies and therefore have more volatile stock market returns.

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