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The Impact of Economic Policy Uncertainty on China's Stock Market

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***Abstract*—Since the outbreak of the international financial crisis, which evolved from the subprime mortgage crisis in the United States in 2008, China has successively introduced many different economic policies to regulate the financial market and the macro economy to maintain its stability, but this has also made the uncertainty of China's economic policies change more frequently. In this context, this paper selects the change rate of economic policy uncertainty index, the standard deviation of stock monthly return rate and the monthly and daily return rate as the empirical analysis variables, and studies the relationship between economic policy uncertainty and China's stock market by establishing the vector autoregressive model and other methods. The results show that the uncertainty of economic policy has a certain negative influence on stock returns in China. In turn, the sharp decline of stock returns and the intensification of stock market volatility will increase the uncertainty of economic policies.**

Keywords: economic policy uncertainty, EPU rate, stock return

I. INTRODUCTION

China's stock market develops relatively late, and the legal and regulatory mechanism is not yet perfect. The excessive intervention of the government makes the stock market have a strong dependence on the policy, which affects the self-regulation of the stock market. China's investors also exist more irrational investment phenomenon, speculative excess, lack of long-term vision. All these make China's stock market more susceptible to impact, more violent and frequent fluctuations. As a trading department with convenient access to information and full disclosure, the stock market can reflect the macroeconomic operation of a country. Since the 2008 financial crisis, in order to reduce the impact of adverse shocks from the international market on China's financial market and macro-economy, the government has introduced a lot of economic policies to adjust, which makes the uncertainty of China's economic policies more drastic. As a trading department with convenient access to information and full disclosure, the stock market can reflect the macroeconomic operation of a country.Since the 2008 financial crisis, in order to reduce the impact of adverse shocks from the international market on China's financial market and macro-economy, the government has introduced a lot of economic policies to adjust, which makes the uncertainty of China's economic policies more drastic.Domestic scholars are gradually aware of the impact of economic policy uncertainty on the stock market, and the index of economic policy uncertainty constructed by Baker et al. for the United States, China and other countries and regions just provides convenience for empirical research. So the economic policy uncertainty influence on Chinese stock market, will help us to understand the reason of abnormal fluctuations in the stock market, explaining the policy of "city" phenomenon of the stock market in our country, and also for our understanding of macroeconomic fluctuations, policy advice and the regulation of the basis, has very important theoretical and realistic significance. The uncertainty of economic policy cannot be measured directly, and two methods are generally used to measure it in the existing literature. The first is to use the change of local government to represent uncertainty in economic policy (Juli and Yook, 2012). The second method is to use the EPU index, which is the most common measure of economic policy uncertainty (Baker and Bloom, 2012). Baker et al. (2012) used their economic policy uncertainty index to study the relationship between economic policy uncertainty and macro economy in the United States, indicating that the uncertainty of economic policy is an important reason for the slow economic recovery in the United States. Sum (2012) also uses economic policy uncertainty index to empirically analyze the impact of economic policy uncertainty in the euro zone on stock returns by establishing VAR model. The results show that the change of economic policy uncertainty will significantly reduce the yield of the stock market. Pastor and Veronsei (2012) did a lot of empirical research to analyze the policy of how uncertainty affects the price of the stock, the analysis shows that when the announced policy changes, should fall in share prices, if the government policy uncertainty is very large, and policy changes before a brief or mild economic downturn, so falling house prices range should be large, policy changes should increase volatility and correlation between the stock.

II.DATA SELECTION AND DESCRIPTIVE STATISTICS

In this paper, the change rate of China's economic policy uncertainty index (EPU), the standard deviation of the monthly return rate of csi 300 index and the monthly and daily return rate of csi 300 index are selected as empirical analysis variables, which are respectively recorded as EPUV, RE and SPV. Among them, the rate of change of EPU index is the proxy variable of uncertainty of China's economic policy, and the standard deviation of monthly return rate and monthly return rate of csi 300 index is the proxy variable of stock market. EPU index change rate through the EPU index calculated logarithmic difference, EPU index is derived from "policy uncertainty" website, Shanghai and shenzhen 300 index yield, according to the index of the last trading day of each month closing price calculated by logarithmic difference day, month returns the standard deviation of daily closing price is obtained by calculation according to the index, the Shanghai and shenzhen 300 index of the daily closing price data from Wind database.Considering the impact of the 2008 financial crisis, the availability of data and the timeliness of

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research, this paper selects January 2008 to April 2018 as the research interval.

First, the graph of the change rate of EPU index (EPUV), stock return (RE) and stock market volatility (SPV) over time is made to roughly see the relationship between them. Then calculate their descriptive statistics, understand the basic statistical characteristics of the variables, and prepare for the following modeling. The time series diagram of each variable is shown in Figure 1, Figure 2 and Figure 3 respectively. Where the x-coordinate represents time (unit: year); The y-coordinate represents the values of the variables.

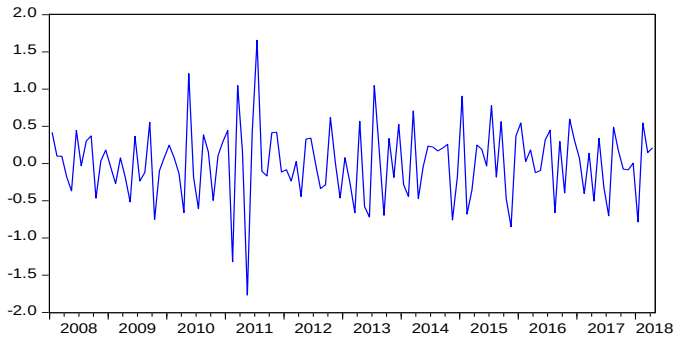

Figure 1. Time series diagram of EPU exponential rate of change

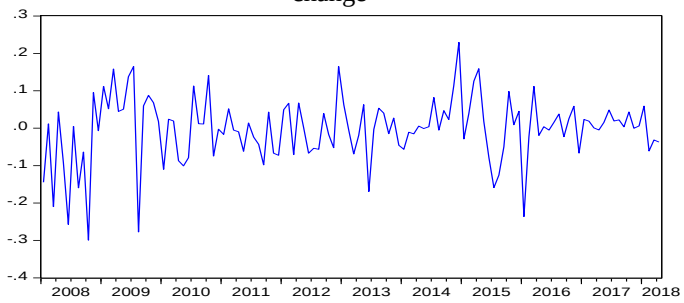

Figure 2. A time series diagram of stock returns

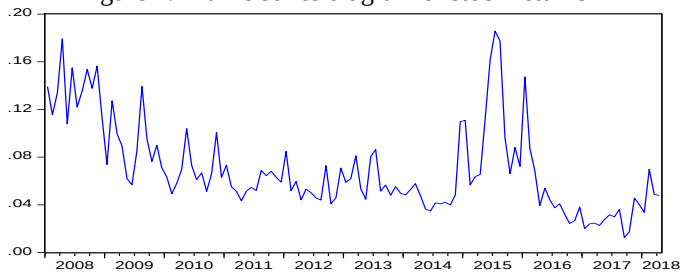

Figure 3. A time series chart of stock market volatility

As can be seen from Figure 1, the rate of change of EPU index changed dramatically in 2011 and reached the lowest and highest peaks successively, which may be related to the fact that this year was the first year of China's "12th five-year plan". The government launched a series of economic policies to prepare for the economic structural transformation. As can be seen from Figure 2 and Figure 3, the stock return rate was negative for most of 2008, and the stock market volatility was also in a high position, which reflected the sharp decline in China's stock price during the financial crisis in 2008.In the end of 2015 and the beginning of 2016, the stock yield reached a low point, while the stock market volatility rose sharply and reached a peak value, which may be related to the implementation of the index circuit breaker mechanism in China. By combining the three graphs, the correlation between variables cannot be visually seen. The descriptive statistics of each variable are shown in Table 1.

Table 1.Descriptive statistics for each variable

variable	mean	SD	Range	skewness	kurtosis	JB statistic
EPUV	0.0095	0.4897	3.423	-0.1210	4.4836	11.6755*
RE	-0.0028	0.0877	0.5287	-0.7057	4.6919	25.0827*
SPV	0.0699	0.0374	0.1732	1.2057	3.9269	34.4836*

As can be seen from Table 1, the average change rate of the EPU index is greater than 0, while the average return rate of the stock is less than 0, indicating that within the research interval, the average trend of China's economic policy uncertainty is up, while the average trend of the csi 300 index is down. The extreme difference and standard deviation of EPU index are significantly larger than that of stock return rate and stock market volatility, indicating that the amplitude and severity of change rate fluctuation of EPU index are larger than that of stock return rate and stock market volatility. Both the rate of change of EPU index and the skewness value of stock return are negative, indicating that their distribution tends to be left-skewed, while the skewness value of stock market volatility is positive, indicating that their distribution tends to be right-skewed. The kurtosis values of EPU index change rate, stock return rate and stock market volatility are all greater than 3, indicating that they all have the characteristics of "peak and thick tail". And the j-b statistics for all three of them show that at the significance level of 1% the null hypothesis that the variables follow a normal distribution is rejected.

Before establishing VAR model, it is necessary to guarantee the stability of variables. The most commonly used ADF unit root test is used to test the stationarity of time series. There are three test equation forms of ADF test: including time trend term and intercept term, including only intercept term, neither including time trend term nor intercept term. In this paper, the minimum criterion of SIC is adopted to select the form of the test equation and the hysteresis order.

Through ADF test, it can be seen that the sequence of the three variables is stable, and VAR model can be established to analyze the relationship between them.

Considering the possible bidirectional causal relationship between variables, this paper chooses the vector autoregressive model, which is often used to study the dynamic relationship of endogenous variables. The vector autoregressive (VAR) model is a model constructed by taking each endogenous variable in the system as a function of the lag value of all endogenous variables, which is not based on economic theory.The basic form of the bivariate VAR(p) model is:

$$\begin{pmatrix} y_t \\ x_t \end{pmatrix} = \begin{pmatrix} \Phi_{10} \\ \Phi_{20} \end{pmatrix} + \begin{pmatrix} \Phi_{11}^{(1)} & \Phi_{12}^{(1)} \\ \Phi_{21}^{(1)} & \Phi_{22}^{(1)} \end{pmatrix} \begin{pmatrix} y_{t-1} \\ x_{t-1} \end{pmatrix} + \begin{pmatrix} \Phi_{11}^{(2)} & \Phi_{12}^{(2)} \\ \Phi_{21}^{(2)} & \Phi_{22}^{(2)} \end{pmatrix} \begin{pmatrix} y_{t-2} \\ x_{t-2} \end{pmatrix} + \cdots + \begin{pmatrix} \Phi_{11}^{(p)} & \Phi_{12}^{(p)} \\ \Phi_{21}^{(p)} & \Phi_{22}^{(p)} \end{pmatrix} \begin{pmatrix} y_{t-p} \\ x_{t-p} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix}, \quad (1)$$

Where y_t, x_t are the endogenous variable of the model; y_{t-q}, x_{t-q} (q = 1, 2,...P) are their q period lag term; Φ_{i0} ,$\Phi_{ij}^{(q)}$ (i, j=1,2;q= 1, 2,..., p) are the coefficients of the constant term of the ith equation and the variable of the lag order q; ε_{it}(i =1,2) is the random perturbation term of the ith equation. This paper establishes a bivariate VAR model for EPU change rate (EPUV), stock return (RE), EPU change rate (EPUV) and

stock market volatility (SPV), and performs Granger causality test and model stability test.

This paper establishes a bivariate VAR model for EPU change rate (EPUV), stock return (RE), EPU change rate (EPUV) and stock market volatility (SPV), and performs Granger causality test and model stability test.In order to analyze the dynamic relationship between variables comprehensively and systematically, the popular impulse response analysis and variance decomposition methods are also adopted in this paper.

III. THE EMPIRICAL RESEARCH

(1) VAR MODEL

When establishing the VAR model, the appropriate lag order should be selected first. The lag order is too small to fully reflect the dynamic characteristics of the model, while the lag order is too large to reduce the degree of freedom and affect the estimation of parameters. In this paper, AIC, SIC and other information criteria are selected to determine the lag order p according to the majority principle. It can be obtained through analysis, in the VAR model of EPU change rate and stock return rate, when the lag order is 2, the five criteria are judged to be the best, so the lag order is 2. Next, parameter estimation is carried out for VAR (2) model, and the estimated results are shown in Table 2. Among them, the horizontal variable is the explained variable, and the vertical variable is the explanatory variable. In the vertical variable, EPUV (-1) and EPUV (-2) respectively represent the first-order hysteresis and second-order hysteresis of the variable EPUV; RE (-1) and RE (-2) respectively represent the first-order hysteresis and second-order hysteresis of the variable RE. The number of rows intersecting columns represents the coefficient of the corresponding explanatory variable.

Table 2. Parameter estimation results

	EPUV	RE
EPUV(-1)	-0.445066* [-5.45069]	-0.014148 [-0.81355]
EPUV(-2)	-0.512203* [-6.26817]	-0.512203* [-0.23416]
RE(-1)	-0.927201* [-2.09878]	0.050124 [0.53274]
RE(-2)	-0.389084 [-0.89210]	0.068236 [0.73462]
C	0.008552 [0.22787]	-0.001473 [-0.18434]

By the parameter estimation results can be seen that in an EPU rate is (EPUV) as the explained variable in the equation, the variation of the EPU first-order and second-order lag of first-order lag with the stock yield coefficient is not significantly to 0, and the stock yield coefficient of the first-order lag item is negative, that stock yields a negative impact on the EPU rate, EPU rate plays a significant role in sequence of the first and second order autocorrelation. To some extent, this explains the situation of "stock market reversal policy" in China, indicating that the sharp decline in stock return rate will attract the attention of relevant government departments, and certain policy measures will be taken, which will aggravate the uncertainty of economic policy changes in China. In the equation with stock return rate (RE) as the explained variable, the coefficients of each lagging term are approximately 0 and not significant, indicating that the rate of change of EPU (EPUV) has no statistically significant effect on stock return rate (RE).

（2）GRANGER CAUSALITY TEST

Granger causality test is a method proposed by Granger in 1969 to test the causality between variables. It considers to what extent the lag value of one variable can explain the current value of another variable. If the addition of the lag value of this variable improves the predictive power of another variable, we say "this variable is the Granger cause of another variable" or "the other variable is caused by this variable Granger". In order to determine whether there is a statistical causal relationship between the rate of change of EPU and stock return, the following Granger causality test is conducted on them with the lag order of 2.The test results are shown in Table 3.

Table3. Granger causality test results

Null hypothesis	number	F statistic	P value
RE is not the Granger cause of EPUV	122	2.66262	0.0740
EPUV is not RE's Granger cause	122	0.33103	0.7189

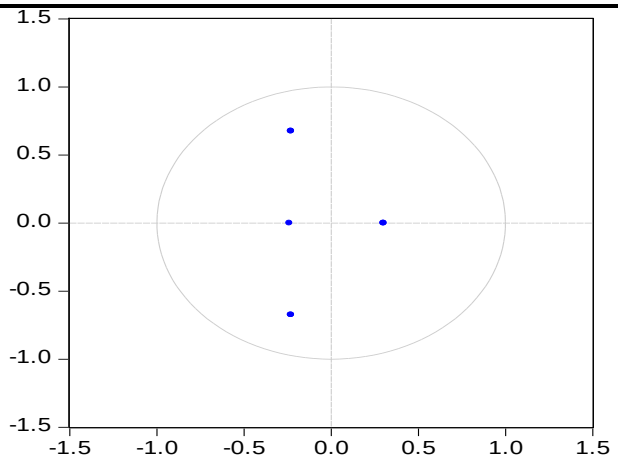

Figure 4. Model stability test

As can be seen from Table 3, at the significance level of 10%, we can reject the null hypothesis that "stock return rate is not the Granger cause of EPU change rate", whose F statistic value is 2.66262, but cannot reject the null hypothesis that "stock return rate is not the Granger cause of stock return rate". This further explains the situation of "stock market forcing policy" in China, and statistically speaking, the uncertainty change of economic policy does not cause the change of stock return rate. It may be because when the uncertainty of economic policy increases, investors tend to choose prudent assets, which makes the risk premium effect caused by the uncertainty of economic policy unable to be reflected.

（3）MODEL STABILITY TEST

The stability of the model is tested below, and the test results are shown in figure 4.

As can be seen from figure 4, the characteristic roots are all in the unit circle, and the model is stable.

(4) PULSE RESPONSE ANALYSIS

Impulse response function is used to study the impact of an endogenous variable in the VAR model on other endogenous variables in the system. It can be used to observe the response of variables to shocks over time. Next, the impulse response function is used to study the dynamic impact of a shock of EPU change rate on the volatility of Chinese stock market and a shock of Chinese stock market volatility on the dynamic impact of EPU change rate, as shown in figure 5 and figure 6 respectively.

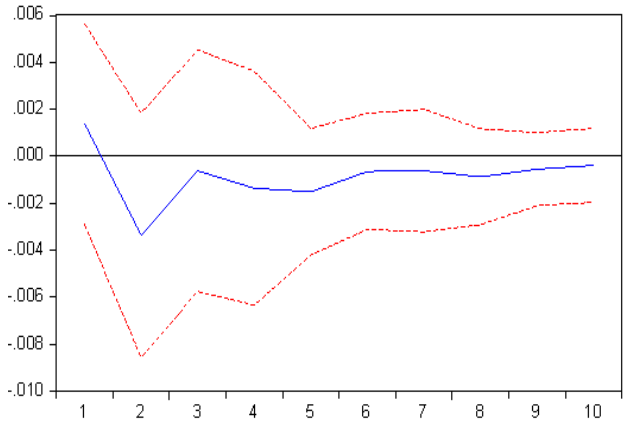

Figure 5. The effect of a shock to the rate of change of EPU on stock market volatility

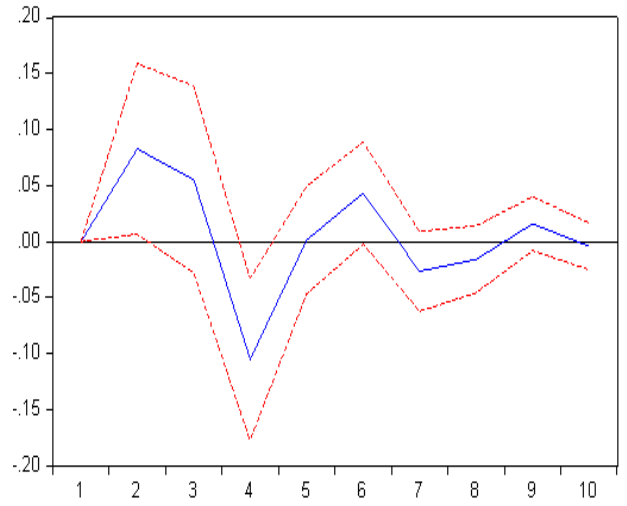

Figure 6. The effect of a shock to stock market volatility on the rate of change of EPU

As can be seen from figure 5, during the current period, there was a positive impact on EPU change rate, and the stock market volatility decreased from positive to negative during the first and second periods, and then gradually increased, approaching 0.This shows that the uncertainty of economic policy has a weak positive impact on stock market volatility at the beginning, and then turns into a negative impact, which is weaker and weaker. As can be seen from figure 6, when the stock market volatility is given a positive impact in the current period, the change rate of EPU will rise from 0 in the first to the second period, reach the maximum value in the second period, then decrease continuously, reach the minimum value in the fourth period, then rise again, and then change alternately. This shows that stock market volatility has a positive impact on the changes of economic policy uncertainty in the short term. Later, as the adjustment of policies begins to take effect, stock market volatility slows down and the changes of economic policy uncertainty also decrease.

(5) VARIANCE DECOMPOSITION

Variance decomposition is a method proposed by Sims in 1980 to study the contribution of each structural impact in VAR model to the change of endogenous variables. It can be used to observe how one variable's contribution to another changes over time. The following is the variance decomposition of stock market volatility and EPU change rate, respectively, to study the contribution of EPU change rate to stock market volatility and stock market volatility to EPU change rate, as shown in Table 4 and Table 5respectively.

Table 4. Variance decomposition of stock market volatility

Lag interval number	Contribution of EPUV to SPV	The contribution of SPV to SPV
1	0.339934	99.66007
2	1.595397	98.40460
3	1.417543	98.58246
4	1.462333	98.53767
5	1.551784	98.44822
6	1.515083	98.48492
7	1.495288	98.50471
8	1.516473	98.48353
9	1.513480	98.48652
10	1.506226	98.49377

Table 5. Variance decomposition of the rate of change of EPU

Lag interval number	The contribution of EPUV to EPUV	Contribution of SPV to EPUV
1	100.0000	0.000000
2	96.63609	3.363911
3	95.49040	4.509602
4	91.53655	8.463445
5	91.53601	8.463993
6	91.00233	8.997670
7	90.79052	9.209478
8	90.71632	9.283683
9	90.64916	9.350842
10	90.64367	9.356327

As can be seen from Table 4, the contribution of EPU change rate to stock market volatility is extremely small, with only 0.3399% in the first period, and a small fluctuation around 1.5% after that. The change of stock market volatility is mainly explained by itself. As can be seen from Table 5, the contribution of stock market volatility to EPU change rate rose rapidly from zero in the first to the fourth period, reached 8.4634% in the fourth period, then rose slowly, and reached the maximum value of 9.3563% in the tenth period. This shows that the uncertainty change of economic policy cannot explain the fluctuation of stock market, but the fluctuation of stock market can explain the uncertainty change of economic policy to some extent.

Ⅳ. CONCLUSION

The article adopts the method of empirical test, the economic policy uncertainty on the impact of the stock market in our country, the following conclusions are drawn: the volatility of the stock market will affect the change of economic policy uncertainty, the stock yields fell sharply and

the stock market volatility will cause changes in the economic policy uncertainty increased, and the impulse response analysis and variance decomposition also illustrates the changes in the economic policy uncertainty will have a negative effect on stock returns.

Based on the conclusions obtained, the following suggestions are proposed. First, government policy making should be forward-looking. That is, when the government intends to regulate the stock market through economic policies, it should not only consider the impact of economic policies on the stock market, but also consider the negative impact of the uncertainty caused by the deviation of investors' expectations and economic policies on the stock market. Secondly, the formulation of government policies should be stable. That is, the government should not change the policy frequently, but should maintain the long-term consistency of the policy, and ensure the openness and transparency of the policy, so as to make the public form stable expectations and minimize the adverse impact on the stock market. Finally, for investors, we should pay attention to market indicators and the operating conditions of enterprises to avoid irrational investment.

REFERENCES

[1] Baker, S. R., Bloom, N., & Davis, S. J. (2012). Has Economic Policy Uncertainty Hampered the Recovery? SSRN Electronic Journal.

[2] W. Zhou, R. T. Gu, L. Shuai. “Penetrating the real performance of SSE STAR enterprises: A double-market investigation,” Finance Research Letters, 2019a, DOI: 10.1016/j.frl.2019.101346.

[3] W. Zhou, S. Lu, J. Chen, Q. J. Chen, S. Meng. “E2E double-process efficiency analysis from the perspectives of energy consumption and environmental treatment,” Emerging Markets Finance and Trade, 2019b, DOI: 10.1080/1540496X.2019.1697673.

[4] W. Zhou, Z. S. Xu, “Envelopment analysis, preference fusion, and membership improvement of intuitionistic fuzzy numbers,” IEEE Transactions on Fuzzy Systems, 2019c.

[5] W. Zhou, W. Rao, S. Lu. “Market stability analysis after the circuit breaker for the CSI 300 energy index,”. Finance Research Letters, 2019d, DOI: 10.1016/j.frl.2019.101348.

[6] Sum, V. (2012). The impulse response function of economic policy uncertainty and stock market returns: a look at the eurozone. SSRN Electronic Journal, 12 (03): 100-105

[7] Brogaard, J., & Detzel, A. (2015). The asset-pricing implications of government economic policy uncertainty. Management Science, 61: 3-18.

[8] Julio, B., & Yook, Y. (2012). Political uncertainty and corporate investment cycles. The Journal of Finance, 67(1): 45-84.

[9] Pastor, L., & Veronesi, P. (2010). Uncertainty about Government Policy and Stock Prices.

[10] Kang, W., & Ratti, R. A. (2013). Oil shocks, policy uncertainty and stock market return. Journal of International Financial Markets, Institutions and Money, 26: 305-318.

[11] Brogaard, J., & Detzel, A. (2015). The asset-pricing implications of government economic policy uncertainty. Management Science, 61: 3-1