
The Effects of Monetary and Fiscal Policies on the Systemic Risk of Iran's Financial Markets (SURE Approach in Panel Data)

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Abstract

The mutual relationship between monetary and fiscal policies and value at risk is one of the most important topics in the financial economics literature and accounts for the vast majority of empirical studies. Therefore, the main objective of this paper is to investigate the effects of monetary and fiscal policies on conditional value at risk in the financial sectors of the stock exchange, bank and insurance during the years 1995-2017. For this purpose, by quantile regression method and in the form of Adrian and Brunnermeier approach, the conditional value at risk of these three financial sectors is estimated and then by using the seemingly unrelated regression equation approach in panel data evaluated the effect of liquidity money variables. The interest rate on facility payments, the real exchange rate, the government's budget deficit, real GDP growth, and the degree of economic openness are subject to conditional risk. The results of the model estimation indicate the significance of the effect of liquidity money, interest rate on facility payments and real exchange rate variables on conditional value at risk in each of three relevant equations, and real GDP growth variable in the model, Exposure to the conditional value at risk of the insurance sector has a negative and significant effect. Also, the degree of openness of the economy in any of the three estimated equations has no significant effect on the conditional value at risk.

Keywords: Monetary and Fiscal Policies, Systemic Risk, Financial Markets, Iran, SURE in Panel Data Approach.

Introduction

Systemic risk refers to the possibility of a financial system crash in a crisis caused by inter-institutional communication, which is similar to a domino line. In most cases, investors are concerned about losing the value of a stock or commodity, while the systemic risk is the focus on the entire market. This decline often occurs when a key company in the entire system goes bankrupt, the resulting wave of fear hurts other companies and they fall. These chain reactions cause the market to become stressed and in crisis. In general, system risk measurement criteria can be divided into two types; the first type is the criteria that measure the risk of the whole system when a key entity is at risk, and the second type includes criteria. They calculate the risk of an entity when the whole system is in crisis. Systemic risk is not only due to mutual size and communication, but may also be due to insufficient risk management, misleading accounting activities, and high rewards for managers to encourage them to increase growth and productivity (Rastegar and Karimi, 2016).

Also, one of the most important issues in macroeconomics is the selection of appropriate policies and tools to eliminate imbalances and create economic stability. Monetary policy is the most important policy used in demand management. Implementing monetary and financial policies is one of the most important policy instruments for achieving macroeconomic goals, including equitable distribution of income, increasing the rate of economic growth, employment levels and price stability. Government monetary policy is applied through monetary and exchange rate variables, and government financial policy is applied using current, civil, and non-tax revenue instruments (Abu Nouri et al, 2008).

Financial markets have always faced various uncertainties, such as changes in monetary and financial policies. The shocks caused by monetary and financial policies are always accompanied by macro and micro-level effects that may not be limited to the target market and may spread to other markets. Therefore, it is very important to study the intensity and direction of shocks from one market to another. Communication and dependence on financial markets are increasingly intertwined. Therefore, the shock of a market does not only affect the same market but also spreads to other financial markets (Sanaei Alam et al., 2013).

On the other hand, the existence of these turmoils and uncertainties has worried many investors and financial analysts, prompting them to look for tools to reduce risk and assess the prospects of their operations (Mensi and et al., 2013). Besides, the concerns were exacerbated by the 2008 financial crisis.

Therefore, it is important to examine the dissemination of news and events from one financial market to another, and in particular to the study of the systemic risk phenomenon. The following article is organized as follows In the second part, the research literature is reviewed in the form of theoretical foundations and research background, and in the third part, research methodology and pattern clarification are examined. The fourth part contains the experimental results of the research and finally, the fifth and final part of the article is dedicated to the summary and conclusion of the research.

Literature Review

Financial markets refer to the structures in which funds flow. The most important function of the financing system is the optimal allocation of financial resources to the needs of financial funds and productive investment opportunities (Ebrahimi, 2013).

In terms of the scope of financial institutions, financial markets can be divided into three main groups: the money market, the capital market, and the assurance market. In this division, the symbols of the money market are the bank, the capital market is the stock market and the assurance market is insurance. Bank, capital market and insurance are the three classic financial markets that are equipped and allocated financial resources in these markets. The following figure shows the types of financial markets based on the scope of activity of financial institutions.

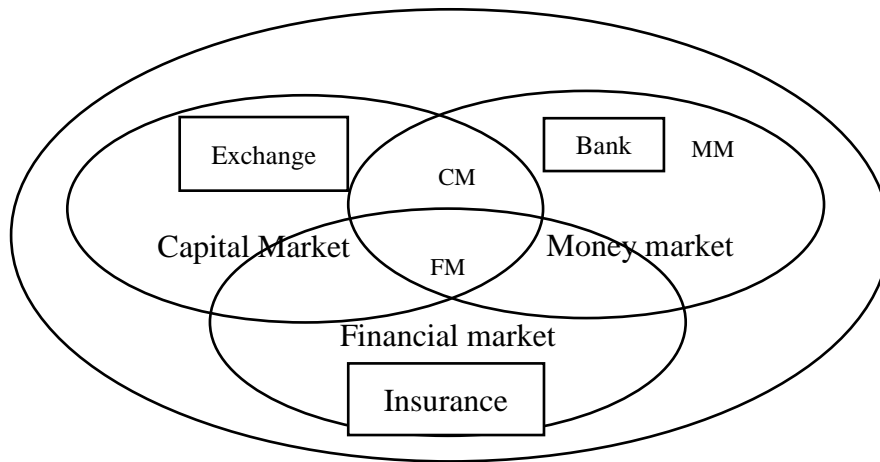


Figure 1. Types of financial markets according to the scope of activity of financial institutions (Source: Shabani, 2013)

Systemic risk refers to the possibility of system failure as a result of failure or crisis in a part of the market. Systemic risk occurs when there is a high correlation between risks and crises in different market segments. The basis of systemic risk is the correlation between losses (Sadeghi, 2013).

To measure systemic risk, a comprehensive and complete definition of this concept must be obtained. So far, several definitions of systemic risk have been proposed. But despite the many definitions of this concept, they all have common features. The European Central Bank (2010) defines systemic risk as to the risk of widespread financial instability that impairs the performance of a financial system to the extent that it is fundamentally affected by economic growth and financial well-being it should be noted that systemic risk is a completely different concept from systematic risk. Systemic risk differs from systematic risk in that systematic risk is created by the overall movement of the market, but in systemic risk, the decline or crisis in a particular segment of the market becomes a pervasive crisis. That is the correlation between losses in most cases; investors are concerned about losing the value of a stock or commodity while the systemic risk is the focus on the entire market. This fall often occurs when a key company in the entire system goes bankrupt, the resulting wave-like fear has a negative effect on other companies and they fall. These chain reactions cause the market to be stressed and exposed to the crisis. In general, system risk measurements can be divided into two types; the first type measures the risk of the entire system when a key entity is at risk, and the second type measures the risk of an entity. Calculate when the whole system is in crisis. Systemic risk is not only caused by size and interactions, but may also be caused by insufficient risk management, misleading accounting activities, and high rewards for managers to encourage them to increase growth and productivity. Given the complexities and sensitivities of systemic risk modeling, as well as the many factors involved in creating such risk, the use of algorithmic tools, programming, and coding can be helpful. Table 1 presents the most important systemic risk measures with their creators.

Table 1. Summary of information on widely used systemic risk metrics

NO	year	Authors	metrics
1	2011	Adrian and Brunnermeier	Delta Conditional value at Risk $\Delta\text{CoVaR}(\alpha)$
2	2011	Achariya	Marginal Expected Shortfall MES
3	2014	Banolsko and Dmetersko	Expected Losses CES
4	2010	Acacia Systems et al.	Systemic Expected Losses SEC
5	2006	Nelsen	Low Tail Dependence LTD

6	2013	Madan and Sutton	Section Distribution Index SDI
7	2013	Madan and Sutton	Correlation of Reply Index CRI
8	2012	Achariya et al.	SRISK metrics
9	2012	Alan and et al.	CATFIN metrics
10	2012	Hang et al.	DIP metrics

Banks and financial institutions are interconnected with other institutions. Part of the assets of one institution is the debts of another, and vice versa. As a result, the financial crisis in one bank is quickly transferred to other institutions through the payment system. Failure of a financial institution to repay its debts means that other institutions have failed to fulfill their claims against the institution and cause them problems. On the other hand, the banking crisis is manifested in the influx of depositors to withdraw their deposits, exposing the bank to bankruptcy. In addition to the issue of deposit volatility, an increase in a bank's overdue receivables also causes the bank to become financially weak and unable to meet its obligations. When the banking crisis continues and intensifies, a systemic crisis has arisen. This crisis will disrupt the order of financial markets such as insurance and capital markets and will have devastating effects on the real sector (Mahdavi Klishmi et al., 2017). In the following section, the main empirical studies in the context of systemic risk estimation have been reviewed.

Li and Perez-Saiz (2018) in their research "Measuring systemic risk across financial market infrastructures", through multi-variable value approaches and the probability laws calculated the systemic risk arising from credit risk in the financial market infrastructure network. In their study, they also identified the institutions that had the greatest impact on credit risk transfer and ultimately proposed solutions.

Ghulam and Doering (2017) in a study titled "Spillover effects among financial institutions within Germany and the United Kingdom" examined whether German and British financial institutions are at risk of reciprocal risk transfer. Which of the following institutions will be most affected by this phenomenon. They concluded that cover funds were the main source of fluctuations in the United Kingdom and Germany, while at the micro level they themselves were affected by fluctuations. Plus, UK insurance companies are less likely to be contagious than the Coverage Funds industry, but on the contrary, they are significantly affected by the significant level of banks' transfer risk channels.

Tian and Hamori (2016) in their article "Time-varying price shock

transmission and volatility spillover in foreign exchange, bond, equity, and commodity markets: Evidence from the United States. ", mechanisms for transferring financial shocks between foreign stock exchanges, commodity markets, bonds US bonds and stocks were studied using a moving structural self-regression model over time based on random fluctuations. Observing the effects of fluctuations, two important issues arise in the transmission of shocks: first, the effects of fluctuations are reflected very quickly, so that within 5 to 10 days they reach their highest level, and second, the susceptibility of fluctuations over time. Is variable.

Mouna and Anis (2016) in their study entitled " Market, interest rate, and exchange rate risk effects on financial stock returns during the financial crisis: AGARCH-M approach ", calculated Sensitivity of stock returns of different financial sectors to exchange rate risk, interest rates And market by using four variables GARCH and also Average. The results showed that exchange rate fluctuations, interest rates and markets during the crisis period had significant (positive and negative) effects on the return on the stock of financial sectors. Besides, this study confirms the susceptibility of these fluctuations to the banking sector in all economies under study.

Liow (2015) in his research " Volatility spillover dynamics and relationship across G7 financial markets", calculated conditionally linked fluctuations between the five main levels of the asset (public real estate, stocks, bonds, money and currency) in domestically and International levels used a multivariate generalized self-regression of the delta conditional variance model. The results showed that the susceptibility of fluctuations between different levels of asset is low among selected countries and the most important source of fluctuation of fluctuations is the stock portfolio.

Elyasiani, Kalotychou, Staikouras and Zhao (2015) in their study entitled " Return and Volatility Spillover among Banks and Insurers: Evidence from Pre-Crisis and Crisis Periods" examined the internal relationship of fluctuations and returns between banks and insurance companies in Japan, Europe and the United States, Using the self-regression model, Beck studied and found that there was a significant shift in the fluctuations and returns between banks and insurance in the three countries, which intensified during the crisis and was the main source of transmission for US companies.

Brownlees and Engle (2012) in their article " Volatility, correlation and tails for systemic risk measurement "developed systemic risk metrics known as comprehensive systemic risk metrics. The latter two measures are considered as a top-down criterion, the purpose of which is to measure the effects of

shocks that have occurred in the market and overshadow a financial institution.

Agnello and Sousa (2010) in their study entitled "Fiscal Policy and Asset Prices" by using the Data Panel Method, Influence Financial Policies on the Asset Prices of Ten Industrial Countries (Germany, Italy, Spain, USA, Belgium, Finland, France, UK, Portugal and New Zealand) in the period 1970-1970 and concluded that the positive shock of fiscal policy hurts has an adverse effect on prices, and stock changes can help stabilize public spending by the government.

Saleem and et al. (2012) in their research named "Budget Deficit and Stock Prices: Evidence from Pakistan and India" examined the question of whether changes in the budget deficit will change stock prices, and if so, in what direction? Accordingly, using Johansen's convergence technique and causal causality, they examined the long-term causal relationship between government budget deficit and stock prices between 1990 and 2010. Research findings show that the high development cost is due to the causal long-term causal relationship between deficit. Budget and stock prices, while in India, high current expenditures are the cause of the long-term negative causal relationship between budget deficits and stock prices, so governments in each country must find the right ways to match budget deficits and stock prices based on current economic conditions and other important factors.

Afonso and Sousa (2012) in their study entitled "The Macroeconomic Effects of Fiscal Policy" Using the system of simultaneous equations in the business framework (B-SVAR) and seasonal data -1970, Italy, Germany, United Kingdom and the United States. They found that government spending shocks had a negative effect and government revenue shocks had a positive effect on stock prices. Overall, financial policy shocks play an important role in the UK's asset markets, with government revenue shocks increasing stock price fluctuations in both countries. In Germany and the United States, the shock of fiscal policy has little effect on stock prices.

Li and et al. (2011), in research entitled "The Impact of Monetary Policy Shocks on Stock Prices" using economic data from Canada and the United States, conducted an empirical study of whether the freedom of financial markets concerning monetary policy shocks on stock's prices important or not. They spoke about the economic importance of stock prices as a result of the shock of domestic monetary policy in Canada and the United States by combining stock prices in the open and closed money cycle business model. In this study, macroeconomic theories and VAR model structure have been used in a short period of time to identify the immediate reactions of variables. Also,

in the model used in this study through foreign demand and monetary policy shocks for the economy of the two countries, special attention is paid to Financial and commercial markets have been liberalized, and it has been concluded that monetary policy shocks in the United States have a significant impact on Canadian stock prices. Also in Canada, stock price reactions to domestic contractionary monetary policy shocks were very brief, but in the United States, stock price reactions to such shocks were relatively large and wide, due to differences in financial market freedom, which led to differences in dynamic reactions. Monetary policy shocks between the two countries are studied in this study. In the study, they found that in the United States, stock prices fell by about 0.4 per cent after a 25 per cent increase in interest rates after 17 months of shocks, but in Canada, the decline was only 0.8 per cent after four months. That's why interest rate reactions are so fast in Canada, but they're not sustainable, while in the United States they're sustainable and long-term.

Hekmatifarid et al. (2016) in a study entitled "Systemic Risk Estimation in the Financial Sectors of Iran's Economy" measured and compared the systemic shock in the Iranian financial markets. According to the research results, the insurance sector has the largest share and the bank has the least share in creating systemic risk.

Mohammadi Aghdam and et al. (2017), in research named "Systematic risk measurement due to currency shock in Iranian financial markets", assessed the effect of currency shock and systemic risk intensity in money, capital and insurance market. The results of the first stage confirmed the hypothesis of the effect of currency shock on different risk increases of all three markets and the second stage, systemic risk measurement, showed that the insurance market compared to the other two markets is the most exposed infection and transmission intensity ranked next in the capital market and money market.

Farzinvash et al. (2017) evaluated the systemic risk in the bank sector of Iran. For this purpose, the banks accepted in the Tehran Stock Exchange have selected 17 banks whose shareholders' rights are available from 2010 to the spring of 2016 and has been evaluated the systemic risk in these banks using the CoVaR criterion. Estimated results show that the changes in conditional value at risk for the Middle East Bank have the highest value (15.61) and for Capital Bank the lowest value (0.32). These results suggest that the crisis or disruption in the Middle East Bank imposes the greatest impact on the financial system among other banks and that Capital Bank has the least impact. In other words, if a crisis occurs in the Middle East Bank, it increases the risk of the

financial system (market) by 15.61 per cent, while the crisis in Capital Bank increases the risk of the financial system by only 0.32 per cent.

Noor Ali Dokht (2016), in his study entitled "Resistance to Debt Transfer in Financial Networks", determined the exact amount of Debt Transfer in the large network of capital market transactions. Based on the results of this study, the institutions that have the greatest impact on the instability of the financial network have more contact with members of the financial network or have had significant concentrated links.

Salmani et al. (2015) in a study entitled "The impact of monetary and financial policy shocks on the Iranian stock market" examined the impact of monetary and financial policy shocks on the Iranian stock market. The results of estimating the model indicate that in the short run, the shock of government spending has a positive effect and in the long run, it hurts the growth of the stock price index. The effect of the money supply shock on the growth of the stock price index, in the short and long term, is positive. Of course, in the short term, this impact is greater than in the long term, in other words, the impact of monetary policy on the stock price index is faster than the impact of financial policy. As the results of the analysis of the variance of the forecast error show, in the long run, the most fluctuations in the stock price index are explained by the shock of financial policy.

Shirmohammadi et al. (2015) in an article named "Systemic risk between money, insurance and foreign exchange markets" showed a significant difference between systemic risk and sum of the risk of each market and finally based on the results of Friedman test, claimed that the insurance industry had the largest share and the banking system the least share in creating systemic risk.

Moradmand Jalali (2015), in a study entitled "Evaluating the share of banks, insurance and investment companies in systemic risk" by selecting 24 companies listed on the Tehran Stock Exchange and using the delta conditional value at risk Measure the systemic risk, the next step was to use the (Kolmogorov–Smirnov) test to rank the stocks of financial companies based on systemic risk.

Aleomran and Aleomran (2013) in research named "Study of the volatile trend of Tehran Stock Exchange" examined the market share of irregular growth of liquidity with quarterly data of 1378: 3-1382: 2 and GARCH method and normal regression technique. And they concluded that the growth of liquidity has a positive effect and instability. The growth of liquidity has a negative effect on the stock price index so that a one per cent increase in

liquidity growth causes a 0.66 per cent increase in the total stock index and a one per cent increase in the volatility of liquidity growth reduces the overall stock index by 0.28 per cent.

In summarizing the above studies, it can be stated that in most studies, using different approaches to econometric approaches, systemic risk assessment and measurement has been considered, while the present study, unlike other studies, is based on the source of systemic risk from shock ducts caused by The application of monetary and financial policies addresses this phenomenon and measures the severity and direction of its impact through multilateral regression, as the shock of monetary and financial policy as a major structural shock in the Iranian economy could potentially trigger crises. Besides, the study examined systemic risk at three market levels, while internal studies were limited to only a few stock companies and could not be generalized to the financial system.

Data and Methodology

The method used in this research is applied in terms of purpose and in terms of access to documentary and library statistics and information. For this purpose, first, the system risk index for the three sectors of the stock exchange, bank and insurance is extracted by $\Delta CoVaR$ and then by using the simultaneous equation system approach or the apparent unequal equation method in the data, depending on the relationship between the financial sector or the lack of a relationship between the stock market, bank and insurance markets to evaluate how financial and monetary policies affect the systemic risk of the three sectors of the stock market, bank and insurance as financial sectors of the Iranian economy is checked. Therefore, first estimate the delta conditional value at risk as a measurement of the systemic risk of financial sectors based on the basic study of Adrian and Brunnermeier, (2011) in six stages.

1. Estimation of systemic risk in the Financial Sectors

Among the various systems for measuring systemic risk, $\Delta CoVaR$, or the delta conditional value at risk, which was first proposed and developed by Adrian and Brunnermeier, (2011), has been used more than other criteria. In addition to making possible each financial institution, such as banks, stock exchanges, and insurance, to estimate the systemic risk, $\Delta CoVaR$ enables this measure of risk to the researcher to aggregate all institutions into one group and estimate common risk. $\Delta CoVaR$ is a system-solved form of risk measurement that provides a sequential dependency between the entire financial system and a particular part of the financial system (such as banks) (Bernal et al., 2017).

It is important to note that systemic risk is a completely different concept from systematic risk. Systemic risk is distinguished from systematic risk in that systematic risk is created by the overall movement of the market, but in systemic risk, default or crisis in a particular segment of the market becomes a pervasive crisis. That is the correlation between losses.

In the field of systemic risk measurement, the conditional value at risk means the difference between the maximum expected loss of the system if each company is critical and the maximum expected loss of the system if the conditions of the company are normal and in fact, It is calculated as follows:

$$\Delta CoVaR(\alpha) = (CoVaR_{mt}|r_{it} \leq VaR_{it}(\alpha)) - (CoVaR_{mt}|r_{it} = Median_{it}) \quad (1)$$

In this relation $\Delta CoVaR$, means the value at risk with a confidence range of $1-\alpha$ for the company i . Also, how to calculate CoVaR is as follows:

$$P(r_{mt} \leq CoVaR_{it}|C(r_{it})) = \alpha \quad (2)$$

This means that in the range of confidence, it can be said that the loss of the company's shares does not exceed, $\Delta CoVaR$:

Generally, $CoVaR_q^{system|i}$ is VaR_q^{system} of the whole system as long as the $C(R^i)$ affects the financial sector i .

$$P_r(R^{system} \leq CoVaR_q^{system}|C(R^i) | c(R^i))=q \quad (3)$$

$\Delta CoVaR_q^{system|i}$ will also be the difference between CoVaR of the whole system provided that the crisis affects the specific financial sector (banks, insurance companies or stock) and the same system's CoVaR provided the financial sector situation be normal:

$$\Delta CoVaR_q^{system|i} = CoVaR_q^{system|Xi=VaRq^i} - CoVaR_q^{system|Xi=median^i} \quad (4)$$

Step1. The annual market return of one of the three financial sectors called $R_t^i(q)$ is estimated using quantil q^{th} regression, for example, 1% quantil to indicate a crisis.

$$R_t^i(q) = \alpha_q^i + \gamma_q^i M_t + \epsilon_t^i \quad (5)$$

In this relation, α_q^i fixed, M_t is the vector of the variables of difference between short-term and long-term interest rates and the difference between long-term interest rates on participation bonds. It is assumed that the error rate

ϵ_t^i is independent of M_t .

Step 2. VaR 1% is predicted for each financial sector, using the variables of the previous step.

$$\widehat{VaR}_t^i(q) = \widehat{\alpha}_q^i + \widehat{\gamma}_q^i M_t \quad (6)$$

In the above equation, $\widehat{\alpha}_q^i$ and $\widehat{\gamma}_q^i$ have come from (5.) Equation.

Step 3. The efficiency of the system is obtained within the framework of quantile regression it means 1% of the crisis:

$$R_t^{\text{system}}(q) = \alpha_q^{\text{system}|i} + \beta_q^{\text{system}|i} R_t^i + \gamma_q^{\text{system}|i} M_t^{\text{system}} + \epsilon_t^{\text{system}|i} \quad (7)$$

In Equation (7), $\alpha_q^{\text{system}|i}$ constant, R_t^i is the return on the index of the financial sector and $\epsilon_t^{\text{system}|i}$ is the error coefficient. M_t^{system} shows the same vector of the variables of the conditions in Equation (5).

Step 4. Then the expected CoVaR of the system is calculated. CoVaR is the system's VaR as long as the bank, insurance, and stock market are in crisis (with 1% quantile regressions shown in the previous steps). For this purpose, VaR_t^i (1%) obtained in Equation (6), in Equation (8) and next to all explanatory variables of Equation (7) are placed.

$$\widehat{CoVaR}_t^{\text{system}|i}(q) = \widehat{\alpha}_q^{\text{system}|i} + \widehat{\beta}_q^{\text{system}|i} \widehat{VaR}_t^i(q) + \widehat{\gamma}_q^{\text{system}|i} M_t^{\text{system}} \quad (8)$$

In the above equation $\widehat{\alpha}_q^{\text{system}|i}$, $\widehat{\beta}_q^{\text{system}|i}$ and $\widehat{\gamma}_q^{\text{system}|i}$ come from (7.) Equation.

Step 5. $\Delta\widehat{CoVaR}$ Calculates the difference between the expected CoVaR in Quantil 1% and the expected CoVaR in Quantil 50%. The second value is obtained by performing steps 1 to 4 with 50% quantil (that is, using the same 1% CoVaR method but with 50% quantil considering the yields per step). this CoVaR In Quantil 50% Describes an intermediate state. Finally, $\Delta\widehat{CoVaR}$ shows the limited share of the banking, insurance or stock market sectors in system risk.

$$\Delta\widehat{CoVaR}_t^{\text{system}|i}(q) = \widehat{CoVaR}_t^{\text{system}|i}(q) - \widehat{CoVaR}_t^{\text{system}|i}(50\%) \quad (9)$$

In the experimental results ($\Delta\widehat{CoVaR}$), are negative because the worst return is 1% for the three financial sectors. The financial system sector, with the highest net value of $\Delta\widehat{CoVaR}$, is the sector that has the relatively largest share of systemic risk during the crisis period. To generalize these results, the final step is devoted to statistical inference.

Step 6. Significant ΔCoVaR test and dominance test is performed to rank the financial sectors based on their share of systemic risk. A meaningful test identifies the financial sector that has the highest systemic risk. ΔCoVaR is a review of a specific financial sector to determine whether it is statistically zero (in other words, whether a particular financial sector is not systematically risky) or not. In this study, All explanatory variables are CoVaR (it means returns and status variables). Since the coefficients of each explanatory variable different according to the quantile, it remains to be seen whether the condensation distribution functions of the CoVaR in quantile 1% and in quantile 50% are different from each other. A significant test determines whether ΔCoVaR have a significant effect.

Zero hypotheses is the equality of the functions of the collective distribution of CoVaR associated with 1% and 50% quantile.

$$H_0: \Delta\text{CoVaR}_{\text{system}} | i(q) = \text{CoVaR}_{\text{system}} | i(q) - \text{CoVaR}_{\text{system}} | i(50\%) = 0 \quad (10)$$

The purpose of the dominance test is to significantly evaluate the rankings obtained from ΔCoVaR to determine whether a particular financial sector i has a higher systemic risk than the financial sector j . Here, the Friedman test is performed to rank the financial sectors. The null hypothesis is defined as follows:

$$H_0: | \Delta\text{CoVaR}^{\text{system}} | i(q) | > | \Delta\text{CoVaR}^{\text{system}} | j(q) | \quad (11)$$

Which shows that the estimated ΔCoVaRs are negative, in simpler terms, the interpretation of the null hypothesis will depend on the absolute values of $\Delta\widehat{\text{CoVaR}}$ According to the method of analysis, the following variables are required in this part of the research. The table below shows the required variables for analysis and how to calculate them.

Table 2. Research variables and how to calculate them

How to calculate	Variable name
Total asset/capital account	Annual Returns On Bank System(ROA_b)
Total asset / net profit	Annual Returns On Insurance Industry(ROA_i)
Returns on the previous year / Return on the current year	Annual Returns On Stock Exchanges(ROA_s)
the weighted average of returns on all three financial sectors based on assets	The total return On the system(RS)

Source: Report and balance sheet of banks, stock exchanges and insurance for the studied years

After estimating ΔCoVaR as a criterion for measuring system risk, the effect of monetary and exchange rate and monetary and financial policy shocks on the system risk of the three sectors of the stock exchange, bank and insurance is evaluated using The method of regression equations is apparently irrelevant in panel data during the years 1374-1396.

The reason for using the seemingly unrelated regression equation method is to consider the effect of monetary policy shocks such as liquidity volume variables, interest rates on legal facilities and legal reserve rates, as well as real exchange rate shocks that multiply the nominal exchange rate in the US producer price index. The price index of Iranian consumer goods and services is defined.

Also, financial policy shocks, such as government spending and government tax revenues, along with other control variables affecting the systemic risk of financial sectors such as real GDP growth and the degree of economic openness, are assessed. The seemingly unrelated regression equation method allows the coefficients of the equations and the variance of the coefficients to change, as well as the statements of the disturbance in the system of equations to be correlated with each other.

2. Model Specifications and Data Sources

As mentioned in previous sections, the equations specified in the algebraic form for the three sectors of the stock exchange, bank and insurance in terms of monetary and fiscal policy shocks have been extracted from the theoretical framework and empirical studies such as Li and Perez-Saiz (2018) and Ghulam and Doering (2017) which modified by Iranian structure situation as following equations:

$$\begin{aligned}\Delta\text{CoVaR}_{st} &= f(MPSit, FPSit, RERit) \\ \Delta\text{CoVaR}_{It} &= f(MPSit, FPSit, RERit, GDPGit, BDit, OPENit) \\ \Delta\text{CoVaR}_{Bt} &= f(MPSit, FPSit, RERit, BDit, OPENit)\end{aligned}\quad (12)$$

In the above three equations, and thus represent the systemic risk of the stock market, insurance and banking sectors, which is estimated by the quantitative regression method. Also, research variables include:

A-Monetary and currency policy's variables:

MPS: liquidity

FPS: The interest rate on payment facilities

RER: The real exchange rate, which is the product of the nominal free market

exchange rate in the ratio of the US producer price index to the price index of Iranian consumer goods and services.

B-Changes in financial policies

BD: Government budget deficit and control variables such as GDPG: Real GDP growth rate and OPEN: Economic openness (trade-to-GDP ratio)

Empirical Findings and Results

In this section, first delta conditional value at risk is extracted in three financial sections of the stock exchange, bank and insurance and then the effect of monetary and financial policy variables on this variable in the three mentioned sections by seemingly irrelevant regression equation in panel data evaluated.

According to the analysis method, VaR must first be calculated to calculate ΔCoVaR . The CoVaR is then estimated according to the calculated VaR. Finally, ΔCoVaR , which is the difference between the CoVaR of the financial system j when the specific financial institution i is in crisis and the CoVaR of the same financial system is estimated, provided that the status of the same institution is normal. VaR with Quantil 1% for each financial sector is obtained according to the VaR equation and using the calculated variables:

Table 3. Risk value of the three financial sectors of the bank, insurance and stock exchange

Quantile 1%		
VaR_p	VaR_i	VaR_s
0/014572	-0/00222	-0/17065

Source: Research Findings

Then according to the obtained VaR, CoVaR the table below shows the CoVaR calculated for the system and all three financial sectors of the Bank, Insurance and Stock Exchange in Quantil 1%

Table 4. CoVaR System, Bank, Insurance and Exchange (with 1% Quantil)

$\widehat{\text{CoVaR}}_{t \text{ system} i}(1\%)$	-0/00619
$\widehat{\text{CoVaR}}_{\text{Banks}}(1\%)$	0/0057
$\widehat{\text{CoVaR}}_{\text{Insurance}}(1\%)$	0/001967
$\widehat{\text{CoVaR}}_{\text{Stock Exchange}}(1\%)$	-0/00693

Source: Research Findings

According to the analysis method, VaR must first be calculated to calculate ΔCoVaR . ΔCoVaR is then estimated according to the calculated VaR. ΔCoVaR , which is the difference between the CoVaR of the financial system j when the financial institution is clearly in crisis, and the CoVaR of the same financial system, if the situation of the same institution is normal, is estimated. VaR with Quantil is 1% for each financial sector, according to the VaR equation, using the calculated variables:

Table 5. Risk value of the three financial sectors of the bank, insurance and stock exchange

Quantile 1%		
VaR_b	VaR_i	VaR_s
0/014572	-0/00222	-0/17165

Source: Research Findings

According to obtained VaR, CoVaR must then be calculated. The following table shows the calculated CoVaR for the system and all three financial sectors, bank, insurance and stock exchange in Quantil 1%.

Table 6. CoVaR System, Bank, Insurance and Exchange (with 1% Quantil)

$\widehat{\text{CoVaR}}_{t, \text{system}} 1 (1\%)$	-0/00619
$\widehat{\text{CoVaR}}_{t, \text{Banks}} (1\%)$	0/0057
$\widehat{\text{CoVaR}}_{t, \text{Insurance}} (1\%)$	0/001967
$\widehat{\text{CoVaR}}_{t, \text{Stock Exchange}} (1\%)$	-0/00619

Source: Research Findings

In the next step, by using the seemingly unrelated regression equation approach in panel data to evaluate the impact of monetary policies such as liquidity volume, facility interest rate and also real exchange rate variable as well as government expenditures along with control variables such as production growth The real gross domestic product is paid at a fixed price in 2011 and the degree of openness of the economy (trade-to-GDP ratio) to the value exposed to the conditional risk difference between the three sectors of the stock exchange, batik and insurance.

The seemingly unrelated regression equations make it possible to change the coefficients of the equations and the variance of the coefficients, as well as the sentences of the disturbance in the system of equations to be correlated with each other. Before estimating SURE regression equations, it is necessary to test the simultaneous correlation between the disruption sentences in the

three equations. The LM test statistic is used to test the correlation of coherence in the disorder sentences, which is distributed and can be calculated as follows:

$$LM = T \sum_{i=1}^M \sum_{j=1}^{i-1} r_{ij}^2 \tag{13}$$

In relation (14), T indicates the number of observations and r_{ij} the correlation coefficient of the equations of the equation i and j. After calculating the statistical value of the test, it is necessary to compare the statistical value of the test with the critical value. The critical value has a degree of freedom $\frac{M(M-1)}{2}$ in which M is the number of equations in the system of simultaneous equations. After comparing the value of the test statistic with the critical value, if the zero hypotheses are rejected, the simultaneous correlation between the disorder sentences cannot be ruled out and therefore a seemingly unrelated regression approach can be used to estimate the system of equations. In this section, before estimating concentration equations, advertising intensity and profitability, LM test statistic has been used to investigate the simultaneous correlation of disruption sentences in three equations edelta conditional value at risk difference between stock exchange, bank and insurance. The results of LM test statistics are in the form of Table (7):

Table7. Simultaneous correlation test between LM test sentences

Distribution of test statistics χ^2	Degree of freedom	The number of test statistics	Probability value (PV)
Bryosh-Pagan test statistics	3	25.6	0.000

Source: Research Findings

The results of the above table show that the statistical value of the Lagrangian coefficient is 25/6 and is larger than the critical value of the table. Therefore, the simultaneous correlation between the disruption sentences in the three regression equations has been accepted, and therefore the seemingly unrelated regression equation estimation method can be used to estimate the pattern equation apparatus. The following three equations value the delta conditional value at risk difference between the stock exchange (first equation), insurance (second equation) and the bank (third equation) as a seemingly unrelated system and regression method, the estimated results of which are as follows:

Table 8. Results of estimating pattern equations by seemingly unrelated regression methods

The explanatory variables And the width of the origin	The first equation (ΔCoVaR_{st})	The second equation (ΔCoVaR_{It})	The third equation (ΔCoVaR_{Bt})
CONS	0/007 (1.88)***	-0/019 (-4.48)**	0/464 (23.21)*
MPS	0/824 (48/26)*	0/765 (5/87)*	0/623 (7/98)*
FPS	0/002 (0/4)	-	0/09 (9/35)**
RER	-0.183 (-7/01)*	-0.159 (-5/68)*	-0.121 (-8/34)*
BD	-	0.045 (8/4)**	0.089 (15/2)*
GDPG	-	-0/164 (-4/48)*	-
OPEN	-	-0/354 (-0/125)	-0/257 (-1/05)
F Statistics	-	70/65	36/98
The mean square of the error (RMSE)	0/077	0/096	0/156
Determine the value of the coefficient	0/78	0/72	0.65

*, **, *** : indicate the variability of the variable at the level of 1%, 5% and 10%, respectively

Source: Research Findings

Based on the results of the above table, it can be stated that the liquidity variable has a positive and significant effect on the conditional value at risk of the stock exchange sector and the real exchange rate has a negative and significant effect on the conditional value at risk. Therefore, an increase in the real exchange rate leads to an increase in the competitiveness of domestic goods, and with an increase of one unit, the efficiency of the stock market increases, or the maximum possible loss of this sector decreases by 0/18 units. It is worth noting that in this study, the variable interest rate of the payment facility does not have a significant on the conditional value at risk of the stock market sector. In the second equation (insurance conditional value at risk), the variables of liquidity volume and government budget deficit have a positive and significant effect on the maximum loss of insurance sector and the variables of the real exchange rate, real GDP growth and economic openness

have a negative effect on risk in this section. In other words, increasing the economic growth and during the period of prosperity of the economy leads to an increase in the efficiency of the insurance sector or a decrease in the value of its conditional risk. It is worth noting that in this study, the variable effect of the degree of economic recovery is not statistically significant. In the third equation (conditional value at risk of the bank sector), the variables of liquidity volume, the interest rate of facility payments and government budget deficit have a positive and significant effect on the conditional value at risk of the bank sector but the effect of real exchange rate variables and economic recovery is negative. It means that the value of the coefficient of determining the first equation is 0/78, which indicates the high fitting power of the model. For the second and third equations, the fitting power of the model is 0.72 and 0.65, respectively. The mean square of the error as a good fit indicator of the model indicates that this criterion is low for each of the conditional value at risk of the bank, stock exchange and insurance.

Conclusion and Policy Implication

This study aimed to evaluate the effect of monetary and fiscal policies on delta conditional value at risk in the financial sectors of the stock exchange, bank and insurance during the years 1995-2017. For this purpose, first, by quantitative regression method at 1% level, the delta conditional value at risk was calculated based on the approach of Adrian and Brunner Meier and then the effect of monetary and fiscal policy variables on the delta conditional value at risk was assessed. The results of the model estimation showed that at the level of 1%, the value exposed to the delta conditional value at risk between the stock exchange and insurance sector is higher than the bank and the delta conditional value at risk in the banking sector is less compared to the other two financial sectors. Also, the results of estimating the model by seemingly unrelated regression method in panel data showed that the volume of liquidity has a positive and significant effect on conditional value at risk of the stock market sector and the real exchange rate has a negative and significant effect on conditional value at risk. Therefore, an increase in the real exchange rate leads to an increase in the competitiveness of domestic goods, and with an increase of one unit, the efficiency of the stock market increases, or the maximum possible loss of this sector decreases by 0/18 units. In this study, the variable interest rate of the payment facility does not have a significant effect on the conditional value at risk of the stock market sector.

In the second equation (insurance conditional value at risk), the variables of liquidity volume and government budget deficit have a positive and

significant effect on the maximum loss of insurance sector and the variables of the real exchange rate, real GDP growth and economy openness have a negative effect on risk in this section.

In other words, the growth of the economy during the period of prosperity of the economy leads to an increase in the efficiency of the insurance sector or a decrease in its conditional value risk. In this study, the variable effect of the degree of economic recovery is not statistically significant. In the third equation (conditional value at risk of the banking sector), the variables of liquidity volume, the interest rate of facility payments and government budget deficit have a positive and significant effect on conditional value at risk of the banking sector but the effect of real exchange rate variables and economic recovery is negative.

Based on the results of this study, it can be recommended that to reduce the conditional value at risk in all three financial sectors, it is necessary to control and reduction of the budget deficit and also to control the volume of liquidity. Reducing the general level of domestic prices and boosting production, and thus promoting economic growth, will reduce the value exposed to conditional risk and increase the expected return on these sectors. The main empirical findings of this paper in the context of the relationship between monetary and fiscal policies with the conditional value at risk is consistent with the theoretical framework and empirical studies such a Li and Perez-Saiz (2018), Farzinvash et al. (2017) and Hekmatifarid et al (2017) and ha not consistent with main empirical studies like Aleomran and Aleomran (2013) and Moradmand Jalali (2015). At the end of this study, we suggest that in future studies, the researcher's focuses on the effects of monetary and fiscal policies shocks on the systematic risk in every financial sector by applying of structural VAR method in panel data.

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