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Sanctions and Iranian Stock Market: Does the Institutional Quality Matter?

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Sanctions and Iranian Stock Market: Does the Institutional Quality Matter?

Abstract:

The effect of shocks of sanctions, oil revenues, exchange rate, and inflation on different regimes of the Iranian stock market is examined in the two cases (with and without considering institutional quality (IQ)) during the 1984-2020 period, using the TSVAR model. The results show that the difference between the impulse-response functions in the bullish and bearish market, with and without considering IQ, is only related to the effects of sanctions and inflation, respectively. In fact, considering the IQ case, inflation has a medium-term positive effect on the stock market; however, without the IQ there has only been a positive short-term effect. Accordingly, within increasing sanctions, if the IQ has been also enhanced, a positive shock of sanctions will lead to a long-term improvement in the bullish market. Also, in the bearish market, the positive shock of sanctions and exchange rate, along with increasing IQ, will lead to a long-term growth in the Iranian stock market.

Key Words: Sanctions, Stock Market, Institutional Quality, TSVAR Model

JEL Classification: G29, F51, F31, C24

1. Introduction

Concerns about Iran's economic and political development have increased in recent years. Despite its vast mineral resources, energy, size, population, and ideal strategic location, Iran has failed to succeed in achieving meaningful economic and financial development. One of the main reasons for the Islamic Republic's low financial and economic successes since the 1979 Islamic Revolution has been the imposition of economic sanctions which have aimed at restricting Iran's nuclear programs and economic development. To this end, sanctioning countries have used various tools including economic sanctions, media propaganda, and military and diplomatic threats to force the sanctioned country to abandon its nuclear activities, (Gurvich and Prillepskiy, 2016). Using economic, financial, and technological tools has been the most effective means to achieving security goals by the targeting countries.

Over the past 43 years, Iran has faced varying financial and economic sanctions, ranging from freezing the 12 billion dollars of Iranian assets abroad in November 1979 to sanctions on the banking sector in recent years, all of which have aimed at tightening restrictions on Iran's economic activities over the years. Although some of these sanctions have been eased at times, the U.S. policy of exerting pressure on Iran also limits the latter's economic and political influences in the

Middle East and, consequently, Iran's nuclear program has always existed front and center in those sanctions. Thus, Iran's economy has been under severe sanctions from the United States, the United Nations, and the European Union for a long period of time (Laudati and Pesaran, 2021).

Sanctions are usually used as a punitive tool in foreign policy. The purpose of these punishments is to put pressures on the targeted country to change its behavior and performance. Among the various types of sanctions, economic restrictions are more common in the world, and their impacts on various sectors of the sanctioned economy including the stock market are inevitable. In general, sanctions through the inflation and exchange rate channels can have a different effect according to the regimes of the stock market. Sanctions reduce the availability of imported and produced goods as a results of reduced investment, which leads to higher prices and inflation. They also reduce corporate profits, which also affect the stock markets if no other measures are introduced to counter or alleviate the impact of the sanctions. Exports are also influenced by the value of the exchange rate, which also are impacted by the sanctions. Although this issue is of special importance in a sanctioned economy, it has not been addressed in previous studies. Further, the quality of institutions can be very decisive, which can play a moderating role in the importance of the sanctions on the profitability of the listed firms, which has not been investigated in previous studies despite their high importance to Iran and the sanctioned countries.

In fact, sanctions can create diversified costs for the non-targeted sectors as well. Accordingly, the impact of sanctions on various listed firms in the stock market and the stock traded value in general is complex¹. Sanctions can limit the access of various firms to international financial funds, technology, and imports, thereby increasing production costs and reducing production (Laudati and Pesaran, 2021). Also, the firms listed on the stock market may face a decreasing demand due to restrictions on export opportunities, investment, and household income. Besides, most of the firms listed in the Iranian stock market are mainly export- or import-oriented firms, so their exports are highly dependent on the values of the exchange rate, domestic inflation and the extent of the sanctions.

With the increases in sanctions, Iran's oil exports have been limited. This factor has led to a decrease in the foreign exchange supply in the Iranian economy, which along with demand

¹ The severity of the sanctions affects investment opportunities through changing the Tobin's q ratio of export and import-oriented listed firms differently. This ratio reflects the future performance of the listed firms, and the sanctions affect this ratio through impacting the market value of their stocks (Singhal, et al., 2016).

pressures, has led to an increase in the exchange rate (depreciating the riyal) and inflation. As petrochemicals and base metal firms are generally export-oriented, an increase in the exchange rate and a depreciation of the riyal have increased their nominal profitability, thereby spurring the demand for their stocks higher, and consequently, increasing their stock traded values. Also, in the case of the mostly import-oriented firms, along with an increase in the sanctions and a rise in the exchange rate (depreciation of the riyal), their production costs increase and their profit margins decrease, which can reduce the demand for their stocks (Batmanghelidj, 2020). Therefore, in general, it can be said that the effect of the tightening of sanctions on the Iranian stock market through the channels of exchange rate and inflation is ambiguous.

The objective of this research is to investigate the impact of positive (increasing sanctions) shocks and negative (decreasing sanctions) shocks of sanctions, oil revenues, exchange rate and inflation on different regimes of the Iranian stock market. Along with the impacts of sanctions, the presence of corruption, the lack of responsibility and accountability, political instability and also the lack of rule of law can also be effective due to the effect of the exogenous shocks on Iran's economy. Based on this, the important role of institutional quality has been considered as a mediating variable in the effect of sanctions on different regimes of the stock market (Bullish and Bearish stock market conditions), which has not been considered in the literature thus far. The institutional quality also plays a fundamental role in determining the influence of the oil resource rent on financial development and the stock market in Iran. Numerous channels negatively affect financial development because of natural resource rent and approval of the curse hypothesis of natural resources. Natural resource rent also leads to corruption and illegal relationships in economies with low institutional quality (Atkinson et al., 2003; Baland et al., 2000; Bhattacharyya et al., 2010; Leite et al., 1999).

Since oil exports and financial transfers are limited under the sanctions, it is possible to export informally, which can lead to increased rents and corruption in situations with a low level of institutional quality. There are various economic sanctions, including export tariffs, import quotas, trade bans, restrictions on bank transfers, and non-tariff restrictions on imports (Dong and Li, 2018). Generally, increasing sanctions will negatively affect oil revenues which account for more than 70% of the Iranian government income, and sanctions on oil exports would thus increase the government budget deficit and accelerate the borrowing from the central bank to finance the deficit.

In this case, the monetary base increases and leads to increased inflation. As inflation increases are based on the purchase power parity to maintain the competitiveness of domestic products, the exchange rate also rises (i.e., the increase in the exchange rate is also due to restrictions on the supply side of the foreign currency). In such circumstances, the firms listed on the stock market will face different effects, depending on whether they are export-oriented or import-oriented, thereby are directly affected by economic sanctions. By ignoring the mediating role of institutional quality, the rent-seeking and non-transparent activities would increase, which can lead to deviations in resource allocation, so the impact of sanctions on the Iranian stock market thus is unknown in both cases.

These economic sanctions have affected key variables of the Iranian economy. Still, the direct impact of the positive and negative shocks of the sanctions index in different stock market regimes (bearish and bullish stock markets) in different periods within considering the institutional quality index has not yet been studied. In fact, with the intensification of sanctions, the lack of transparency in the economy has increased and can cause an increase in corruption and resource rent, and in such a situation, the risk of being in the financial markets also increases. In this case, improving the quality of institutions can be effective in making the economy and firms more transparent.

Accordingly, the novelties of the current study are as follows. (i) The simultaneous direct impact of the positive and negative shocks of the sanctions index on different stock market regimes (bearish and bullish market conditions) has not been studied. (ii) The coincident effect of sanctions' positive and negative shocks by considering the mediating role of institutional quality on different stock market regimes (bearish and bullish stock markets) has not been investigated. (iii) The simultaneous effect of positive and negative shocks of the sanctions index on different stock market regimes (bearish and bullish markets) in the form of the shock transmission mechanism in the Threshold Structural Vector Autoregression model (TSVAR) has also not been investigated. (iv) Furthermore, the institutional quality includes major aspects of this index such as corruption, government stability, law and order, accountability and political stability. This index is calculated via the Principal Component Analysis (PCA) technique.

Based on the above considerations and by focusing on the mediating role of institutional quality in affecting sanctions in both bearish and bullish markets in Iran, the results show that the increase in sanctions, exchange rate and inflation affects the Iranian stock market positively.

However, a positive shock to oil revenues influences it negatively. But the difference between these two models is due to the period that has affected the stock market. In this case, the difference between the impulse response functions in the bullish market is just related to the impact of the sanctions. Thus, with accounting for the role of institutional quality in driving sanctions, there is a long-term positive impact of the sanctions shock on the stock market. However, without considering institutional quality, there is only a short-term positive impact of the sanctions on the stock market.

The results also show that the difference between the impulse response functions in the bullish market is simply in the effect of inflation. Actually, by focusing on the role of institutional quality in moderating the role of sanctions, there is only a medium-term positive effect of the inflation shock on the stock market. Besides, without institutional quality, we have found only a short-term positive impact of increasing inflation on the stock market. Accordingly, if institutional quality also succeeds in driving the sanctions condition, we can expect that a positive shock (an increase) in the sanctions will lead to a long-term increase in the stock market in both regimes (bullish and bearish). Therefore, if there is a good level of institutional quality, the economic sanctions will become an opportunity for investing in the Iranian stock market.

The following sections of the paper are organized as follows: The literature review is described in Section 2. The data and methodology are explained in Section 3. The empirical results are provided in Section 4., The conclusion and policy implications are presented in Section 5.

2. Literature Review:

Although the largest and most serious sanctions against Iran have occurred in the last decades, there is still a little systematic knowledge regarding the impact of sanctions on the economy of this country (Greenwald, 2020). Shahrestani and Anaraki (2008) state that the Iranian economy has experienced various sanctions after the 1979 Islamic revolution and the 1980-1988 war with Iraq. Economic sanctions lead to increasing inflation, imposing gasoline quotas, and reducing exports and foreign direct investment (FDI). The sanctions imposed on Iran after 2006 are different from the previous sanctions because they were accompanied by an international consensus, and thus, have exerted more pressures on the Iranian economy. That study also examines the impact of sanctions through inflation expectations, exchange rate fluctuations, financing costs, housing prices, foreign direct investment, total factor productivity and economic growth.

Hadinejad et al. (2010) examine the effectiveness of sanctions on Iran's non-oil trade, using the gravity model. To that aim, the authors use the data of 42 Iranian trading partners over the 1977-2006 period. In that study, two dummy variables of wide extensive and moderate sanctions have been used. The results show that the sanctions significantly affect Iran's exports and imports with its trading partners.

Dizaji and Van Bergeijk (2013) examine the economic impact of the sanctions on oil revenues using the VAR model. The results show that the sanctions have been effective in the short term but become ineffective over time. Similar results are obtained by Esfahani et al. (2013), who believe that the impact of the sanctions shock on Iran's oil production and exports is short-termed.

Farzanegan and Dizaji (2018) have investigated the impact of sanctions on Iran's military spending during the 1960-2017 period by using the ARDL model. The results show that unilateral sanctions have a significant impact on Iran's military budget and the multilateral sanctions have a significant negative impact on Iran's military spending. Zamani et al. (2021) study the impact of energy-related sanctions on the Iranian riyal-U.S. dollar exchange rate black-market premium using the NARDL model over the 1959-2017 period. The results demonstrate that the decrease in oil revenues due to the sanctions has an increasing effect on the black-market premium.

Moeeni et al. (2021) examine the impact of the Iranian oil sanctions on the exchange rate. In that study, the Google Trend is used to examine the relationship between sanctions and sanctions-related expectations. The Google Search Index (GSI) reflects the expectations of economic agents. Based on the results of the ARDL model, the Google search index has a positive and significant effect on the informal exchange rate (depreciating the riyal) and a positive and non-significant effect on the real informal exchange rate in Iran.

Iranmanesh et al. (2021) have extracted the economic sanctions index in Iran during the 1979-2019 period by using the fuzzy logic. The authors aimed at investigating the effects of economic sanctions on the structure of business cycles in Iran. For this purpose, they benefited from the opinion of experts in the field of sanctions. The results reveal that under two scenarios of the sanctions and without economic sanctions, inflation has the least effect on production and investment in Iran. Also, based on the results of that study, the Iranian economy will experience a long period of prosperity without the sanctions.

Laudati and Pesaran (2021) examine the impact of sanctions on the Iranian economy via newspaper coverage and the SVAR model. The results show that the sanctions significantly and negatively affected the exchange rates, inflation, and output growth. More precisely, sanctions have led to a rise in the exchange rate (devaluation of the riyal) and inflation and a reduction in production, employment, labor force participation rates, and secondary education.

Samadi et al. (2021) have investigated the impacts of sanctions and the COVID-19 pandemic on Iran, as two unstable conditions over the period from September 2014 to June 2020. Also, those authors have used the Segmented regression to study the co-movement of financial and commodity markets (oil, stock and gold markets along with exchange rate) in Iran. Their findings show that there exists a co-movement between the gold price and exchange rate during the times of sanctions. Besides, they have confirmed that the oil market is the most suitable choice for risk-averse investments, as it has the lowest co-movement with the other financial assets under consideration.

Ghasseminejad and Jahan-Parvar (2021) have focused on the effects of financial sanctions against Iran on publicly traded companies. They have also considered political connections of the firms in this relationship. Their results demonstrate that the politically connected companies have suffered more from financial sanctions than the ones that are not connected. Furthermore, in order to manage their risk in unstable conditions, those companies have decelerated their leverage and accelerated their cash.

Hatipoglu et al. (2022) have also dealt with another aspect of the macroeconomic effects of the sanctions in developing countries. Based on the results of their study, the imposition of sanctions against a particular country can also affect the economies of the neighboring countries. The authors also state that the design of the sanctions should minimize their spillover impacts on the neighboring countries to prevent regional disruption.

Aflatooni et al. (2022) have focused just on the impacts of sanctions on the performance of politically connected firms, compared to regular firms. In fact, those authors have considered the other aspects of sanctions' effects in Iran. They have shown that through intensifying the sanctions, the speeds of adjustment of politically connected firms are stronger than the regular firms. In fact, the result of thier study is the opposite to the result obtained in the study of Ghasseminejad et al. (2021) reviewed above. The reason for the different result is that in none of these studies, the role of institutional quality in driving the effect of economic sanctions on Iran's financial markets has not been considered which is included in our current study.

Zamani et al. (2022) have also studied the direct impacts of sanctions on the exchange rate and also the indirect effects of the sanctions and inflation on exchange rate by using the Markov switching method in Iran during the 1985-2021 period. Based on the results, the exchange rate is influenced by sanctions positively (a deterioration in the riyal). Also, the authors have also shown that the likelihood of staying in a low exchange rate regime is higher than staying in a high exchange rate one.

In the current study, to examine the effects of economic sanctions on key Iranian indicators, the institutional quality index, which can have a significant influence on the impact of the sanctions index on the stock market, has also been considered. It should be noted that some studies have highlighted the importance of increasing institutional quality in strengthening social indicators related to economic growth in developing countries, which shows the undeniable role of this fundamental indicator in driving such economies. For example, in connection with this issue, Murshed et al. (2022) state that democratization, which is one of the main aspects of the institutional quality index, can significantly increase government spending in the social sectors, reduce poverty and inequality, increase consumption, and enhance human development and economic growth.

Burlone (2002) investigates the economic effects of the sanctions on the target population in developing countries. Based on the results of their study, improving institutional quality can considerably reduce the destructive effects of the external shocks of sanctions on the targeted population under the pressure of these sanctions. Therefore, in that study, the effective role of institutions in reducing the negative impacts of sanctions on the human development index and poverty has been proven.

Ha and Hoang (2021) find that economic sanctions have negatively affected the environmental performance index among the countries studied. They also prove that improving the institutional quality index can reduce the negative environmental effects of the sanctions. More specifically, those authors have studied the relationship between global economic sanctions and life expectancy concerning the mediating role of institutional quality. According to the results of their study, which was conducted for 108 countries, the imposition of economic sanctions significantly and negatively affects national health in the targeted countries. In addition, institutional quality significantly affects the relationship between these two key indicators and helps these countries reduce the destructive effects of sanctions on national health.

Generally, reviewing previous studies reveal that our current study is innovative in several aspects. First, none of the previous studies have examined the direct effects of the sanctions index on different stock market regimes. This study investigates the effects of positive and negative shocks of the economic sanctions index on the stock market index in Iran, which has not been done before. Also, to increase the accuracy of the results and investigate the effects of this external shock on the stock market regimes, this market is studied in two parts: bearish and bullish conditions. Second, this is the first study that investigates the simultaneous direct effect of the positive and negative shocks of the sanctions index on different stock market regimes (bearish and bullish markets). Third, the coincident effect of the sanctions' positive and negative shocks, considering the mediating role of institutional quality on different stock market regimes (bearish and bullish markets), has not yet been investigated. In fact, one of the reasons for achieving the different results in previous studies is related to neglecting the role of institutional quality in the relationship between sanctions and different regimes of Iran's financial market. Fourth, this is the first study that considers the contemporaneous impact of positive and negative shocks of the sanctions index on different stock market regimes (bearish and bullish markets) in the form of the shock transmission mechanism, using the Threshold Structural Vector Autoregression model (TSVAR).

3. Data and Methodology:

3.1 Data description

Stocks traded total value and inflation variables are extracted from the World Development Indicators (WDI) database. Oil revenues (as a % of GDP) and exchange rate (riyals per US dollar) are extracted from the Central Bank of Iran (CBI). Also, bureaucracy quality, corruption, democratic accountability, government stability, and law and order variables are extracted from the ICRG database. Also, an institutional quality index was created using five variables and the principal component analysis. The current paper uses the institutional quality index according to some previous studies (Khan et al., 2019a; Khan et al., 2019b; Khan et al., 2020a; Khan et al., 2020b).

In the following, the trends of the key economic variables in Iran's economy are provided, so they would be useful and helpful as we attempt to make the effects of sanctions on Iran's economy more understandable.

<<<<Please Insert Figure 1 here>>>>

According to Figure 1, in the years after the 1980-1988 Iran-Iraq war and during the construction period, the inflation rate in Iran reached 50% in 1995 due to the implementation of expansionary monetary policies, which then followed a downward trend until 2010. But since 2010, with the presence of more economic sanctions, inflation had risen until 2013, after the nuclear deal that lasted from 2015 to 2017, and again after the U.S. withdrew from the nuclear deal. With the escalation of economic sanctions against Iran, the inflation rate has risen again.

<<<<Please Insert Figure 2 here>>>>

<<<<Please Insert Figure 3 here>>>>

Figure 3 illustrates Iran's per capita economic growth, which has declined during the sanctions. Also, it shows the same decreasing time trend during the Iran-Iraq War (1979-1988) and the years (2010-2015; 2018-2020).

<<<<Please Insert Figure 4 here>>>>

In Figure 4, the stock traded value has grown significantly during the peak years of the sanctions (i.e., 2010-2013, 2018-2020). As the international sanctions intensified, the state-owned stocks have been a haven for part of the budget deficit due to a limited access to oil revenues. Therefore, the values of the shares associated with the state-owned and quasi-state-owned companies increased dramatically in this period. Table 1 shows a summary of the recent sanctions against Iran:

<<<<Please Insert Table 1 here>>>>

Table 2 shows the descriptive analysis of the data in the current study:

<<<<Please Insert Table 2 here>>>>

According to some studies (Khan et al., 2019a; Khan et al., 2019b; Khan et al., 2020a; Khan et al., 2020b), the principal component analysis (PCA) approach has been used for extracting institutional quality index. In this regard, the Spider environment in the Python programming language has been employed for the computations. The PCA is one of the oldest and most widely used techniques for converting multidimensional indices into a single variable, which contains most of the characteristics of the variables (Le et al., 2016).

According to Khan et al. (2020), the institutional quality index has been established using the bureaucracy quality, corruption, democratic accountability, government stability, and law and order variables. Tables 3 and 4 provide the factor loading results for Iran.

<<<<Please Insert Table 3 here>>>>

<<<<Please Insert Table 4 here>>>>

<<<<Please Insert Figure 5 here>>>>

<<<<Please Insert Figure 6 here>>>>

According to Figure 6, from 1989 to 1996, there had been a decline in institutional quality², and from 1997 to 2004 the index had an upward trend. However, from 2006 to 2013 it had a downward trend, and from 2013 to 2016 it had experienced an upward trend and then it was down again. Also, the current study has used the sanctions index estimated by Iranmanesh et al. (2021). The trend of the sanctions index is presented in Figure 7.

<<<<Please Insert Figure 7 here>>>>

² The available data on institutional quality, which is one of the important components in the financial markets and the economy in general, has been available since 1984, and this was one of the limitations of the current research about the data span.

According to Figure 7, from 2006 to 2012, the sanction index had also risen with the intensification of sanctions against Iran. In 2014 and 2015, this index decreased, and from 2018 to 2020, it had had an increasing trend. Based on Figures 6 and 7, it can be argued that there has been an inverse relationship between the trend of the sanctions index and the institutional quality index in Iran. When sanctions have intensified, the institutional quality index has a downward trend which is not helpful. When the sanctions index has been declining, the institutional quality index has been rising.

3.2 Methodology

The Threshold Structural Vector Autoregression model (TSVAR) model has been employed to analyze the impact of sanctions, oil revenue (% of GDP), exchange rate, inflation, and institutional quality index as an interaction terms in the sanctions on the stock market based on two different states: considering and ignoring the institutional quality index in the sanctions at the values above (the bullish market) and below (the bearish market) the stock market thresholds. The TSVAR model can evaluate the effect of positive and negative shocks on the higher and lower values of the stock market threshold. Indeed, the influence of positive and negative shocks may vary according to the amount and level of the stock market.

In the following, the stock market (total traded value) is characterized as a threshold variable. Hence, two regimes are available when the stock market crosses a threshold value (the first regime is higher than the threshold, and the second regime is lower than the threshold). Thus, the TSVAR model can be formulated as follows:

$$Y_t = C_1 + A_1 Y_t + B_1(L) Y_{t-1} + (C_2 + A_2 Y_t + B_2(L) Y_{t-1}) I [Z_{t-d} > \gamma] + U_t \quad (1)$$

As shown below, Y_t is a vector of endogenous net variables defined above, Z_t is the threshold variable, d is the lag order, I is an indicator function, and γ is a threshold value. Thus, the second regime takes place if $Z_{t-d} > \gamma$. In this case, the system parameters are $C_1 + C_2$, $A_1 + A_2$, and $B_1(L) + B_2(L)$ because of $I [Z_{t-d} > \gamma] = 1$. In contrast, the first regime takes place if $Z_{t-d} \leq \gamma$. In this case, the system parameters are C_1 , A_1 , and $B_1(L)$ because of $I [Z_{t-d} > \gamma] = 0$,

$$\left\{ \begin{array}{ll} A_1 Y_t + B_1(L)Y_{t-1} + U_t & \text{if } I=0 \text{ (Regime1)} \\ (A_1 + A_2)Y_t + [B_1(L) + B_2(L)]Y_{t-1} + U_t & \text{if } I=1 \text{ (Regime2)} \end{array} \right\} \quad (2)$$

In the following, Y_t is a $(K \times 1)$ vector of endogenous variables, which includes the percent change in the stock market (*GSTOCK*), the percent change in the sanction index (*GSANCTION*), the percent change in oil revenues to GDP (*GOIL*), the percent change in exchange rate (*GEXC*), the percent change in consumer price index (*INF*), and finally the percent change in the intersection variable (*GSANCTIONINS*). It is briefly expressed as

$$Y_t = [GSTOCK, GSANCTION, GOIL, GEXC, INF, GSANCTIONINS]$$

Where C_1 and C_2 are a $(K \times 1)$ vector of constant variables. A_1 and A_2 are the $(K \times K)$ contemporaneous matrices because the concurrent effects might also differ across the regimes. B_1 and B_2 are $(K \times K)$ lag polynomial matrices. U_t is a vector of serially and mutually uncorrelated structural disturbances. After dividing the period into two different regimes, it is possible to apply the nonlinear TSVAR model to analyze the stock market's responses to different shocks. A VAR (p) model is formulated as follows:

$$\begin{aligned} Y_t &= \mu + A_1 Y_{t-1} + \dots + A_p Y_{t-p} + \varepsilon_t \quad (3) \\ A(L)Y_t &= \mu + \varepsilon_t \end{aligned}$$

$A(L)$ is the matrix of a lag polynomial of order p, and $\varepsilon_t \sim N(0, \Omega)$. Under the weak regularity conditions, a stationary process can be expressed as an invertible distributed lag of serially uncorrelated disturbances. Thus, Equation (3) can be written as follows:

$$Y_t = A^{-1}(L)\varepsilon_t \quad \text{and} \quad Y_t = B(L)\varepsilon_t \quad B_0 = 1 \quad (4)$$

The elements of ε_t are contemporaneously correlated. Thus, these elements cannot be represented as structural shocks. The elements of ε_t are orthogonalized by applying the restrictions. Hence, Equation (4) can be rewritten as follows:

$$Y_t = C(L)e_t \quad (5)$$

Given that B_0 is an identity matrix, the following formula is achieved using Equations (2) and (3):

$$\varepsilon_t = C_0 e_t \quad \text{and} \quad B_j C_0 = C_j \quad (6)$$

Then, the following formula is obtained by Equation (6):

$$B(L)C_0 = C(L) \quad (7)$$

In this case, the C_0 matrix contains twenty-five elements when the existing five endogenous variables are used in the system. The normalization of VAR (e_t) denotes that $\Omega = C_0 C_0'$. By applying eight restrictions [$C_{12} = C_{13} = C_{14} = C_{23} = C_{24} = C_{34} = C_{35} = C_{45} = 0$], the long run expression of Equation (3) can be written in the matrix form ($C_1 = \sum_{j=1}^{j=\infty} C_j$) as follows:

$$\begin{pmatrix} GSANCTION \\ GOIL \\ GEXC \\ INF \\ GSTOCK \end{pmatrix} = \begin{bmatrix} C_{11} & 0 & 0 & 0 & 0 \\ C_{21} & C_{22} & 0 & 0 & 0 \\ C_{31} & C_{32} & C_{33} & 0 & 0 \\ C_{41} & C_{42} & C_{43} & C_{44} & 0 \\ C_{51} & C_{52} & C_{53} & C_{54} & C_{55} \end{bmatrix} * \begin{bmatrix} e_t^{GSANCTION} \\ e_t^{GOIL} \\ e_t^{GEXC} \\ e_t^{INF} \\ e_t^{GSTOCK} \end{bmatrix} \quad (8)$$

$$\begin{pmatrix} GSANCTIONINS \\ GOIL \\ GEXC \\ INF \\ GSTOCK \end{pmatrix} = \begin{bmatrix} C_{11} & 0 & 0 & 0 & 0 \\ C_{21} & C_{22} & 0 & 0 & 0 \\ C_{31} & C_{32} & C_{33} & 0 & 0 \\ C_{41} & C_{42} & C_{43} & C_{44} & 0 \\ C_{51} & C_{52} & C_{53} & C_{54} & C_{55} \end{bmatrix} * \begin{bmatrix} e_t^{GSANCTIONINS} \\ e_t^{GOIL} \\ e_t^{GEXC} \\ e_t^{INF} \\ e_t^{GSTOCK} \end{bmatrix}$$

In this study, ε_t is characterized as the reduced form error associated with the five variables: growth of the sanction index, growth of oil revenues (as % of GDP), exchange rate growth, consumer price index growth (inflation), and the stock market growth. It is assumed that the

relationship between the reduced form and structural disturbances is recursive. The TSVAR model is estimated by testing the existing threshold structure. Hence, the hypothesis $C_2 = A_2 = B_2(L) = 0$ is first tested. However, the threshold value is not recognized under the null hypothesis (there is no threshold effect). Also, the distribution of traditional statistical tests becomes nonstandard due to the existing nuisance parameters. This issue has been solved by the following three steps proposed by Balke (2000). First, the threshold model is estimated by the least squares for all possible threshold values. Second, the Wald test statistics are calculated to determine the difference between regimes for each possible threshold value. Third, three different test statistics (i.e., Sup-Wald, Avg-Wald, and Exp-Wald) are considered and utilized with each other. The Sup-Wald statistic is the maximum Wald statistic over all possible threshold values. The Avg-Wald statistic is the average Wald statistic over all possible threshold values. The exp-Wald statistic is a function of the sum of exponential Wald statistics. The empirical distribution of the three statistics under the null hypothesis is obtained via the simulation method proposed by Hansen (1999). If the statistics are significant, a linear structure null hypothesis is rejected, and the threshold model is utilized to perform the analyses. Finally, the estimated threshold value is used to minimize the log determinant of the residual covariance matrix.

4. The Results

Before estimating the TSVAR model, the stationarity of the variables should be examined.

<<<<Please Insert Table 5 here>>>>

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As shown in Table 5, the Augmented-Dickey Fuller and Phillips-Perron tests have been used to evaluate the stationarity of the research variables. The t-statistic and probability level values are presented for all the variables. In the following and in Table 4, the results of the threshold significance test in the SVAR model are presented.

In the next step, it is necessary to set the lag length. In this case, the Schwarz, Akaike, and Hannan-Quinn criteria have been considered to determine the lag length. According to the results of the initial run of the VAR model, each of the three information criteria shows one optimal lag. Therefore, a test process has been developed to find whether the threshold value of the stock market growth is statistically significant. If it is statistically significant, the next step is to obtain the threshold value of the stock market growth. Thus, the nonlinear relationship between the stock

market and the other variables is analyzed. Using the TSVAR model without considering the institutional quality index, the threshold of the stock market growth is 28.72 percent annually. However, the threshold of the stock market growth was 35.73 percent, using the institutional quality index as an interaction term.

The nonlinear test results in Tables 6 and 7 show that all the Wald statistics reject the null hypothesis, and thus the models have threshold effects. The test statistics of the Sup-Wald, Avg-Wald, and Exp-Wald are significant for all the obtained threshold values. This issue demonstrates that the TSVAR model has the threshold value and divides the period into two regimes. Therefore, if the stock market growth is higher than their threshold values, the stock market growth is in the second regime. In contrast, if the stocks' market growth is lower than their threshold values, the stock market growth is in the first regime.

<<<<Please Insert Table 6 here>>>>

<<<<Please Insert Table 7 here>>>>

According to Tables 6 and 7, if the institutional quality index is considered in the model, the threshold of the stock market growth will increase. After approving the existing threshold effect and dividing the period into two regimes, the nonlinear impulse response function has been utilized to analyze the dynamic impacts of the sanctions growth, oil revenue (a % of GDP) growth, exchange rate growth, and inflation on the stock market growth. In another case, the moderating role of the institutional quality index in driving sanctions and other variables have been studied in the two regimes of the stock market growth. It is necessary to note that the responses to variables' shocks are under the conditions of plus or minus one and two standard deviations ($\pm 1SD$ and $\pm 2SD$) in two regimes. Thus, we first examine the bullish stock market responses to other variables' shocks.

4.1. Results of impulse response function in the bullish market

According to Figure 8, a positive shock to sanctions (i.e., tightening the sanctions) can increase the stock traded value in the short term. Additionally, a positive shock to oil revenues will

cause a short-term decline in the stock traded value, underscoring the importance of the oil sector in the Iranian economy at least in the short run. In fact, with the increase in oil revenues, the supply of foreign currency increases and causes the exchange rate to decrease and the value of the national currency (riyal) to increase. In this situation, the stock market listed companies that are export-oriented lose, which eventually causes the stock market index to decrease. In addition, in the condition of increasing oil revenues, the government no longer needs to sell its property and shares in the stock market to finance its expenses, and therefore, liquidity is prevented from entering this market and the stock market index drops. Positive shocks to the exchange rate (riyal/foreign currencies), which is a devaluation of the national currency the riyal, will also increase the stock traded value in the short term because it encourages exports but has a neutral effect in the long run. Also, a positive shock to inflation has a positive effect on the stock market only in the short run because higher prices increase profits in the short run but costs will catch up in the long run.

<<<<Please Insert Figure 8 here>>>>

4.2. Results of impulse response function in the bearish market

According to Figure 9, a positive shock to the sanctions in both the short and long terms has a positive effect on the stock market. on one hand, the export-oriented quasi-state-owned companies have a dominant role and a major weight in Iran's stock market. On the other hand, the intensification of sanctions will both isolate Iran's financial markets from international fluctuations and increase the exchange rate (depreciation of the riyal). Therefore, due to the export-oriented nature of these companies, an increase in the exchange rate enhances their profitability and ultimately increases the index of the Iranian stock market, and this effect is maintained both in the short term and in the long term.

<<<< Please Insert Figure 9 here>>>>

Moreover, a positive shock to oil revenues also has a negative impact on the stock market only in the short run. In fact, with the increase in oil revenues, the supply of the domestic currency increases and accelerates the value of the national currency (appreciation of the riyal). This issue causes losses for the export-oriented companies listed on the stock market and ultimately reduces the stock market index. In addition, oil revenues will increase when sanctions are reduced. In this

situation, the government does not sell its surplus property and shares in the companies listed on the stock market and does not have an incentive to finance through the stock market. This causes a decrease in liquidity in the market and finally a decrease in the stock market index. A rising exchange rate (depreciation) also positively affects the stock market in the short and long terms, and its impact has been greater in the short term. Rising inflation has only positively affected the stock market in the short run.

4.3. Results of impulse response function in the bullish market (with institutional quality):

In the following, the impulse response functions in the bullish market considering the institutional quality index is presented in Figure 10.

<<<<Please Insert Figure 10 here>>>>

Regarding the bullish market and considering the mediating role for institutional quality under sanctions, the positive shock of sanctions, despite the mediating role of institutional quality in the short and long term, has positively impacted the stock market. Because under the conditions of the tightening of the sanctions, the government has transferred the shares of state-owned companies to the private sector to meet its budget expenses, which has led to the entry of more liquidity into the stock market, leading to a growth in the stock market index. Also, a positive shock to oil revenues has had a negative impact on the stock market. Positive shocks to the exchange rate and inflation have only positively impacted the stock market in the short run. The difference between the response impulse functions in the bullish market (with considering the mediating role of institutional quality and without it) is merely in the impacts of sanctions. In fact, by considering the mediating role of institutional quality in moderating the sanctions, the sanction shock positively impacts the stock market in the long term. Still, without the institutional quality, only the positive shock of the sanctions has a short-term positive effect on the stock market. With increasing the sanctions, the stock market can be expected to have a long-term positive response if the institutional quality improves.

4.4. Results of impulse response function in the bearish market (with institutional quality)

<<<<Please Insert Figure 11 here>>>>

In the bearish market and also considering the mediating role of institutional quality in driving the sanctions condition, a positive shock to sanctions, despite the mediating role of institutional quality in the short and long term, has positively impacted the stock market. As mentioned above in the bullish market, this result is related to the government's attempts to sell state-owned companies to the private sector, which leads to an acceleration in liquidity and an increase in the entrance of liquidity to the stock market, leading to growth in the stock market index. Generally, it shows that regardless of the type of regimes that exists in Iran's stock market, the intensification of sanctions has led to an increase in the transfer of state-owned companies to the private sector, which ultimately increases the stock market index based on the mechanism that was explained.

Also, a positive shock to oil revenues has had a negative impact on the stock market. Positive shocks to exchange rates and inflation have also positively impacted the stock market in the short and long terms. The difference between the impulse response functions in the bearish market (without regard to the mediating role of institutional quality and concerning institutional quality) is merely in the effect of inflation. In fact, due to the mediating role of institutional quality in affecting the sanctions, there is a positive medium-term impact of inflation shock on the stock market; however, without considering the institutional quality, only the positive shock of inflation has a positive short-term positive effect on the stock market.

5. Conclusion and Policy Recommendations:

During the years post the Islamic revolution, Iran has always been subject to economic sanctions by the United States, the United Nations, and/or the European Union (sometimes by the United States alone and in some periods by all three) for various reasons. In the current study, the effect of positive and negative shocks to the sanctions index, oil revenues, exchange rate, and inflation on different regimes of Iranian stock market (bullish and bearish stock markets) in two cases with considering the mediating role of institutional quality in the sanctions index and without it has been investigated during the 1984-2020 period by using the threshold structural vector autoregression (TSVAR) model.

In this study, the sanctions index developed by Iranmanesh et al. (2021) has been used, and the principal component analysis (PCA) technique has been applied to estimate the multilateral institutional quality index. During the passing years after the Islamic revolution, sanctions on Iran's

economy, oil exports and financial transfers have been restricted, and in some years (2006-2015 and 2018-2020), the sanctions had intensified. With the increase of the sanctions and the consequent significant plunge in Iran's oil and gas exports, the government's budget deficit increased, particularly due to the loss of oil exports. To cover the increased budget deficit, the government intends to borrow from the domestic banking network. As a result, this would lead to a rise in inflation as a result of the increase in the monetary base. On the other hand, the main supply of foreign exchange (riyal/foreign currencies) in the Iranian economy comes from oil and gas exports. With restrictions on oil and gas exports, the supply of foreign exchange decreases and causes an increase in the exchange rate (devaluation of the national currency, the riyal).

Depending on the export or import orientation of the listed firms on the Iranian stock market, changes in exchange rates and inflation due to the shock of sanctions can affect these firms differently. The results show that in all regimes (bearish and bullish markets) and considering the mediating role of institutional quality in sanctions, the positive shocks to sanctions, exchange rate and inflation have a positive effect, while a positive shock to oil revenues has a negative impact on the stock market. But the difference between these two models is due to the period that has affected the stock market. According to the research results, the difference between the impulse response functions in the bullish market (considering the mediating role of institutional quality and without it) is only in the effect of the sanctions. In fact, through taking care of the mediating role of institutional quality in driving sanctions, the positive impact of the sanction shock on the stock market has been in the long-term. Still, without institutional quality, only the positive shock of sanctions has a short-term positive effect on the stock market.

The difference between the impulse response functions in the bullish market (concerning the mediating role of institutional quality and without it) is merely in the effect of inflation. In fact, through considering the mediating role of institutional quality in affecting the sanctions, the positive impact of the inflation shock on the stock market has been in the medium term. Still, without the institutional quality, only the positive shock of inflation has a positive short-term effect on the stock market. Accordingly, if the institutional quality also increases in the increasing sanctions condition, we can expect that a positive shock to the sanctions will lead to a long-term increase in the stock market. Also, in the bearish market, the positive shock of sanctions and exchange rates (depreciation of the riyal) can lead to long-term growth in the stock market.

Therefore, in this way, the threats posed by the sanctions will become an opportunity for investors to invest the Iranian stock market.

Based on the results of this study, it can be said that the presence of high institutional quality can have a positive effect on moderating the economic sanctions on the Iranian stock market (both bearish and bullish markets) in the medium and long terms. This would happen despite the fact that if the institutional quality is low, this positive effect will only exist in the short term. Therefore, if the government adopts appropriate policies to increase the institutional quality and the rule of law, it can significantly reduce the negative effect of sanctions on the stock market index.

In addition, due to the fact that a significant share of income of the Iranian government is dependent on the sale of oil, international sanctions have significantly increased the budget deficit. In such a situation, the government forces the central bank to print more money, or it sells its assets. It can cause a change in the stock market index by causing severe inflationary effects. In such a situation, the results of the present study show that if the institutional quality improves, despite the intensification of inflation caused by the sanctions, the stock market index will improve in the medium term. This would happen despite the fact that under the conditions of not considering the institutional quality, the increase in inflation caused by the sanctions can only cause growth in the stock market index in the short term. In addition, this issue clearly shows that the Iranian government should pay serious attention to reducing the share of oil revenues in the budget by diversifying its revenues in order to reduce the sale of crude oil and gas to avoid the negative effects of sanctions and other shocks.

Also, any improvements in institutional quality can help the listed companies avoid the negative effect of inflation from the sanctions on their profits and stocks through improving their firms' productivity. According to the results of this research, the increase in sanctions regardless of the Iranian stock market regimes has led to an increase in the stock index, but in terms of institutional quality, the increase in sanctions can lead to a long-term increase in the stock market index. However, in the conditions of lack of institutional quality, the increase in sanctions has only a short-term positive effect on the stock market.

As a key policy application, it can be said that financing the government's budget deficit through the offering of state-owned companies listed on the stock market, in the case of intensifying sanctions, requires the improvement of institutional quality. Because the results show

that only by improving the institutional quality, the long-term impact of sanctions on the stock market will be positive. Also, according to the results of this study, institutional quality has a decisive role in driving the effect of sanctions on the stock market, especially in conditions where the stock market is bullish. Therefore, it can be concluded that in a situation where the stock market is bullish, only by improving the quality of institutions, the effect of the sanctions on the stock market can be turned into a positive effect in the long term.

For future research, it is possible to examine the effect of sanctions on the stock market through the channel of monetary policy efficiency. In fact, positive and negative shocks to the sanctions can decrease and increase oil revenues, respectively. Oil revenues themselves lead to changes in money supply, and according to different schools of economics, money can affect inflation or production and influence the stock market through the channel of inflation and production. Also, in future studies, it is possible to first identify all the economic variables that are effective in moving the stock market, using the Bayesian averaging, and then proceed to design the sanctions shock transfer mechanism through the channel of the variables that are not fragile.

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Tables and Figures:

Table 1: Recent important events related to the sanctions on Iran	
The U.N. Security Council boycotts Iran over Iran's nuclear program - U.S. sanctions on some Iranian banks	July 2006
Some U.N. members have called for an end to cooperation with Melli Bank and Saderat Bank because of their impacts on financing Iran's nuclear and missile programs – Also, the members have authorized inspections of Iran's exports and imports by sea and air.	March 2008
The U.N. Security Council sanctions against Iran - A boycott of Iranian shipping and members called for a ban on establishing new banking branches and their transfers.	June 2010
The European Union and the United States have announced comprehensive oil and banking sanctions against Iran.	June 2012
An initial nuclear deal was reached.	November 2013
The comprehensive Nuclear-Test-Ban Treaty (JCPOA) was reached.	July 2015
Implementation of the Comprehensive Nuclear-Test-Ban Treaty was announced	January 2016
The United States withdrew from the nuclear deal unilaterally and re-imposed pre-nuclear sanctions on Iran.	May 2018
The United States announced the first part of sanctions against Iran.	August 2018
The United States announced the implementation of the second part of sanctions against Iran.	November 2018
Source: Research finding	

Variable	Definition	Source	Mean	Std. dev.	Minimum	Maximum	Median
Stock	Stocks traded, total value -	WDI	21,436,457,956	75,740,272,016	211,960,000	462,460,320,000	3,912,990,000
Exc	Exchange rate	CBI	22115	44044	580	228809	8323
Inf	Inflation	WDI	20.283	10.55	4.389	49.65	17.349
Oil	Oil Revenue (% of GDP)	CBI	0.0433	0.0506	0.00018	0.1684	0.0245
Sanction	An index constructed using fuzzy logic	Iranmanesh et al, (2021)	5.232	1.946	1.694	8.856	4.374
Ins	Institutional Quality- An index that is constructed using principal component analysis	ICRG- Research findings	4.242	0.951	2.698	5.614	4.123

Source: Research finding

Table 3: Factor loading results

	F1	F2	F3	F4	F5
Law- Law and Order	0.940	-0.038	0.142	-0.281	-0.130
Govst- Government Stability	0.643	0.732	-0.111	-0.194	0.014
Demo- Democratic Accountability	-0.841	-0.164	0.498	-0.122	0.060
Corr- Corruption	0.768	0.501	0.334	0.218	-0.004
Bq- Bureaucracy Quality	0.971	-0.017	-0.044	-0.135	0.190

Source: Research finding

Table 4: Factor loading results

	F1	F2	F3	F4	F5
Law- Law and Order	0.940	-0.038	0.142	-0.281	-0.130
Govst- Government Stability	0.643	0.732	-0.111	-0.194	0.014
Demo- Democratic Accountability	-0.841	-0.164	0.498	-0.122	0.060
Corr- Corruption	0.768	0.501	0.334	0.218	-0.004
Bq- Bureaucracy Quality	0.971	-0.017	-0.044	-0.135	0.190

Source: Research finding

Table 5: ADF-PP Unit Root Tests

Variable	Include in test Equation	ADF , PP t-statistic	Probability	Result
GSTOCK	Intercept	-3/21, -3/02	0/027-0/041	S
	Intercept and Trend	-3/64, -3/39	0/0403- 0/068	S
GSANCTION	Intercept	-3/895, -3/873	0/005, 0/005	S
	Intercept and Trend	-3/904, -3/908	0/022, 0/021	S
GOIL	Intercept	-6/121, -6/129	0/000, 0/000	S
	Intercept and Trend	-6/238, -6/243	0/000, 0/000	S
GEXC	Intercept	-4/822, -4/822	0/000, 0/000	S
	Intercept and Trend	-5/086, -5/082	0/001, 0/001	S
INFLATION	Intercept	-4/178, -4/075	0/002, 0/007	S
	Intercept and Trend	-4/119, -3/673	0/013, 0/042	S
GSANCTIONINS	Intercept	-3/987, -3/995	0/003, 0/003	S
	Intercept and Trend	-3/996, -4/029	0/017, 0/016	S

Source: Research finding

Table 6: Test for Threshold without Institutional quality

Test Statistics			Threshold Value
Wald Test	Value	p-value	28/72
Sup-Wald	201/85	0/000	
Avg-Wald	155/41	0/000	
Exp-Wald	99/83	0/000	

Source: Research finding

Table 7: Test for Threshold with Institutional quality

Test Statistics			Threshold Value
Wald Test	Value	p-value	35/73
Sup- Wald	215/79	0/000	
Avg- Wald	163/46	0/000	
Exp- Wald	104/53	0/000	

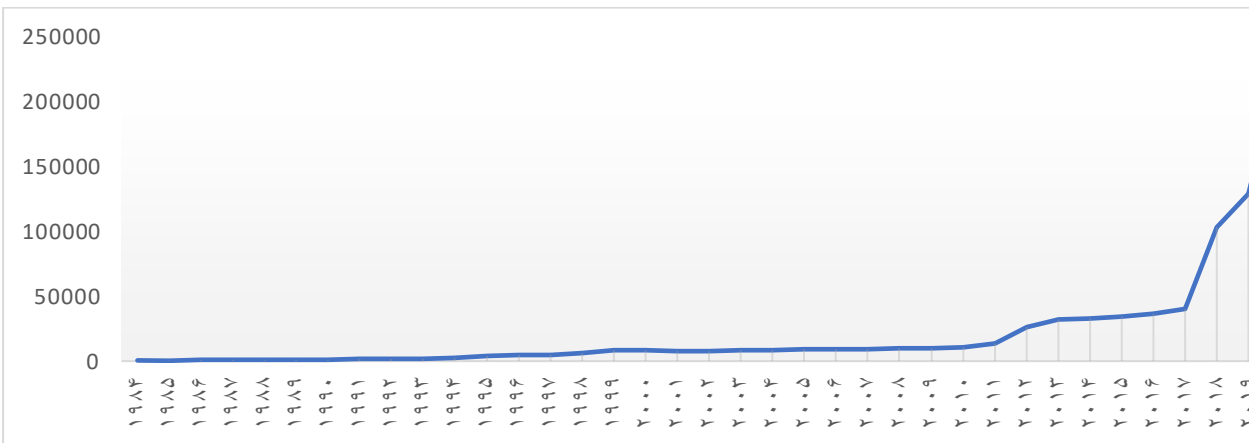
Source: Research finding

Figure 1: Inflation rate in Iran



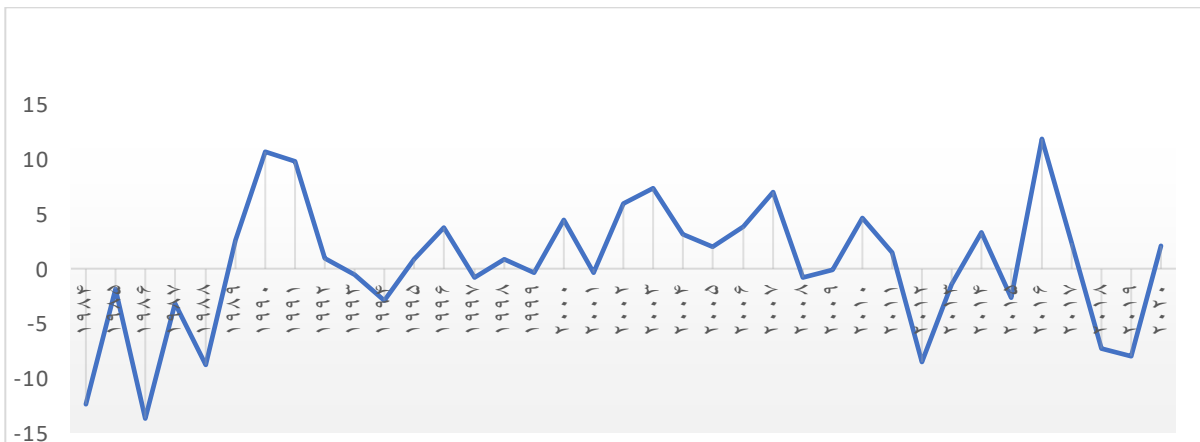
Source: World Bank

Figure 2: Exchange rate in Iran



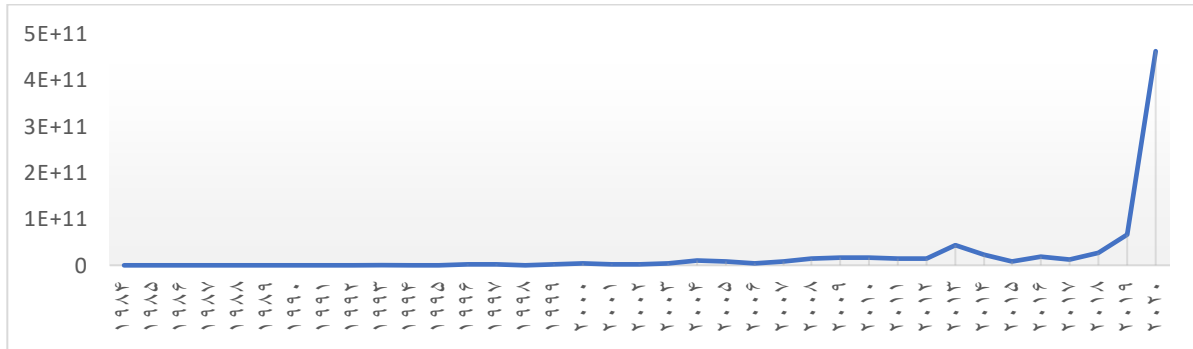
Source: Central Bank of Iran

Figure 3: Iran's GDP per capita growth



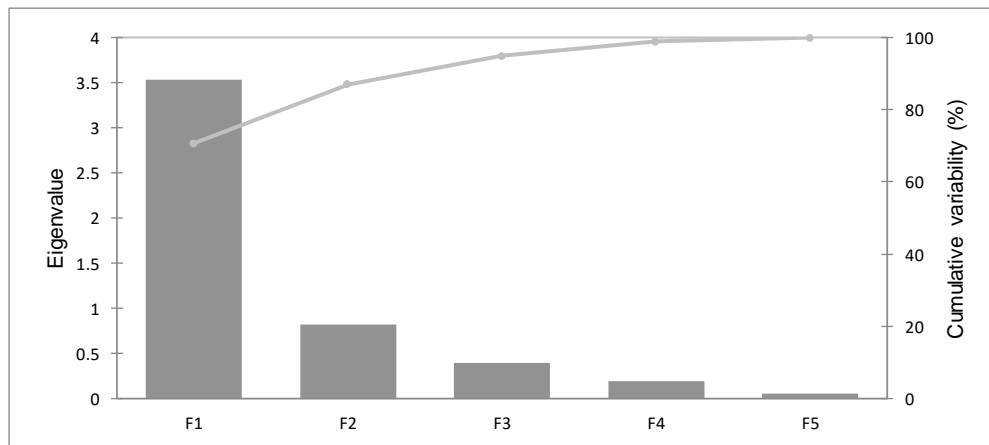
Source: World Bank

Figure 4: Stock Traded Value- U.S. Dollar



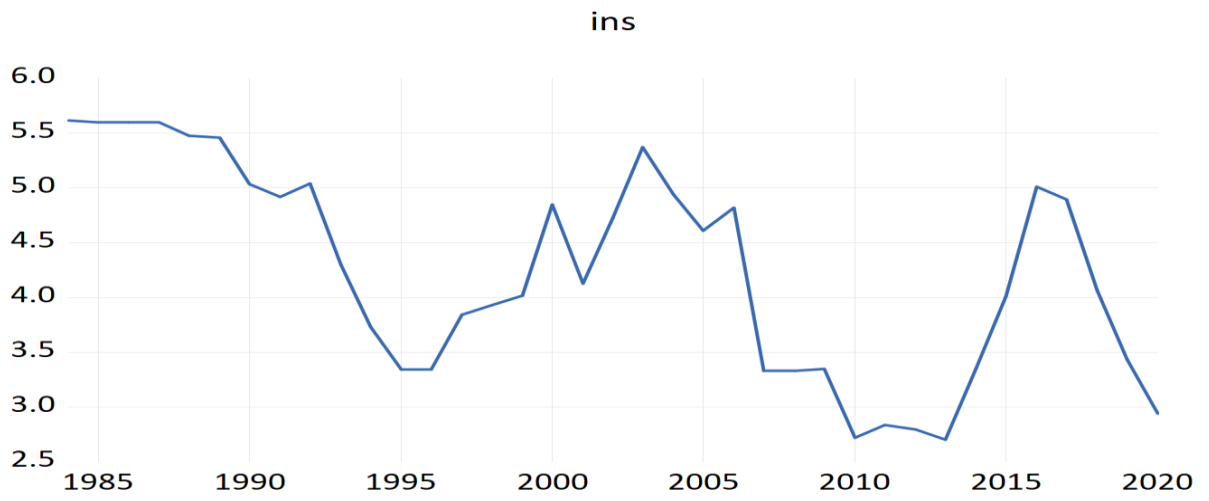
Source: World Bank

Figure 5: Screen plot



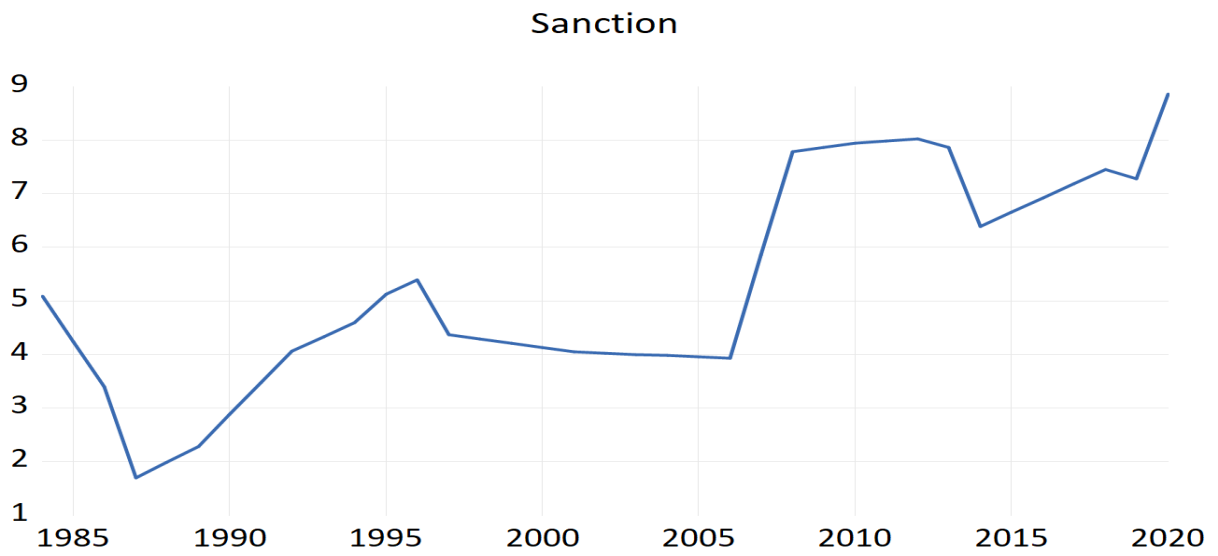
Source: Research finding.

Figure 6: Institutional quality in Iran



Source: Research finding. It is estimated using the PCA method.

Figure 7: The Sanction Index Trend



Source: Iranmanesh et al. (2021).

Figure 8: Impulse Response Functions in the Bullish Market



Source: Research finding.

Figure 9: Impulse Response Functions in the Bearish Market



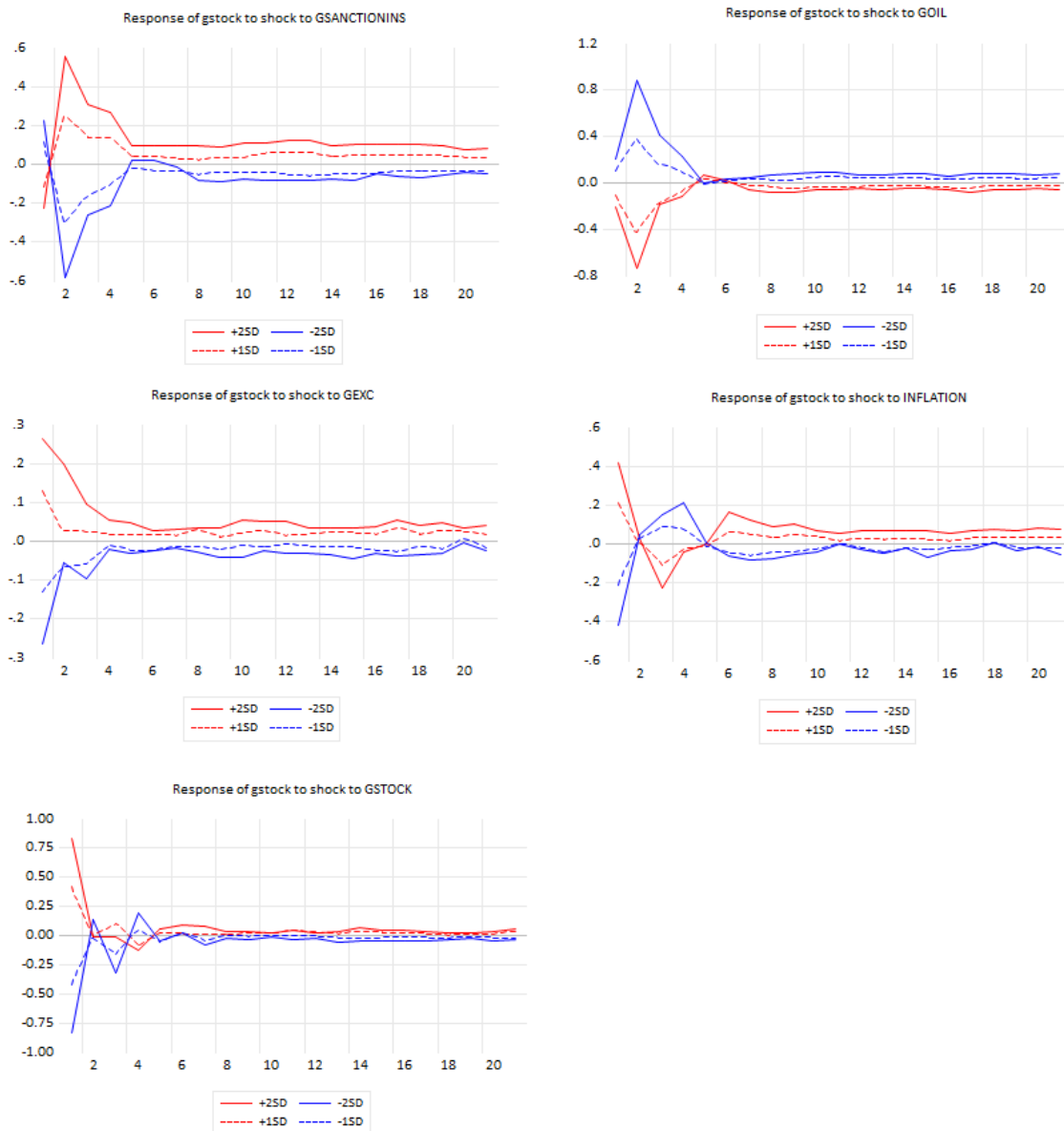
Source: Research finding.

Figure 10: Impulse Response Functions in the Bullish Market (with Considering Institutional Quality)



Source: Research finding.

Figure 11: Impulse Response Functions in the Bearish Market (with Considering Institutional Quality)



Source: Research finding.