The Effects of Coronavirus Outbreak on Fiscal Policy of Government and Economy of Iran (Using the Structural SVAR Model)

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Abstract

This study investigates the impact of Iranian government's expansionary fiscal policies on domestic production in Iran utilizing a Structural Vector AutoRegression (SVAR) model during the Coronavirus epidemic. The analysis spans the period from 1998 to 2020, providing a comprehensive evaluation of the scale and effectiveness of fiscal policies within the Iranian economy. The findings reveal that the fiscal shock, characterized by increased government spending during the initial phase of the epidemic, mitigated the adverse effects of the business depression, compensating for an average 38% decrease in domestic income. This underscores the significant role that fiscal and supportive policies played in stabilizing the economy during the crisis. However, the study highlights the importance of identifying sustainable revenue sources to prevent budget deficits, thereby assuring the long term efficacy of expansionary fiscal policies. The research provides policymakers with critical insights, underscoring the necessity of a balanced approach to fiscal expansion in response to economic shocks such as the Coronavirus epidemic.

Keywords: Covid-19 Disease, Iran's Economy, Fiscal Policy, Gross Domestic Product, SVAR Model .

JEL Classification: E42, E62, E63.

1. Introduction

The coronavirus disease outbreak presents new challenges for economists and policymakers. The economic shock of the outbreak in the final days of 2019 resulted in a decline in sales for numerous affiliated businesses. Meanwhile, the government tried to temporarily mitigate the negative economic effects of this outbreak on households by promising support. According to international reports, the Coronavirus outbreak has limited Iran's exports to neighboring countries. Consequently, while over half of the country's revenue is derived from regional trade channels, Iran's neighbors have closed their borders one after another. As a result, Iran's exports experienced a significant decline. In such an environment, intervention serves as the fiscal policy of governments on a large scale.

This study examines the effect of financial measures resulting from Coronavirus outbreak on the Iranian economy with structural vector Autoregression Model (SVAR) this feature. This model possesses several appealing attributes that are pertinent to a small, open economy like Iran. First, in this model, government expenditures are to some extent composed of imported goods, representing that government expenditures have a lower ratio as a result of higher import costs. Second, this model allocates government expenditures between spending goods and investment goods. Third, this model allows complementary private and public spending expenditures. The latter two features allow us to analyze the effects of these complementary on the size of government fiscal policy.

This study analyzes the effects of several financial shocks due to Coronavirus outbreak on the Iranian economy. This study, in particular, delineates the sources of financial diversity as 1) government investment, 2) government spending, 3) direct taxation, 4) indirect taxation, and 5) social benefits. The emphasis on financial measures is due to the fact that they are the primary instruments used by the national authorities of the Iranian government to monitor and influence the business cycle. Iran's fiscal policy is assumed to be under full control of the Central Bank.

A brief background may explain why we focus on fiscal policy actions. After the Islamic Revolution, Iran experienced two important financial interventions: A significant financial crisis ensued during the years of the imposed war, and a second crisis occurred from 2018 to 2020 as a result of economic sanctions, which introduced a recession into the Iranian economy. The government's fiscal policy programs were in existence prior to the outbreak. But how much Coronavirus has contributed to further development of government fiscal policies in Iran is a question that will be answered in this study.

1-1. Theoretical Foundations

Fiscal policy measures are intended to directly support domestic demand by increasing government expenditures, investment, and tax break, thereby temporarily mitigatingdeclining economic activity. However, the primary objective of the measures is to prevent companies from going insolvent, to reduce the workforce, and to maintain production capacity in the long term.

Specifically, for the Covid-19 outbreak, some measures are taken directly to ensure sustainability of the health care system and redistribution of government funds to support research to discover a cure for the virus.

Direct or indirect financial measures are permissible. Subsidies to companies, stock grants to businesses, tax exemptions, and cash unemployment benefits to households and independents are the primary direct measures that contribute to the long term sustainability of the health care system. These measures are the main focus of this study. The second part is indirect aids. These goals are mainly to help companies get new loans and solve their liquidity problems. Most of them are loan guarantees (Arigoni et al., 2020).

According to Arigoni et al. (2020), the Slovenian government implemented a series of measures estimated to be worth approximately one billion euros on March 9, 2020. These measures were primarily designed to offer liquidity to companies that were experiencing challenges in resolving their debts due to a lack of revenue. They consist mostly of loan rescheduling by regional development fund. Government guarantees and possibility of tax deferrals were also foreseen. Hence, the first set of measures consisted primarily of indirect measures. The government formulated the "Emergency Measures Act to Control the Covid-19 Epidemic and Reduce Its Consequences for Citizens and the Economy" in response to the deteriorating situation. The National Assembly approved the act on April 2. Additional measures taken at € 2 billion (4% of GDP) were estimated. These measures primarily included direct financial aid to maintain jobs.

According to Arigoni et al. (2020), the most important measures to protect jobs was recompensating the workers who were temporarily waiting for work and absence and exemption from premiums, while maintaining insurance premiums and benefits of social security funds. Pension benefits and disability insurance are paid by the Republic of Slovenia for working employees. The self-employed, who were unable to do their jobs due to the crisis, were granted exceptional benefits, including a base monthly income of €350 for March and €700 for April and May 2020. Compensation for sick leave during the epidemic was covered by the health insurance company rather than the employer. Companies were exempt from the requirement to make personal income tax prepayments from business income and corporate income tax prepayments. The payment deadline for payment to private suppliers from the public budget was reduced to 8 days. In addition, the second package contained measures to enhance corporate liquidity, support agriculture, and enhance the social status of individuals, among other measures.

## 1-2. Effects of Coronavirus on Domestic Economy of Iran

Taherinia and Hassanvand (2020) argued that the Covid-19 virus, by becoming a global epidemic virus, has many economic consequences and affects almost all countries of the world. Therefore, it is anticipated that the global economy will experience a significant recession in 2020. Meanwhile, Iran, like many of the countries affected by the global epidemic, is suffering as a resultconsequences. This prerequisite necessitates the consideration of the economic consequences of this disease on the Iranian economy, which has experienced two challenging years in 2018 and 2019 and is currently confronted with a global phenomenon.

Hossein Mennati (2016) argued that fiscal policies of governments are to reduce interest rates and also to reduce tax rates financially in order to encourage online businesses and implement quarantine.

Due to the decrease in Iran's oil exports from 2.8 million barrels per day (in 2018) to current situation with several hundred thousand barrels per day (in 2020), even before the Covid-19 outbreak, the country's officials knew well that they could not reduce the economic damages to households, especially low-income groups.

As indicated by international reports, Iran's exports to neighboring countries have been restricted by the Coronavirus outbreak. Accordingly, while more than half of the country's revenue is said to come from regional trade channels, Iran's neighbors have closed their borders one after another. Therefore, Iran's export is reducing significantly. Iran has been hesitant to restrict travel to China and vice versa since the initial report of the coronavirus outbreak in Wuhan, China in December, as China is its primary trading partner. This is due to the fact that approximately 23% of Iran's non-oil exports (more than $8 billion) were directed to China during the first eleven months of 2019. This is well illustrated in Figure 1.
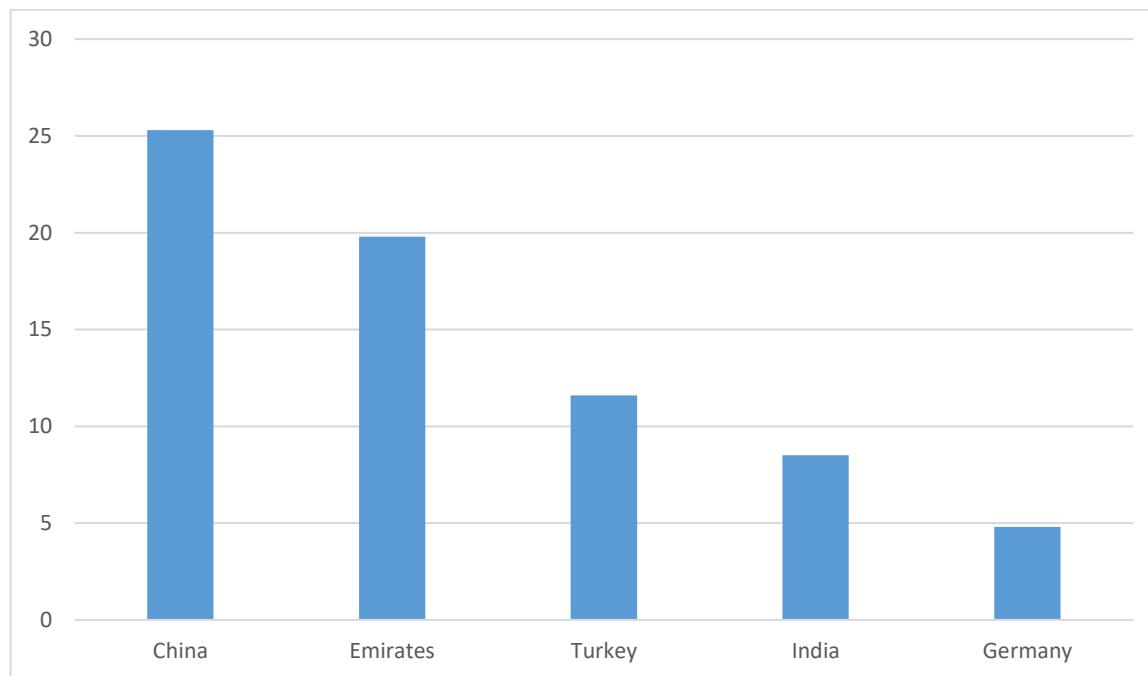
Figure 1. Main trade partners of Iran from 2018 to 2020

Source: Research findings

The International Monetary Fund also estimates that the value of rial has fallen by more than 50% since the United States withdrew from the nuclear deal. Inflation accelerated to 40% and large foreign companies left the country; according to the same estimate, Iran's economy shrank by 9.5% last year. Therefore, Iran's domestic economy has experienced turbulent conditions before the Coronavirus outbreak (Central Bank Economic Indicators, 2020, third period).

Furthermore, the Iran's 2020 budget has been developed at a rate of $50 per barrel of oil sales. Meanwhile, we are witnessing a drop in the price of Iranian heavy oil below $15 at the beginning of the year. According to realistic forecasts, the price of a barrel of oil in 2020 will be between $17 and $42 per barrel, which puts the average oil price between $20 and $25 this year. In general,

it appears that the budget deficit that results can cause significant disruptions in Iran's domestic economy. The government must cover the majority of the deficit through the issuance of securities, as per the 2020 budget. However, according to international institutions, governments should buy back treasury bonds to support the economy in times of crisis. This was done in developed countries, including the United States. In fact, analysts anticipate that the isolation of Iran's economy and the distance from international capital markets will result in the country relying on domestic financing. This could result in increased lending rates and increased budgetary pressure due to uncontrollable inflation (Central Bank Economic Indicators, 2020, third period).

Figure 2 shows the economic growth rate along with growth of government expenditure as a component of fiscal policy:
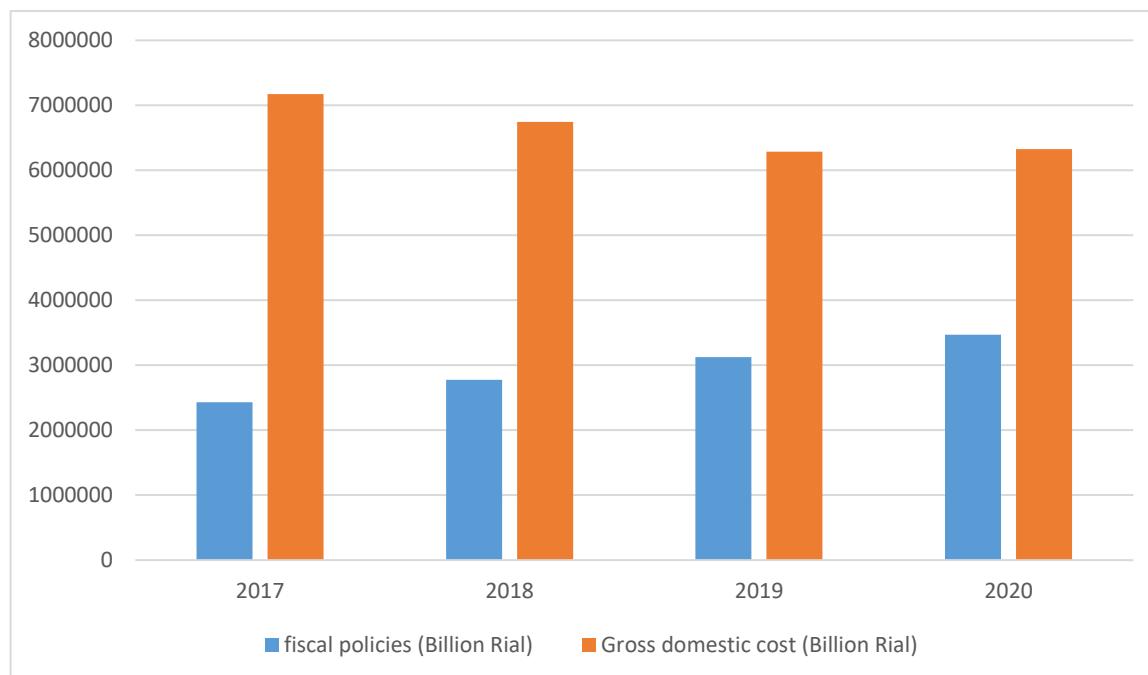
Figure 2. Domestic production along with annual expenditures of government fiscal policies from 2017 to 2020

Source: Research findings

Figure 2 clearly shows that since 2019, government expenditures have reached 50% of domestic production with Covid-19 outbreak, and even in 2020, growth of fiscal policies has reached an unprecedented 54% of domestic production, while in 2017, value of fiscal policies was 34% of domestic production.

The coronavirus crisis reduced business activity, as did government tax revenues. Therefore, the government budget deficit was the result of the reduced tax-paying capacity of economic activities, reduced oil prices, and the necessary measures to support businesses and individuals afflicted, as well as increased government expenditure on health services. Due to this and the increase in liquidity, inflation also took an upward trend.

1-3. Challenges of Iran's Economy in the Context of Coronavirus Crisis

It is undeniable that the coronavirus crisis will cast a shadow over Iran's economy and lead to a decrease in GDP. The Iranian government has announced that it has provided support tools to support the vulnerable groups, such as businesses affected by the current economic recession. Meanwhile, the government itself is facing problems such as budget deficits, foreign sanctions and falling global oil prices, which has left the effects of these supports in a state of ambiguity. Evidence suggests that the government's status as the largest economic actor in the country presents the initial obstacle to the development and implementation of appropriate incentives for Iranian businesses. Despite this, the government is expected to serve as a policymaker and overseer of economic sectors. This implies that direct incentives, such as grants, will primarily be allocated to state-owned or semi-state-owned companies that do not align with the primary objective of these support tools. According to information provided by the Central Bank of Iran, all commercial banks are required to extend low-interest loans for 10 job categories that have suffered the most from the Covid-19 outbreak (Jafari et al., 2020).

Meanwhile, the chairman of the Chamber of Trade Unions is of the opinion that the government should not solely concentrate on certain sectors of the economy, but should also provide economic incentives to all businesses. This is due to the fact that the devastating economic consequences of this crisis are expected to become apparent in the next three months. Although incentives such as deferral of loan installments and payment of VAT and incentives for employer insurance are provided, the government seems to focus more on low-income groups than on reducing the pressure on businesses. In other words, the government's response to the coronavirus (Covid-19) is more indicative of a focus on the public health crisis than on the economic crisis. The government's primary concern will be government funding, regardless of which aspect of the crisis it prioritizes. In fact, as explained, the lower the activity of businesses, the lower the tax revenues of the government, which leads to an increase in the government budget deficit. Inflationary effects will also put more pressure on the government's financial situation and the economy in general.

The government and central bank have implemented a series of measures to control the economic consequences of the coronavirus. These measures include the provision of 750,000 billion rials in loans to affected businesses at a preferential rate of 12%, 50,000 billion rials in unemployment insurance funds, a cash support package for low-income groups, a three-month deferral of repayment, the potential withdrawal from the National Development Fund for the supply of medicine and medical equipment, a request for a $5 billion loan from the International Monetary Fund, and a support package for taxpayers, including the extension of VAT due deadlines and a new quarterly deadline for debts. These measures have been implemented to varying degrees in other countries. But the important thing is that businesses in Iran, unlike most countries, have lost almost 3 high-yield months, which includes the market before and after Nowruz. In other words, the economic damage to households can continue in the coming months and even after the social distancing plan. Consequently, it seems that the businesses will not revert to their previous state by delaying the payment of loan and tax installments for a period of three months. Therefore, as noted in the previous section, not after the end of the crisis, a relative improvement cannot be expected in employment and welfare of families in general, at least in some specific jobs affected by the crisis (Central Bank Report, 2020).

On the other hand, volume of Iran's economic stimulus package was announced by the government as 100,000 billion tomans. The adequacy of this package to resolve the crisis and the location of its supply are two critical factors that can be inferred. The ratio of the magnitude of the stimulus package to the GDP of each country is measured to ensure comparability. Looking at the economic stimulus package of other countries affected, it can be seen that $2 trillion package of the United States is about 10% of the country's GDP. The economic stimulus package of other developed countries, including Japan and Germany, is slightly less than 19% of their GDP. Singapore's package is 13%, and Britain's package is approximately 4%. According to the Fitch Ratings, the ratio is about 30% for the Gulf countries, about 30% for Bahrain and Oman, about 10% for the UAE and Qatar, and 4% for Iran's regional rival, Saudi Arabia (Taherinia & Hassanvand, 2020).

According to available data, packages equal to 5% of the world's gross domestic product have been proposed by governments on average in about 75% of the world economy. This occurs in contrast to the economic stimulus program that Iran has proposed, which accounts for approximately 0.2% of GDP and 7% of the current year's budget. Moreover, according to economists, since Iran has not yet had a financial support package, this economic stimulus package is not a financial package, but a monetary policy package. However, according to the Fitch Ratings, a larger stimulus package will not necessarily lead to a relative improvement in welfare. For the latter, the location of its supply appears to be uncertain in light of the budget conditions of the current year and the items mentioned in this memo: a package that surpasses Iran's request for a loan from the IMF (World Economic Forum, 2020).

2. Literature Review

The Coronavirus pandemic has had a profound impact on economies worldwide, significantly influencing government fiscal policies. In Iran, the expansionary fiscal measures implemented during this crisis have played a crucial role indomestic production and economic conditions. This literature review synthesizes existing research to provide a comprehensive understanding of these impacts, predominantly utilizing the structural vector autoregression (SVAR) model for analysis.

Cugnasca & Rother (2015) examined the effect of financial integration on economic growth in the EU. They found that the size of financial ratio in different countries of the trade cycle, the degree of trade openness, composition of financial adjustment, and tight credit market varied significantly. Only a few integrating parts show the ratios above one.

Kilponen et al. (2015) estimated production ratios for alternative financial instruments in the euro region by simulating fifteen structural models. They discovered that the short term financial ratios of each country are invariably less than one.

Jafari et al. (2016) argued that the coronavirus outbreak in Iran has a great impact on domestic economy. According to economic experts in Iran, the story is a bit more complicated; on the supply side, the economy is facing downward pressure. The value chain of a diverse array of products is disrupted, and the production capacity of businesses is reduced as a result of a lack of inputs, as well as the disruption of international trade and domestic transportation. The economic effects of outbreak of this virus on businesses and economic activities in the country can be examined from different aspects. They argued that the borderless coronavirus has affected economic conditions, the prices of goods and commodities, the relationships between countries

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and their governments, the opinions of experts and economists worldwide, as well as the exports and imports of these countries in various fields.

Gornicka et al. (2018) implemented a quasi-natural experiment to simulate the behavior of financial ratios during GFC and the European sovereign debt crises (SDC) in the EU. They found that financial ratios increased over time, from about 4.1 to about 3.2. They do not find evidence that the financial ratios were significantly higher than 1.

The excess of national fiscal policies to other countries in the euro region was evaluated by Alloza et al. (2020). They found that the ratio of domestic (cumulative) expenditure was slightly less than one, while the average cumulative output response in one-euro region country relative to the increase in government trade weight in other euro region countries was approximately 0.4. However, the domestic ratios and the spillover between countries are inconsistent across the euro region. In addition, they found that reaction of interest rates to financial expansion is an important determinant of the amount of overflows.

Developing a model for social cost of Covid-19, La Torre et al. (2020) chose a social program to allocate tax revenues to prevention and treatment. Results indicated that optimism allocation is contingent upon epidemic infection.

Khan et al. (2020) examined the global repercussions of lockdown measures on the dairy industry. Not concentrating exclusively on Iran, their findings offer valuable insights into the sector-specific effects of fiscal policies related to the pandemic. Understanding these sectoral effects is crucial for evaluating overall economic performance in Iran, as certain industries are directly influenced by fiscal measures.

Rasoulinezhad (2020) analyzed how economies, including Iran's, have transformed in response to the Coronavirus outbreak. This study provides a better understanding of the broader economic implications and the associated fiscal policy responses, suggesting that the pandemic has caused structural changes in economic dynamics. Understanding these macroeconomic transformations is essential for a comprehensive evaluation of their effects on Iran's economy.

The SVAR model was employed by Arigoni et al. (2020) to examine the impact of the Covid-19 outbreak on the Slovenian economy. First, they simulated the layered shocks of the economy in a general equilibrium model and then used a small-scale SVAR model to test the strength of the theoretical results. The findings indicate that GDP and imports exhibit a significant response to significant shocks. In particular, the results highlight that, compared to other anticipated developments, the current government expenditure shock explains the shock share of domestic developments.

Dantas et al. (2020) conducted an investigation into the economic implications of social distancing during the Covid-19 pandemic, highlighting its considerable impact on economic activities. Their findings demonstrate that public health measures directly influence fiscal policy by affecting productivity and output. This relationship is crucial for comprehending the interconnections between Iran's fiscal policies, public health initiatives, and economic performance.

Bhutta et al. (2021) explored the challenges of reconciling scientific evidence with public policy in Pakistan's Covid-19 response. Their study emphasizes the necessity of evidence-based decision-making in crafting effective fiscal policies during health crises. These insights are

especially pertinent for the Iranian government's fiscal policy responses, emphasizing the importance of integrating scientific knowledge into policy formulation.

Khosravi et al. (2023) conducted a qualitative study on the function of the National Anti-Coronavirus Headquarters in Iran. This research provides insight into the policy mechanisms and institutions that are involved in responding to the pandemic. The findings contribute to a nuanced understanding of the operational aspects of government fiscal policies and emergency responses, which are vital for assessing the effectiveness of measures aimed at mitigating economic impacts.

The literature suggests that the Coronavirus pandemic has significant implications for Iran's fiscal policies and economic landscape. Future research should focus on developing comprehensive models that integrate these various dimensions to enhance understanding of the interplay between health crises and economic policy responses. Additionally, empirical research that employs SVAR models that are specific to Iran can offer a more sophisticated understanding of the causal relationships between fiscal policies and economic outcomes during the pandemic.

3. Research Model

This study first evaluated the VAR model in the scale of the Iranian economy for the period 1998 to 2020 to evaluate the size of fiscal policy scale ratio in the Iranian economy. During the Covid-19 epidemic, governments announced extensive measures to help the economy recover after a long lockout period. The fiscal policy scale ratio is quantified by employing the SVAR model. This model incorporates three endogenous variables: GDP, government expenditures, and net taxes collected by the Iranian government. It is important to recognize that government expenditure is comprised of government spending and government investment. This tax set consists of net social aids, direct taxes and indirect taxes. All variables are regarded as logarithmic. Two exogenous variables, degree of economic openness and gross capital formation, in the VAR model are estimated as follows:

$$GDP_t = \alpha_t + \beta_1 GDP_{t-1} + \beta_2 GOVX_{t-1} + \beta_3 TAX_{t-1} + \beta_4 CPI_{t-1} + \beta_5 INV_{t-1} + \beta_6 OPEN_{t-1} + \epsilon \tag{1}$$

According to Arigoni et al. (2020), the SVAR model is institutionalized as:

$$GDP_{t-1} = \alpha_t + \beta_1 GDP_{t-2} + \beta_2 GOVX_{t-1} + \beta_3 TAX_{t-1} + \beta_4 CPI_{t-1} + \beta_5 INV_{t-1} + \beta_6 OPEN_{t-1} + \epsilon_1$$

$$Govx_{t-1} = \alpha_t + \beta_1 GDP_{t-1} + \beta_2 GOVX_{t-2} + \beta_3 TAX_{t-1} + \beta_4 CPI_{t-1} + \beta_5 INV_{t-1} + \beta_6 OPEN_{t-1} + \epsilon_2$$

$$TAX_{t-1} = \alpha_t + \beta_1 GDP_{t-1} + \beta_2 GOVX_{t-1} + \beta_3 TAX_{t-2} + \beta_4 CPI_{t-1} + \beta_5 INV_{t-1} + \beta_6 OPEN_{t-1} + \epsilon_3$$

$$CPI_{t-1} = \alpha_t + \beta_1 GDP_{t-1} + \beta_2 GOVX_{t-1} + \beta_3 TAX_{t-1} + \beta_4 CPI_{t-2} + \beta_5 INV_{t-1} + \beta_6 OPEN_{t-1} + \epsilon_4 \tag{2}$$

$$INV_{t-1} = \alpha_t + \beta_1 GDP_{t-1} + \beta_2 GOVX_{t-1} + \beta_3 TAX_{t-1} + \beta_4 CPI_{t-1} + \beta_5 INV_{t-2} + \beta_6 OPEN_{t-1} + \epsilon_5$$

$$OPEN_{t-1} = \alpha_t + \beta_1 GDP_{t-1} + \beta_2 GOVX_{t-1} + \beta_3 TAX_{t-1} + \beta_4 CPI_{t-1} + \beta_5 INV_{t-1} + \beta_6 OPEN_{t-2} + \epsilon_6$$

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To identify the model, we adhere to Blanchard & Proti (2002). The reduced form residues that accumulate in the vector are generally associated. To identify orthogonal shocks and recover the effect of orthogonal structural shocks on government taxes and expenditures (u_t^{tax} and u_t^{govx}) on GDP, the identification equations can be expressed as such:

$$\epsilon_t^{tax} = a_1\epsilon_t^{gdp} + a_2u_t^{govx} + u_t^{tax}$$
$$\epsilon_t^{govx} = b_1\epsilon_t^{gdp} + b_2u_t^{tax} + u_t^{govx} \qquad (3)$$
$$\epsilon_t^{gdp} = c_1\epsilon_t^{tax} + c_2u_t^{govx} + u_t^{gdp}$$

Where u_t is the vector that denotes orthogonal structural shocks. After resetting and assuming that the identification scheme is depicted in Figure 4:

$$A\epsilon_t = Bu_t$$

According to Arigoni (2020) model, matrices A and B for SVAR model of Iranian economy can be constrained as follows:

$$A = \begin{bmatrix} 1 & 0 & -a1 & 0 & 0 & 0 \\ 0 & 1 & -b1 & 0 & 0 & 0 \\ -c1 & -c2 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & a2 & 0 & 0 & 0 & 0 \\ b2 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Following Delakorda et al. (2011), we impose the above constraints. In other words, we assume that government expenditures do not respond to a simultaneous increase in GDP. Since we have 6 equations, we can estimate 6 parameters in A and B. Once more, we adhere to Blanchard & Proti (2002) and ascertain the ratios a1, a2, b1, b2, c1, and c2. That is, we assume that taxes are not adjusted at the same time due to changes in government expenditures, and we will finally examine the response functions.

4. Model Analysis

Table 1 shows the results of descriptive statistics of variables:

Table 1. Results of descriptive statistics

Variable	Symbol	Mean	Max.	Min.	SD	Skewness	Jarque-Bera
Domestic production	GDP	15.49702	15.75293	15.04485	0.197364	-0.92506	0.188993

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Governme nt expenditur e	GOVX	13.34386	13.47661	13.13116	0.086998	-0.75749	0.332651
Tax	TAX	12.32702	14.20502	9.641142	1.394815	-0.32891	0.483069
Commodit y price index	CPI	4.360684	5.823736	2.74084	1.02555	0.004407	0.388283
Investment	INV	26.51793	27.23578	25.81178	0.376474	0.171329	0.805835
Openness degree	OPEN	20.18191	21.49983	17.56831	1.417442	-0.79496	0.193765

Source: Research findings

In the table above, logarithm of fixed capital formation from 1998 to 2020 is greater than the logarithm of current government expenditures and its tax revenue, on average. Additionally, the Jarque-Bera statistic indicates that the distribution of all data is normal.

Table 2 also depicts the results of data stationary test:

Table 2. Data stationarity test results

Variable	Test	Statistic	P-value	Stationarity
GDP	Generalized Dickey Fuller	-3.31709	0.0264	Stationary of zero degree
GOVX	Generalized Dickey Fuller	-2.10419	0.0368	Stationary of 1 degree
TAX	Generalized Dickey Fuller	-3.24917	0.0305	Stationary of zero degree
CPI	Generalized Dickey Fuller	-2.20294	0.0202	Stationary of 1 degree
INV	Generalized Dickey Fuller	-3.655	0.0009	Stationary of 1 degree
OPEN	Generalized Dickey Fuller	-4.00088	0.007	Stationary of zero degree

Source: Research findings

As the results of stationarity test showed, all variables became stationary either at the level or with a single differentiation, and according to Johansen-Juselius (1992) theory, regression methods can be used.

The results of estimating the VAR model are shown in Table 3. The results of the VAR model estimation indicate that current government expenditures (GOVX) have a positive and significant effect on GDP. Specifically, Iran's real GDP increased by an average of 0.8% for every 1% increase in fiscal policies. The effect of 1% tax increase (TAX) as a contractionary fiscal policy will reduce GDP by 0.13%.

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Table 3. Results of estimating the VAR model

Variable	Ratio	SD	T-value
GDP(-1)	0.151472	0.19641	[0.77122]
GDP(-2)	-1.61589	0.21216	[-7.61646]
GOVX(-1)	0.801815	0.14051	[5.70656]
GOVX(-2)	0.720437	0.2911	[2.47486]
TAX(-1)	0.050773	0.07509	[0.67620]
TAX(-2)	0.139333	0.05228	[2.66535]
CPI(-1)	-0.614306	0.14612	[- 4.20399]
CPI (-2)	-0.47243	0.14155	[-3.33756]
INV(-1)	0.063944	0.05019	[1.27410]
INV (-2)	0.298016	0.05419	[5.49944]
OPEN(-1)	-0.02617	0.03864	[-0.67737]
OPEN (-2)	-0.02126	0.03741	[-0.56820]
C	6.217631	2.55629	[2.43229]
R^2	0.995964		
F-value	164.5167 (0.0000)		

Source: Research findings

Moreover, investment had a positive and significant effect on GDP, so that 1% increase in fixed capital formation will grow GDP by an average of 0.29%. Finally, it can be asserted that in general, the effect of coefficients of the estimated variables on the dependent variable has the requisite validity (P-value<0.05).

But in the VAR model, selecting the amount of break and accuracy of the model requires performing the tests discussed in Table 4. Section A of Table 4 shows the results of cointegration test, which indicates that there is at most one long-term relationship in the estimated form of Table 3 between the variables. According to the results of the VAR model break selection test in Section B, the optimal number of model breaks is 2. This is based on the three Schwartz, Akaike, and Henan-Quinn criteria.

Table 4. The results of break detection and accuracy of VAR model

A) Cointegration test

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Number of equations between variables	Eigenvalues	Johansen	Critical values	P-value
None *	0.629394	35.79941	29.79707	0.009
At most 1 *	0.465817	15.94712	15.49471	0.0527
B) Break selection test				

Number	LogL	LR	FPE	AIC	SC	HQ
0	44.33546	NA	1.62E-08	-3.74624	-3.49754	-3.69226
1	149.2652	149.8997	8.71E-12	-11.3586	-9.86642	-11.0348
2	215.6335	63.20784*	2.78e-13*	-15.29843*	-12.56277*	-14.70472*
C) Stationarity test of roots of the reduced form of VAR model						

Inverse Roots of AR Characteristic Polynomial

Source: Research findings

Section C of Table 4 shows stationarity test of the roots of the reduced form of VAR model. The estimated model's convergence was demonstrated by the fact that all of the roots of the reduced form of the VAR model are contained within a circle with a single radius. According to the results of the tests in Table 4, validity of the VAR model can be accepted, based on which, the SVAR model is estimated.

Table 5 shows the results of estimating the matrix of coefficients A and B of the SVAR model:

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Table 5. Results of estimating the SVAR model

| Model: Ae = Bu where E[uu']=I				
A =				
1	0	$-a1$	0	0
0	1	$-b1$	0	0
$-c1$	$-c2$	1	0	0
0	0	0	1	0
0	0	0	0	1
B =				
1	$a2$	0	0	0
$b2$	1	0	0	0
0	0	1	0	0
0	0	0	1	0
0	0	0	0	1
Including the restriction(s)				
S =				
1	NA	NA	NA	NA
NA	1	NA	NA	NA
NA	NA	1	NA	NA
NA	NA	NA	1	NA
NA	NA	NA	NA	1
Variable	Factor	SD	Z-value	P-value
c1	-73.9107	1.535368	-48.1387	0.000
c2	38.68983	1.595224	24.25355	0.000
a1	27.46506	2.453233	11.19545	0.000
b1	10.29468	0.231814	44.4093	0.000
b2	0.366146	0.038751	9.448783	0.000
a2	2.602254	0.261045	9.968592	0.000
Log likelihood	6594.307			
LR Lagrange coefficient test:				

Chi-square(19)	171.0879	Probability	0.000

Source: Research findings

In Table 5, the estimated coefficients of the SVAR model including the impact factor of tax on GDP (c1), are -73.9 and are statistically significant. The impact factor of government expenditure on GDP (c2) is 38.6, which is statistically significant. Moreover, the impact factor of government expenditure on tax revenue (a2) is 2.6, and the impact factor of tax revenue on government expenditure (b2) is 0.36, all of which are significant.

Therefore, it can be interpreted that an average of 38% decrease in national income due to business recession is compensated due to the shock of increasing fiscal policy during the Coronavirus epidemic, including the increase in government expenditure during the first period. However, only 2.6% of the decrease in government tax revenues that occurred during the outbreak will be compensated in the event of such a shock. Therefore, with the increase in fiscal and supportive policies during the outbreak, the government should definitely be able to consider revenue sources to prevent the budget deficit during the outbreak in order to have an effective expansionary fiscal policy.

However, the aforementioned results will be more tangible if we also consider the response function diagrams of the SVAR model: response functions of Figure 3 illustrates the production to government expenditure (GOVX) shocks, taxes (TX), investment (INV), and an increasing trade balance (OPEN). The response of production to government expenditure shocks indicates that domestic production, which represents the income of Iranians, increased in the first and second periods as a result of the positive shock caused by government aid during the Coronavirus outbreak. However, it will gradually decrease from the third period onward due to the shock of fiscal policy. The effect of tax reduction shock will also lead to expansionary fiscal policy and a boom in production in the short term, and the shock effect will be neutralized over the second period. However, trade balance and investment shocks during the Coronavirus epidemic will start their effects on domestic production from the second period and will lead to a boom gradually until the fourth period. Finally, these shocks will be dampened from the fifth period and will be reduced to zero. It should be noted, however, that the phenomenon of shock effect damping in the response functions of the VAR and SVAR models is indicative of the reduced form's stationarity and enhances the validity of the estimates.

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.
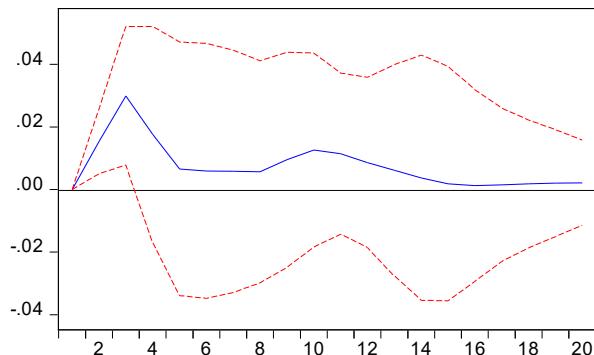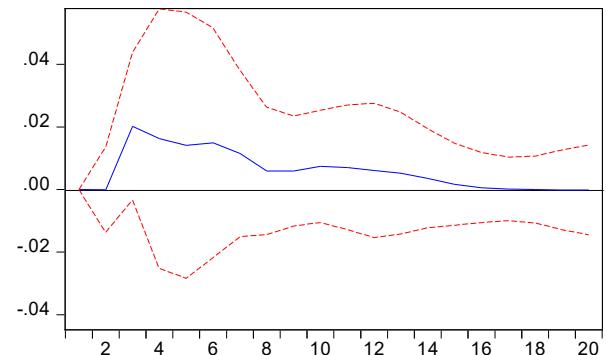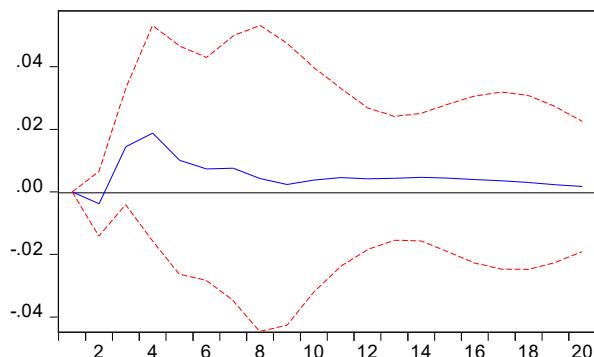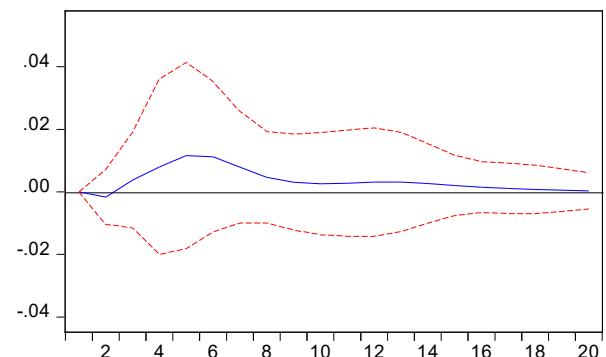
Figure 3. Results of response functions of the SVAR model

Source: Research findings

5. Conclusion

The present study investigated the effect of expansionary fiscal policies of the government during the Coronavirus epidemic on domestic gross of the Iranian economy based on a structural vector model. Government fiscal policies include two components: government expenditures and adjustment of tax rates. Expansionary fiscal policy may involve the provision of support packages to the public or reducing tax rates and increasing rebates for businesses that have been impacted by the crisis, such as the coronavirus outbreak. However, considering the productive foundations of Iran's economy, the extent to which this fiscal policy shock has had a positive effect on Iran's domestic production was a question that was addressed through model analysis. We concluded that the impact of the outbreak's heightened fiscal policy on domestic production can be compensated by a 38% decrease in national income as a result of the business recession. In such a shock, only 2.6% of the reduction in government tax revenues during the outbreak will be compensated.

On the other hand, Iran's real GDP will grow by an average of 0.8% with 1% increase in fiscal policies. The effect of tax deductions on the increase in domestic production during the outbreak can lead to a growth of up to 0.13% in domestic production of the Iranian economy. To achieve these effects of expansionary fiscal policy, it is recommended that the government allocate the requisite financial resources to prevent a budget deficit. Meanwhile, solutions such as reducing the transfer of government capital assets or withdrawing from the National Development Fund may serve as an economic justification for preventing a budget deficit, albeit only for the Coronavirus outbreak, which is a form of national crisis.

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