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Examination and Comparison of the Economic Effects of Spillovers of Investment Risk in Iran: Computable General Equilibrium Model Approach

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Abstract

Investment is very important for economic and social development and is considered as one of the powerful levers for achieving development. Accordingly, it is of great importance to assess the investment risk and its spillovers in all developed and developing countries because the risk phenomenon is one of the key features of decision making in the field of investment, affairs related to financial markets and a variety of economic activities. In this regard, the present paper evaluates the effect of investment risk spillover on key economic indicators using a computable general equilibrium (CGE) model, GTAP.9 data base and the 2011 inter-regional social accounting matrix (SAM). Two scenarios of 10 and 3% increase in investment risk were considered in order to investigate the effect of these changes according to a recent trend analysis of economic indicators in Iran and the trend of the Iranian economy towards globalization and opening of the economy windows. The results show that both scenarios of increasing investment risk reduce inflation, gross domestic product and total investment. Government expenditures are reduced in all sectors of the economy except the service sector, which is almost unchanged. The exports are increased in all sectors and the imports are reduced in sectors of agriculture, industry and services. Also, the results show that the import of the oil and gas sector has not been heavily influenced by the investment risk due to its governmental status. By assessing these two scenarios and the sensitivity of the macroeconomic indicators to the degree of risk change, it can be stated that the key economic indicators will be significantly improved by managing the risk of investment; and the country will ultimately follow the development path more quickly.

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1. Introduction

Controlling and monitoring financial risk have been considered by many businessmen, policy makers and financial market researchers in recent years. The main concern of the activists is related to the large incompatible movement in the market through financial risk monitoring. Extreme market dynamics indicate a huge movement of capital among market participants, in which the bankruptcy of some market participants is inevitable. The existence of extensive communication between financial markets vindicates the monitoring and control of risk in various markets. In trade and exchanges between the two countries, as there are some spillovers such as technology and investment spillovers that can have beneficial effects on the country, this could also lead to spillover of risk, which have adverse effects on the economic structure of the country. Risk spillovers in Iran's economy can affect the economy of the country through the oil and foreign exchange markets, but given the fact that these two spillovers result in spillovers of investment risk, the focus of the spillovers in this study are based on investment risk spillover. Global literature suggests that, generally, as technological and investment spillovers are from large to small economies, risk spillovers are also in the same direction. The research seeks to answer the following questions: (1) Does investment risk spillovers affect macroeconomic indicators in Iran? and (2) To what extent is the impact of risk spillovers on the indicators of inflation, production, government expenses, imports, exports, total investment and the welfare? To answer the questions, the framework of the article is presented as follows: (1) The introduction; (2) the literature review; (3) The methodology and model, (4) The model calibration; and at the end, (5) The conclusion.

2. Literature review

Several studies have been conducted worldwide and in Iran, on the subject matter of the paper, some of which are dealt with in this section.

Shakeibaei and Teimori (2012) applied new risk management tool, Value at Risk (VaR) methodology and granger causality test for risk spillover effect examination in US dollar exchange and oil market. Pursuant to market risk, their results showed that there is no strong interaction between oil and US dollar exchange.

Mc Dougall et al. (2012) in an article entitled mechanism of general equilibrium and the real exchange rate in the global trade analysis project (GTAP) model, suggested that, because different economic sectors are interconnected, the impact of shock in one part of the economy can be found in other parts. According to the results of this paper, the initial increase in the exchange rate will increase exports and change the trade balance.

Alsakka and Gwilym (2013) analyzed sovereign credit spillover and effects (change of rating, outlook and watches signals) on two sample exchange markets in Europe and Central Asia between 2000 and 2010. Their results showed that these credit events guide the own-country rate of exchange, and

also caused strong spillover effects for exchange rate of other countries in the region.

Bedendo and Colla (2013) provided practical information for credit risk spillover from the complete to non-financial corporate part testing credit default swap data at the time of the European debt markets latest turmoil. They proved there is a connected credit risk of non-financial firms with sovereign risk growth. They also showed that government control firms which their markets are mostly domestic and are based more on bank financing and are affected more adversely by a country's credit quality deterioration.

Chen et al. (2015) in an article on subject of spillover of tail risk and its tail to systemic risk: global reinsurers network analysis, analyzed dependence of short-run tail risk among global reinsurers and its relation with reinsurance industry systemic risk. They used the VaR to compute each reinsurer tail risk and form network for the tail risk among global reinsurers based on Granger causality tests. The results showed that interconnect global reinsurer tail risk is a common subject for insurance industry and economy shocks: the latter has a smaller effect than the former.

Du and He (2015) investigated the extreme risks spillovers between stock and oil markets. VaR is employed to measure market risk with the base of Granger causality in risk method. Experimental results showed significant risk spillovers between two markets.

Lin and Li (2015) investigated both volatility effects of spillover and price across oil and natural gas markets of Japan, USA and Europe in a comprehensive VEC–MGARCH framework. In all areas, the spillover price presence from oil markets to natural gas markets is supported by their results but there is no reverse relationship. It was also found that in both US and Europe, the volatility in oil market seems to spillover to the natural gas market and vice versa. In contrast, in Japan, oil market and natural gas volatility seems to be independent.

Jalaee et al. (2016) examined the exchange rate effects on employment and investment in Iran, based on the GTAP 8 dataset using a CGE model. The results showed that the total investment in all areas examined is in line with exchange rate changes. Also, positive exchange rate shocks can increase overall employment rate.

Dreassi et al. (2016) investigated spillovers of credit risk to the insurance segment, based on European sovereign debt crisis and analyzed credit default swap (CDS) variation which spreads. They found that the insurers' credit risk through their asset holdings increased with debt crisis and the banking sector spillovers amplified this effect.

Vergote (2016) have presented time-varying contagion indices of credit risk spillover and feedback between 64 financials and sovereigns in the Euro area, where spillover is identified based on bilateral Granger causality regressions. The results have shown that in particular the run-up to the financial

crisis and the more intense phases of the crisis were associated with credit risk contagion and feedback.

Poon et al. (2017) examined the impact of the sovereign risk international spillover on bank credit risk, through both a ratings channel and an asset holdings channel. In the first case, the downgrade of sovereign ratings in GIIPS (Greece, Italy, Ireland, Portugal and Spain) countries led to rating downgrades of banks in the peripheral countries. The second channel indicates that larger asset holdings of GIIPS debt increased the credit risk of cross-border banks and, hence, the probabilities of downgrade.

Wang et al. (2017) proposed an extreme risk spillover network for analysis of the interconnectedness across financial institutions by using the VaR and the Granger causality risk test. They found that extreme risk spillover networks have a time-lag effect. Both the static and dynamic networks show that on average, the real estate and bank sectors are net senders of extreme risk spillovers and the insurance and diversified financial sectors are net recipients, which coheres with evidence from the recent global financial crisis.

Heidari et al. (2017) investigated macroeconomic and sectoral effects of labor immigration in Iran, applying a CGE model. The results showed that both skilled and unskilled labor immigration lead to reduction in economic growth, investment and capital return. This also reduces the production of various economic sectors.

Gharibnavaz and Waschik (2017) detailed the latest international sanctions against Iran which was imposed by a group of developed countries, using a CGE model. Their study found based on the GTAP 8 dataset, that international sanctions reduced aggregate Iranian welfare by 14–15%. The government of Iran observed a decrease in real revenue of 40–50%, expected from sanction large negative effects against Iran oil segment. Phimister and Roberts (2017) explored the CGE models exogenous shocks uncertainty importance. Their results showed that the uncertainty limitation can affect the estimation impact magnitude with some variables more sensitive to uncertainty than others.

3. Methodology and Model

The GTAP is a static model without any dynamic effects of technological change, capital stock and population growth. Social activities and inter-sectoral and inter-regional exchanges consist of two components of the main equations consisting of accounting relationships and behavioral equations. The accounting relationships include data available in the social accounting, data-output matrix tables, and equations trend signify model economic factors manner which shows regional investment, savings, consumption and production. There are four economic factors in each zone, which includes the household representative of the region, private households, government and firms. The regional household has the basic elements used in the production of firms. The regional household income is sum of the sales value of the production factors and the types of taxes and tariffs allocated to these revenues for savings, the private household and the

state based on a Cobb Douglas function. In standard closure of GTAP, each component of final demand maintains roughly a total regional income constant share. So, when regional income increases, it makes a (roughly) equiproportional change in private, government expenditures and savings. Private households and the government, having received income from the regional household, buy the goods and services they need from domestic and foreign markets. The demand for private households is evaluated based on the constant difference elasticity (CDE) function, which was originally provided by Hanoch (1975); therefore, the private household demand will have a non-homothetic type, which, together with income changes, will not be a constant share of the cost of various goods in the household budget. The government's consumption demand functions are extracted using a Cobb Douglas function, which has a constant share of the cost of various goods. Firms use goods and factor inputs including labor, capital, land and natural resources for different goods and services production. There are five production factors which include capital and natural resources, unskilled labor, skilled labor and land. All the factors, except land and natural resources, are fully mobile across different sections, but none of them is tradable or has international mobility. Selling these goods occurs inside and outside each region. Based on standard closure for the GTAP, all the sectors of production: land, labor, capital and natural resources, and all prices are determined within the framework of the model, in other words, they are endogenous. The numeracies in the GTAP model is the world price index of primary factors, which is usually exogenous and is the weighted average of the price of the factors of production in all regions. It should be noted that depending on the type of research, it is possible to assume different macro closures.

In the general equilibrium model which can be calculated for the implementation and application of each scenario, a change is required in the model standard closure. In other words, combination of the endogenous and exogenous variables of the model must be changed. In addition, the number of functions must be equal to the number of unknowns so that the system can be solved. Therefore, the classification of variables in the closing of each model depends on the economic problem, in a way which is in line with the purpose and policy. The first new function which is considered in the table and shows the effect of internal equilibrium on product changes is the function of the initial factors.

$$qo(i, r) = qocom(i) + qoreg(r) + qoall(i , r) \quad (1)$$

In equation (1), *qo(i,r)* is the percentage change in the amount of product related to the initial commodity i in the region r and is determined by three factors that are normally exogenous in the standard GTAP. Adding this new function and shifter makes it easier to isolate the internal and external balance. These three primary factors in the regions *r* and *qoall* are the percentage change in the amount of the product related to the factor in the region r.

The second new equation introduces another closure variable, which is the total actual per capita consumption (*uc*) as the sum of government spending and private sector. It should be noted that for the separation of curves foreign equilibrium (FE) and balance of payments (BP), the variable *uc* is used. Adding an equation to define this variable expresses its endogenousity in the GTAP standard closure.

AGGEXPAND (r). uc(r) = PRIVEXP (r). up(r) + GOVEXP (r). ug(r) (2)

In equation (2), *uc(r)* is the per capita consumption utility of the government and private sectors in the region r. This endogenous variable is divided into *up(r)* and *ug(r),* which are the per capita consumption of the private and government sectors, respectively.

The two remaining variables that are effective in the closure are *dpsave* and *pfactor(r). dpsave* represents the growth rate of a part of the income that affects the savings distribution based on the savings equation in the region r. Also, the change in *dpsave* affects the balance of investment-savings.

Psave (r)+ qsave (r)- y (r)=uelas (r)+dpsave (r) (3)

In equation (3), *psave* is the percentage change in the saving price in the region r, *qsave (r)* is the change percentage in regional demand for net savings, *y(r)* is the change percentage in the regional household income in the region r, *uelas* is the elasticity of the cost relative to the changes in desirability and *dpsave (r)* is the savings distribution parameter.

The intended shock is applied by the variable *pfactor* which is the weighted average of the relative price of the production factors. This variable, which is an appropriate index to show the real exchange rate, is considered by the equations (4), (5) and (6) in the standard
closure.

$$VENDWWLD \cdot pfactor(r) = \sum_{i \in END-COM} (VOM(i,r) \cdot pm(i,r)) \quad (4)$$

Equation (4) calculates the percentage of changes in the primary price index in each region. In this equation, pfactor(r) is the primary market price index in the region r (average weight of the variety of production factors revenue), VENDWWLD(r) is the global value of the primary factors, VOM (i,r) is the value of the product i in the market price in the region r and *pm(i,r)* is the market price of the commodity i in the region r.
Equation (5) specifies the rate of actual return of the primary factor i in the region r.

$$pfactorreal(i, s) = pm(i, s) - ppriv(s) \quad (5)$$

In equation (5), *pfactorreal (i,r)* is the difference between the rate of return of the primary factor i and the growth rate consumer price index (CPI), *pm(i,s)* is

the market price of the factor i in the region s, *pprive(s)* is the price index for the private sector's consumption expenditure.
The equation (6) calculates the percentage of change in the global price index of the primary factors.

$$VENDWWLD.pfactwld = \sum_{r \in REG} (VENDWrEG(r).pfactor(r)) \quad (6)$$

In equation (6), *pfactwld* is the percentage of change in the global price index of the primary factors.

$$VENDWWLD = \sum_{i \in END-COMM} (VENDWrEG(r) \quad (7)$$

In equation (7), VENDWREG(r), the value of the primary factors for the market price in each region, is obtained endogenously through equation (8).

$$VENDWrEG = \sum_{i \in ENDw-COMM} VOM(i,r) \quad (8)$$

In the standard closure of the GTAP model, qoreg and dpsave are exogenous; while pfactor and *uc(r)* are defined endogenously. On the other hand, the curve FE and BP are analyzed through the relationship between consumption and real exchange rate. Hence, the exogeneity of consumption and the real exchange rate in the model are essential. To apply these modifications, there is also need to change the model closure; so that the transition parameters are endogenous. So, using the replacement equations, consider uc exogenous and dpsave endogenous; so that these equations can enable the model to change the total savings. It also makes pfactor exogenous and qoreg endogenous so that it is possible to change at the level of the primary factors.

Labor is one of the primary factors behind which price has changed followed by the exogenous changes of pfactor in this study. In the general equilibrium model, demand and supply of labor are determined, respectively, by the regional firm and household. Therefore, according to Equations (9) and (10), the demand and supply of this factor and employment in general are affected.

qfe(i,j,r)= -afe(i,j,r)+qva(j,r) -ESUBVA(j)*[pfe(i,j,r)-afe(i,j,r)- pva(j,r)] (9)

In Equation (9), *qfe (i,j,r)* is the demand for the factor i in the section j and the region r, *afe(i,j,r)* is the technical progress related to factor i in the section j and the region r, *pva(j,r)* is the value added price of the firm in section j in the region r, *pfe(i,j,r)* is the price of production factor i in section j and the region r.

$$ps(i,r) = to(i,r) + pm(i,r) \quad (10)$$

In equation (10), *ps(i,r)* is the supply price of the primary production factor i in the region r, *to(i,r)* is the tax on the supply of the primary factor and *pm(i,r)* is the market price of the factors. With change in regional household income, one of the ways to achieve it is the sale of primary production factors and

savings will also change. On the other hand, in the GTAP model, according to Walras law, savings and investment are equal. So, to change the regional household income, investment will also change. Equations (11) and (12) illustrate how the regional household income changes, following change in the price of the primary factors of production, and the allocation of that income between private consumption expenditure, government and savings.

$$FY(r)*fincome(r)VDEP(r) * [pcgds(r) + kb(r)] = \sum_{ENDWMENT} VOM(i,r) * [pm(i,r) + qo(i,r)] \quad (11)$$

Where, *FY(r)* is the net income from sales of the production factors in the region r, *fincome(r)* is the growth rate of FY. *Vom(i,r)* is the value of selling the factors of production to the market price, *qo(i,r)* is the amount of the supply of factor i in the region r, *VDEP(r)* is the value of depreciation of capital in the region r, *kb(r)* is the growth rate of the beginning capital stock in the region r and *pcgds(r)* is the price of capital goods.

Regional household income is distributed on the basis of a Cobb-Douglas function, between private households, government and savings. Therefore, the regional household demand system is expressed in accordance with Equation (12).

$$dpav(r)= XSHRPRIV(r) * dppriv(r)+ XSHRGOV(r) *dpgov(r)+ XSHRSAVE(r) *dpsave(r) \quad (12)$$

Where, *dpav(r)* is the average transmission of distribution parameter in the region r, *XSHRPRIV (r)* is the share of private households cost in total cost (or total regional household income), XSHRGOV(r) is the share of government expenditure. *XSHRSAVE(r)* is the savings share, *dpprive(r)* is the private household consumption distribution parameter, *dpgov(r)* is the government consumption distribution parameter and *dpsave(r)* is the saving distribution parameter in the region r.

In the risk model we assume that the global bank equalizes expected risk-adjusted rates of return, so that risk-adjusted rates for all regions are equal to some global average.

$$NRE(r)/ RER(r) = WWAR \quad (13)$$

NRE (r) is a non-risk-adjusted expected rate of return.

\ is the ratio of equilibrium returns in region r which represents the global average rate of return. Estimated ratio is above 1 for high-risk countries and is below 1 for the safe ones. It is noteworthy that this variable is a ratio. WWAR represent a weighted average of returns around the world.

If we write it as below,

$$NRE(r) = WWAR * RER (r) \quad (14)$$

Then by total differentiation and division through by NRE(r) we can obtain

$$nre(r) = wwar + rer(r) \quad (15)$$

When the variables changes are in percentage, in the case where NREDELTA=1 the analogue of equation is:

$$nre(r) = wwar + cgdslack(r) \quad (16)$$

This equation shows that the rate of return percentage changes on investment in region r equals global rate of return percentage change plus a disequilibrium factor which is mainly exogenous and in general equilibrium fixed as zero.

When the existence of disequilibrium is allowed in the capital goods market, the *cgdslack* variable is non-zero. The *cgdslack* is not practical for other purposes such as exogenous and unshocked in a general equilibrium closure.

4. Model Calibration

In this study, the criterion of risk spillover and its channel is investment. Given that one part of the investment is from external sources, it can transfer the risk from the outside to the other part or from one part to the other. In this study, the effect of spillover risk on the indicators firstly affected by risk was studied and, secondly, these indicators could affect other variables.

4.1 Aggregate GTAP data

Data in GTAP is introduced AS 8 production factors, 57 sectors and 140 regions. In this research, the information is in the form of the 2011 inter-regional Social Accounting Matrix, which uses the latest version of GTAP.9[1]. The database contains all the exogenous variable values and parameters and the endogenous variable equilibrium values. Model is estimated by GEMPACK package. Sectors, regions and factors of production details are presented in Table 1. As Iran has a small economy, investment risk generation in it would not affect other zones like European Union, USA, the Middle East, etc. So, they were not set apart. It should be noted that the revenue from the sale of natural resources in the social accounting matrix of the year 2011 is based on the Purdue University database.

Table 1. Model Details

Aggregate	Subset
Sectors	Agriculture, Oil and Gas, Industry, Services
Regions	Iran, Rest of world
Production factors	Labor, Capital, Land, Natural Resources

1https://www.gtap.agecon.purdue.edu/databases/v9/default.asp

The scenarios in this study are two which are an increase of 10 and 3% of investment risk. In each of these scenarios, CGE model was employed to analyze the effects of the investment risk on inflation, GDP, government expenditures, imports, exports, employment, total investment and the welfare. The 3% increase scenario is based on past trends of risk changes. An increase of 10% is the highest degree of risk change which can be achieved by comparing the normal process and the 10% momentum of the change. In fact, the goal was not to examine symmetric changes.

4.2 First scenario: 10% increase in investment risk spillover

In this scenario, the authors considered 10% of the imported risk based on the past trend of the Iranian economic system, which, of course, can be achieved by using the VaR method.

As shown in Table 2, the investment risk spillover has a negative impact on government spending related to agriculture, industry, gas and oil, with a preponderance of agriculture, oil and gas sectors. This is because the agricultural sector plays an alternative role in the government and contributes to the oil and gas sector. Nevertheless, the service sector inherently has not only been negatively affected, but also positively, due to sluggish changes. One of the reasons is that the activities of this sector are more labor-intensive.

Shocked, imports in agriculture, industry and services have declined. Given that about 85% of Iran's imports are intermediate and capital goods, as well as agricultural and industrial sectors are dependent on imports of these types of goods; therefore, due to the shrinking investment, the import volumes of these sectors as a result of decrease in the ability to buy them will be reduced. However, the oil and gas sector has not only diminished, but also increased due to its oil revenues and government spending. The service sector, like the industrial and agricultural sector, has been less able to buy and, as a result, has reduced its imports.

Exports have increased in all sectors as these sectors compensate for investment-related shortages in investment through increased exports. On the other hand, the effect of investment on exports will occur over a long period. As the oil sector is a public one, it is affected less than the others in raising export by investment. The reason for not reducing oil and gas imports is the low sensitivity of this section of the economy to price changes as well as the weak response of this sector to investment impacts, given the key role of long-term investments in the oil and gas sector. Also, the increase in exports is due to a decline in the general level of prices due to the real exchange rate behavior in the economy.

Table 2. The results of a 10% increase in investment risk on macroeconomic variables (percent)

	Agriculture Sector	Oil and Gas Sector	Industry Sector	Service Sector
Government Expenditure	-2.15	-2.55	-1.92	0.06
Imports	-3.99	0.79	-5.53	-5.57
Exports	10.17	1.34	11.43	9.58
Employment	1.49	2.24	2.33	-1.20

Source: Researcher's findings

As shown in Table 3, with a 10% investment risk shock, inflation dropped to 2.02%. Given the indirect relationship between risk and investment, the risk involved will reduce the investment that stimulates the demand side of the economy, thereby affecting the demand side of the economy and therefore has a negative impact on inflation.

GDP declined by 0.34%. The reason is that in the Iranian economy, because of the government's economy and the high share of the state in the economy, production is more based on sectors that are state-owned. Therefore, the overwhelming impact of the risk of investment by the nongovernmental sector on production is diminishing, but this decline is not very significant due to the higher share of the government.

The total investment dropped to 7.76%, which is quite natural because there is always a significant and indirect relationship between investment risk and amount of investment. Reduction in investment is more likely to decrease other indicators, and this due to the impact of spillover risks directly on investment itself. Therefore, considering that the impact of spillover of investment risk on the investment is negative and also negatively affects the main sectors of the economy, including the agricultural sector, the welfare also decreases. As investment through government expenditures as well as imports has negative effects on agricultural and industrial sectors and, on the other hand, much of the population is dependent on these two economic areas, and the welfare is directly related to people's lives, therefore, the total welfare decreased (757.14 million dollars).

Table 3. The results of a 10% increase in investment risk on Inflation, GDP, total Investment (percent) And Welfare (million dollars)

	Inflation	GDP	Investment	Welfare
Iran	-2.02	-0.34	-7.76	-757.14
Rest of the world	0.01	0	0.04	515.35

Source: Researcher's findings

4.3 Second scenario: 3% increase in investment risk spillover

In this scenario, the risk was reduced from 10 to 3% to show if the sensitivity of the research indicators to degree of risk change is significant.

As shown in Tables 4 and 5, the sectors firstly showed a large response in the same direction, and secondly, determined how much modulation policies in the area of investment risk can affect making decisions on the effect of investing in economic sectors. Therefore, adjusting the risk index can substantially modulate the sectors of GDP, government spending, inflation, imports, exports, employment, total investment and welfare.

Table 4. The results of a 3% increase in investment risk on macroeconomic variables (percent)

	Agriculture Sector	Oil and Gas Sector	Industry Sector	Service Sector
Government Expenditure	-0.69	-0.81	-0.61	0.01
Imports	-1.28	0.24	-1.75	-1.79
Exports	3.11	0.44	3.47	2.9
Employment	0.46	0.71	0.72	-۰.37

Source: Researcher's findings

Table 5. The results of a 3% increase in investment risk on Inflation, GDP, Total Investment (percent) And Welfare (million dollars)

	Inflation	GDP	Investment	Welfare
Iran	-0.64	-0.11	-2.42	-243.48
Rest of world	0	0	0.01	167.54

Source: Researcher's findings

As shown in Tables 2 and 4, in the 3 and 10% impacts of investment risk, employment in agriculture, oil and gas industry sectors, where labor mobility is less has undergone a normal process, but the service sector has been experiencing a decline in employment due to more labor mobility.

5. Conclusion

As today's world moves towards opening more economy doors and the process of globalization occurs with greater acceleration, one of the factors resulting from the process of globalization on the economies is risk spillover. The risks spill from different regions of the world to a country or a region. This research aimed to answer these questions: 1- Does the investment risk spillover influence macro-economic variables in Iran? and, 2- How much is the impact of risk spillover on the inflation, production, government spending, import, export, total investment and welfare?

Proper estimation was done to answer the two questions of the research, and the results have shown that the existence of the main economic variables of the investment risk have influenced cases such as the inflation, gross domestic product, government spending, import, export, total investment and the welfare. Due to the existence of crowding out between the government spending and investment, it has negatively affected different economic sectors by creation of

investment risk. It reduces the inflation and gross domestic production, and because the total investment is directly under the influence of investment risks, it was greatly reduced.

Welfare, which is a function of income and the prices, by reducing the amount of investment because of the risk, followed by reducing the general price level and the reduction of real income, led to decrease in the income of private households and thus, reduced private consumption by them; therefore, the total welfare is reduced. With increased shock, the import of all economic sectors except the oil and gas sector, were reduced, because this section is completely state-owned. In turn, the export increased in all the sectors. In this study, in order to measure the sensitivity of variables towards the risk variable, the impact of risk spillover on the desired variables of the research in two scenarios of 3 and 10%were studied. The 3% increase scenario is based on past trends of risk changes. An increase of 10% is the highest degree of risk change which can be achieved by comparing the normal process and the 10% momentum of the change. In fact, the goal was not to examine symmetric changes.

It is concluded that, firstly, the main economic variables react to the change of the risk extent, and secondly, their sensitivity is remarkable. So, if in the economic system of Iran, the risk extent is managed, then the macroeconomic indexes will show notable reaction towards improvement.

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