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Present a model determining the oil market transferability turmoil on the financial markets of the Iranian economy (Dynamic systems approach)

Ahmad Farhadi, Mehrzad Minouei*, Gholamreza Zomordian

Department of Financial Management, Central Tehran Branch, Islamic Azad University, Tehran, Iran

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Abstract

A model for determining the oil market transferability turmoil on the financial markets of the Iranian economy using the dynamic systems approach. At first, data related to oil, gold, stock exchange and foreign exchange were extracted from statistics related to the World Bank, Central Bank and Statistics Center of Iran and were analyzed with statistical analysis and simulation software. Then the research model was constructed using simulation methods and system analysis and the results were analyzed. The oil market in supply and demand for price determination is based on global systemic behavior. this simulation has used the factors affecting oil supply, oil demand, the expectations that shape this supply and demand, as well as macro factors such as macroeconomic indicators of the US economy, sanctions on the oil sector in Iran, the rate of world industry development and the available knowledge on oil substitution. Hidden mechanisms are the main reason for some oil price behaviors. The results of the research have led to the forecast of oil prices in the baseline scenario until 2025. The presence of political problems due to the interconnectedness of parallel markets in Iran causes widespread fluctuations in the currency and gold sectors in the Iranian economy

Keywords: Fluctuation Contagion, Oil Market, Financial Market, Dynamic Systems
2020 MSC: 91G15, 37N40

1 Introduction

The oil sector in the world today is one of the most important sectors affecting the global economy. This impact is doubly important in the economies of oil-dependent countries such as Iran. This makes the oil prices and their impact on financial markets and government development and current expenditures as one of the most important issues in Iran, so that any unexpected increase or decrease in oil prices will lead to a change in oil revenues, which in turn, directly affects the country's economy and, if the right economic policies are not implemented, will lead to crisis and economic imbalance. Over the past three decades, oil prices have changed dramatically; Oil prices rose about 76 percent between March 2007 and June 2008 and then fell 48 percent between June and October 2008 [19]. Crude oil prices also averaged less than $100 a barrel in 2011, and fell to $55 a barrel in 2019. Therefore, these drastic changes in oil prices can affect markets, including the stock market in a country such as Iran as one of the major oil exporters. At

*Corresponding author
Email addresses: farhadi.app@gmail.com (Ahmad Farhadi), m.m2525034@yahoo.com, omm1344@yahoo.com (Mehrzad Minouei), gh.zomorodian@gmail.com (Gholamreza Zomordian)

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present, Iranian oil is under the most severe sanctions, which have reduced oil exports and thus reduced oil revenues. This affects investors in oil markets, fluctuations in financial markets such as stocks, gold, currency and prices of various commodities in the market and government expenditures and revenues, and causes disruption in the Iranian economy and makes it more difficult to control the economy, because with a view on a country macroeconomics structure and the different markets in each economy it can be seen that the capital markets are among the most fundamental markets in any economy. Undoubtedly, the conditions of these markets are strongly influenced by other sectors and can affect other sectors of the economy as well. The oil sector does not function the same in all countries; in some countries, such as Iran; the oil revenues has not solved the problems of the country's economy and has made the country dependent on this revenue; however, in developed countries like the United States and Norway, the effect is different. The reason is the management of oil revenues. The current paper carefully examines the oil sector and financial markets where there is an spillover between these markets and the oil sector to analyze solutions to optimize the management of oil revenues and identification of channels of contagion of effects among financial markets and then adopt optimal fiscal policies to reduce negative effects.

The oil sector does not have the same function in all countries; In some countries, such as Iran; The existence of oil revenues has not solved the problems of the country's economy and has made the country dependent on this revenue; But in developed countries like the United States and Norway, the effect is different. The reason for this is the management of oil revenues. The present study carefully examines the oil sector and financial markets where there is an overflow between these markets and the oil sector; Following the analysis of solutions to optimize the management of oil revenues and identification of channels of transmission of effects among financial markets; Adopts optimal fiscal policies to reduce negative effects.

Major research has been conducted to examine fluctuation contagion on the financial markets through retrospective econometric models; in this case, the dynamic nature of the fluctuations is lost due to different statistical analyzes in the construction and estimation of the model based on the consistency characteristics of variance and lack of alignment; on the other hand, the trends observed in financial markets are not a continuation of past financial trends and it is not possible to examine the continuation of market trends based on past statistical data. Accordingly, the current paper aims at modeling the Iranian economy in the form of dynamic system models. Dynamic models have many advantages over other economics models. In these models, the main variables of the model are affected by environmental variables and different loops of the model are strengthened or weakened; This distinguishes dynamic models from other existing models. Accordingly, first, we examine the concept of spillover of fluctuations and how to transfer it in the financial markets of Iran. Then, we address the concept of financial contagion and the available literature. on the subject will be examined. In the end, we present the research method and simulate the research model based on default scenarios.

2 Theoretical foundations and research backgrand

2.1 Spillover of fluctuations in market

Today, whatever is experienced in one market affects other markets. This has focused researchers on understanding how shocks and spillovers fluctuate from one market to another [2]. On the other hand, the intensity and direction of shocks and spillovers fluctuations may be affected by structural failures in fluctuations [4].

Typically, the occurrence of a shock or the presence of an impulse or a shock in one market affects other markets, and this has led researchers to try to figure out how shocks and fluctuations are transmitted from one market to another. In general, by looking at time series, we can see that often these time series in a period or periods under the influence of economic, political, social, domestic and glob-al events, such as financial crises, oil shocks, political instability, war, or sudden changes in foreign ex-change policies fluctuate sharply. So that these events sometimes remain in the markets for a long time. Fluctuations in a market cause the investor to want to revise and adjust their portfolio and change the composition of their portfolio assets. This exacerbates the turmoil in the crisis market and also transmits fluctuations and shocks to other markets. With these explanations, the correct pricing of financial assets and the correct diagnosis of fluctuations, improving the forecast of future price fluctuations, optimal allocation of resources and optimal selection of the portfolio are important.

The relationship between the oil, stock, currency and gold markets and the power of risk transfer between them is strongly influenced by the news and the stability of volatility in a market, and their prices are inherently related to the economy. The stability of the upward trend in oil prices and the fluctuations in the upward trend of gold prices in the last decade have created an important relationship between efficiency and strengthening the volatility transmission among the four markets. It is natural to expect prices or volatility between oil prices and the stock market to be related in asset pricing models. Asymmetric good and bad news in the markets also means that the asymmetric acceptance

of good and bad news in a market, for example in the oil market, can be important and effective in strengthening and measuring the amount of risk between markets. Dynamics may change over time due to structural changes in the economy and the foundations that drive these markets. Therefore, it is important to consider the possibility of random changes or differences in the time frame of these prices or their associated volatility [9].

Structural failure in volatility can be justified by various reasons such as natural, economic, social or political events. Accurate understanding of the time sequence relationship between markets will be useful for financial market participants and policymakers. Volatility in oil prices affect consumer behavior, which directly affects the performance of the overall economy.

2.2 Financial contagion

There are many theoretical explanations of financial contagion in the financial literature. Most studies interpret financial contagion as highly coordinated movements that result from the rational behavior of actors in failed market environments such as asymmetric information, heterogeneous information, imperfect competition, wealth and borrowing constraints, risk-bearing capacity, and so on, or it is attributed to irrational decisions by the same market participants such as herd behavior. For example, Valdes [22] states that when a crisis in one market can reduce the liquidity of market participants, investors may be forced to sell their assets in other markets in the face of Margin Call (It is a warning that the brokerage firm gives to its client in order to increase the amount of capital in its credit account and to bring the ratio between loan and capital to a certain level.) to increase de-posits or other legal requirements to rebalance their portfolio. Kodres and Pritsker [13], noting that rebalancing between market and asymmetric information is the root of financial contagion, argue that balancing the inter-market portfolio of a portfolio of different market assets can serve as a channel for financial contagion. Gromb and Vayanos in [12], and Kyle and Xiong in [14] argue that financial contagion can occur when financial intermediaries suffer from adverse shocks to their portfolio position (A portfolio position that refers to what the investor has, including all of assets and liabilities, as well as shares borrowed from others and sold.) so that their portfolio value is below the risk tolerance threshold. Yuan [23] showed that price correlation movements are due to asymmetric information reactions and borrowing constraints. Broner, Gelos and Reinhart [4, 22] presented a model in which rebalancing the investor portfolio can serve as a channel for crisis contagion.

The World Bank classification provides three definitions of contagion, as follows:

1. Broad definition
   Contagion is the contagion of shocks among countries or markets. Contagion can occur in both good and bad times; Therefore, contagion does not have to be crisis-related. However, the phenomenon of contagion is more emphasized in times of crisis.
2. Narrow Definition
   Contagion refers to the contagion of shocks to other markets or countries, regardless of the underlying links between them. This definition usually refers to the simultaneous extreme movements of markets and is generally explained by herd behavior.
3. Most narrow definition
   Contagion occurs when correlations between markets increase in times of crisis compared to correlations in relaxed times.

Given the above definitions, there are two types of contagion in the financial literature:

1. Mechanical Contagion that is the result of financial and real dependence among markets or countries [3].
2. Psychological Contagion that focuses on investor behavior [6].

Investor behavior plays a central role in the process of shocks contagion, especially in the phenomenon of financial contagion. Thus, it is believed that investors can make decisions that are rational based on their personal predictions, and this in itself leads to simultaneous and extreme movements in the markets.

2.3 Literature review

Eydizadeh and Samadi in [10] say that we achieve this goal, after designing a dynamic model and simulating its behavior, the future status of this industry was studied according to the current conditions. Eventually, different policies were designed to better understand the conditions needed to achieve the goals of the industry in 2025. The

results of solving the basic model showed that with the continuation of the current trend and in the absence of fundamental changes in government policies, we will not achieve any of the basic objectives of the vision document.

Lang and Auer in [15] presented a structured review of the dynamic model of crude oil prices. In their study, the evidence related to the important factors determining oil prices and discussed the impact of oil market shocks on macroeconomics and the stock market are examined and how the impact of crude oil markets on the performance and productivity of the oil market and financial stock markets presenting methods to predict crude oil prices and fluctuations. Comparing the results of the current paper with the most important fluctuations of recent decades and the studies conducted, main developments and research gaps in each field are identified. The most important variable among the many variables mentioned in the current paper is political changes and conflicts in the Middle East and the occurrence of unpredictable political events .

Authors in [16], examined the dynamics of fluctuations between oil markets and agricultural products since the crisis of 2008-2009. In this research, a dynamic model has been used to investigate the fluctuations to identify the effects of short, medium and long term interference. During the financial crises of the crude oil market, agricultural markets witnessed bilateral developments in the short term compared to the long term. These findings show that after the crisis of 2008-2009, the markets for crude oil and agricultural goods have become integrated markets, and the market for agricultural products has attracted the attention of policymakers and investors.

Singhal et al. in [20] examined the dynamic relationship between international oil prices, international gold prices, exchange rates and stock indices in Mexico. Mexico is a major oil and gold exporter and a major petroleum products importer. The findings of this study show that international gold prices have a positive effect on Mexican stock prices and oil prices have a negative effect on them. Reducing oil prices did not affect the exchange rate at high prices and also gold had no significant effect on exchange rate. The findings of this study have important implications and also show some signs of monetary and fiscal policy with respect to the pressures of crude oil pressures on stock markets and exchange rates.

Abura and Chivalier in [1] examined the relationship between returns and fluctuations among commodity, stock, bond and currency markets in the years 1983-2013 using the DCC-GARCH asymmetric model. Evidence from their research shows that there is a spillover effect between returns and fluctuation in commodity and financial markets.

Mansi et al. in [17] modeled symmetric fluctuations, asset allocation, and portfolio adjustment between the dollar/euro equity with energy prices in six oil cash markets around the world using the DCC-GARCH model from 1998-2012. Their results show a significant spillover of significant asymmetric fluctuations in the dollar exchange rate to oil markets.

Ewing and Malik in [8] used the generalized variable conditional variance heterogeneity model to examine price fluctuations in the futures gold and oil Comax and Nimex markets, taking into account structural failures. The instrument used to detect the endogenous failures was the algebraic Cumulative Sum of Squares algorithm in the time period of 1993 to 2010. They found strong evidence for a direct contagion of fluctuations between gold and oil earnings taking into account structural failures in variance. They also stated that by ignoring structural failures in fluctuations, there is a weak and indirect effect between price fluctuations in the two gold and oil markets.

Dibold and Yilmaz in [5] examined the spillover of lateral and general fluctuations among stock markets, bonds, currencies, and commodities from 1999-2010 using the Generalized Auto Regressive Conditional Hetroskedastisity model. They showed that the inter-market fluctuation spillover has intensified since the 2007 crisis, with dynamic fluctuations have been observed among the four markets during the period under review.

Rostami et al. in [18] achieved the important point that preliminary studies show that the fluctuations are clustered, i.e. the characteristic of independent and uniform distribution and variance homogeneity is violated. The Breusch Godfrey test confirms the existence of the effects of Arch and Garch. Also, the holistic test by estimating the kernel density according to the Monte Carlo rule by applying the Parzen weight indicates the existence of ARCH effects in the variable.

Fitras and Hoshidari in [11] achieved that there is a negative and significant relationship between fluctuations in crude oil price returns and fluctuations in stock index returns of the Tehran Stock Exchange. Also, there is a negative and significant relationship between exchange rate fluctuations and the return of fluctuations in the return of the Tehran Stock Exchange index.

Elmi et al. in [7] investigated the effect of structural failures in fluctuations on impulse contagion and fluctuation spillover between gold and Iranian stock markets. The results of applying the GARCH approach in the form of non-diametrical specification by Baba, Engle, Kraft and Kroner show that the contagion of shocks and spillover of fluctuations between the gold and Iranian stock markets is two-way, that is, first gold market news has a significant

effect on stock market fluctuations and vice versa. Second, gold market fluctuations have a significant effect on stock market fluctuations and vice versa. Thus, the results related to inter-market effects are sensitive not only to the presence or absence of structural failures in the fluctuations, but also to the fact that these structural failures are determined based on the conventional or modified algorithm of iterative sum of squares. Also, based on the research findings, ignoring or incorrectly determining structural changes in fluctuations and estimating the multivariate GARCH approach based on it, can lead to misconceptions about the direction of contagion of shocks and spillover of fluctuations among gold and stock markets.

3 Research methodology

This is an applied quantitative research. The data was collected using the Central Bank of Iran, World Bank and the Statistics Center of Iran data. Sterman system dynamics literature [21] was used in the current paper modeling stimulations. the data was collected by Excel software and analyzed in Wensim software and then simulated with MATLAB software. The data analysis method is based on system dynamics methods.

3.1 Oil sector simulation model

To oil sector statistics from 2009 to 2018 have been used annually to simulate the oil sector. In this research, first, the data of the desired years are processed and examined based on the existing trend. Given that the price of oil is set at foreign borders and its amount is determined by OPEC, so the demand-supply curve and the factors affecting it are formed abroad. In this section, oil supply and demand are based on the total supply of the United States, other countries, OPEC, and smuggled oil, all of which determine the amount of oil prices.

The expectations variable is the main factor influencing the oil price. This variable is a factor that shapes expectations for changes in oil supply. One of the dimensions of expectations is the occurrence of some events that affect the change of expectations in the future of supply, eventually these expectations through some variables and parameters become real changes in oil prices. In such cases, although there may not have been a real change in the supply of oil yet, the price of oil changes as if the supply has really changed in the expected direction. This is why many of the variables that are specifically involved in waiting loops are modeled in such a way that they are affected by changing the direction of the main variables. For example, some of them change depending on key factors such as oil revenue or economic growth. Because, in fact, expectations are formed according to the (recent) direction of changes in economic factors. Therefore, in a new way, we have modeled these types of parameters to affect oil prices only through the supply of oil. Expectations are a dynamic factor that acts as a booster or suppressor to global oil supply. Thus, oil prices do not change directly, and the value of supply is expected to change artificially, and it is only through the supply-to-demand ratio that oil prices change. In other words, it seems that the oil supply has really changed and the price of oil reacts well to such a change. In the end, the actual supply is represented by the variable "actual total supply" in the model.

In the next section, Total Oil Demand (TOD) is determined by the oil demand of the European Union and the United States, Russia, India, Brazil, China and the other countries. The reason for the RIBC oil demand split is that these countries have a growing economy that is extremely thirsty for oil. Thus, their industries are increasingly consuming oil, which makes them slightly different from the EU and the US, as the growth rate of oil demand in other sectors is much lower. In particular, through new policies on oil consumption or even finding alternative sources of energy, they even tend to reduce their oil dependencies in the future. Therefore, the structure of oil demand and even economic growth are different on both sides of the demand. Therefore, there is a need to model their causal loops in slightly different ways with different variables and functions.

Oil consumption policy variables reflects the impact of policies and regulations related to oil-related industries such as automotive factories. In general, there is a tendency to reduce the economy's dependence on oil consumption due to factors such as air pollution caused by burning fossil fuels, limited oil reserves, and vulnerable economic growth due to oil prices. Newer cars, for example, have higher MPGs (Miles Gallons). Therefore, we have modeled the effect of those regulations, which are them-selves a function of economic health, on the above variable. In addition, the variable "Other energy sources" indicates the impact of oil alternatives such as natural gas, which is increasingly used by the European Union and the United States. In particular, the United States has been the world's largest producer of natural gas since the shale boom. It has also put more pressure on oil prices, which were very volatile in the second half of 2014, and from 2015 onwards lithium-ion battery cars are a new trend in the automotive industry, which also reduces oil dependence. The electricity used to charge those batteries, whether produced by renewable energy sources or other types of fossil fuels, will ultimately affect oil demand and improve the environment. These are some of the

variables that are of particular importance for reducing the oil dependence of the European Union and the United States. Unfortunately, this type of policy is sometimes overlooked or underestimated in RIBC countries.

Similarly, in the oil supply chain, the variable of expectations includes the factors that make up expectations for changes in demand. To emphasize the need for this variable, consider the conditions under which the International Monetary Fund announces the expected economic growth of the European Union, the United States, or China. Oil prices usually react to these kinds of announcements. This is because projected economic growth, as discussed in the previous section, is related to global oil demand. Therefore, waiting for economic growth through some variables and parameters becomes the expectation of global oil demand. In such a case, although the real change in oil demand may not have occurred yet, the price of oil seems to change slightly, as if demand had actually changed in the expected direction. Therefore, the current paper aims at modeling a set of qualitative variables in deter-mining oil prices. Likewise, ExD is a dynamic factor that acts as a booster or suppressor of global oil demand.

Oil prices have changed for Iran from 2009 to 2018 as shown in the figure below. Oil revenues has de-creased sharply from 2009 to 2011 due to lower oil prices, and from 2015 to 2018 oil prices have in-creased significantly. In this part of the paper, oil prices per barrel in Iran are simulated based on causal loops. Based on the causal loops described above, the general model for determining oil prices and Iran's share of this production is modeled in the software. Accordingly, all the necessary factors and trends are extracted from the statistics of the Central Bank and the World Bank and entered into the model.

3.2 Equations

The paper equations are:

"Residential Energy Service Demand"= MAX (normal in birth ∗ "birth rate" ∗ perceived attractiveness–XIDZ ("Normal Residential Energy Consumption per Capita" ∗ normal out migration, perceived attractiveness, "Residential Oil Products Price"), −1∗ "Residential Energy Substitutes Price") Units: m3/year

"rasportation Gasoline & Gasoil Demand"= INTEG ("0-19 net immigration"+births-maturing, 40817)

Grow = population ∗ grow rate Units: person/Year

grow rate = 0.013 Units: percent

population= INTEG (grow, 75000000) Units: person

rate product= (b coefficient ∗ vehicle relative pop index ∗ (saturate-vehicle relative pop index))/saturate Units: percent

rate production= rate product ∗ vehicle production Units: vehicle/Year

b coefficient= 0.012 Units: percent

saturate= 40 Units: vehicle/person

vehicle relative pop index= (total ∗ 100)/population Units: vehicle/person

exit= scrape5+scrape5oil Units: vehicle/Year

total= Total gas Vehicles+Total gasoline Vehicles Units: vehicles

Commercial Oil Products Demand= ABS (Commercial Energy Service Demand + Commercial Oil Products Price: if Commercial Energy Substitutes Price)

Industry-Related Oil Products Demand= integ (Industry-Related Energy Service Demand + Industry-Related Oil Products Price + Industry-Related Energy Substitutes Price)

Figure 1 shows the model in the oil sector. The results of modeling the oil price trend from 2009 to 2025 is estimated as follows:

3.3 Gold simulation

According to the statistics provided in the gold sector, the price of gold in Iran, like the price of oil, has increased from 2009 to 2012 with a downward trend from 2012 to 2015. Then from 2016 to 2018, there has been an almost constant increasing trend. The simulated model based on the rate of increase in oil prices, which is one of the most important factors affecting the global gold price is modeled as follows. The equations used in this section are:

Gold price= integ (increasing – decreasing)

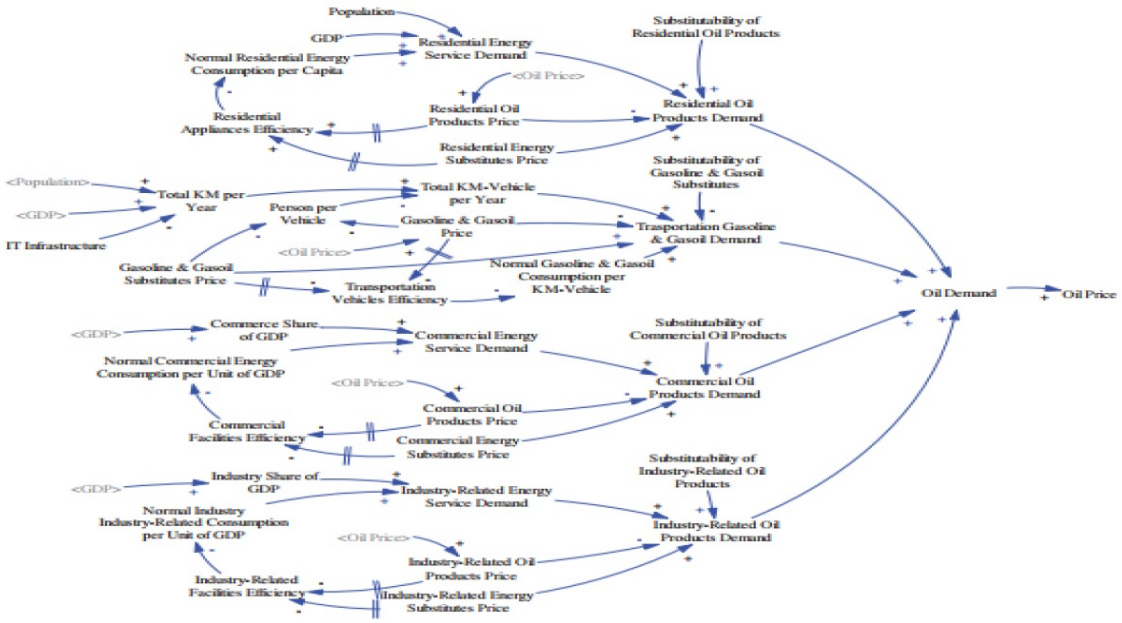

Figure 1: the model in the oil sector

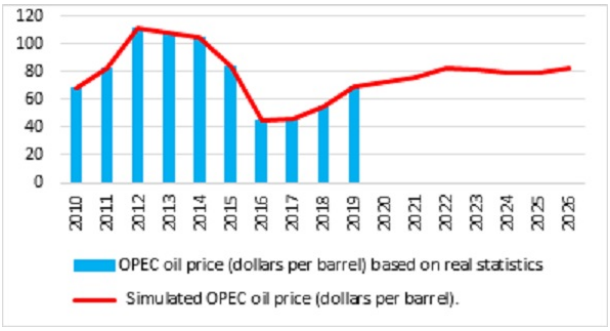

Figure 2: Oil price simulation

Spdr= gold price if (in=32: of 25)

Oil price= integ (increasing – decreasing)

Us cpi= integ (increasing)

Trade balance= impact- export

Us gdp= government – gross

Us labor cost= ABC (US gdp)

Figure 3 shows the model in the gold sector. The results of modeling the gold are estimated as follows:

3.4 Foreign exchange simulation

The foreign exchange sector in Iran has two different rates due to the fixed exchange rate system. An exchange rate is controlled by the central bank and the second rate is set by the free market, and usually the rate set in the free market has a broad impact on the prices of domestic goods and gold and the stock market. Therefore, the current paper uses the free exchange rate in Iran. The model written in the software is based on the following figure. The equations used in this section are:

N=strength of housing availability effect+strength of relative regional services effect +strength of relative job market effect +strength of land occupied effect

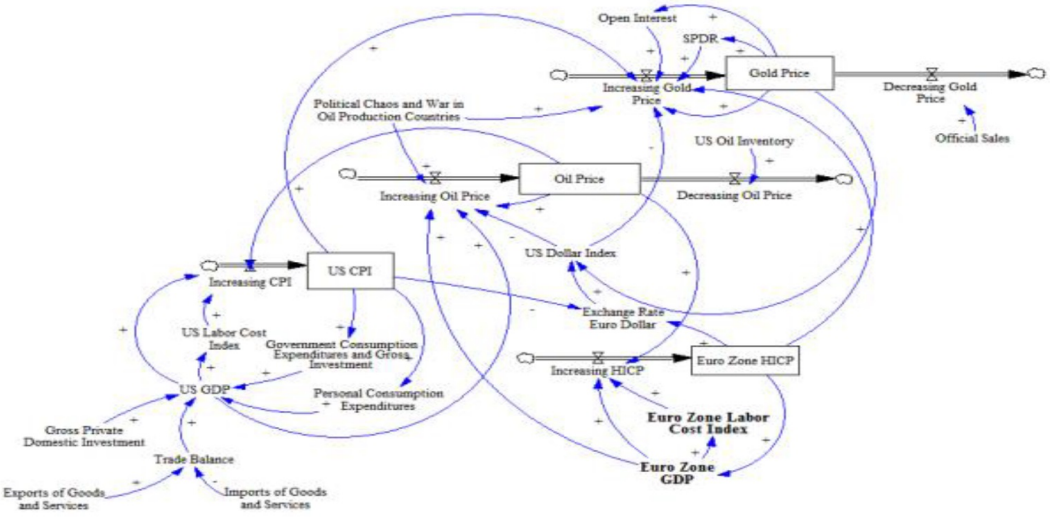

Figure 3: The model in the gold sector

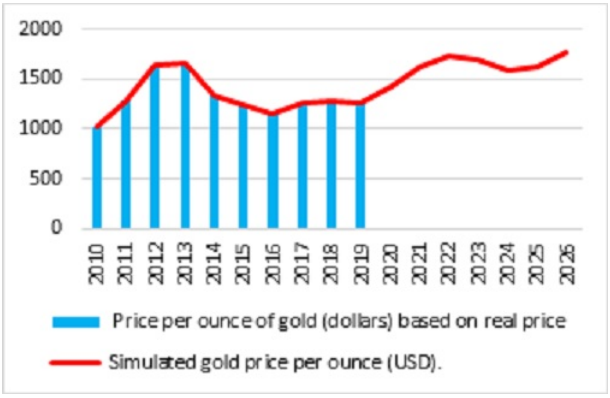

Figure 4: Gold price simulation

$$ex = \left(\left({}_{\text{effect of housing availability}}{}^{\text{strength of housing availability effect}}\right) * \left({}_{\text{effect of relative regional services}}{}^{\text{strength of relative regional services effect}}\right) * \left({}_{\text{effect of relative job market}}{}^{\text{strength of relative job market effect}}\right) * \left({}_{\text{effect of land occupied}}{}^{\text{strength of land occupied effect}}\right)\right)^{(1/(N))}$$

Units: Dmnl

M=strength of skilled labor availability effect strength of relative regulatory environment effect + strength of telecommunication services effect + strength of relative cost of doing business effect

$$\text{ex avail (lfo)} = \left(\left({}_{\text{effect of availability of skilled labor}}{}^{\text{strength of skilled labor availability effect}}\right) * \left({}_{\text{effect of relative regulatory environment}}{}^{\text{strength of relative regulatory environment effect}}\right) * \left({}_{\text{effect of telecommunication services}}{}^{\text{strength of telecommunication services effect}}\right) * \left({}_{\text{effect of relative cost of doing business}}{}^{\text{strength of relative cost of doing business effect}}\right)\right)^{(1/(M))}$$

Figure 5 shows the model in the foreign exchange sector. The results of research in the foreign ex-change sector trend in the future upcoming years is estimated as follows:

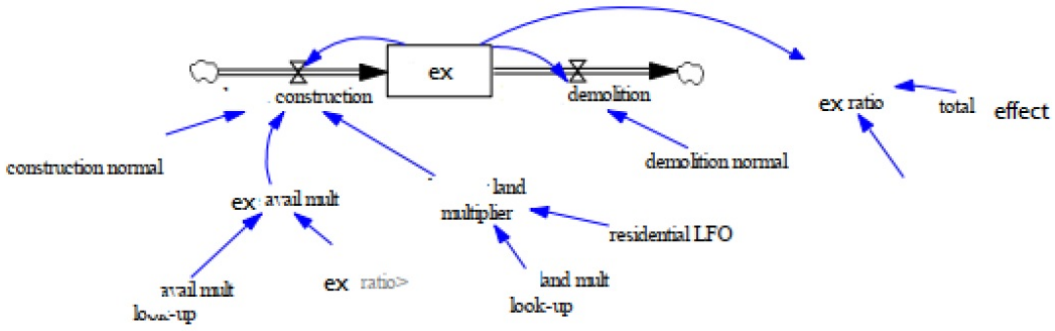

Figure 5: The model in the foreign exchange sector

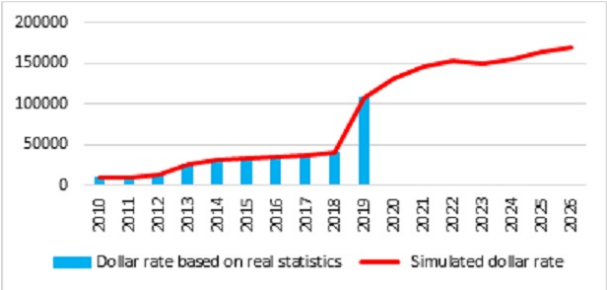

Figure 6: Foreign exchange price simulation

3.5 Stock market simulation

The stock market in Iran has a lot of financial instability. This is due to the underdevelopment of the financial system in Iran, which is affected by other parallel markets. With the rise in the price of gold or foreign exchange, due to the creation of short-term profits, financial resources are transferred from the stock exchange to other markets. This reduces returns in the stock market and also increases fluctuations in the gold and foreign exchange sectors, as well as the prices of other commodities in the economy. The stock market index in Iran increased from 2009 to 2013 and decreased from 2013 onwards, and the increases in the following years were not as high as in 2013. Then, from 2016 to 2018, there has been an increasing trend. The simulated model for the stock market in Iran is as follows. The equations used in this section are:

Sales chanel=IF THEN ELSE((cpc/Total)≥Fpcc

needed per stock+sales per cpc ratal ses, (Total gap Vehicles-gas taxi)∗ gas needed per stock+(oil stock)∗ cpc retail price, capacity of stock)

wti price=(forced cpc)+(expected revenue without price ∗ (expected revenue by price))+IF THEN ELSE((forced cpc /Fpcc)≥ (gas needed per car+gas needed per stock), 0, ((money needed per stock+gas needed per Gnp)

Figure 7 shows the model in the stock exchange sector.

According to the statistics obtained from the research, from 2019 to 2025, the stock market in Iran will have an upward trend in general, which will be accompanied by ups and downs:

4 Results and discussion

The current paper was conducted to investigate the oil market fluctuation contagion on the financial markets of the Iranian economy using the dynamic systems approach. Accordingly, at first, data related to oil, gold, stock exchange and foreign exchange were extracted from the World Bank, Central Bank and Statistics Center of Iran data banks and entered into statistical analysis and simulation soft-ware for review. Then, the research model was constructed using simulation methods and system analysis and the results were analyzed. The oil market in supply and demand for price determination is based on global systemic behavior. The simulation has taken into account the factors affecting oil sup-ply, oil demand, the expectations that shape this supply and demand, as well as macro factors such as macroeconomic indicators of the US economy, sanctions on the oil sector in Iran, the rate of world industry

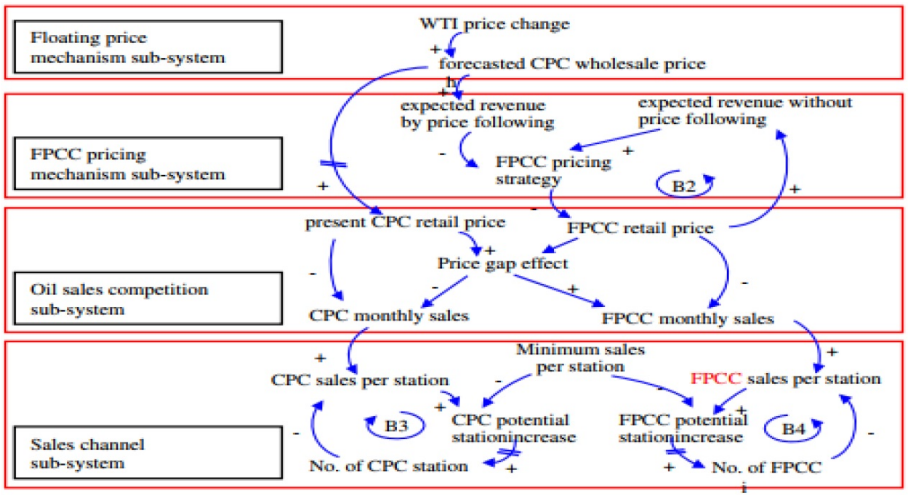

Figure 7: The model in the stock exchange sector

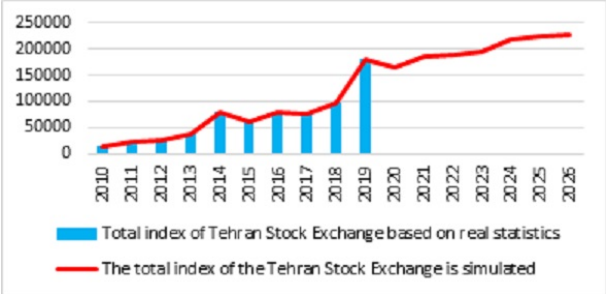

Figure 8: Stock market index simulation

development and available knowledge on oil substitution. Hidden mechanisms are the main reason for some oil price behaviors that surprise researchers and people in the market. In fact, this is why many have not been able to predict market behavior or describe the behavior as unexpected and unpredictable in case of a big shock in the market. For example, in case of a conflict in the Middle East region, oil prices fall due to expectations of declining production. These types of events can increase oil price volatility and thus make it more difficult to predict the market through conventional models. Another basis for changes in oil prices is the diverse sources of oil production in the region. On the demand side, we classify importers into two main categories. On the one hand, there are emerging markets such as Russia, India, Brazil and China (RIBC), whose emerging economies are heavily dependent on oil consumption. In the EU and the US, on the other hand, the oil dependency has not increased significantly compared to RIBC countries. Most importantly, there are policies to limit pollution and air emissions that prevent unauthorized increases in fossil fuel consumption. Therefore, the oil price determining factors are more than supply and demand. The current paper proposes a dynamic system model that attempts to plot some of the parameters and variables specifically involved in determining oil prices other than supply and demand, other than supply and demand. We classify oil demand into three categories: The United States, Europe, and other countries. In addition, sources of supply are classified as OPEC, US, surplus oil reserves, smuggled oil production and production by other countries. The model structure absorbs significantly new parameters. In particular, we obtain two variables called "Expectations on lateral demand" and "Expectations on supply" to obtain the trend of unconventional factors. Having determined the global demand for oil and Iran's share in OPEC, we will the impact of Iran's financial revenues from the oil sector on other markets will be analyzed. Also, parallel markets in Iran have been analyzed based on dynamic behavior among different markets and the results have been determined for future periods.

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