

Investigating the non-linear effects of the economic sanctions index on the relationship between monetary policy transmission channels and economic growth in Iran

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Abstract

Extensive studies have been conducted on the relationship between monetary policy transmission channels and economic growth; however, there is no comprehensive theory in the literature. The relationship between monetary policy channels and economic growth is influenced by many economic and non-economic factors that vary depending on countries' economic and political conditions. A key factor in Iran over the last four decades has been economic sanctions. According to the cause; The purpose of this study was to investigate the non-linear effects of the sanctions index on the relationship between monetary policy transmission channels and economic growth in Iran during the period 1982-2018 with a non-linear approach and using the NARDL method. The findings of this study showed that in the period under review, the exchange rate had a negative and significant effect on economic growth, which has become stronger with the introduction of sanctions in the model. Similar results were obtained for the bank credit variable, with the difference that bank credit has had a positive and significant effect on economic growth, strengthened by the sanctions index in the model. Other results also showed that interest rates had not had a significant effect on economic growth.

Keywords: Sanctions index, Monetary policy, Transmission channels, Economic growth

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1. Introduction

Monetary policies and theories of economic growth have evolved rapidly over time and have been dominated by similarities, ambiguities, inconsistencies, and cross-flows [4]. Monetary policy is considered a combination of measures designed to regulate the value, supply, and cost of money in an economy, according to the expected level of economic activity [9]. For most economies, monetary policy goals include price stability, the balance of payments, employment promotion, output growth, and sustainable development. Staying consistently ensures price stability. Indirect pursuit of other goals, such as economic growth, can only be achieved in terms of price stability and the allocation efficiency of financial markets. The purpose of monetary policy is to ensure that the money supply is at a level that is consistent with the goal of real income growth; To ensure non-inflationary growth [28]. Theories of economic growth and monetary policy go back to the classical theory of the quantity of money (TQM) [7]. However, modern theories only in the 1930s, with the Keynesian theory of liquidity preference followed by monetarism. Subsequently, several theories have been at the center of monetary policy analysis for two decades [3].

Over the years, monetary policy's short-term and long-term effects on actual variables, especially economic growth, have remained obscure at the research center. Most studies have focused mainly on long-term monetary policy neutrality in developed countries [27]. The analysis of the effect of monetary shocks through the transmission channels of monetary policy is one of the most critical fundamental discussions in the macroeconomic literature in both Keynesian and neoclassical can be examined [9]. On the other hand, there are broad variables that affect the transmission channels of monetary policy. One of the most critical factors affecting the channels of monetary policy transmission in Iran has been economic sanctions, which have always had a different impact on monetary policy in recent decades. Researchers, especially in the last two decades, have sought to examine the limitations, economic effects, and effectiveness of sanctions on various sectors of the Iranian economy. Although they argue that sanctions are a means of overcoming war, which in itself has far broader implications, it is nevertheless argued that the consequences of economic sanctions can sometimes be more severe and far-reaching than war and military tensions [26]. In today's world, economic sanctions have become essential tools for governments to oppose policies, pressure other countries to change course, and gain economic and political concessions in international politics [19]. They are designed to change the policies of the target country and are seen as a non-violent and somewhat more humane option to avoid military tension and confrontation [17]. The study of the methods of transmitting the effects of shocks and monetary fluctuations through the various transmission channels that exist on monetary policy in various articles, books, and debates has been considered by analysts. In Iran, due to the economic sanctions factor, the mechanism of monetary policy transfer may be different from other countries. Analysis of monetary policy transmission channels is one of the critical issues in the macro area, which has many policy implications for decision-makers in this area. To achieve monetary policy goals effectively and purposefully, it must clearly understand the transfer mechanisms of practical factors. The money transfer mechanisms explored in this study are interest rates, credits, and exchange rates. Research has been conducted on the impact of monetary policy on macroeconomics in Iran.

Nevertheless, distributive effects, including non-linear effects and other influential factors such as economic sanctions, have not been empirically and extensively explored empirically. Given that the impact of monetary policy on economic growth occurs through many transmission channels, which may sometimes be non-linear, it is not easy to measure these effects. Considering the role and importance of economic sanctions and their intensification in recent years, the purpose of this article is to investigate the non-linear effects of the economic sanctions index on the relationship

between monetary policy transmission channels and economic growth in Iran during 1982-2018 with the NARDL approach.

2. Theoretical literature and experimental background

Classical monetary theory is the first well-known theory of monetary policy. In classical theory, some Irving Fisher money was established, which showed the relationship between monetary policy (money) and economic variables. In this theory, both the velocity of money and the output are assumed to be constant; Therefore, any increase in the amount of money ultimately, according to the theory of the amount of money, increases prices relatively. Long-term growth is affected only by real factors, and the money supply is ineffective in both the short and long term [7]. Keynes rejected the theory of the quantity of money, both theoretically and as a tool of applied politics. He argued to some extent that the speed of money is unstable and not constant. The quantity of money theory also assumed the absence of exchange between inflation and production [11]. Keynesianism believed that the amount of money was adjusted quickly. In this theory, the demand for money was not exogenous but endogenous and depended on income and interest rates, which is expressed in the liquidity preference theory. This theory is also based on the supply relationship of liquidity preference, also known as the LM curve assumes a positive relationship between production and interest rates. The original version of the IS-LM model assumes a fixed price level and can not be used to analyze inflation but to produce in the short term [10]. The theory of liquidity preference combines the demand for money with the amount of money provided by the central bank to determine the level of money equilibrium. This balance turns interest rates into a monetary phenomenon. The money supply is assumed to be exogenous. Any increase in the money supply leads to a reduction in the interest rate at which the amount of money demanded equals the supply. Low-interest rates positively affect the final efficiency of capital and investment and thus lead to increased production. However, Hicks' IS-LM view of Keynesian general theory was empirically challenged [5]. Keynes was skeptical about the effectiveness of monetary policy when the economy was trapped in liquidity and because of uncertainty in financial markets. Keynes advocated a more prominent role in fiscal policy. Assumption of exogenous money supply in classical and Keynesian theory and in later and modern theories was challenged and left out [21]. Long-term interest rates are believed to have distortions in Keynesian theory in the form of volatile asset price bubbles [22]. The theory of monetarism was introduced in the 1950s and took its foundation from the theory of quantity of money, assuming that the velocity of money in the theory of quantity of money is generally constant; This means that nominal income is largely a function of money supply [6]. Monetarism maintained the exchange principle between inflation and production but kept the Phillips curve in terms of real wages, not wages [8]. In this theory, equilibrium in the labor market is achieved at a normal rate, and the assumptions of sticky wages prevail. Nominal stickiness in wages and prices shows that monetary policy affects real income in the short run (stabilization). An increase in the amount of money causes a temporary increase in real production (GDP) and employment in the short run but will have no effect in the long run due to the interaction of rising general prices. In the long run, the money supply is inflationary, so the theory assumes long-term monetary neutrality. However Monetarism has been challenged by technology development and the instability of money demand performance [28]. Monetarism also assumed the money supply to be exogenous, challenged theoretically and empirically [21]. The assumption of a constant velocity of money has also been challenged [15]. Long-term neutrality has also been challenged in the experimental literature. Real, classic, and Keynesian business cycle models have been dominated by post-populism. The differences between these theories are small and are addressed in the treatment of nominal wage adhesions Prices are

relevant. This model also predicts monetary policy neutrality concerning real variables. The new classical model has four important assumptions: reasonable expectations, the natural rate hypothesis, the continuous settlement of the market, and the incomplete information of market factors. In these models, the equilibrium dynamics of employment, production, and real interest rates are determined independently of monetary policy, and changes in technology are assumed to be the only real driving force [18]. Overall, given what has been said, monetary policy is a combination of rules and measures that the central bank has to achieve and implement its goals. In most countries, the primary goal of monetary policy is price stability. However, central banks may have other goals, such as achieving full employment, maintaining internal financial stability, and destabilizing the external balance of payments. A change in monetary policy occurs in the face of shocks from internal and external factors that challenge monetary policy goals. Central banks implement policy changes by changing their policy instruments [16]. One of the most important factors influencing monetary policy in Iran has always been economic sanctions, which have almost always been imposed on the Iranian economy with ups and downs in the last 40 years. One of the first events that may occur in the context of sanctions is the relative growth of the general level of prices (inflation) and the creation of large shocks in the monetary and foreign exchange markets. This is due to declining government foreign exchange earnings and pressure on the foreign exchange market. The reason for the government's inability to properly allocate resources in different sectors of the economy and at the same time reduce the government's power to import commodity shocks will hit the general level of prices and signal a sharp rise in inflation. On the other hand, in the absence of adequate foreign exchange reserves in the face of sanctions, which acts as a deterrent, a sharp devaluation of the national currency and rapid inflation will most likely occur [5]. The exchange rate will intensify inflationary pressures in all economic sectors due to its position in determining the prices of raw materials, intermediate goods, capital equipment, and final goods, as well as due to its high dependence of production and consumption on the imported sector [20]. DiGreou emphasizes the uncertainty caused by exchange rate fluctuations and their consequences, including disruption of the price-interest rate mechanism. He states that uncertainty in the exchange rate leads to uncertainty in the future price of goods and services. Economic decisions in the field of production, investment, and consumption are affected by the price system. If prices are unpredictable, this uncertainty will affect the decisions of economic actors in these cases by disrupting the structure and operation of prices and interest rates. It affects and ultimately jeopardizes the efficiency of investment and production projects [5]. Rising exchange rates and inflation on the sanctioned country's access to foreign capital and technology are the most important factors affecting economic growth. Inflation at high levels destroys investment incentives and leads to a lack of optimal allocation of resources and reduced productivity of production factors, ultimately affecting domestic production and the production of commercial goods. since investment is an important factor in creating overall economic developments for all countries, especially in developing countries, special attention should be paid to providing the required capital for activities. Due to the impact of the economic and political conditions of the societies of the countries targeted by the issue of sanctions, there is a decline in the return on capital in these countries. Furthermore, the spread of insecurity and the high risk of the activities of some sectors in these countries reduce the supply of capital funds. Investment should be considered the most important channel of technology dissemination affecting the host economy by restricting the inflow of foreign capital and access to new technologies and management approaches. In general, it can be said that the economic structure of the sanctioned countries systematically increases the economic and political risks and thus reduces investment [1]. A review of US and allied US sanctions against Iran over the past four decades shows that following the exchange rate fluctuations in the country, uncertainty about the future has increased, and profitability is expected. Economic units are in doubt; Therefore, foreign investors

are not interested in investing in the Iranian economy, and this issue has overshadowed the country's economy. It is noteworthy that with the reduction of foreign direct investment, the transfer of financial capital, technology dissemination, and other skills (management, marketing, set forth.) to the domestic economy will also decrease. Lack of required capital, limited resources, limited access to technology and management approaches, along with high transportation costs due to the poor condition of existing networks and routes. Exhaustion and limited transport fleets of the country have caused the cost of domestically produced goods to increase globally. Because of this issue, we lose a large part of our share in global markets [23]. Increasing the price of higher productivity inputs will reduce the use of each of the inputs in the production and service system and lead to a decrease in the unit's income and the owners of the production factors resulting in a reduction in savings and high training costs.

3. Internal experimental studies

In the following, some of the most critical studies in monetary policy and its various channels are analyzed and reviewed. In a study by Raei et al. , they examined monetary shocks and channels transmitting monetary policy in the Iranian economy, emphasizing the exchange rate channel, housing prices, and credits during the period 1369 to 1395. For this purpose, positive and negative monetary shocks have been estimated using the Markov rotational model. Then the results of the model used by estimating the autoregression method with distributed intervals are estimated to have been hit. The estimated results show that the three channels of exchange rate, housing price, and credit are incapable of transmitting the effects of monetary policy in the long run. These results mean the neutralization of money in the long run. Also, despite the mentioned channels, there was an asymmetry between positive and negative shocks.

On the other hand, the credit channel has played a more substantial role in transmitting the effects of monetary policy than the other two channels. Komijani and Alinejad Mehrabani [12], in another study, examine and analyze the impact of the four main channels of money transfer on the actual growth rate of the economy and inflation (i.e., interest rate channel, exchange rate channel, asset price channel (stock), and bank lending channel) using quarterly data during the period 1369 to 1387. The study results showed that in the Iranian economy, all four channels under study have the power to transfer monetary measures on the growth rate of production and inflation. Monetary policy through the bank lending channel also has the most significant impact on real output growth. On the other hand, monetary policy has had the most significant impact on inflation through the exchange rate channel. Moshiri and Vashghani [15] also in a study examined the mechanism of money transfer in the Iranian economy in the framework of credit channels, exchange rates, asset prices, and interest rates using the VAR approach and quarterly data during the period 2007-2007. The results showed that the effect of monetary shock on production was not statistically significant, but the inflation response to the monetary shock has been almost simultaneous and significant. The results of the analysis of variance of production and the general level of prices also confirm the above point, so that the share of monetary base disorders from production fluctuations and inflation was equal to 5.7 and 72%, respectively. Upon the effect of production from monetary shock, transmission channels did not contribute to the transmission of monetary shock to production but effectively transmitted the inflationary effects of monetary shock. In this case, the channel share of the asset price, interest rate, exchange rate, and credit in the 9-quarter horizon are equivalent, respectively. With 35.7, 30.6, 19, and 3.2 percent and in total 88.5 percent explained the change in the general level of prices.

4. Experimental foreign studies

Moeeni [14] : The intergenerational effects of economic sanctions, Working Paper Series, No. 33, University of Waterloo, Canadian Labour Economics Forum (CLEF), Waterloo, this paper focuses on while economic sanctions are successful in achieving political goals, can hurt the civilian population .These negative effects could be even more detrimental and long-lasting for future generations.

Shokri [25]: Investigating the Impact of Economic Sanctions and Exchange Rate Uncertainty on FDI in Iran: A Fuzzy Approach, Economic growth and development, this paper focuses on Today, foreign direct investment is an important factor in creating economic changes for all countries and especially developing countries. Therefore, considering the importance of foreign direct investment in the Iranian economy.

Mahdiloo [13]: Ranking of Economic Sanctions and Estimating Hazard of Sanctions Index Using Fuzzy Analytical Hierarchy Process, Economic growth and development , ,Pages 47-72 this paper focuses on in last years, one of the main challenges facing the Iranian economy has been economic sanctions. These sanctions have been imposed for various reasons and have been aimed at influencing various economic sectors of Iran. Accordingly, management of the hazard of economic sanctions is one of the most important priorities of policy makers.

Anwar and Nguyen [2] examined the monetary policy transmission channels in Vietnam using the SVAR method. Upon quarterly data from 1995 to 2010, this paper focuses on money transfer mechanisms in Vietnam. In particular, we examined the dynamic response of the Vietnamese economy to interest rates, exchange rates, and external shocks. The results estimated based on the Structural Vector Regression (SVAR) method show that monetary shocks significantly impact Vietnam production. The results showed that Vietnam's monetary policy towards stock external is relatively sensitive. Ulke and Broment investigated the asymmetry of monetary shocks in Turkey using the threshold vector autoregression method from 1990 to 2014 in Turkey. This study shows that there is an asymmetry in shocks in terms of size and direction of monetary shock. Torres and Rasterpo examined the asymmetry of monetary shocks in Colombia from 1994 to 2015 using the Markov rotational model. The results show that monetary shocks are adequate when housing prices are falling. Allen and Robinson examined the impact of monetary shocks on economic growth in Jamaica from 1997 to 2015. This study showed that the effects of the money transfer on inflation and exchange rates depend on the state of monetary policy. Dalhous, in a study using quarterly data in the United States and using mild transfer regression, examined the effect of monetary policy on macroeconomic variables. Findings showed that the policy of increasing the money supply through the mechanism of money transfer channels has a substantial impact on production, consumption andThey have investments. Pearsman also used the panel vector autoregression model (PSRT) to examine the impact of monetary policy on economic growth through the bank lending channel. Findings showed that the effect of monetary shocks on economic growth from the credit channel of banks depends on the source of the shock, and if the increase in lending is due to the supply side of the banking market and the monetary shock has a positive effect on inflation and growth. If the loan increase is due to the demand shock, the result will be the opposite of the previous case.

5. Method of model analysis and estimation

In this study, the NARDL method will investigate the non-linear effects of the sanctions index on the relationship between monetary policy channels and economic growth in Iran. This method will be briefly described below. This paper uses a special form of the NARDL approach recently developed by Sheen et al. The NARDL method with statistical asymmetric and non-linear cumulative estimation has more statistical power than the ARDL method. The NARDL method is a specific

format of the linear ARDL approach developed by Sons et al. was introduced and makes it possible to study the asymmetry in short-term and long-term relationships between model variables. One of the advantages of the non-linear ARDL approach over other cohesive methods is that the NARDL method is more efficient in models with low observations. On the other hand, the NARDL method is also used in a situation where the model's independent variables are endogenous [1]. Another advantage of the NARDL method is that it can be used regardless of whether the model variables $I(0)$ and $I(1)$ are a combination of the two. Furthermore, the NARDL method does not include short-term dynamics in the error correction section and still works in low observation mode [5]. Applying the NARDL approach, in addition to non-linear analysis of long-term and short-term relationships between variables, can model asymmetry between variables. To estimate the non-linear effects, in the first step, the positive and negative impulses of the model's explanatory variables are calculated. For this purpose, positive impulses based on Granger and ion (2002) approach are defined as a positive cumulative sum (positive components), and from the following relation is calculated $\Delta(X, 0)$.

Also, adverse shocks based on Granger and ion method (2002) are defined as a negative cumulative sum (harmful components) and are calculated from the following equation.

$$B_t = \sum_{j=1}^p \varphi_j X_{t-j} + \sum_{j=0}^q (\theta_j^+, X_{t-j}^+ + \theta_j^-, X_{t-j}^-) + \sum_{j=0}^q (\theta_j, X_{t-j}^+ + \theta_j^-, X_{t-j}^-) + \epsilon_t \quad (1)$$

In the following, after extracting positive and negative impulses, the model will be estimated as follows

$$\ln GDP = \alpha_0 + \alpha_1 \ln CAPITAL + \alpha_2 \ln GEX + \alpha_3 \ln EXCHANGE + \alpha_4 \ln OILPRICE$$

$$\ln GDP = \beta_0 + \beta_1 \ln CAPITAL + \beta_2 \ln GEX + \beta_3 \ln INTEREST + \beta_4 \ln OILPRICE$$

$$\ln GDP = \gamma_0 + \gamma_1 \ln CAPITAL + \gamma_2 \ln GEX + \gamma_3 \ln CREDIT + \gamma_4 \ln OILPRICE$$

Where X represents the list of explanatory variables affecting the dependent variable (Y). In this paper, the following three equations are used to investigate monetary policy transmission channels

$$\ln GDP = \varphi_0 + \varphi_1 \ln CAPITAL + \varphi_2 \ln GEX + \varphi_3 \ln ET AHRIM + \varphi_4 \ln EXCHANGE + \varphi_5 \ln OILPR$$

$$\ln GDP = \omega_0 + \omega_1 \ln CAPITAL + \omega_2 \ln GEX + \omega_3 \ln T AHRIM + \omega_4 \ln INTEREST + \omega_5 \ln OILPR$$

$$\ln GDP = \theta_0 + \theta_1 \ln CAPITAL + \theta_2 \ln GEX + \theta_3 \ln ET AHRIM + \theta_4 \ln CREDIT + \theta_5 \ln OILPR$$

The next step is to examine whether the Sanctions Index increases or decreases the intensity of monetary policy transmission channels (interest rates, exchange rates, and bank credits) on GDP. For this purpose, to compare the channels of monetary policy transmission in the context of sanctions, the following regressions will be estimated.

If coefficients 4, 4, and 44 increase (decrease) in Equations (7) to (9), economic sanctions increase (decrease) the intensity of the channels' impact on domestic production. Finally, the linearity or non-linearity of these effects will be measured. Table (1) presents the variables and their symbols. All statistics except the severity of the sanctions index have been collected from the Central Bank. The sanctions severity index is also extracted from the article by Mahmoudi et al.. Model variables are also entered logarithmically.

6. Reliability of test results

The first principle in estimating a regression model is to examine the reliability of the model variables to avoid the problem of false regression in regression analysis. This paper examines the

Table 1: Symbol and source of model variables

symbol	refrence	Variable name
lnGDP	Central by mahmoudi et al	gdp
lnCAPITAL	Central by mahmoudi et al	Gross fixed capital formation
lnGEX	Central by mahmoudi et al	Total government expenditures
lnOILPR	Central by mahmoudi et al	Oil prices
lnEXCHANGE	Central by mahmoudi et al	Exchange rate
lnINTEREST	Central by mahmoudi et al	Intrest rate
lnCREDIT	Central by mahmoudi et al	Bank credit
lnTAHRIM	Central bank of iran	Sanctions severity index

Table 2: ADF test results (level of variables)

result	possibility	Test statistics	variable
	-2.94	0.55	Variable name
Unstable	-2.94	-2.32	gdp
Unstable	-2.94	-0.907	Gross fixed capital formation
Unstable	-2.94	-0.93	Total government expenditures
Unstable	-2.94	-0.77	Oil prices
Unstable	-2.94	-1.39	Exchange rate
Unstable	-2.94	-1.61	Interest rate
Unstable	-2.94	-3.29	Sanctions severity index

reliability of the research variables from the generalized Dickey-Fuller unit (ADF) root test. Tables 2 and 3 show the ADF test results at the first level and difference, respectively.

The results of the ADF test in Table 2 show that for the research variables except for the sanction index, the absolute value of ADF calculation is smaller than the critical values. Therefore, these variables are unstable. The results of the reliability test for the first-order difference of unstable variables are presented in Table 3.

Table 3: ADF test results (first difference of variables)

result	possibility	Test statistics	variable
	-2.94	3.67	Variable name
Unstable	-2.94	-2.32	gdp
Unstable	-2.94	-0.907	Gross fixed capital formation
Unstable	-2.94	-0.93	Total government expenditures
Unstable	-2.94	-0.77	Oil prices
Unstable	-2.94	3.25	Exchange rate
Unstable	-2.94	-1.61	Interest rate
Unstable	-2.94	-3.29	Sanctions severity index

According to Table 2, it can be concluded that the unknown variables remain the same once differentiated; That is, they are accumulated of the first degree or $I(1)$. Due to the increase in relationships and estimation models, only asymmetric summative results, long-run relationships, and ECM coefficient will be presented. Due to the increase in relationships and estimation models, only asymmetric summative results, long-run relationships, and ECM coefficient will be presented. In

the following, the results of the symmetric cohesive relationship of the research models are presented separately.

Table 4: Symmetric congruent results of the studied models

At the 90 level		At the 95 level		statistics	model
I(0)	I(1)	I(0)	I(1)		
2.45	3.52	2.86	4.01	4.66	model
				5.11	model
				4.78	model
				4.18	model
				5.03	model
				4.32	model

Since the test statistic is higher than the critical values presented in Table 4, the hypothesis of no cumulative relationship between the variables of research models has been rejected. The results of long-run relationships and error correction coefficients in different models are shown below.

Table 5: Results of estimation of long-term coefficients and error correction coefficient (models 1 and 4)

Model 4		Model 1		variable
Statistics t	coefficient t	Statistics t	coefficient t	
(3.09)	0.68	(3.02)	0.76	C
(2.11)	(0.053)	(2.03)	0.0675	LCAPITAL
(-1.89)	(-0.076)	(-2.01)	-0.0543	LEXCH
(0.99)	(0.0573)	(1.11)	(0.0675)	LGEX
(1.97)	(0.082)	(1.94)	(0.0989)	LOIL
(-4.34)	-0.0565	-	-	LTAHRIM +
(-1.89)	-0.0242	-	-	LTAHRIM-
-1.93	-0.289	-1.98	-0.356	ECM

The results of Table 5 show that the long-term effect of the sanctions index on economic growth has been negative and significant. The imposition of economic sanctions will lead to instability and uncertainty in the process of relative prices, investment, as well as exchange rate fluctuations. It will create an unstable and uncertain environment in the economy that will jeopardize investment and business. In this instability, too, the process of saving and investing is irrational; the optimal allocation of resources will not be possible and will negatively affect economic growth. The results also show that the ECM coefficient decreased with the introduction of sanctions in the model. In other words, the sanctions index has increased the speed of reaching equilibrium in the event of a shock to GDP. In Table 6, the symmetry results of the sanctions index coefficient are calculated.

Table 6: Results of symmetry or asymmetry of the effects of the sanctions index in the model (4)

$C(1)^+ = C(2)^-$
The number of probability statistics
0.0046 (0.76)

The results of Table 4 indicate the rejection of the hypothesis that the coefficients of positive and negative shocks of the sanctions index are equal. These results indicate the asymmetric and

consequently non-linear effects of the sanctions index on economic growth. The results of models (2) and (5) are presented in Table 7.

Table 7: Results of estimating long-term coefficients and error correction coefficient (models 2 and 5)

Model 5		Model 2		
Statistics t	coefficient t	Statistics t	coefficient t	variable
(2.43)	0.38	(2.21)	0.45	C
(2.09)	0.053	(1.98)	0.0564	LCAPITAL
(-1.25)	-0.0454	(-1.43)	-0.0367	LINTEREST
(1.14)	0.0573	(1.34)	0.108	LGEX
(1.76)	0.082	(1.89)	0.0895	LOIL
(-2.45)	-0.043	-	-	LTAHRIM +
(-1.66)	-0.017	-	-	LTAHRIM-
-1.99	-0.234	-2.11	-0.276	ECM

The results of estimating models (2) and (5) show that interest rates have not had a significant effect on economic growth.

Table 8: Results of symmetry or asymmetry of the effects of the sanctions index in the model (4)

$C(1)^+ = C(2)^-$
The number of probability statistics
0.0046 (0.76)

Also, as in the estimation results of Model (3), the sanctions in Model (5) were asymmetric and, therefore non-linear.

Table 9 shows the estimates of models (3) and (6)

Table 9: Results of estimating long-term coefficients and error correction coefficient (models 3 and 6)

Model 5		Model 2		
Statistics t	coefficient t	Statistics t	coefficient t	variable
(2.43)	0.38	(2.21)	0.45	C
(2.09)	0.053	(1.98)	0.0564	LCAPITAL
(-1.25)	-0.0454	(-1.43)	-0.0367	LINTEREST
(1.14)	0.0573	(1.34)	0.108	LGEX
(1.76)	0.082	(1.89)	0.0895	LOIL
(-2.45)	-0.043	-	-	LTAHRIM +
(-1.66)	-0.017	-	-	LTAHRIM-
-1.99	-0.234	-2.11	-0.276	ECM

According to the results of Table 9, bank credits have had a positive and significant effect on economic growth, which is also strengthened by the inclusion of the inflation index in the model. Bank credit is a crucial factor in economic development with the aim of access to credit resources, to create job opportunities to improve their economic and social situation and a tool for earning income and investment and pave the way for increasing production and consequently economic growth. These results indicate that in the face of sanctions, and reduced access to international credit, reference to domestic bank credit and financing of investment projects increases.

Table 10: Results of symmetry or asymmetry of the effects of the sanctions index in the model (6)

$C(1)^+ = C(2)^-$
The number of probability statistics
0.0046 (0.76)

Also, like the estimation results of models (3) and (5), the results of model (6) were asymmetric and therefore non-linear.

7. Conclusion and recommendations

This article examines the theoretical and empirical literature on the relationship between monetary policy and economic growth in the context of economic sanctions. This article also provides an overview of how monetary policy transitions to economic growth when the sanctions index enters the model. Although there are extensive studies on the relationship between monetary policy and economic growth in Iran, we found no study on the role of sanctions in the monetary policy transfer review channels. The results of this study indicate a non-linear relationship between sanctions and economic growth in Iran. These results also show that the declining effect of the exchange rate on economic growth has been strengthened by the rejection of the models under review; sanctions have strengthened the positive effect of bank credit on economic growth. This study showed that economic sanctions are an essential variable in examining the relationship between monetary policy and economic growth. This variable and its effects should not be ignored in studies of monetary policy. Efforts to maintain monetary value – by increasing foreign exchange – reserves to reduce the pressure on the exchange rate to rise. In addition, the prosperity of the non-oil sector in the reduction of the effects of sanctions and economic growth can be considered by policymakers. It is also suggested that the government while managing the budget, prevent high construction costs from derailing it by boosting effective demand in the economy.

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