

The Effects of Economic Sanctions and Speculative Attacks on Inflation

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Abstract

This paper surveys the Persian monetary crises due to economic sanctions and speculative attacks that leads to high inflation. Economic sanctions are associated with various forms of trade barriers and restriction on financial transactions. Among the most influential sanctions on Iran's oil export and central bank sanctions are noted that their Aims to reduce Iran's oil revenues and Devaluation of the national currency of Iran. New economic sanctions have greatest effect on foreign currency transactions and foreign currency speculative attacks can lead to devaluation of the national currency to be stimulated inflationary pressures. This study introduced a new inflation function based on Neo-Keynesian framework in the case of oil exporting countries. Also dynamics of speculative attacks based on Markov Regime-Switching GARCH (MRS-GARCH) model is used to capture some of the exchange rate dynamics associated with the speculative attacks. The results of co-integration vector estimation using the FMOLS approach indicated that speculative attacks have positive effect on inflation but sanctions affect inflation indirectly through speculative attacks, stagnation, currency crisis, expected inflation and etc.

Keywords: Economic Sanctions, Speculative Attacks, inflation.

1- Introduction

Economic sanctions are penalties include various form of trade barriers and restrictions on financial transactions. They may be imposed for a variety of political and social issues that can be used for achieving domestic political

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gain. Following the Iranian Revolution in 1979, the United States imposed sanctions against Iran and expanded them in 1995 and also UN Security Council passed a number of resolutions imposing sanctions on Iran, when Iran rejected the Security Council's demand that Iran suspend all enrichment-related and reprocessing activities in 2006. Sanctions targeted investment in Oil, gas and petrochemical, refined petroleum products export, business dealing with the Iranian republican guard corps, encompasses banking and insurance transactions including central bank of Iran and Iranian banks blacklisted by the EU were disconnected from the Society for Worldwide Interbank Financial Telecommunication (SWIFT) banking network, shipping, web hosting and domain name registration services.

The effect of sanctions on Iranian economy based on Congressional Research Service report in May 2014 is including: 1- decline in oil export about 60% from 2.5 mbd in 2011 to 1 mbd in 2013 that this leads to reduce in Iran's oil sale revenue from \$100 billion to \$35 billion. The International Energy Agency (IEA) report in April 2014 shows that Iran's oil exported about 1.65 mbd in February 2014. 2- Oil Production is decreased from 4.0 mbd at end of 2011 to about 2.6-2.8 mbd. 3- Iran has not been paid in hard currency for its oil export revenue nearly \$100 billion and Iran was unable to access as much as \$60-\$80 billions duo to banking restrictions. 4- Iran suffers gross domestic product (GDP) contraction and it dropped about 5%. Also unemployment rate was increased about 20%. 5- Value of Rial on unofficial markets declined from about 13000 of the US dollar in September 2011 to about 37000 to the US dollar in May 2013 and to about 29000 to the US dollar as of start 2014. 6- Value of Rial Declining caused inflation acceleration. Central bank of Iran reported 45% rate in July 2013 and many economist asserted 50% and 70% rate. 7-Currency declination and finance restriction have made Iran's manufacturing sector difficult to operate, for example Iran's automobile sector fell down about 40% from 2011 to 2013.

It is clear that economic sanctions are associated with oil revenue decreasing and declination of foreign currency supply in the Iranian economy and also, based on this fact that available foreign exchange reserve is restricted, this subject will promote investor to make speculative attack. A speculative attack is the position that created by massive shorting of a nation's currency usually forces it down in value. The first model of a speculative attack introduced on the gold market by Salant and Henderson

(1975) at the Federal Reserve Board. Krugman (1979) adapted their mechanism to explain speculative attacks in the foreign exchange market. Financial speculative attack research typically grouped into three categories: first generation models argue that sudden speculative attack on a fixed exchange rate is a result of rational behavior by investor even though it appears to be an irrational change in expectation. Second generation models argue that doubts about government reaction to maintain its exchange rate peg led to multiple equilibriums and expect of investors about other investors to attack the currency leads to attack the currency. Third generation models explored how banking and financial system interact with currency crises and how they have real effect on the economy. Sudden devaluation of a currency or currency crises often occurs in speculative attack in foreign exchange market and usually affects fixed exchange rate regimes rather than floating regimes.

Therefore, economic sanctions and speculative attack lead to promote foreign exchange rate. Increasing in exchange rate has direct and indirect effects on inflation. Directly, increasing of exchange rate are associated with increasing of the imported goods and services price including final, intermediate and capital goods and services and they will contribute to increase in inflation. Indirectly, domestic currency depreciation become relatively cheaper domestic product for foreigner and demand for export will increase that associated with increase in demand for domestic good and services and inflationary pressure. Inflation is a sustained increasing in the aggregate price level and if price increasing are extremely rapid or out of control then concept of inflation meaningless and this situation is high inflation. Thus, this study examines the effect of economic sanctions and speculative attack on high inflation in Iranian economy based on Neo-Keynesian framework in the case of oil exporting counties. MRS-GARCH model is used to capture some of the exchange rate dynamics associated with the speculative attack and FMOLS approach is used for estimation purpose.

2- Literature Review

Most of studies about sanctions are usually qualitative. Hufbauer and et al. (1990) examined 115 case studies about sanctions that were begun with World War I and Lam (1990) used probit estimation technique to analyze Hufbauer and et al (1990). Their result suggested that sanctions are most

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effective when are imposed against relatively small target countries; relatively sane foreign policy goals; weak economy and unstable politic of target country; quickly and decisively sanctions; sanctioning country avoids high costs to itself; more trade linkage among sender and target countries and ability of sender and target countries to conduct substantial trade. Elliott and Uimonen (1993) based on Lam (1990) analysis introduced economic sanctions as an alternative to war. This study supported Hufbauer and et al (1990) for Iraq that sanctions work best when the goal is modest, there is extensive trade linkage and weak economy, extend of cooperation among nations in imposing the sanctions and unstable politic of target country. Their model indicated that probabilities of success in the Iraq case were above 50 percent.

Currency crisis are painful events and they are often associated with negative real growth, high level of inflation, sever trade, budget deficit and etc. therefore, poor economic development expected due to currency crisis and it depend in a fundamental way on the central banks crisis management. Therefore, understanding of currency crises mechanism is important to specify the optimal policy response to an emerging crisis. Erlor and et al (2014) introduced 3 types of currency crisis: 1-immediate depreciation, 2-successful defense, and 3-unsuccessful defense or delayed depreciation. Once a central bank has started to intervene in foreign exchange because she is not able to intervene (e.g. reserves are depleted) or she is not willing to further intervene (e.g. expected benefits of the intervention are less than there expected costs). Central bank intervenes can permanently succeeds and achieve the best economic performance or it can only stabilize the exchange rate transitorily and ultimately fails in her intervention policy. In the case of successful defense the central bank can completely neutralize the effect of speculative attack and in unsuccessful defense associated with high costs in term of output loss.

Cheung and Friedman (2009) argue that speculators attack by selling the currency short to profit from the difference between the exchange rate before and after devaluation when they think the monetary authorities may not be able to maintain fixed exchange rate. Krugman (1979) suggested a model of speculative attacks on currency crises in the context of a small open economy with a fixed exchange rate regime. Pazarbasioglu & Otker (1997) results show that foreign reserve loss, expansionary output, expansionary

monetary and fiscal policies, increase in inflation differentials, and appreciation of real exchange rate can be attributed to speculative pressures. Also, declining in foreign reserves and the increase in the share of foreign currency indexed debt are main factors which contributed to the timing of the crisis. Gupta et al. (2007) indicated that crisis can have very different economic outcomes and it is more severe in the case of large capital inflows during pre-crisis periods, fewer capital market restrictions, lower trade openness and higher external long term debt. Cerra and Saxena (2008) and Bussiere et al. (2010) indicated that currency crisis associated with a permanent output loss of 2-6% of GDP.

Pansard (1999) shows that the relation between the interest rate differential and the fundamentals before the speculative attack is dependent on the public expectations relative to monetary policy by the central bank after the attack. Willman (1987) investigated that if pre crisis exchange rate is constrained by set limits and there is uncertainty about monetary policy reactions, balance of payments crisis are accompanied by discrete in exchange rate. Darzen (2000) and Darzen (2003) argue that high interest rate is as a signal of the government's willingness or ability to defend the exchange rate and it can potentially deter a speculative attack. Angeletos et al. (2006) discuss there is an inactive policy equilibrium when the fundamentals are very strong or very weak because speculators coordinate on ignoring any attempt of the government to affect market behavior. Also, when the fundamentals are neither too weak nor too strong there is a continuum of active policy equilibrium to raise the interest rate to meet the market expectation and thus avoid attacks. In this condition speculators coordinate on either an aggressive or a lenient course of action.

The subject of whether high interest rate help to defend currencies during speculative attack is testing in some empirical studies. Furman and Stiglitz (1998) find a negative relationship between either the magnitude or duration of an interest rate increase and the ultimate outcome to help defend the domestic currency. Kraay (2003) finds no evidence either that high interest rates help defend exchange rates. Hubrich (2000) finds that rising discount rates significantly lowers the chance of a successful defense and reducing domestic credit significantly helps defend the exchange rate. Darzen and Hubrich (2005) suggested that raising interest rate make strung the currency in the short run and this leads to an expected depreciation and an increase in

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the risk premium in the long run. Grier and Lin (2010) investigate that rising interest rate significantly reduces the probability of attacks in hard pegging countries but increases it in soft pegging countries. They find that high reserves and capital controls enhance the effectiveness of monetary policy against speculative attacks and also the weak monetary authority faces a higher probability of attack.

Bergman and Jellingso (2010) find that interest rate defense can prevent a currency crisis in the short run but it may cause a currency crisis in the medium term. This result supported the empirical observation the interest rate defense have been successful in some studies but unsuccessful in other. Therefore policy makers must carefully evaluate the characteristics of their economy before using monetary policy. Also, they find that expectation of future capital control by raising the risk premium making the economy more vulnerable to crisis. Rochon (2006) surveyed when fundamentals are stronger and deteriorate more slowly, the informed speculators delay attacking longer. Also, high opportunity costs make speculators become informed more slowly. Bartolini and Parti (1998) suggested that soft target zones or allowing the exchange rate to move within wide margins in the short run but within narrow margins in the long run are significantly less vulnerable to speculative attack than hard target zones. The results of Disyatat (2002) indicated that countries with higher degree of financial market imperfection, weak banking sector balance sheets are much more likely to suffer a contraction in the wake of a currency crisis.

In open economies exchange rate fluctuations can affect the price of all tradable goods and consequently inflation behavior through direct and indirect channels. Naz et al. (2012) surveyed the impact of exchange rate movements on price to appropriate monetary policy response to currency movements. They find that the exchange rate movements have moderate effect on domestic price. An exchange rate shock on domestic prices is quite gradual and it is taking about 14 quarters to arrive at the full impact. Sahminan (2002) argues that Exchange rate depreciation increases the costs of imported raw materials and capital goods and this leads to increase in prices of domestically produced goods. Restrepo and Garcia (2001) find that larger share of imported goods within the consumer price index (CPI) associated with the larger exchange rate effect on prices. McCarthy (1999) introduced that exchange rate depreciation affect net exports, change

aggregate demand and putting upward pressure on domestic prices. Ghosh and Rajan (2007) investigated that exchange rate has a greater effect on import prices than national CPI because CPI includes non-tradable goods that are less responsive to exchange rate changes.

3- Model Specification

In this study new inflation function is extracted with using Neo-Keynesian framework in the case of oil exporting countries. Notice to the importance of oil sector in economics of these countries it is necessary to include oil sector in the model analysis. Therefore we consider simple two-sector model for this reason, including oil exporting sector (O) and other sectors that it includes all sectors in the economy except oil exporting sector (X). We assume that these two sectors use labor force and capital in the production process. Therefore we have:

$$X = X(L_x, K_x) \quad (1)$$

$$O = O(L_o, K_o) \quad (2)$$

We assume that these production functions are linearly homogenous and concave. Therefore:

$$X_{LL} < 0 \quad (3)$$

$$X_{LK} < 0 \quad (4)$$

$$O_{LL} < 0 \quad (5)$$

$$O_{LK} < 0 \quad (6)$$

With assume perfect competition condition in commodity and factor markets have nominal factor prices are equal to marginal value productivity. The first partial derivation of each production function is marginal product of factors, W_i is nominal wage and R_i is nominal rent of capital. Also p_i in these equations are product price.

$$W_x = p_x \cdot X_L \quad (7)$$

$$W_o = p_o \cdot O_L \quad (8)$$

$$R_x = p_x \cdot X_K \quad (9)$$

$$R_o = p_o \cdot O_K \quad (10)$$

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Also, it assumed that labor force and capital are mobile and inelastically supplied that showed with bar atop on the variables, also we have full employment among these sectors:

$$L_x + L_0 = \bar{L} \quad (11)$$

$$K_x + K_0 = \bar{K} \quad (12)$$

It can expect that wage rate in O sector is more than X sector, because of more productivity, proficiency and rigidity condition of labor force in oil exporting sector. We can show the relationship between these wages with follow:

$$W_0 = \mu W_x \quad \mu \geq 0 \quad (13)$$

Notice to this subject that oil exporting countries have small economics, so level of domestic price (P) is equal to the level of price in sector X (p_x) plus world relative price of imported goods (p_f) with β coefficient (Notice: world related price multiplied to exchange rate (ER) to transform foreign price level to domestic price level). The sign of β coefficient is related to economic conditions. If world relative price of imported goods that exogenously determined is lower than the level of price in domestic economy (because of lower productivity and efficiency in oil exporting countries rather than other countries) then we expected that β coefficient has negative sign. Also if world relative price is higher than domestic price we can expected that β coefficient sign is positive. It is obvious that the scale of foreign price effect is related to trade openness of the country; therefore β coefficient is a function of trade openness.

$$P = \alpha p_x + \beta \cdot (ER \cdot p_f) \quad (14)$$

In this economy nominal gross domestic product (Y) is:

$$Y = p_0 \cdot O + p_x \cdot X \quad (15)$$

Therefore real gross domestic product (y) investigated from Y divided to P:

$$\frac{Y}{P} = \frac{p_0}{P} \cdot O + \frac{p_x}{\alpha p_x + \beta \cdot (ER \cdot p_f)} \cdot X \quad (16)$$

Thus:

$$y = RO + \frac{x}{\alpha p_x + \beta \cdot (RER)} \quad (17)$$

We know that real money demand for money is function of interest rate (i) and real gross domestic product that interest rate has negative effect on real money demand and the relationship between gross domestic product and real money demand is positive. We can write real money demand function as below:

$$\frac{M^d}{P} = M(i, y) \quad (18)$$

From equilibrium in money market we have:

$$\bar{M} = PM(i, y) \quad (19)$$

In this equation \bar{M} is supply of money and exogenously determined.

From total differentiation yields:

$$d\bar{M} = dP.M + \frac{\partial M}{\partial i} \cdot di.P + \frac{\partial M}{\partial y} \cdot dy.P \quad (20)$$

With assume P=1 for initial value for simplifies and rearrangement we have: (21)

$$d\bar{M} = dP.M + \frac{\partial M}{\partial i} \cdot di \cdot \frac{i}{i} + \frac{\partial M}{\partial y} \cdot dy \cdot \frac{y}{y}$$

and

$$\frac{d\bar{M}}{M} = dP + \frac{\partial M}{\partial i} \cdot di \cdot \frac{i}{i.M} + \frac{\partial M}{\partial y} \cdot dy \cdot \frac{y}{y.M} \quad (22)$$

Therefore:

$$\frac{d\bar{M}}{M} = dP + e_{Mi} \cdot \frac{di}{i} + e_{My} \cdot \frac{dy}{y} \quad (23)$$

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Where the elasticity of money to interest rate is shown with e_{Mi} and the elasticity of money to real GDP is shown with e_{My} .

By differencing from Equation 17 and substituting in Equation 23 and with simplify assumption that real gross domestic product is constant in the long run and also assuming that the real exchange rate will tend towards equilibrium in the long term, we have:

$$dp = \frac{d\bar{M}}{M} - \frac{di}{i} \cdot e_{Mi} - e_{My} \cdot \left(dRO + \frac{dx}{\alpha + \beta \cdot RER} \right) \cdot \frac{1}{y} \quad (24)$$

From Equation 24 we expected that inflation is related to money supply positively and interest rate negatively and also it is related to add value of oil sector and real gross domestic product without oil negatively. For real exchange rate and trade openness variables that included in the model as control variable, we expected that more real exchange rate associated with higher foreign price and this leads to increase in inflation and trade openness stimulate this effect. Thus we consider Equation 25 to explain inflation in oil exporting countries:

$$P = f(M, X, RO, i, TO, RER) \quad (25)$$

In the log-linear form of Equation 25 for econometric estimation with Speculative attacks and economic sanctions dummy variables we have (all the variables are in logarithmic form except trade openness and dummy variables):

$$P = \alpha_0 + \alpha_1 \cdot M + \alpha_2 \cdot X + \alpha_3 \cdot RO + \alpha_4 \cdot i + \alpha_5 \cdot TO + \alpha_6 \cdot RER + Sanctions + Attacks * RER + \varepsilon_i \quad (26)$$

4- Data and Methodology

At first monthly exchange rate data over the period March 1980 to March 2014 is used to generate speculative attacks series. Unit root test with wavelets proposed by Fan & Gencay (2010) is used to investigate the degree of stationary of monthly exchange rate data. Unit root test with WAVELETS

is based on the different behavior of the spectra of a unit root process and that of a short memory stationary process. In this approach variance of the underlying process decomposed into the variance of its high and low frequency components via the discrete wavelet transformation (DWT). In econometric, GARCH models used to describe and forecast time series volatility and usually excessive persistence found in these models associated with too smooth and high volatility forecast. In Markov Regime-Switching GARCH (MRS-GARCH) models it is possible for some or all parameters to switch across different regime according to a Markov process. In this study MRS-GARCH model developed by Marcucci (2005) is used that it consist of four elements: the conditional mean, the conditional variance, the regime process and conditional distribution.

MRS-GARCH model is h step ahead volatility forecast at time T-1:

$$\hat{h}_{T,T+h} = \sum_{\tau=1}^h \hat{h}_{T,T+\tau} = \sum_{\tau=1}^h \sum_{i=1}^2 \Pr(s_{\tau} = i | \mathcal{G}_{T,T+\tau}^{(i)}) \hat{h}_{T,T+\tau}^{(i)} \quad (27)$$

In equation (27) $\hat{h}_{T,T+h}$ is the time T aggregated volatility forecast for the next h steps, also $\hat{h}_{T,T+\tau}^{(i)}$ indicates the τ step ahead volatility forecast in regime i at time T:

$$\hat{h}_{T,T+\tau}^{(i)} = \alpha_0^{(i)} + (\alpha_1^{(i)} + \beta_1^{(i)}) E_T \{h_{T,T+\tau-1}^{(i)} | S_{T+\tau}\} \quad (28)$$

The log-Likelihood function can be written as:

$$l = \sum_{t=-R+w+1}^{T+w} \log [p_{1,t} f(r_t | s_t = 1) + (1 - p_{1,t}) f(r_t | s_t = 2)] \quad (29)$$

At the second, unit root tests with structural breaks are used for annually data of Iran that extracted from central bank of Iran during 1980 to 2012. A structural break may be the change in the time series as a result of some unique economic event such as institutional, legislative or technical change. Structural unit root tests have some advantage such as: 1- it prevents test results from becoming biased towards unit root and it can identify when possible break occurred. 2- There is a trade-off between the power of the test and the amount of information included with respect to the choice of break date. 3- Theses tests only capture the single most significant break by using

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tests allowing for multiple breaks. In this study Perron (1997) and Zivot and Andrews (1992) are used for endogenous structural break unit root test. Hansen's instability test is used for testing the existence of co-integration relations. It proposed by Hansen (1992) and null hypothesis in this test is co-integration. Also, Fully Modified OLS (FMOLS) proposed by Philips and Hansen (1990) is used which employs a semi-parametric correction to eliminate the problems caused by the long run correlation between the co-integrating equation and stochastic regressors innovations. The result of FMOLS estimator is asymptotically unbiased and has fully efficient mixture normal asymptotics.

5- Empirical Result

Wavelet filters provide a natural platform to deal with the time varying characteristics found in most real world time series. The wavelet transform intelligently adapts itself to capture features across a wide range of frequencies that this makes wavelets transform an ideal tool for studying non-stationary time series. The result of wavelet unit root test is reported in Table 1 and it shows that exchange rate variable (e) is non-stationary based on both FGdemean and FGdtrend statistics. Also, the results show that growth of exchange rate variable (\dot{e}) is stationary.

Table 1: The Results of Unit Root Test with Wavelet Using Monthly Data

Statistics:	e	1%	5%	10%
FGdemean	-3.929076	-40.38	-27.38	-21.75
FGdtrend	-7.804062	-50.77	-36.54	-30.23
	\dot{e}	1%	5%	10%
FGdemean	-359.7123*	-40.38	-27.38	-21.75
FGdtrend	-350.9074*	-50.77	-36.54	-30.23

* denote a statistic significant at the 5% significance level

This Regime switching GARCH has two main advantages including: it allows higher flexibility in capturing the persistence of shocks to volatility and Markov regime-switching literature maximum likelihood estimation is

adopted to estimate the numerous parameters. The parameter estimates for MRS-GARCH models are reported in Table 2. In this model parameters are allowed to switch between the two regimes. First regime is characterized by a low volatility and almost nil persistence whereas the second have high volatility and a higher persistence. The conditional mean estimates are all insignificant whereas for most of the conditional variance parameters are significant.

Table 2: The Results of MRS-GARCH Model Estimation Using Monthly Data

Variables:	Coefficients	Std-errors	t-stats	t-stats-hess-rob
$\delta^{(1)}$	5.8934e-08	0.0105	5.5901e-06	0.0212
$\delta^{(2)}$	-1.5733e-07	0.0169	-9.3114e-06	-0.0258
$\alpha_0^{(1)}$	9.7160e-09	4.0982e-09	2.4401*	7.1619*
$\alpha_0^{(2)}$	0.4144	0.1450	68.9695*	36.6952*
$\alpha_1^{(1)}$	0.9838	0.0798	12.3267*	31.9560*
$\alpha_1^{(2)}$	5.8112e-09	0.0335	2.9864e-07	0.0956
$\beta_1^{(1)}$	9.6839e-09	1.0729e-08	0.9321	2.1821*
$\beta_1^{(2)}$	0.9909	0.0646	15.3407*	37.5260*
P	0.6131	0.0542	11.3111*	4.2208*
q	0.4501	0.0804	5.5979*	0.5264
Log(L): -691.9069				
N. of Par: 10				
N. obs: 407				

* denote a statistic significant at the 5% significance level

Based on the results of MRS-GARCH model estimation using monthly data exchange rate volatility generated. Fig.1 shows the volatility of

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exchange rate during 1980 to 2012. The results show that maximum of exchange rate volatility occurred during 1988-1990, 1994-1996 and 2012-2013 periods. 1988-1990 referred to end of the Gulf War and starting of the Persian Gulf War. In 1987 executive order 12613 prohibiting the importation and exportation of any good or services from Iran. 1994-1996 referred to executive order 12957 prohibiting USA trade in Iran's oil industry and order 12959 prohibiting any USA trade with Iran. Also in 1995 United States Congress passed the Iran-Libya sanctions act that all foreign companies that avoided investments over \$20 million for the development of petroleum resources in Iran. 2012-2013 referred to additional sanctions imposed on Iranian oil exports and Banks by USA and Europe. Europe agreed to an oil embargo, freeze the assets of Iran's central bank, Iranian banks disconnected from the SWIFT, the Worlds hub of electronic financial transactions. USA froze all property of the central bank of Iran and other Iranian financial institution.

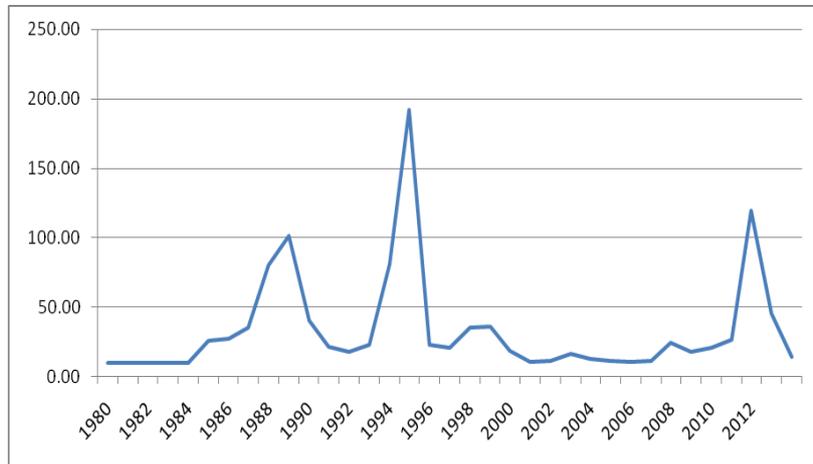


Figure 1: Exchange Rate Volatility Generated by MRS-GARCH Model During 1980-2014

Source: Research Results

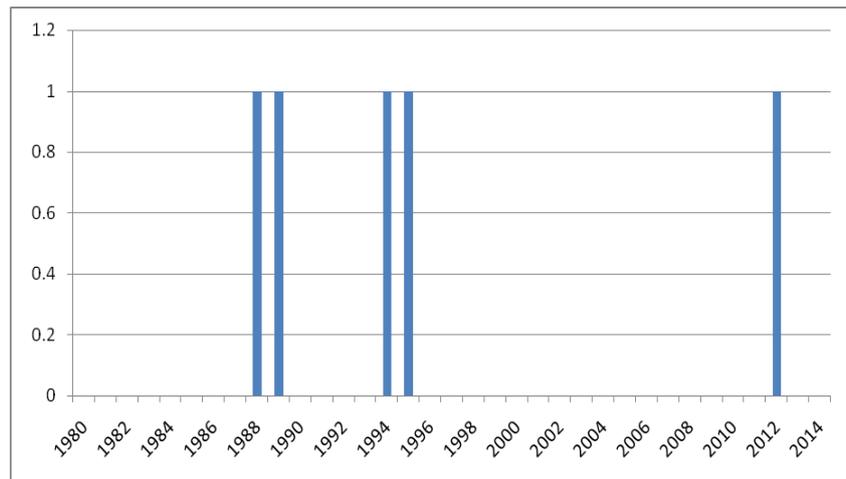


Figure 2: Speculative Attacks Dummy Variable in Iranian Economic During 1980 to 2014

Source: Research Results

Now, using Fig. 1 data that generated using MRS-GARCH model can identify speculative attacks in Iranian economic during 1980 to 2014. The method is based on the standard deviation of the mean deviation of the exchange rate is used to identify extreme values in exchange rate volatility. Speculative attacks dummy variable created based on the value 1 if volatility is more than mean plus one standard deviation and zero otherwise. Dummy variable in Fig. 2 shows that speculative attacks occurred in Iranian economy at 1988, 1989, 1994, 1995 and 2012 years.

In Table 3 the results of Perron and Zivot-Andrews tests for endogenous break reported. These tests for unit root allowing for one endogenously determined structural break. For all variables the null hypothesis of unit root cannot be rejected despite that a break has been included in each test in 10% significance level. Therefore, all the variables in the model are non-stationary during 1980 to 2012.

Table 3: The Results of Perron and Zivot-Andrews Unit Root Test in Annual Data

Unit Root Test:	P	Break Point	1%	5%	10%
Perron	-4.908703	1994	-6.32	-5.59	-5.29
Zivot-Andrews	-4.925371**	1994	-5.57	-5.08	-4.82
	M	Break Point	1%	5%	10%
Perron	-4.259100	1988	-6.32	-5.59	-5.29
Zivot-Andrews	-4.129294	1989	-5.57	-5.08	-4.82
	X	Break Point	1%	5%	10%
Perron	-2.919869	2004	-6.32	-5.59	-5.29
Zivot-Andrews	-4.599345	2002	-5.57	-5.08	-4.82
	R	Break Point	1%	5%	10%
Perron	-3.507494	2007	-6.32	-5.59	-5.29
Zivot-Andrews	-3.532838	2007	-5.57	-5.08	-4.82
	i	Break Point	1%	5%	10%
Perron	-3.756567	1992	-6.32	-5.59	-5.29
Zivot-Andrews	-3.656647	1992	-5.57	-5.08	-4.82
	RER	Break Point	1%	5%	10%
Perron	-4.030262	1997	-6.32	-5.59	-5.29
Zivot-Andrews	-4.555085	1998	-5.57	-5.08	-4.82
	Openness	Break Point	1%	5%	10%
Perron	-3.536898	1997	-6.32	-5.59	-5.29
Zivot-Andrews	-4.545615	1997	-5.57	-5.08	-4.82

** denote a statistic significant at the 10% significance level

Therefore, Hansen's instability test is used for testing the existence of co-integration relationship. The results of Hansen's instability test show in Table 4 supported the existence of long run relationship among the variables of the model. For the estimation of a single co-integration relationship among variables with a combination of non-stationary variables FMOLS method is used. Consequently the FMOLS estimation makes appropriate corrections to circumvent the inference problems and hence t-tests for the estimated long run coefficients are valid. The estimated long run co-integrating equation from the FMOLS method is therefore reported in Table 4.

Table 4: The Results of FMOLS Model Estimation

Dependent Variable: P	Coefficient	Standard Error	t Statistics
M	0.552158	0.049780	11.09194*
X	-0.397264	0.174827	-2.272319*
RO	-0.168754	0.051298	-3.289675*
i	0.510092	0.098370	5.185461*
RER	0.501602	0.046442	10.80066*
Openness	-0.730979	0.168665	-4.333921*
C	-1.104862	1.833721	-0.602525
Attacks*RER	0.005575	0.003251	1.714822**
Sanctions	0.002511	0.029050	0.086448
R-Squared	0.999176		
Adjusted R-Squared	0.998890		
Long run Variance	0.001796		
Durbin-Watson Stat	1.787970		
Hansen Lc Stat	0.580967		

*, ** denote a statistic significant at the 5% and 10% significance level respectively

The empirical results of Table 4 indicated that increase in money supply have a significantly positive effect on inflation. This result supported quantity of money theory or monetarism that money supply and prices have a direct relationship and therefore high quantity of money associated with lower buying power of the currency. In budget deficit condition government increase money supply to pay the debt and this leads to promoting aggregate demand and inflationary pressure. The coefficient of gross domestic product without oil sector is negative and it is statistically significant. Domestic product of goods and services led to an increase in the supply side of the economy and reduce demand pressure in the economy that these actives are depressing effect on inflation. About the added value of the oil sector has been observed that it has negative effect on inflation. The reason is that

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foreign exchange that earning from this sector is spent for import or domestic production support to answering domestic demand. In other hand, the foreign exchange earning in this sector could lead to higher inflation and reduce the negative effects on inflation by injection of foreign exchange income to the economy and increasing the monetary base.

The results indicated that an increase in interest rate has been accompanied by rising inflation. The reason is that with interest rates set by the state command, the interest rates will not be affected by changes in economic variables in the Iranian economy. In this situation, economic operators intended raising interest rate as rising investment and production costs that this leads to increase in expected inflation. Also, Capital flows into non-productive activities and speculation that resulting in reduced production and inflation increases. The result is supported the direct relationship between exchange rate and inflation. Exchange rate changes inflation through direct and indirect effects .In direct effect, increasing in exchange rate associated with increasing in the price of imported goods and services including final, intermediate and capital goods and services. In indirect effect, increasing in exchange rate increases demand for domestic good and services. Trade openness has a negative effect on inflation. This sign suggests that trade openness leads to lower domestic economic business cycle effects on inflation in the oil exporting countries, leading to increased imports and supply of goods and services, which has a negative effect on the level of inflation in Iranian economy.

In final, interaction of exchange rate and dummy speculative attacks variables that indicated the presence of speculative attacks effects on inflation is significant and has a positive effect. The reason is that when speculators understand the government's inability to regulate the foreign exchange market, in order to exploit the benefits of increased exchange rate buys the foreign exchange rate in the market and speculative attack occurs. Based on the MRS-GARCH model results speculative attack occurred at 1988, 1989, 1994, 1995 and 2012 years during 1980-2013. In continue the speculative attacks on the rise in the exchange rate promoting expected inflation in the economy and this is leading to increase in inflation. Sanction variable is dummy variable that has been included in the model to test for the effects of Stringent international sanctions from 2010 imposed on Iran's economy. This period referred to additional sanctions imposed on Iranian oil

exports and Banks by USA and Europe. Europe agreed to an oil embargo, freeze the assets of Iran's central bank, Iranian banks disconnected from the SWIFT, the Worlds hub of electronic financial transactions. USA froze all property of the central bank of Iran and other Iranian financial institution. The results indicated that stringent international sanctions have positive but insignificant effect on inflation in Iran's economy. This insignificant effect shows that economic sanctions have indirect effect on inflation through foreign exchange shortage in the market and increasing expected inflation notice to direct and indirect effects of increase in exchange rate. Also, economic sanctions stimulate inflation through its role in creating speculative attacks, reducing in Oil and Non-Oil sector added value.

6- Conclusion and Policy Implication

This paper surveys the Persian monetary crises duo to economic Sanctions and speculative attacks that leads to high inflation. This study introduced a new inflation function based on Neo-Keynesian framework in the case of oil exporting countries. Also, dynamics of speculative attacks based on Markov Regime-Switching GARCH (MRS-GARCH) model developed by Marcucci (2005) is used to capture some of the exchange rate dynamics associated with the speculative attacks. Fully Modified OLS (FMOLS) proposed by Philips and Hansen (1990) is used which employs a semi-parametric correction to eliminate the problems caused by the long run correlation between the co-integrating equation and stochastic regressors innovations. Unit root test with WAVELETS and Perron (1997) and Zivot and Andrews (1992) are used for e unit root tests and Hansen's instability test is used for testing the existence of co-integration relations. It proposed by Hansen (1992) and null hypothesis in this test is co-integration.

Based on the MRS-GARCH model results speculative attacks occurred at 1988, 1989, 1994, 1995 and 2012 years in Iranian economy during 1980-2013. Empirical results indicated that increase in money supply has a significantly positive effect on inflation and high quantity of money associated with lower buying power of the currency. The coefficient of gross domestic product without oil sector is negative and statistically significant. This variable promotes supply side and reduces demand pressure that these actives are depressing effect on inflation. Added value of the oil sector has a negative effect on inflation because foreign earning from this

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sector is spent for import or domestic production support to answering domestic demand.

An increasing in interest rate has been accompanied by rising inflation. In the condition that interest rates set by the state command, economic operators intended raising interest rate as rising investment and production costs that this leads to increase in expected inflation. Also, the result is supported the direct relationship between exchange rate and inflation through direct and indirect effects. Trade openness leads to lower domestic economic business cycle effects on inflation and also it increased imports and supply of goods and services. The speculative attacks on the rise in the exchange rate promoting expected inflation in the economy and this is leading to increase in inflation. In final, the results indicated that stringent international sanctions have insignificant positive effect on inflation in Iran's economy. Therefore economic sanctions have indirect effect on inflation through creating foreign exchange shortage in the market, increase expected inflation notice to direct and indirect effects of increase in exchange rate, stimulate speculative attacks, and reducing Oil and Non-Oil sector value added.

Based on the results policy suggestions to reduce high inflation in Iranian economy are: Active diplomacy aimed at breaking the economic sanctions, Join trade unions for breaking sanctions, reducing the share of dollar portfolio transactions in order to reduce the economy's dependence on dollar, allowing the exchange rate to move within wide margins in the short run but within narrow margins in the long run, raising interest rate to make strong the currency in the short run as a signal of the government's willingness or ability to defend the exchange rate (it can potentially deter a speculative attacks) and not in the long run because this policy leads to an expected depreciation and an increasing in the risk premium in the long run, strong monetary authority to face a lower probability of speculative attacks, Diversify exports and reduced dependence on oil revenue, increase in trade openness and competitiveness of local products, Reducing the rate of increased liquidity in the economy, and Spending of oil revenues to support investment and production activities in the country.

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