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ECONOMIC SANCTIONS, SPECULATIVE ATTACKS AND CURRENCY CRISIS

Farshid Pourshahabi[1†] **--- Nazar Dahmardeh**[2]

[1]*PhD Candidate in Economics, University of Sistan & Baluchestan, Zahedan, Iran*

[2]*Associate Professor in Economics, University of Sistan & Baluchestan, Zahedan, Iran*

ABSTRACT

In this study, the effects of economic sanctions and speculative attacks on creating currency crisis have been investigated in Iranian economy during recent years. Economic sanctions can lead to currency crisis through trade barriers and restrictions on financial transactions and also speculative attacks can stimulate currency crises. According to the important of this issue, new model of currency crisis introduced based on Neo-Keynesian framework in Iranian economy. Also, the stock of foreign assets that held domestically is estimated using money demand equation with ratchet mirrors. Iranian holdings of US dollar assets estimated using DOLS approach. MRS-GARCH is used to capture dynamics of speculative attacks and Beta-Skew-t-EGARCH model is used to generate economic uncertainty variable using exchange rate, interest rate, inflation and economic growth variables. The results of model estimation based on CCR approach indicate that economic sanctions and speculative attacks have positive and significant effect on currency crisis.

Keywords: Economic sanctions, Speculative attacks, Currency crisis, Foreign assets, Uncertainty, Money demand.

JEL Classification: F51, D84, E31.

Contribution/ Originality

This study introduced a new model of currency crisis based on Neo-Keynesian framework and tries to explain the effects of economic sanctions and speculative attacks on currency crisis in Iranian case study.

† Corresponding author
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1. INTRODUCTION

Currency crisis is a situation with a sharp depreciation in the domestic currency value that forces the monetary authorities to defend the currency by selling foreign exchange reserves or rising domestic interest rate. In currency crisis, the exchange rate peg or regime tend to drop. Theoretical models of currency crisis categorized as first, second and third generation. Also, there are many models of currency crisis that combined the elements of these generic forms. First generation models focus on the fiscal and monetary causes of crises. Countercyclical policies in mature economies and self-fulfilling crises are considered in second generation models. These models are unrelated to market fundamentals. In final, third generation models focus on moral hazard and imperfect information.

As IMF (International Monetary Fund) (1998) reported, 61% of all currency crises episodes were associated by a negative significant deviation in GDP from output trend and also in some crises which exemplified by IMF, 71% of the crises led to significant output losses from 1975 to 1997. Hutchinson and Noy (2002) find that currency and balance of payment crises lead to reduce in real GDP about 5-8% over the period of 2-3 years. Herz and Tong (2003) find that 32% of all debt crises are related to currency crises in developing countries. Gupta *et al.* (2007) find that about 60% of the crises are contractionary. Berg and Patillo (1999) and Goldstein *et al.* (2000) argue that a crisis occurs when the index of speculative pressure is higher than the mean about two standard deviations.

Speculative attacks on foreign currency have occurred in the countries with high inflation rate. High inflation which is due to high opportunity cost of holding domestic currency and high uncertainty leads to use for domestic saving as foreign currency. Krugman (1979) provided the monetary authority is credibly committed to defend the peg while reserves last. Speculators test the availability of a secondary reserve and exchange rate does not appreciate if the peg is still viable after the attack. Krugman (1997) argues that speculative attacks do not observable at the minimum hint of trouble may be due to transaction costs or other macroeconomic frictions. Mackowiak (2007) discussed that a speculative attack and currency crisis will be sudden and difficult to predict.

International economic sanctions have become an increasingly important foreign policy tool in the 20th century. Economic sanctions usually combine restrictions on international trade and investment. Tsebelis (1990) argues that sanctions are often imposed to send a signal that a certain behavior will not be tolerated. Mack and Khan (2000) point out that caused by sanction framework, governments is leaded into changes because of citizen in target states. Past experiences indicated that targeted regimes hardly try to dampen the negative economic consequences and tend to respond by pursuing policies which severely compound the sanctions' adverse effects on the economy. According to Hufbauer *et al.* (2007) from 57 episodes during 1914-2000, 21% of them can be judged as at least substantial and 65% of them lifted although regime change and democratization was not even partly accomplished.

Numerous governments and multinational entities impose sanctions against Iran such as: United States sanctions and UN Security Council passed resolutions. Sanctions imposed on oil, gas

and petrochemicals, banking and insurance transactions (including with central Bank of Iran and banking system disconnected from the SWIFT), Iranian ship and aircraft, web-hosting services, domain name registration, freeze on Iranian assets and restrictions on financial services. Therefore, due to the important of distinguish the effects of economic sanctions to make currency crisis in Iranian economy and also the role of speculative attacks, in this study, it has been tried to examine this subject using modeling based on Neo-Keynesian framework and econometric approaches. The rest of the paper is organized as follows: Literature review is presented in section 2, section 3 describes the model specification, Data and Methodology introduced in section 4, empirical results and finally conclusion and policy implication are summarized in sections 5 and 6 respectively.

2. LITERATURE REVIEW

Hong and Tornell (2005) examined the macroeconomic adjustments of countries in the aftermath of a currency crisis. The results indicated that the level of GDP remains permanently below the initial growth path even if the growth rate regains its potential value after 2 or 3 years of recession and the real domestic credit and foreign borrowing remain below the previous trend for many years. Gupta *et al.* (2007) found that economies with large private capital inflows in the years prior to the crisis have more likely to experience a contraction during the crisis and in other hand fewer restrictions on the capital account would make it stronger. They found that countries which traded more with the rest of the world and exported more through the devaluation during the crisis experienced lesser decline in growth.

Maltritz (2008) investigated that increase in amount of resources that leads to government ability or willing to avoid crisis, positive expected future development of resources, decrease the uncertainty about the development of the state variable, lower indebtedness, lowers the crisis probability. Higher debts necessary to fend off a speculative attack and it has higher probability of success if currency attack is launched shortly before a debt repayment is due. Therefore, avoiding high indebtedness especially high short term debt, stability, sustainability, credibility of the government economic policy, decrease in the uncertainty of whether the government will be able or willing to make payments to avoid crisis suggested to lower the probability of currency crisis.

Esaka (2014) indicated that consistent pegs policy have a significantly lower probability of currency crisis in the countries that actually adopt pegged regimes. The deviations of actual exchange rate regimes from announced regimes affect the occurrence of currency crises. In consistently maintain announced pegged regimes countries can substantially avoid speculative attacks and currency crises through enhancing the credibility of their currencies and perceiving a government's willingness to defend the exchange rate to speculators. Esaka (2010) indicated that hard pegs with capital account liberalization have a significantly lower probability of currency crises than intermediate and free float regimes with capital controls.

Ghosh *et al.* (2003) estimated the occurrence of currency crises under alternative exchange regimes in IMF member countries and they found that the probability of currency crises in floating regimes is the highest. In other hand, Haile and Pozo (2006) find that in 18 developed countries the

probability of currency crises is significantly higher for pegged regimes than for other regimes. Genberg and Swoboda (2005) argue that average exchange rate changes are lower for countries with consistent pegs but the standard deviation is higher in these countries. Also, countries with consistent pegs often experience extreme changes in their exchange rate and it increases the risk of speculative attacks. Holtemöller and Mallick (2013) indicated that the higher flexibility of the currency regime leads to lower misalignment of actual real effective exchange rates from its equilibrium level. In addition, they explored that length of misalignment could be used as a leading indicator of a potential crisis.

Tudela (2004) indicated that increase in export growth, bank deposit growth and openness decrease the probability of currency crises and in other hand increases in import growth, claims on government and foreign portfolio investment, appreciated real effective exchange rate increases the probability of currency crises. Tillmann (2004) examined the impact of disparate information on the probability of currency crises. The results showed that a smaller disparity of information lowers the probability of a speculative attack. Morris and Shin (1998) indicate that sudden movements in devaluation probabilities might be related to changes in the information structure of speculators. Fischer (2001) argue that monetary authorities should adopt hard pegs to stabilize their currencies with achieve greater credibility to avoid speculative attacks.

Obstfeld (1996) introduce three ranges of fundamental values. First, fundamentals are so bad and government will relinquish the peg without considering speculative attack. Second, fundamentals are so strong and speculators do not find it worthwhile to launch an attack. Third, there are multiple equilibria. Speculators attack and government abandons the peg if they believe that the government will relinquish the peg or Speculators are deterred from attacking by a belief that the government will defend the peg. Heinemann and Illing (2002) show that the probability of a currency crisis will rise due to an increase in the range of beliefs across speculators about the state of economic fundamentals. Eijffinger and Karatas (2012) concluded that in advanced economies tight monetary policy is effective on exchange rate stabilization and it does not have a robust effect on the exchange rate in emerging economies. They found that the current account deficits, appreciated real exchange rates and the country riskiness invite the currency crises possibility in both advanced and emerging countries.

Goderis and Ioannidou (2008) surveyed the effect of high interest rates on defend currencies during speculative attack. The results showed that the upper interest rate leads to the lower probability of a successful attack for low levels of short term corporate debt. Also, raising interest rate decreases reverses for higher levels of debt. Cheung and Friedman (2009) discussed that the probability of a successful attack is a decreasing function of the strength of the fundamentals and successful attacks come sooner when speculators have information about the strength of fundamentals and other speculators activity. Speculators are more likely to attack when fundamentals are weaker or more speculators are already to attack. The presence of a large speculator further enhances success and increases small speculators' response to the public information.

Oechslin (2014) argue that the most frequent goal of international economic sanctions is regime change and democratization. But past experiences indicated that such sanctions are often ineffective. The imposition of sanctions makes previously reluctant citizenry more inclined to revolt and a dictatorial regime reducing the supply of public goods and services to increase the cost of a revolt as a tool of defense. Eaton and Engers (1992) demonstrated that sanctions are more successful when the cost of a threatened sanction to the sender country is relatively low to the gain to the sender from changing the target's behavior.

Morgan and Schwebach (1996) discuss that the impact of sanctions on the target country is best imagine on the political elite in terms of direct and indirect effects. Morgan and Schwebach (1997) argue that sanctions will have the greatest effect on the distribution of expected outcomes if the cost of the sanctions is sufficiently high. Torbat (2005) notes that in the case study of US trade and financial sanctions against Iran, the use of smart sanctions designed to exert pressure directly on the ruling center while delivering a powerful economic blow have had little political success and this is avoiding negative impacts on the Iranian population as a whole.

Allen (2005) found that target states responses to sanctions strongly influence through domestic political structure. Bolks and Al-Sowayel (2000) indicated that the target country's institution and political vulnerability significantly affect the duration of sanctions episodes. McGillivray and Smith (2000) argue that if politicians fail to cooperate with foreign nations this leads to costs through the reduction in the level of public support. Baldwin David (1985) says that negative economic sanctions are imposed as forms of embargo, boycott, tariff sanctions, quotas, or license denial. On the other hands, positive sanctions alter targeted behavior by providing rewards. Wood Reed (2008) argues that negative sanctions punish the target by decreasing resources or restricting the opportunity for more resources that this leads to diminish the economic status of targets.

3. MODEL SPECIFICATION

Primarily, economic conditions of Iran are considered to design the model of monetary crisis. In Iran economy, foreign exchange earning of exports are sold on the parallel market and the government sells petro-dollars in the parallel market for control it. Also, government after considering the remainder of the expenditure of exchange rate offers to private sector based on the priorities. Thus, excess demand of the nominal foreign exchange by the private sector is provided through the parallel foreign exchange market.

Initially, the price equation for this model is designed. It is assumed that commodities are classified to tradable goods sectors and non-tradable goods:

$$P_t = P_t^T + P_t^N \qquad (1)$$

In equation (1), P_t is total price index, P_t^T is tradable goods price index and P_t^N is non-tradable goods price index. As the tradable commodity price index in equation (2):

$$P_t^T = [\theta E + (1-\theta)S]P_t^* \qquad (2)$$

In this equation, E is the official exchange rate, S is Parallel market exchange rate and P_t^* is Global Price Index. Based on equation (2) tradable goods price index is a function of the average rate of exchange parallel market and the official currency. Growth of domestic prices of non-tradable goods price index is shown in equation (3):

$$P_t^N = \omega_{t-1}P_t + \varphi\left[m_{t-1} - m_t^d\right] \qquad (3)$$

In this equation, the growth of domestic prices is a function of expected inflation ($_{t-1}P_t$) and excess money supply relative to the demand for money. So, the total price index is:

$$P_t = [\theta E + (1-\theta)S]P_t^* + \omega_{t-1}P_t + \varphi\left[m_{t-1} - m_t^d\right] \qquad (4)$$

Free interest rate hedge in equation (5) is provided:

$$i_t = i_f + \frac{\dot{r}_t}{r_t} \qquad (5)$$

In this equation, i_t is the domestic interest rate, i_f is the foreign interest rate and r_t is the exchange rate. As can be seen, In the case of fixed exchange rates, domestic and foreign interest rates are equal. Real money demand relationship in equation (6) is considered to be:

$$\frac{M_t}{P_t} = \alpha_0 + \alpha_1 y + \alpha_2 i_t + \alpha_3 u_t \qquad (6)$$

In this equation, M_t is monetary base (Powered money), P_t is the total price index, y is the real gross domestic product, i_t is the domestic interest rate and u_t is the economic uncertainty.

Notice to the fact that government's budget deficit is financed through selling bonds to central bank or agents, thus:

$$\Delta BD = \Delta CLG + \Delta PLG \qquad (7)$$

In this equation, ΔBD is the government's budget deficit, ΔCLG is the Changes in central bank lending to the government and ΔPLG is the changes in government debt to the private sector. Changes in the monetary base by the central bank's balance sheet are:

$$\Delta M = \Delta F + \Delta CLG + \Delta CLB \qquad (8)$$

In this equation, ΔM is the change in the monetary base, ΔF is a change in foreign exchange assets of central bank and ΔCLB is the Changes in central bank lending to banks. It is Indicating that changes in the monetary base are a function of changes in monetary policy, fiscal and balance of payments and foreign exchange policy. Using equation (7) & (8) we have:

$$\Delta M = \Delta F + (\Delta BD - \Delta PLG) + \Delta CLB \qquad (9)$$

Assuming that changes in debt to private sector and changes to lending of central banks is almost zero. The above equation (9) can be written as follows:

$$\dot{M} = \dot{F} + \dot{BD} \qquad (10)$$

This indicates that the liquidity growth equal to the sum of government deficit growth (μ) and growth of foreign exchange reserves of the Central Bank. Government's revenue includes oil and tax revenues in Iran, so the budget deficit is a function of tax revenue earnings in the period prior and the oil revenue including the sale of petro-dollars in the parallel foreign exchange market and another portion of the sale of petro-dollars is the central bank.

$$BD = T(Y, TAX_{-1}) + (OILEXP * E) + (OILEXP * q) - G \qquad (11)$$

In this equation, T is tax revenue, OILEXP ∗ E is the Proceeds from the petro-dollars sold to the Central Bank, OILEXP ∗ q is the Proceeds from petro-dollars sold in the parallel foreign exchange market, $q = {}^{S}/_{E}$ is the marginal currency and G is government expenditures.

Using monetary market balance equation, equation (12) investigated:

$$\frac{M_t}{[\theta E+(1-\theta)S]P_t^*+\omega_{t-1}P_t+\varphi[m_{t-1}-m_t^d]} = \alpha_0 + \alpha_1 y + \alpha_2(i_f + \frac{\dot{r}_t}{r_t}) + \alpha_3 u_t \quad (12)$$

Liquidity based on the above equation is:

$$M_t = (\alpha_0 P_t^* + \alpha_1 P_t^* y + \alpha_2 P_t^* i_f)[\theta E + (1-\theta)S] + (\alpha_0 + \alpha_1 y + \alpha_2 i_f)\omega_{t-1}P_t + (\alpha_0 + \alpha_1 y + \alpha_2 i_f)\varphi[m_{t-1} - m_t^d] + \alpha_2 P_t^*[\theta E + (1-\theta)S]\frac{\dot{r}_t}{r_t} + \alpha_2\omega_{t-1}P_t\frac{\dot{r}_t}{r_t} + \alpha_2\varphi[m_{t-1} - m_t^d]\frac{\dot{r}_t}{r_t} + [\theta E + (1-\theta)S]P_t^*\alpha_3 u_t + \alpha_3\omega_{t-1}P_t u_t + \varphi[m_{t-1} - m_t^d]\alpha_3 u_t \quad (13)$$

equation (14) can be written as:

$$M_t = \gamma_1[\theta E + (1-\theta)S] + \gamma_{2\,t-1}P_t + \gamma_3\varphi[m_{t-1} - m_t^d] + \gamma_7[\theta E + (1-\theta)S]u_t + \gamma_{8\,t-1}P_t u_t + \gamma_9\varphi[m_{t-1} - m_t^d]u_t \quad (14)$$

Given the simplifying assumption of a stable deficit and using equations (10) and (14):

$$\dot{R}_t = \gamma_{2\,t-1}\dot{P}_t + \gamma_3\varphi[\dot{m}_{t-1} - \dot{m}_t^d] + \gamma_7[\theta E + (1-\theta)S]\dot{u}_t + \gamma_{8\,t-1}\dot{P}_t u_t + \gamma_{8\,t-1}P_t\dot{u}_t + \gamma_9\varphi[\dot{m}_{t-1} - \dot{m}_t^d]u_t + \gamma_9\varphi[m_{t-1} - m_t^d]\dot{u}_t \quad (15)$$

Given the coefficients α_2 and α_3 are negative, so γ_8 and γ_9 coefficients are negative. As a result of increase uncertainty, expected inflation and money growth can spread rapidly depleted international reserves (Notice: $\dot{R}_t = \dot{F}$). Therefore, to simplify the estimation model based on the equation (15), international reserves give a Function of the following factors: expected inflation, money supply surplus, average of exchange rates, economic uncertainty and interaction effect among economic uncertainty, money supply surplus and expected inflation. The estimation model is considered in equation (16):

$$R = f(_{t-1}\dot{P}_t, \varphi(m_{t-1} - m_t^d), [\theta E + (1-\theta)S], _{t-1}\dot{P}_t u_t, \varphi[m_{t-1} - m_t^d]u_t) \quad (16)$$

4. DATA AND METHODOLOGY

In this study monthly exchange rate data over the period March 1980 to March 2014 is used to generate the proxy of speculative attack variable. Wavelets unit root tests that proposed by Fan and Gencay (2010) is used to investigate the degree of stationary of exchange rate data. 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. 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.

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. In this study Perron (1997) and Zivot and Andrews (1992) are used for endogenous structural break unit root test. Beta-Skew-t-EGARCH model is a dynamic model of scale or volatility of financial returns that proposed by Sucarrat

(2013). Beta-Skew-t-EGARCH models allow for heavy tails and skewness in the conditional returns and parameters not be restricted to be positive to ensure positivity of volatility.

Park Joon (1992) canonical co-integration regression (CCR) is used for estimation goals. CCR estimates follow a mixture normal distribution which is free of non-scalar nuisance parameters. This technique permits asymptotic chi-square testing, fully efficient, have the same unbiased and CCR transformations asymptotically eliminate the endogeneity caused by the long run correlation of the co-integration equation errors. Dynamic OLS (DOLS) method involves augmenting the co-integration regression with lags and error terms is orthogonal to entire history of the stochastic regressor innovations. DOLS method advocated by Saikkonen (1992) and Stock James and Mark (1993) constructing an asymptotically efficient estimator that eliminates the feedback in the co-integration system. In final Hansen's instability test is used for testing the existence of co-integration relations. Hansen's instability test proposed by Hansen Bruce (1992).

5. EMPIRICAL RESULT

The wavelet transform adapts itself intelligently to capture features across a wide range of frequencies that this makes wavelets transform an ideal tool for studding non-stationary time series. The result of wavelet unit root test is reported in table 1 and it shows that exchange rate variable (ER) is non-stationary based on both FGdemean and FGdtrend statistics. Also, the results show that growth of exchange rate variable (GER) is stationary.

Table-1. The results of unit root test with wavelet using monthly data

Statistics:	**ER**	**1%**	**5%**	**10%**
FGdemean	-3.929076	-40.38	-27.38	-21.75
FGdetrend	-7.804062	-50.77	-36.54	-30.23
	GER	1%	5%	10%
FGdemean	-359.7123*	-40.38	-27.38	-21.75
FGdetrend	-350.9074*	-50.77	-36.54	-30.23

***** denote a statistic significant at the 5% significance level

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*
				Continue

$\alpha_0^{(2)}$	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

The results of MRS-GARCH model estimation show that maximum of exchange rate volatility occurred during 1988-1990, 1994-1996 and 2012-2013 periods. The period of 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. The period of 1994-1996 referred to executive order 12957 prohibiting USA trade in Iran's oil industry and order 12959 prohibiting any USA trade with Iran.

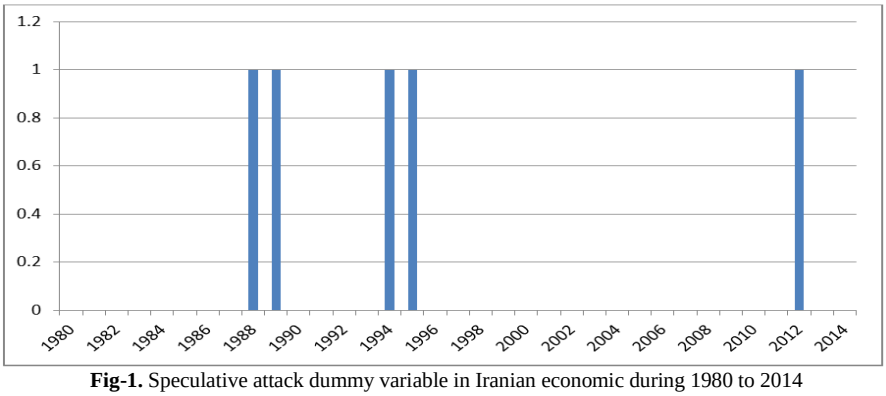

Fig-1. Speculative attack dummy variable in Iranian economic during 1980 to 2014

Source: Research results

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. The 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. The USA froze all property of the central bank of Iran and other Iranian financial institution. Speculative attack 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 1 shows that speculative attack occurred in Iranian economy at 1988, 1989, 1994, 1995 and 2012.

Atta-Mensah (2004) money demand function is used to generate international assets in Iranian economy. Also, Bahmani-Oskooee and Rehman (2005) is considered in estimation model.

Therefore, money demand (M/P) is a function of scale variable (Y), inflation (INF), interest rate (r), maximum inflation rate to date (INFMax) and economic uncertainty (UNC).

$$\log\left(\frac{M}{P}\right) = \alpha_0 + \alpha_1 \log(y) + \alpha_2 \log(r) + \alpha_3 \mathrm{Inf} + \alpha_4 InfMax + \alpha_5 \log(Unc) \qquad (23)$$

In table 3 the results of Perron and Zivot-Andrews unit root tests for endogenous break is reported. These tests are allowed for one endogenously determined structural break. Thus, there are non-stationary variable in the model during 1980 to 2012.

Table-3. The results of Perron and Zivot-Andrews unit root test in Annual data

Unit Root Test:	Log(M/P)	Break Point	1%	5%	10%
Perron	-3.066121*	2001	-5.92	-5.23	-4.92
Zivot-Andrews	-2.989798*	2004	-5.34	-4.93	-4.58
	Log(r)	Break Point	1%	5%	10%
Perron	-3.682050*	1989	-5.92	-5.23	-4.92
Zivot-Andrews	-3.672534*	1990	-5.34	-4.93	-4.58
	Log(Y)	Break Point	1%	5%	10%
Perron	-3.195991*	2002	-5.92	-5.23	-4.92
Zivot-Andrews	-3.123021*	2002	-5.34	-4.93	-4.58
	Log(INF)	Break Point	1%	5%	10%
Perron	-4.342914*	1985	-5.92	-5.23	-4.92
Zivot-Andrews	-4.100854*	2000	-5.34	-4.93	-4.58
	Log(INFMax)	Break Point	1%	5%	10%
Perron	-7.072828	2001	-5.92	-5.23	-4.92
Zivot-Andrews	-7.255751	2002	-5.34	-4.93	-4.58
	Log(UNC)	Break Point	1%	5%	10%
Perron	-3.507850*	2001	-5.92	-5.23	-4.92
Zivot-Andrews	-3.824411*	2002	-5.34	-4.93	-4.58

* denote a statistic significant at the 5% significance level

Thus, Hansen's instability test is used to testing the existence of co-integration relations among the variables to prevent the existence of liar regression in the model. The results reported in table 4 indicated that there is co-integration relationship among non-stationary variables of the model. The results of money demand estimation (equation 23) using DOLS model is reported in table 4.

Table-4. The results of DOLS model estimation

Dependent Variable: Log(M/P)	Coefficients	Std-errors	t-stats
Log(r)	-0.243166	0.151733	-2.563121*
Log(Y)	0.932367	0.121548	10.151119*
INF	0.1016349	0.001897	6.207573*
INFMax	-0.004919	0.002018	-3.653654*
Log(UNC)	-0.294545	0.039647	-7.168964*
C	-2.300051	0.938469	-2.439281*
R-Squared: 0.998736 Adjusted R-Squared: 0.995927 Long run Variance: 0.000512 Durbin-Watson Stat: 1.860980 Hansen Lc Stat: 0.116675			

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

The results indicated that interest rate, economic uncertainty and maximum inflation rate to date have negative effect on money demand. Also, scale variable and inflation have positive effect on money demand in Iranian economy.

Based on Kamin and Ericsson (2003), INFMax variable implies a literally permanent effect of some inflationary shocks on money demand. The Measure of the implied ratchet variable's long run effect for dollar-denominated assets based on inflationary ratchet effect indicated in equation (24):

$$R_t = \left(\frac{M_t}{E_t}\right).(\exp[\alpha_4 InfMax_t] - 1) \quad (24)$$

Money demand extracted from estimation standard money demand equation including interest rate and scale variable. Also, expected inflation generated by Hodrick-Prescott filter to obtain a smooth estimate of the long term trend component in an inflation variable. This method proposed with Hodrick and Prescott (1997).

Based on equation (22), international reserves (R) is a Function of expected inflation (EINF), money supply surplus (MSS), average of exchange rates (AER), economic uncertainty (UNC) and interaction among economic uncertainty, money supply surplus and expected inflation. In continue this model estimated using Park Joon (1992) canonical co-integration regression (CCR). The results of Perron and Zivot-Andrews tests are reported in Table 5. Based on the results there is non-stationary variable in the model. The results of Hansen's instability test show in table 6 supported the existence of long run relationship among the variables of the model.

Table-5. The results of Perron and Zivot-Andrews unit root test in Annual data

Unit Root Test:	**Log(R)**	**Break Point**	**1%**	**5%**	**10%**
Perron	-6.784788	2001	-5.92	-5.23	-4.92
Zivot-Andrews	-6.965120	2002	-5.34	-4.93	-4.58
	Log(UNC)	Break Point	1%	5%	10%
Perron	-4.091843*	2001	-5.92	-5.23	-4.92
Zivot-Andrews	-4.302679*	2002	-5.34	-4.93	-4.58
	Log(MSS)	Break Point	1%	5%	10%
Perron	-4.145498*	1993	-5.92	-5.23	-4.92
Zivot-Andrews	-4.189744*	1995	-5.34	-4.93	-4.58
	Log(AER)	Break Point	1%	5%	10%
Perron	-3.767264*	1991	-5.92	-5.23	-4.92
Zivot-Andrews	-3.877249*	1992	-5.34	-4.93	-4.58
	Log(UNC)*EINF	Break Point	1%	5%	10%
Perron	-5.704408*	1988	-5.92	-5.23	-4.92
Zivot-Andrews	-5.629631*	1994	-5.34	-4.93	-4.58
	Log(UNC)*Log(MSS)	Break Point	1%	5%	10%
Perron	-5.762812*	2005	-5.92	-5.23	-4.92
Zivot-Andrews	-5.879722*	2005	-5.34	-4.93	-4.58

* denote a statistic significant at the 5% significance level

Empirical results reported in table 6 indicated that expected inflation decrease international assets of Iranian economy. With expected inflation, Economic actors buy dollar to benefit from the devaluation of the Rial. Government maintains a constant exchange rate and this leads to decline in

international reserves. Uncertainty coefficient indicated that economic uncertainty has a positive effect on the country's foreign reserves because of the existence of economic instability in the country, thus economic agents less sensitive to economic uncertainty. Also, although the volatility of the economy is increased in recent years but increasing oil revenues led to an increase in foreign reserves. The results show that interaction effect of economic uncertainty and expected inflation is negative. Therefore, the combination of economic uncertainty and increasing expected inflation has Synergistic effect on decrease in foreign reserves in Iranian economy.

The results of table 6 indicated that if money supply is more than money demand that needed in the economy then this leads to decrease in foreign reserves. In the monetarist view of inflation, excess money supply in the economy leads to inflation and this leads to increase in demand for foreign currencies due to the appreciation of the foreign currency against the domestic currency. This would reduce the country's foreign reserves to maintain the exchange rate in the country. The interaction effect of economic uncertainty and surplus money supply rather than money demand is negative. Therefore, the combination of economic uncertainty and excess money supply has Synergistic effect on decreasing foreign reserves in Iranian economy.

Table-6. The results of CCR model estimation

Dependent Variable: Log(R)	**Model 1**	**Model 2**	**Model 3**
EINF	-0.203434 (-5.633162)*	-0.056408 (-1.595383)	-0.039927 (-1.001813)
Log(UNC)	1.347092 (5.719188)*	1.400283 (4.882079)*	1.660214 (6.990949)*
Log(MSS)	-20.88211 (-10.58940)*	-15.73490 (-7.418826)*	-15.64873 (-7.204496)*
Log(UNC)*EINF	-0.192958 (-6.481242)*	-0.069919 (-1.943013)**	-0.046140 (-1.055558)
Log(UNC)*Log(MSS)	-12.65807 (-9.803880)*	-9.056608 (-5.833304)*	-9.250749 (-6.675152)*
Log(AER)	1.790207 (8.226341)*	1.680291 (5.807981)*	1.791528 (5.771998)*
Sanction	-1.352236 (-3.344500)*	-1.390253 (-2.787878)*	-
Crisis*Log(AER)	0.535350 (4.198021)*	-	-
C	2.178041 (2.664507)*	3.119724 (2.885316)*	2.876040 (2.469536)*
R-Squared	0.455506	0.618783	0.773096
Adjusted R-Squared	0.213509	0.478334	0.705025
Long run Variance	0.169997	0.290896	0.353738
Durbin-Watson Stat	2.158907	1.341195	2.326738
Hansen Lc Stat	0.745299	0.857889	0.500132

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

The relationship among exchange rate and international assets are positive. Positive relationship between exchange rate appreciation and foreign assets is due to the increasing volume of money in the economy on the one hand and increasing foreign earnings from the crude oil prices are on the other hand. The interaction effect of speculative attack and exchange rate on foreign

reserves is insignificant. This variable is meaningless because of the high level of foreign exchange reserves in the economy. Therefore speculative attacks are not successful and foreign reserves of the country are not in crisis.

In final, the effects of economic sanctions on foreign reserves are negative and statistically significant in Iranian economy. Thus, oil embargo, sanctions on banking and SWIFT system and the Central Bank of Iran were avoided Iranian authority to increase the country's foreign reserves. Economic sanctions target the country's foreign reserves through increase in foreign exchange rates on the one hand that is led to supply foreign exchange by the central bank to avoid a shock in foreign exchange market. On the other hand, decline in foreign exchange earnings and foreign exchange reserves blocking affected the supply of foreign exchange reserves.

6. CONCLUSION AND POLICY IMPLICATION

In this study, the relationship among economic sanctions, speculative attacks and currency crisis have been investigated in Iranian economy. Economic sanctions can lead to currency crisis and speculative attacks can stimulate currency crisis. Notice to Iranian economy, new model of currency crisis introduced based on Neo-Keynesian framework. Empirical results indicated the expected inflation decrease international assets because Economic actors in situations where expected inflation is raising buy dollar to benefit from the devaluation of the Rial against the dollar. This leads to decline in international reserves. As a result, economic uncertainty has a positive effect on the country's foreign exchange reserves. Due to the existence of economic instability in the country, economic agents are less sensitive to economic uncertainty. In other hand, increasing oil revenues lead to higher foreign reserves in Iranian economy although the volatility of the economy increased too. Interaction effect of economic uncertainty and expected inflation has negative sign because the combination of economic uncertainty and increasing expected inflation has synergistic effect on depletion of international assets.

Excess money supply rather than money demand leads to inflation and appreciation of foreign currency that associated with negative effect on foreign assets. The combination of economic uncertainty condition and excess money supply rather than money demand has a synergistic effect of depletion of foreign assets. Also, The relationship among exchange rate and international assets are positive because of the combination of increased volume of money in the economy and increased foreign exchange from increasing oil prices. The interaction effect of speculative attack and exchange rate on foreign assets is insignificant because of the existence of high level of foreign reserves that leads to unsuccessful speculative attacks. Therefore foreign reserves of the Iranian economy are not in crisis. The results show that economic sanctions have significantly negative effect on foreign assets. Oil embargo, sanctions on banking and SWIFT system and the Central Bank of Iran were avoided Iranian authority to increase foreign currency assets. Also, declining in foreign exchange earnings and blocking foreign exchange reserves leads to depletion Iranian foreign exchange reserves. In this condition, foreign reserves management policy pursued in Iran to prevent currency crisis.

Based on the results, policy suggestions to reduce probability of currency crisis in Iranian economy are: expanding trade policy followed with more the rest of the world and exported more through the devaluation, Controlling capital inflows through restriction on the capital account, Avoiding high indebtedness especially high short term debt, Following stability economic policy such as stable fiscal and monetary policy, decrease current account deficit, decrease country politically risk, Decreasing the degree of financial market imperfection, Using consistent pegs policy and avoiding sudden movements in devaluation, Decreasing disparity of information to avoiding speculative attacks, Using high interest rate to defend currency during speculative attack, Monetary authority should announce their adoption of currency pegs with actually adopt pegged regimes to avoid speculative attacks, Active diplomacy aimed at breaking the economic sanctions, Join trade unions for breaking sanctions, Diversify exports and reduced dependence on oil revenue, Reducing the rate of increased liquidity in the economy, and Spending of oil revenues for supporting the investment and production activities in the economy.

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