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Appropriate Short-term Policies to Tackle the Foreign Exchange Crisis

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Abstract

During last years, there have been widespread investigations on foreign exchange rate and its problems, indicating the importance of foreign exchange rate as a key factor in an open economy. This rate influences many types of macroeconomic variables such as import, export, inflation, interest rate and governmental policies and economic decisions. Therefore, nowadays, it is a fundamental goal for governments to control the foreign exchange market. In this regard, the main hypothesis of our model is that Iran's economy is in foreign exchange crisis. And after proposing a new method for modeling of demand for money by using pressure index to foreign exchange market; some suggestions have been brought to control the foreign exchange crisis. Of course, regarding our research results, if central bank policies do not change stocks of foreign exchange, then foreign exchange rate fluctuations would not affect the currency market turbulence index.

Keywords: Exchange rate; Portfolio; Foreign exchange crisis; Short-term policies; Money demand

Introduction

In 1936 for the first time, Keynes in his book "General theory, employment, interest and money" stated: if currency in circulation loses its liquidity feature, a large number of substitutes will come into existence for it, such as short-term debts, foreign currency, jewellers, precious metals and bank credit flows called credit money [1].

Of course dollarization of economy has a longer history [2]. Currency substitution will occur when people of a country prefer to substitute foreign currency for local currency [3]. There are several reasons for this phenomenon, which the most significant is continuous depreciation of national currency. On these occasions, local currency weakens or in other words, foreign exchange rate will increase and probably demand for local currency will rise. Obviously foreign exchange rate escalation may result in a decline in demand for local currency, because people prefer to replace local currency with foreign currency, meaning that Gresham principle converse and good money will make bad money quit the market [4].

There is various number of modeling approaches for the investigation of currency substitution, including Ramirez-Rojas and Luis [5], El-Erian [6], Mongardini and Muller [7]. Most of these researchers have mentioned that currency substitution rate is a function of the difference between foreign and domestic interest rate, foreign exchange rate and lagged currency substitution rate variable. Furthermore, Miles [8] have done their research on currency substitution and believe that currency substitution rate depends on logarithm of the ratio of foreign interest rate to domestic interest rate as well as risk. Guidotti and Rodriguez [9] have also allocated their study to currency substitution with portfolio combination when there is capital mobility and introduced two models for currency substitution rate:

- A model in which currency substitution rate is only considered as a function of the difference between foreign and domestic inflation.
- A model that currency substitution rate is regarded as a function of the difference between foreign and domestic inflation and trend variable.

In this study, along with proposing the modeling of economic relations, we aimed to introduce a new algorithm which is completely based on mathematical techniques without any particular presumption whereas other methods, depending on their nature, are accompanied by many presumptions, causing them to encounter serious errors and numerous problems. Considering the fact that our main purpose is on how to alleviate the foreign exchange crisis, after optimization, we have focused on the effects of monetary policy on foreign exchange crisis by entering Chaos index in foreign exchange market.

Therefore, in this paper, currency substitution is analysed by portfolio approach. Following Markowitz approach, portfolio selection has been divided into two stages: First stage incorporates observation and experience and the other begins with beliefs about future performance [10].

With the assumption from Linter viewpoint, the purpose of portfolio selection is to find the optimal risk and expected return combination [11]. In general, portfolio selection approach indicates that economic activists endeavor to select the best set of risk and expected return combination among available assets [12]. In addition, similar to Rojas Suarez [13] and Ortiz [2] studies, to find the optimal combination of local and foreign currency, each economic activist maximizes their utility function with regard to their budget constraint and supposing that economic activists have rational expectations, Individuals' preference function would depend on the difference between local and foreign currency [14] and then by solving the maximization problem, the ratio of local currency to foreign currency saving will be obtained and afterwards, regarding currency market turbulence index introduced by Saxena and Wong [15] we investigate the effect of monetary policy on controlling the foreign exchange crisis. The reason for the application of this index is to have a better performance in determination of foreign exchange crisis rather than that of alarming approach [16,17]. It's Necessary to mention that many studies have been limited to introduction of a constrained crisis index [18]. Some other studies have surveyed the quick movement of capital entry flow into output during t and t+1 years [19] and also another

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study with KLR approach has been done by Kaminsky, Lizondoin this area of research.

Literature Review

Sturzenegger [20] has introduced a substitution model for currency in which economic activists strike their deals with both local and foreign currency. In an economy where individuals are allowed to use other payment instruments, welfare will improve. Using Ramsey tax rules, the author observed that currency substitution will transfer the inflationary burden to demand for inelastic goods. Then he has shown that inflation has strong distributive effects. When currency substitution prevails, those high-income economic activists will benefit and those low-income ones will suffer a loss.

Miles in his paper "Currency substitution, flexible foreign exchange rates and money independence" went through the subject of foreign currency holding and transaction costs of buying foreign commodities. In his opinion, keeping foreign currency will decrease the transaction cost of foreign buys and the disparity between rates of inflation in different countries determines the currency substitution rate [21]. However, Bordo and Choudri in their research criticize Miles's view and believe his function specification to be wrong.

Girton and Roper [22] in their paper "Theory and the consequences of currency substitution" present a model with two functions for money demand and external supply for money as well as a non-monetary asset. In their model, demand for both foreign and local currency is a function of real rate of return for both currencies, real non-monetary rate of return and wealth scale variables.

Tanzi and Blejer [23] in their paper called "Inflation, interest rate policy, currency substitution in developing countries" investigate interest rate policies and currency substitution. It is totally assumed that demand for money, in addition to scale variables such as wealth and income depends on rate of return for money savings in proportion to other assets. It is expected that higher rate of return for other assets including foreign currency, reduces the demand for local currency. Hence foreign currency of the main trade parties would be probably a substantial part of domestic portfolio.

Daniel and Fried, the authors of "Currency substitution, post strikes and money demand in Canada" have carried out a research on the replacement of foreign currency instead of local currency and in their point of view, if the effect of post strikes on demand for money is overlooked then in the strike period the estimate of demand for money will be lower than its true value. Their results have confirmed the existence of substitution of foreign currency for local currency (through negative coefficient of foreign interest rate) and the effect of post strikes on demand for money.

Thomas [24] in a paper with the title of "Asset theory and currency substitution" presume that in money demand side, economic activists have enough motivation to hold both foreign and local currencies and therefore foreign interest rate, foreign inflation rate, expected changes of foreign exchange rate are influential in demand for money. He concluded that these currencies can just be replaced with each other when cross elasticity between demands for local (foreign) currency to foreign (domestic) interest rate is negative.

Melvin [25] in a paper called "Currency substitution and western European countries' monetary alliance" with an asset portfolio approach has considered the currency substitution in some western European countries. Its final conclusion is that in a floating foreign exchange rate system, it is inevitable for European countries to accept monetary alliance in order to achieve monetary independency.

Guidotti and Rodriguez [9] in their paper "Dollarization in Latin America, Is Gresham principle converse?" reached the conclusion that dollarization of the economy may be an unstable time series while the difference between foreign and domestic inflation appears to be stationary. In other words, dollar level shocks of economy have a permanent effect as against to shocks related to the difference between foreign and domestic inflation rate by a transient effect.

Instead of applying direct method of measuring currency substitution rate, Miles [21] has suggested another method for currency substitution test. Miles method has been based on this assumption that real remaining parts of local and foreign currencies are data for production function and the output is the flow of monetary service. He assumed that production function is CES, homogeneous of degree one and foreign exchange market is determined by foreign exchange transactions with perfect interest. Miles maximizes the flow of monetary service with regard to asset constraint and supposes the currency substitution rate is just a function of the logarithm of the ratio of foreign interest rate to domestic interest rate.

Using a data series in a period of 1867 to 1965, Spinell [26] has analyzed the demand for money in Italy and states that money demand function in Italy is a stable function of two key variables: permanent income and interest rate. He has concluded that in long-term, under a firm foreign exchange rate system, price levels are determined externally and just domestic monetary policy can affect the payment balance. While under a floating foreign exchange rate system, foreign exchange market will be adjusted and price levels and the amount of money would be under Italian bank control and monetary policies would turn out to be powerful.

McKinnon [27] has declared world demand for money to be fairly stable. He believes that currency substitution in international level causes monetary controls to reduce. Most of the money holders are influenced by interest rate changes that is an indirect form of currency substitution and from quantity point of view, it is very important. In countries where the degree of economic openness is increasing, the risk of changes in foreign exchange rate in proportion to dollar will rise. Therefore, there would be the possibility of currency substitution at the expense or to the benefit of national currency.

Vegh [28] has examined inflationary tax in a small open economy in which both foreign and local currencies are looked as current transaction instruments. His conclusion in optimal inflationary literature has been that, if money is regarded as a decreasing tool for transaction costs then nominal interest rate would be zero.

In order to analyze dollarization of Bolivia economy, Melvin and Ladman [29] due to inaccessibility to foreign currency in circulation data in national economy-have left demand side patterns and have just noticed dollarization of economy from supply side. In their opinion, since illegal actions are financed by cash (and in Latin America by dollar), a high amount of dollars in circulation in the economy of countries like Bolivia, Peru and Colombia are earned from illegal addictive drug trafficking. Therefore dollarization of economy in some Latin America countries can be considered in line with addictive drug trafficking in these countries.

Research Model

The main hypothesis of our model is that Iran's economy is in

foreign exchange crisis. Hence, based on existing rules of rational expectations, economic activists decide to include foreign exchange in their portfolios; therefore, currency substitution will occur and cash is replaced with foreign exchange in people's portfolio. At this time, when liquid assets enter to foreign exchange market, foreign exchange crisis will intensify. Hence, in order to investigate the effect of monetary policy on foreign exchange rate management, assume economic activists' utility function is U(Z_t) with the following constraint:

$$\begin{cases} U(Z_t)=E\left\{\sum_{t=0}^{\infty}U(c_t(k_t^{\$},k_t^{\zeta+\vartheta},m_t^{\xi}),m_t^{\psi})\right\} \\ m_t^{\psi}+c_t+k_t^{\$}+k_t^{\zeta+\vartheta}+m_t^{\xi}=\dfrac{m_{t-1}^{\psi}}{1+\hat{P}_t}+\dfrac{(1+r_t^{\$})k_{t-1}^{\$}}{1+\hat{P}_t}+\dfrac{(1+r_t^{\zeta+\vartheta})k_{t-1}^{\zeta+\vartheta}}{1+\hat{P}_t}+\dfrac{(1+r_t^{\xi})m_{t-1}^{\xi}}{1+\hat{P}_t}+y_t \end{cases} \quad (1)$$

Where c_t: Real consumption of consumable goods, $k_t^{\$}$: Real amount of foreign exchange assets, $k_t^{\alpha+\vartheta}$: Real amount of a portfolio of assets that can be stocked and land and house, m_t^{i}: Real amount of long-term deposits, $m_t^{\varnothing}$: Real amount of cash kept by people, $\hat{P}_t$: Inflation rate, $r_t^{\$}$: Return rate of foreign exchange assets, $r_t^{\alpha+\vartheta}$: Return rate of a portfolio of assets that can be stocked and land and house, $r_t^{\hat{i}}$: Return rate of bank deposits, y_t: Real income, Z_t: A vector of state variables, E_t: A Conditional expectation operator to full information at time t, β^t: Discounting coefficient (a coefficient by which the present value of utility gained from good consumption and money saving during the time can be calculated) Lagrange function has been used so as to maximize utility function considering its constraint. Regarding 1st order condition, following results have been attained:

$$\begin{aligned} L(Z_t)=&U\left(C_0\left(k_0^{\$},k_0^{\zeta+\vartheta},m_0^{\xi}\right),m_0^{\psi}\right)+\lambda_0\left[y_0+\frac{m_{-1}^{\psi}}{1+\hat{P}_0}+\frac{(1+r_o^{\$})k_{-1}^{\$}}{1+\hat{P}_0}+\frac{(1+r_o^{\zeta+\vartheta})k_{-1}^{\zeta+\vartheta}}{1+\hat{P}_0}+\frac{(1+r_o^{\xi})m_{-1}^{\xi}}{1+\hat{P}_0}\right]+ \\ &E\left\{\beta U\left(C_1\left(k_1^{\$},k_1^{\zeta+\vartheta},m_1^{\xi}\right),m_1^{\psi}\right)+\lambda_1\left[y_1+\frac{m_0^{\psi}}{1+\hat{P}_1}+\frac{(1+r_1^{\$})k_0^{\$}}{1+\hat{P}_1}+\frac{(1+r_1^{\zeta+\vartheta})k_0^{\zeta+\vartheta}}{1+\hat{P}_1}+\frac{(1+r_1^{\xi})m_0^{\xi}}{1+\hat{P}_1}\right]\right\}+\ldots+ \\ &E\left\{\beta^t U\left(C_t\left(k_t^{\$},k_t^{\zeta+\vartheta},m_t^{\xi}\right),m_t^{\psi}\right)+\lambda_t\left[y_t+\frac{m_{t-1}^{\psi}}{1+\hat{P}_t}+\frac{(1+r_o^{\$})k_{t-1}^{\$}}{1+\hat{P}_t}+\frac{(1+r_o^{\zeta+\vartheta})k_{t-1}^{\zeta+\vartheta}}{1+\hat{P}_t}+\frac{(1+r_o^{\xi})m_{t-1}^{\xi}}{1+\hat{P}_t}\right]-m_t^{\psi}-c_t-k_t^{\$}-k_t^{\zeta+\vartheta}-m_t^{\xi}\right\}+\ldots \end{aligned} \quad (2)$$

F.O.C

$$\begin{cases} \dfrac{\partial L}{\partial k_0^{\$}}=\dfrac{\partial U}{\partial c_0}\times\dfrac{\partial c_0}{\partial k_0^{\$}}+E\lambda_1\left(\dfrac{1+r_1^{\$}}{1+P_1}\right)-\lambda_0=0 \\ \dfrac{\partial L}{\partial k_0^{\zeta+\vartheta}}=\dfrac{\partial U}{\partial c_0}\times\dfrac{\partial c_0}{\partial k_0^{\zeta+\vartheta}}+E\lambda_1\left(\dfrac{1+r_1^{\zeta+\vartheta}}{1+\hat{P}_1}\right)-\lambda_0=0 \\ \dfrac{\partial L}{\partial m_0^{\xi}}=\dfrac{\partial U}{\partial c_0}\times\dfrac{\partial c_0}{\partial m_0^{\xi}}+E\lambda_1\left(\dfrac{1+r_1^{\xi}}{1+\hat{P}_1}\right)-\lambda_0=0 \\ \dfrac{\partial L}{\partial m_0^{\psi}}=\dfrac{\partial U}{\partial m_0^{\psi}}+E\lambda_1\left(\dfrac{1}{1+\hat{P}_1}\right)-\lambda_0=0 \\ \dfrac{\partial L}{\partial c_0}=\dfrac{\partial U}{\partial c_0}-\lambda_0=0 \end{cases} \quad (3)$$

$$\begin{cases} \dfrac{\partial L}{\partial k_1^{\$}}=E\beta uc_1\times\dfrac{\partial c_1}{\partial k_1^{\$}}+E\lambda_2\left(\dfrac{1+r_2^{\$}}{1+P_2}\right)-E\lambda_1=0 \\ \dfrac{\partial L}{\partial k_1^{\zeta+\vartheta}}=E\beta uc_1\times\dfrac{\partial c_1}{\partial k_1^{\zeta+\vartheta}}+E\lambda_2\left(\dfrac{1+r_2^{\zeta+\vartheta}}{1+\hat{P}_2}\right)-E\lambda_1=0 \\ \dfrac{\partial L}{\partial m_1^{\xi}}=E\beta^t uc_1^{\xi}\times\dfrac{\partial c_1}{\partial m_1^{\xi}}+E\lambda_2\left(\dfrac{1+r_2^{\xi}}{1+\hat{P}_2}\right)-E\lambda_1=0 \\ \dfrac{\partial L}{\partial m_1^{\psi}}=E\beta um_1+E\lambda_2\left(\dfrac{1}{1+\hat{P}_2}\right)-E\lambda_1=0 \\ \dfrac{\partial L}{\partial c_1}=E\beta uc_1-E\lambda_1=0 \end{cases} \quad (4)$$

$$\begin{cases} \dfrac{\partial L}{\partial k_t^{\$}}=E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\$}}+E\lambda_{t+1}\left(\dfrac{1+r_{t+1}^{\$}}{1+P_{t+1}}\right)-E\lambda_t=0 \\ \dfrac{\partial L}{\partial k_t^{\zeta+\vartheta}}=E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\zeta+\vartheta}}+E\lambda_{t+1}\left(\dfrac{1+r_{t+1}^{\zeta+\vartheta}}{1+\hat{P}_{t+1}}\right)-E\lambda_t=0 \\ \dfrac{\partial L}{\partial m_t^{\xi}}=E\beta^t uc_t^{\xi}\times\dfrac{\partial c_t}{\partial m_t^{\xi}}+E\lambda_{t+1}\left(\dfrac{1+r_{t+1}^{\xi}}{1+\hat{P}_{t+1}}\right)-E\lambda_t=0 \\ \dfrac{\partial L}{\partial m_t^{\psi}}=E\beta^t um_t^{\psi}+E\lambda_{t+1}\left(\dfrac{1}{1+\hat{P}_{t+1}}\right)-E\lambda_t=0\overset{uc_t=\lambda_t}{\Rightarrow}um_t^{\psi}=uc_t-E\lambda_{t+1}\left(\dfrac{1}{1+\hat{P}_{t+1}}\right) \\ \dfrac{\partial L}{\partial c_t}=E\beta^t uc_t-E\lambda_t=0\Rightarrow uc_t=\lambda_t \end{cases} \quad (5)$$

Therefore:

$$E\left(\frac{\lambda_{t+1}}{1+\hat{P}_{t+1}}\right)=\frac{E\beta^t uc_t\times\dfrac{\partial c_t}{\partial m_t^{\xi}}-E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\zeta+\vartheta}}}{r_{t+1}^{\zeta+\vartheta}-r_{t+1}^{\xi}} \quad (6)$$

$$\begin{cases} um_t^{\psi}=E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\$}}+\dfrac{E\beta^t uc_t\times\dfrac{\partial c_t}{\partial m_t^{\xi}}-E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\zeta+\vartheta}}}{r_{t+1}^{\zeta+\vartheta}-r_{t+1}^{\xi}}E\left(r_{t+1}^{\$}\right) \\ uc_t=E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\$}}+\dfrac{E\beta^t uc_t\times\dfrac{\partial c_t}{\partial m_t^{\xi}}-E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\zeta+\vartheta}}}{r_{t+1}^{\zeta+\vartheta}-r_{t+1}^{\xi}}E\left(1+r_{t+1}^{\$}\right) \end{cases} \quad (7)$$

If utility function is supposed to be Cobb-Douglas, marginal utilities of consumption and cash holdings would be:

$$U\left(c_t,m_t^{\psi}\right)=(1-\eta)^{-1}\left[c_t^{\delta}(m_t^{\psi})^{\tau}\right]^{(1-\eta)}\Rightarrow\begin{cases} uc_t=(1-\eta)^{-1}(1-\eta)\delta c_t^{\delta(1-\eta)-1}\times(m_t^{\psi})^{\tau(1-\eta)}=\delta c_t^{\delta(1-\eta)-1}\times(m_t^{\psi})^{\tau(1-\eta)} \\ um_t^{\psi}=(1-\eta)^{-1}(1-\eta)\tau c_t^{\delta(1-\eta)}\times(m_t^{\psi})^{\tau(1-\eta)-1}=\tau c_t^{\delta(1-\eta)}\times(m_t^{\psi})^{\tau(1-\eta)-1} \end{cases} \quad (8)$$

By replacing them in Lagrange relations, money demand function will be obtained.

$$m_t^{\psi}=\frac{\tau c_t\left[\left(E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\$}}\right)+\left[\dfrac{E\beta^t uc_t\times\dfrac{\partial c_t}{\partial m_t^{\xi}}-E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\zeta+\vartheta}}}{r_{t+1}^{\zeta+\vartheta}-r_{t+1}^{\xi}}E\left(1+r_{t+1}^{\$}\right)\right]\right]}{\delta\left[\left(E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\$}}\right)+\left[\dfrac{E\beta^t uc_t\times\dfrac{\partial c_t}{\partial m_t^{\xi}}-E\beta^t uc_t\times\dfrac{\partial c_t}{\partial k_t^{\zeta+\vartheta}}}{r_{t+1}^{\zeta+\vartheta}-r_{t+1}^{\xi}}E\left(r_{t+1}^{\$}\right)\right]\right]} \quad (9)$$

Regarding the achieved relation, it can be concluded that by an increase in expected interest rate, demand for money goes up too. Furthermore, with an increase in rate of return for a portfolio of assets which can be stocked, land and house as well as foreign exchange assets, demand for money will also decrease. On the basis of what mentioned, Tobin in his liquidity preference argument states that when people anticipate the prices to lessen, then saving would lead to a loss and they will decide to keep cash and since their estimations about whether interest rates will pick up or fall and to some extent these changes will occur would be diverse and extensive, they will prefer to keep money [30-35]. It is noticeable that in I_t currency market turbulence index, R_t is equal to foreign exchange stocks; $p^{\$}_t$ would be price of dollar at time t and by replacing them in demand money function:

$$I_t=\frac{\%\Delta p^{\$}_t}{\sigma_{\Delta p^{\$}_t}}-\frac{\sigma_{\Delta p^{\$}_t}}{\sigma_{\Delta R_t}}.\frac{\%\Delta R_t}{R_t}\Rightarrow I_{t+1}=\frac{\%\Delta p^{\$}_{t+1}}{\sigma_{\Delta p^{\$}_{t+1}}}-\frac{\sigma_{\Delta p^{\$}_{t+1}}}{\sigma_{\Delta R_{t+1}}}.\frac{\%\Delta R_{t+1}}{R_{t+1}} \quad (10)$$

$$m_t^{\psi} = \frac{\tau c_t \left[E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\$}} + \frac{E\beta^t uc_t \times \frac{\partial c_t}{\partial m_t^{\xi}} - E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\xi+\vartheta}}}{r_{t+1}^{\xi+\vartheta} - r_{t+1}^{\xi}} + \frac{E\beta^t uc_t \times \frac{\partial c_t}{\partial m_t^{\xi}} - E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\xi+\vartheta}}}{r_{t+1}^{\xi+\vartheta} - r_{t+1}^{\xi}} E\left(r^{\$}_{t+1}\right) \right]}{\delta \left[E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\$}} + \frac{E\beta^t uc_t \times \frac{\partial c_t}{\partial m_t^{\xi}} - E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\xi+\vartheta}}}{r_{t+1}^{\xi+\vartheta} - r_{t+1}^{\xi}} E\left(r^{\$}_{t+1}\right) \right]} \quad (10),\ E\left(r^{\$}_{t+1}\right) = \%\Delta p^{\$}_{t+1} \Rightarrow$$

$$I_{t+1} = \left(\frac{\tau c_t}{\ddot{a} m_t^{\psi} - \tau c_t} \right) - \frac{\left(r_{t+1}^{\xi+\vartheta} - r_{t+1}^{\xi} \right) \left(E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\$}} \right)}{E\beta^t uc_t \times \frac{\partial c_t}{\partial m_t^{\xi}} - E\beta^t uc_t \times \frac{\partial c_t}{\partial k_t^{\xi+\vartheta}}} - \left(\frac{\acute{o}_{\Delta p^{\$}_{t+1}}}{\acute{o}_{\Delta R_{t+1}}} \cdot \frac{\Delta R_{t+1}}{R_{t+1}} \right) \quad (11)$$

Results and Discussion

Regarding the fact that in Iran's economy, inflation rate is higher than return on bank deposits (interest rate) in addition to greater marginal propensity of consumption of portfolio asset of other commodities than that of bank deposits, the pressure on currency market turbulence index of foreign exchange market will escalate with an increase in inflation rate, and because of inflexibility in portfolios of Iranian families, foreign exchange market for investment would be desirable [36-39]. A striking result is that during foreign exchange crisis period, if central bank decides to spend stocks of foreign exchange to gain the control of foreign exchange market, then stocks of foreign exchange would decrease and subsequently the increase in foreign exchange fluctuations in free market has an positive effect on currency market turbulence index and foreign exchange crisis will be aggravated. Therefore, it is highly recommended that central bank avoid those policies resulting in a higher oscillation levels for foreign exchange rate and instead, implement more stable and gentle policies to take the control of foreign exchange crisis [40,41]. In other words, shock treatment for controlling foreign exchange crisis has a reverse effect. Of course, regarding our research results, if central bank policies do not change stocks of foreign exchange, then foreign exchange rate fluctuations would not affect the currency market turbulence index.

References

1. Keynes JM (1936) The general theory of employment, interest, and money, New York: H Arcourt, Brace & World.
2. Ortiz G (1983) Currency substitution in Mexico: the dollarization problem. Journal of Money, Credit and Banking 15: 174-185.
3. Fischer S (1982) Seigniorage and the case for a National Money. Journal of Political Economy 90: 295-313.
4. Arango S, Nadiri MI (1981) Demand for money in open economies. Journal of Monetary Economics 7: 69-83.
5. Ramirez R, Luis C (1996) Monetary substitution in developing countries, finance and development, pp: 35-41.
6. El-Erian M (1988) Currency substitution in Egypt and the Yemen Arab Republic: A comparative quantitative analysis. Staff Papers 35: 85-103.
7. Mongardini J, Mueller J (2000) Ratchet effects in currency substitution: An application to the Kyrgyz Republic. IMF Staff Papers 47: 218-237.
8. Miles MA (1978) Currency substitution: perspective, implications, and empirical evidence. The Monetary Approach to International Adjustment, pp: 170-183.
9. Guidotti PE, Rodriguez CA (1992) Dollarization in Latin America: Gresham's law in reverse? Staff Papers 39: 518-544.
10. Markowitz H (1952) Portfolio selection. The Journal of Finance 7: 77-91.
11. Lintner J (1965) Security prices, risk, and maximal gains from diversification. The Journal of Finance 20: 587-615.
12. Alami TH (2001) Currency substitution versus dollarization: A portfolio balance model. Journal of Policy Modeling 23: 473-479.
13. Rojas-Suarez L (1992) Currency substitution and inflation in Peru.
14. Calvo GA, Rodriguez CA (1977) A model of exchange rate determination under currency substitution and rational expectations. Journal of Political Economy 85: 617-625.
15. Saxena SC, Wong KY (1999) Currency crises and capital controls: a selective survey. University of Washington.
16. Wyplosz C (1996) Contagious currency crises: first tests. Scand. Journal of Economics 98: 463-484.
17. Krznar I (2004) Currency crisis: Theory and practice with application to Croatia.
18. Edwards S, Montiel PJ (1989) Devaluation crises and the macroeconomic consequences of postponed adjustment in developing countries. Staff Papers 36: 875-903.
19. Radelet S, Sachs J (1998) The onset of the East Asian financial crisis. National Bureau of Economic Research.
20. Sturzenegger F (1997) Understanding the welfare implications of currency substitution. Journal of Economic Dynamics and Control 21: 391-416.
21. Miles MA (1978) Currency substitution, flexible exchange rates, and monetary independence. The American Economic Review 68: 428-436.
22. Girton L, Roper D (1981) Theory and implications of currency substitution. Journal of Money, Credit and Banking 13: 12-30.
23. Tanzi V, Blejer MI (1982) Inflation, interest rate policy, and currency substitutions in developing economies: A discussion of some major issues. World Development 10: 781-789.
24. Thomas LR (1985) Portfolio theory and currency substitution. Journal of Money, Credit and Banking 17: 347-357.
25. Melvin M (1985) Currency substitution and western European monetary unification. Economica 52: 79-91.
26. Spinelli F (1980) The demand for money in the Italian economy: 1867-1965. Journal of Monetary Economics 6: 83-104.
27. McKinnon RI (1982) Currency substitution and instability in the world dollar standard. The American Economic Review 72: 320-333.
28. Végh CA (1989) The optimal inflation tax in the presence of currency substitution. Journal of Monetary Economics 24: 139-146.
29. Melvin M, Ladman J (1991) Coca dollar and dollarization of South America. Journal of Money, Credit and Banking 23: 752-763.
30. Tobin J (1958) Liquidity preference as behavior towards risk. The review of economic studies 25: 65-86.
31. Taylor JB (1975) Monetary policy during a transition to rational expectations. Journal of Political Economy 83: 1009-1021.
32. Agenor PR, Khan MS (1996) Foreign currency deposits and the demand for money in developing countries. Journal of Development Economics 50: 101-118.
33. Wong WK (2008) How much time-inconsistency is there and does it matter? Evidence on self-awareness, size, and effects. Journal of Economic Behavior and Organization 68: 645-656.
34. Barro RJ, Gordon DB (1983) A positive theory of monetary policy in a natural rate model. Journal of Political Economy 91: 589-610.
35. Rogers JH (1992) The currency substitution hypothesis and relative money demand in Mexico and Canada. Journal of Money, Credit and Banking 24: 300-318.
36. Alvarez F, Kehoe PJ, Neumeyer PA (2002) The time consistency of monetary and fiscal policies. Federal Reserve Bank of Minneapolis, Research Department.
37. Reinhart CM, Kaminsky G, Lizondo S (1998) Leading indicators of currency crises.
38. Kocherlakota NR (2001) Looking for evidence of time-inconsistent preferences

in asset market data. Federal Reserve Bank of Minneapolis. Quarterly Review-Federal Reserve Bank of Minneapolis 25: 13.

39. Minford P (1995) Time-inconsistency, democracy, and optimal contingent rules. Oxford Economic Papers, pp: 195-210.

40. Auernheimer L (1974) The honest government's guide to the revenue from the creation of money. Journal of Political Economy 82: 598-606.

41. Mishkin FS (1981) Does anticipated aggregate demand policy matter? Further Econometric results.