

The Effect of Exchange Rate Fluctuation on Economic Activities of Iran

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Abstract

Investigating the effect of exchange rate fluctuations on gross domestic product (GDP), private consumption, exports, imports and investment is of particular importance. In this study, we apply the exchange rate fluctuations which are analyzed in both expected and unexpected components; the unanticipated components fluctuations include positive and negative shock. In addition, we applied the time series data of 1978-2010 and an auto-regressive model with Distributed Lags (ARDL) to find the relation between variables. The main findings of the model from a positive shock (increase in exchange rate or decrease in money value), negative shock (decrease in exchange rate or increase in money value) and exercising fiscal and monetary policies show that the expected fluctuations have a negative effect on GDP, private consumption, exports, imports and investment. On the other hand, positive unexpected fluctuations (positive shock) have a positive effect on exports but they have a negative impact on all other variables. Finally, it was found that negative unexpected fluctuations have a negative effect only on export but they have a positive impact on all other variables.

Key Words: Exchange Rate Fluctuations, Economic Activities, Auto-Regressive Model with Distributed Lags.

Introduction

Currency is one of the key issues for developing countries like Iran. If properly regulated, it could have a positive effect on a country's balance of payments and strengthening its foreign power and conversely, inadequate regulation of the exchange rate could reduce economic efficiency, the misallocation of economic resources, undermining production incentives in agriculture and industry and economic imbalances (Sebastian). In semi-industrial countries like most countries in the Middle East, in which the production units are heavily dependent on imported inputs, inputs are not readily available in the country. Firms' costs for import of inputs increases as the exchange rate increases which leads to the increase in commodity prices (Naz, Mohsin and Zaman, 2007). Devaluation of the national currency on the one hand leads to a reduction in export prices and thus to an increase in exports and on the other hand, such a reduction would lead to increased prices of imported goods and a decline in imports. In this way, the devaluation in national currency can lead to an increase in net exports, so in this way, the total amount of economics demand aggregates. Obviously, such increase would have positive effects on production, consumption, employment, prices and other economic variables (Sameti et al., 2010). Experiences of crises resulted from unexpected positive and negative shocks of exchange rate fluctuations pointed to the significance of the forecasts provided by economic units of these changes in the design of currency

appropriate policies. Based on rational expectations, exchange rate fluctuations are divided into two groups of expected and unexpected components. Expected exchange rate fluctuations include observations of economic units of macroeconomic variables. The deviation of realized currency from its predicted value yield the unexpected exchange rate. In anticipated exchange rate fluctuations, the cost of manufactured goods and predictions made by producers about the competitiveness are determined; while in anticipated fluctuations in exchange rates, economic conditions of the net exports, money demand and goods produced are examined. Unexpected exchange rate fluctuations include positive and negative shocks. Positive shocks represent an unexpected increase in the exchange rate and negative shocks represent an unexpected decrease in exchange rate (Khalid et al,2007). Exchange rate shocks affect aggregate demand through import, export and money demand and aggregate supply through cost of imported intermediate goods. In general, in the commodities market, positive shocks of exchange rate will make the imported goods expensive and the exported goods will be cheaper and consequently, there would be an increase in the demand for domestic goods. On the other hand, with the devaluation of the national currency, there has been an increase in the demand for cash by businesses and this increases the demand for money as well. In terms of supply, it can be argued that the positive shocks of exchange rates or devaluation of the national currency in developing countries increase the cost of imported intermediate goods and consequently make imports of intermediate goods and production inputs more expensive and thus increase production costs, which is called imported inflation (Khalid et al. 2007).

Theoretical Foundations

Mechanisms of the Influence of the Exchange Rate on Macroeconomic Variables

A-Short Term

By changing the nominal exchange rate, which led to a change in the real exchange rate, financial and business transactions will immediately take reactions based on the affected exchange. With the increase in the real exchange rate, the imported goods and services will become more expensive and subsequently their import becomes limited. In contrast, exports increases with the rise in currency. That is because the exchange rate rise makes imports more expensive and exports cheaper, the short-term effect of exchange rate could limit imports and expand exports and improve the balance of trade. This is in fact the effect of immediate and short-term exchange rate (Zamani Farahani, 2012).

B-Midterm

Following the increase in the exchange rate, there would be a rise in prices of imported goods and in fact there is a possibility that some of the domestic manufacturing goods take the position of the imported goods and with the increase in the exchange rate, the demand for domestic exported goods will increase. The midterm effect of exchange rate increase is the increase in the domestic production through import substitution and export promotion as long as the productive capacity of the country has the possibility of increasing production capacity (Zamani Farahani, 2012).

C-Long term

If the increase in the exchange rate does not offset with the changes in the general level of prices, there would be an increase in the long-term investment; consequently, there would be an increase in the production capacity to respond to increased effective demand, and the economy which is in a state of underemployment move towards adequate employment. The long-term effect of exchange rate increase under some conditions increases investment, boosts productivity, increases employment and reduces the unemployment rate. The positive short-, mid- and long term economic effects, increase in exchange rate on the balance of payments, investment, GDP and unemployment devaluation occur at time that the country has the potentiality of producing more and attracting investments; otherwise, the exchange rate, which

makes the imports expensive only exacerbate inflation, which is referred to as import inflation (Zamani Farahani, 2012).

The Effect of Exchange Rate on GDP

Weakening or strengthening of national products depends on the competitiveness of locally-produced goods against similar foreign goods. One criterion for measuring economic competitiveness is the real exchange rate. Simply put, if the level of prices in our country increased more than the trading partners, but the exchange rate is not adjusted to the same level (which means that the exchange rate remains stable or increases less than the difference in increasing price), the real exchange rate would decrease. This means that the price of foreign goods gets cheaper compared with the price of domestic goods or in other words, the power of competitiveness against foreign goods declined. So the production of domestic goods is not affordable and domestic goods will lose their market cost against imported goods (Totonchi Maleki, 2005).

The Effect of Exchange Rate on Consumption

The increase in exchange rate would increase the price of imported consumer goods and make the household consumption, which is partly composed of imported goods, be provided at higher prices than in the past and thus it has a direct impact on inflation in the country and there would be a decline in public consumption (Mehrra & Moradi, 2008).

The Effect of Exchange Rate on Export and Import

When the exchange rate rises, it is expected that the price of imported goods be increased and consequently there would be a reduction in demand for imports. On the other hand, with the increase in the exchange rate, export of goods will increase due to the cheaper price of domestic goods in foreign markets. As a result, the increase in exports and decrease in imports should stimulate production section and increase production. But it should be noted that the affectability of import and export from the exchange rate depends on the elasticity of demand for export and import (Mehrra and Moradi, 2008).

The Effect of Exchange Rate on Investment

Exchange rate depreciation or excessive valuation of the domestic currency reduces the competitiveness of domestically manufactured goods in the international markets and therefore reduces the profitability of production. Conversely, the exchange rate reflects the instability and uncertainty in the relative prices, which increases the risk and uncertainty in investment returns (Izadi and Izadi, 2009).

Literature Review

Rateghi (2004) in an investigative attempt studied the effect of exchange rate fluctuations on price index. He used the response function and variance analysis methods to find the effects of short-term impulses. The results of the survey show that the 10% increase in the exchange rate variable lead to a 1.3% increase in the index of consumer goods and services and a 2% increase in the wholesale price index. Also, the results of Granger causality test show that there is a two-way causality relationship between the exchange rate and price indices in Iran's economy.

Farzinvas and Asgharpour (2007) in an article investigated the asymmetric effects of exchange rate fluctuations on production and prices in Iran and their findings show that the effects of exchange rate fluctuations on production and the level of prices is asymmetric in the way that the actual production reacts more toward the negative shocks of the exchange rate (the strengthening of the domestic currency) than the positive shocks (weakening of the domestic currency).

Khataee and Mousanik (2008) investigated the effect of exchange rate fluctuations on economic growth considering the development of financial markets of 69 countries. The results show that considering the financial development index of this effect, the financial development has been negative at low levels and with the increase in financial development index exceeding a certain level, which we refer to as the threshold level, the effect of exchange rate fluctuations on economic growth is positive. The threshold level of financial development for all countries is 81, for less financially developed countries, it is 106 and for more financially developed countries, it was found to be 72.

Mousavi Mohseni and Sobhanipour (2008) in an investigation into exchange rate in Iran studied the effect of exchange rate fluctuations on the prices of imports, wholesale and consumers. The main findings of the study suggest that exchange rate fluctuations have little effect on prices; in other words, the currency transition is incomplete. Currency transition is more in the import price index compared with the wholesale and consumer price index; and it is more in the wholesale prices index compared with the consumer prices index. Analysis of variance showed that the exchange rate shocks partly explain the variability of inflation. Tavakoli and Saiah (2010) in their study investigated the effect of exchange rate fluctuations on economic activity. Exchange rate fluctuations are divided into two groups of expected and unexpected ones and the impact of such fluctuations on the country's economic activity are evaluated besides the two instruments of monetary policy (liquidity) and fiscal policy (government spending). Their results pointed that with the increase in the exchange rate, non-oil exports would show a negative reaction and consumer expenditures show a positive reaction. Import of real output and private investment do not show a significant effect considering the exchange rate fluctuations.

Sameti, Khanzadi and Yazdani (2010) investigated the hypothesis of asymmetric effects of exchange rate shocks on production levels and prices of Iran. In their study, four equations were estimated. The first two equations dealt with the effects of expected and unexpected shocks on production and prices and the second ones dealt with the effect of positive and negative unexpected shocks of exchange rate on the level of production and prices. Also, the hypothesis of asymmetry of effects of these shocks on the level of output and the price level were tested. According to the obtained results, the effect of unpredictable shocks of the exchange rate on the production level is positive and the effect of the predictable shocks are negative and the effects of predictable shocks on the production level is more than the effects of shocks on symmetrical output level. The hypothesis of asymmetry of the effects of positive and negative unpredictable shocks on production levels is accepted; while, this hypothesis is rejected at the level of prices.

Ibrahimi (2011) in an article entitled "The impact of oil price shocks and exchange rate fluctuations and the subsequent uncertainties on the economic growth of selected oil countries" examined this theme for Algeria, Iran, Saudi Arabia and Venezuela individually. The results of long-term relationship in the four countries indicate that there is a long-term positive relationship between oil prices and GDP of the four largest exporters of oil. The greatest impact of changing oil prices was in the growth of Algeria and the least effect was on the developing of Saudi Arabia. The positive relationship between oil prices and production can be derived from the fact that the highest portion of infrastructure investment in these countries is funded by oil revenues. Long-term relationships also showed that the relationship between the exchange rate and production in four countries was negative and significant.

Kazerouni et al. (2012) in an investigative attempt studied the asymmetric effects of real exchange rate fluctuations on the economic growth of Iran in applying the time series data in the period of 1973- 2008. With this regard, positive and negative shocks of the real exchange rate were extracted by auto-regression model and in the next step, the effect of such shocks on economic growth was evaluated applying markov – switching non-linear approach. The results suggest that markov – switching model is advantageous over linear models in evaluating the effect of the real exchange rate shocks on economic growth. Results also show that the real positive exchange rate shocks increase GDP growth and negative shocks led to a decline

in GDP growth. Asymmetry test results showed that the effect of real exchange rate shocks on GDP growth is symmetrical.

Kandil, Berument and Nergiz Dincer (2007) in their article investigated the effects of exchange rate fluctuations on economic activity in Turkey. Based on the results obtained, the anticipated exchange rate appreciation has significant adverse effects, contracting the growth of real output and the demand for investment and exports, while raising price inflation. The authors also concluded that positive and negative exchange rate effect of shocks on each of the variables of GDP, private consumption, investment, exports, imports, consumer price index is asymmetric.

Bahmani Oskooee and Harvaei (2011) investigated exchange rate volatility and industry trade between the US and Malaysia. The results pointed that exchange rate volatility has short-run effect on 70% of goods traded between the two countries and in the long run it affected 38 exported goods and 10 imported goods. Exchange rate fluctuations had an impact on commodities that have little share in the trade. One of the important factors that was influential in trade between the two countries was the countries' income level.

Serenis and Tsounis (2013) investigated exchange rate volatility and foreign trade in Cyprus and Croatia in the period of 1990-2012. The authors proposed a new measure for volatility and their findings suggested significant negative effects from volatility on exports for the countries under investigation. Recently, Bahmani Oskooee, Harvey and Hegerty (2014) investigated exchange rate volatility and Spanish-American commodity trade flows over the period from 1962 to 2009, for 131 U.S. export industries and 88 import industries. The authors found that that exchange rate volatility has short-run and long-run effects in only a fraction of the cases, but that exports respond more to increased uncertainty than imports do.

In a quite recent study, Yanamandra (2015) studies exchange rate changes and inflation in India over the period from 2003 to 2013. The author applies both trade-weighted and bilateral USD exchange rates and also examines the asymmetry and non-linearity in the exchange rate pass-through at the aggregate level. The findings pointed that there was more than complete exchange rate pass-through into Indian import prices in the short run and even higher pass-through in the long run, which refers to the inertial effect of rising prices.

Model and variables specification

To find the effect of the real exchange rate shocks on macroeconomic variables applying the Kandil, Berument and Nergiz Dincer's (2007) model, the following equations are used:

Equation (1-3)

$$\ln Y_t = \alpha_0 + \alpha_1 \ln OIL_t + \alpha_2 \ln M_t + \alpha_3 \ln G_t + \alpha_4 \ln RNEG_t + \alpha_5 \ln RPOS_t + \alpha_6 \ln (E_{t-1} * DRS_t) + \varepsilon_t$$

Equation (2-3)

$$\ln C_t = \beta_0 + \beta_1 \ln OIL_t + \beta_2 \ln M_t + \beta_3 \ln G_t + \beta_4 \ln RNEG_t + \beta_5 \ln RPOS_t + \beta_6 \ln (E_{t-1} * DRS_t) + \varepsilon_t$$

Equation (3-3)

$$\ln I_t = \delta_0 + \delta_1 \ln OIL_t + \delta_2 \ln M_t + \delta_3 \ln G_t + \delta_4 \ln RNEG_t + \delta_5 \ln RPOS_t + \delta_6 \ln (E_{t-1} * DRS_t) + \varepsilon_t$$

Equation (4-3)

$$\ln X_t = \theta_0 + \theta_1 \ln OIL_t + \theta_2 \ln M_t + \theta_3 \ln G_t + \theta_4 \ln RNEG_t + \theta_5 \ln RPOS_t + \theta_6 \ln (E_{t-1} * DRS_t) + \varepsilon_t$$

Equation (5-3)

$$\ln IM_t = \rho_0 + \rho_1 \ln OIL_t + \rho_2 \ln M_t + \rho_3 \ln G_t + \rho_4 \ln RNEG_t + \rho_5 \ln RPOS_t + \rho_6 \ln (E_{t-1} * DRS) + \varepsilon_t$$

The variables applied in this attempt include: OIL the oil price, M the real money supply, G Real government spending, REG negative exchange rate shock, RPOS positive exchange rate shock, DRS differences of the real exchange rate, Y real GDP, C Real private consumption, I real investment, X real non-oil exports, IM real import E: real exchange rate.

To calculate the expected positive and negative fluctuations in the exchange rate, the following equation is used.

$$RNEG = -0.5\{|DRS| - DRS\}$$

$$RPOS = 0.5\{|DRS| + DRS\}$$

$(E_{t-1} * DRS_t)$ is the expected exchange rate which is estimated by multiplying E_{t-1} and DRS.

Model Estimation and its Analysis

Stationary Test

To test the whether the variables are station, Augmented Dicky Fuller test was applied. If the test statistic in Augmented Dicky Fuller test is then the absolute value of the critical value, then the null hypothesis of H_0 is not rejected. Which means that the time series has a unit root and it is non-stationary.

Table 1- the results of stationary state of variables at the intercept level or at the intercept level in trend

| At the intercept level | | | | At the intercept level in trend | | | |
|-------------------------------------|----------------|-----|----------------|------------------------------------|----------------|-----|----------------|
| Variable | Calculated ADF | Lag | Result | variable | Calculated ADF | Lag | Result |
| LNC | -3.2 | 0 | Non-stationary | LNC | -1.9 | 0 | Non-stationary |
| LNI | -2.3 | 1 | Non-stationary | LNI | -2.8 | 1 | Non-stationary |
| LNy | -2.2 | 1 | Non-stationary | LNy | -1.7 | 1 | Non-stationary |
| LNRNEG | -3.9 | 0 | stationary | LNRNEG | -3.3 | 0 | stationary |
| LNRPOS | -4.1 | 0 | stationary | LNRPOS | -3.4 | 0 | stationary |
| LNM | -2.87 | 1 | Non-stationary | LNM | -0.98 | 1 | Non-stationary |
| LNG | -2.1 | 1 | Non-stationary | LNG | -1.1 | 1 | Non-stationary |
| LNx | -2.2 | 1 | Non-stationary | LNx | -1.3 | 0 | Non-stationary |
| LNIX | -3.49 | 0 | Non-stationary | LNIX | -2.17 | 0 | Non-stationary |
| LNOIL | -2.3 | 0 | Non-stationary | LNOIL | -2.58 | 2 | Non-stationary |
| LNE(-1)DRS) | -2.9 | 1 | Non-stationary | LNE(-1)DRS) | -2.25 | 1 | Non-stationary |
| :ADF-3.58: Table at the level of 5% | | | | Table at the level of 5% ADF-2.97: | | | |

Source: Findings of the study

As you can see, all variables except for the volatility of the exchange rate, the absolute value of the calculated ADF is less than the absolute value of table ADF at the level of 5%. As a result, all seasonal variables except for the volatility in the exchange rate level are non-stationary at the intercept or intercept in trend level, but the exchange rate fluctuations are stationary at the intercept level. So, a stationary test was performed on the first difference operator of the variables which were not stationary and it was found that variables are stationary at the first difference operator. Thus, the volatility of the exchange rate was I (0) and other variables were I (1). Seasonal variables that were not stationary at the surface went through the structural break test, since their state of being stationary might be due to the shock that has been entered

to this series. Perron method is used to perform this test and it was found that the absolute value of calculated \hat{t}_p is less than the absolute value of \hat{t}_p of the table at the level of 0.5, thus the null hypothesis H_0 is not rejected. Therefore, the stationary state of variables at the level of 5% is rejected. As a result, the stationary state of seasonal variations is not due to shock entered to the model.

Auto-regressive model with Distributed Lags (ARDL)

Because the variables used in this study are a combination of I (0) and I (1), the ARDL model can be used. The ARDL method of *Schwarz Bayesian Criterion (SBC)* for *optimum* lag is selected. After estimating the model, the collective test is performed to determine whether the estimated equation tends towards collection of variables or not.

To this end, we must calculate the following statistics: (where α_i is the coefficients of the lagged variables related to the dependent variable and the S_i is Standard deviation of the above coefficients)

$$t = \frac{\sum_{i=1}^{\infty} \alpha_i - 1}{\sum_{i=1}^{\infty} S_i}$$

This number is compared with the critical values that Banerjee, Dolado and Master have offered. If the absolute value of the calculated statistics is more than the absolute value of the above critical value, the convergence (long-term relationship) is confirmed; otherwise, it would not be verified. Given that the computational statistics equal -4.54, -14, -7, -6 and -20, and it is less than the table of Banerjee, Dolado and Master which equals 3.27, the null hypothesis that there is no long-term relationship is rejected and the existence of long-term relationship will be accepted.

Estimation of the Long-term Pattern

After performing the test and ensuring that there is a long-run relationship between the variables, results are provided in the following table.

The results of the estimation of the first model

Following the increase in money supply, GDP also increases. Its mechanism is that by increasing the money supply, interest rates reduces; as a result, the demand increases and subsequently, the production increases. In addition, by one per cent increase in government spending, GDP increase at a rate of 0.46 percent. When the government spending increases, as it is a proportion of GDP, the production of the country increases. The price of oil has a significant positive impact on GDP; in other words, 1% increase in oil prices results in 0.29% increase in gross domestic product. Because the increase in oil revenues is followed by the government increased oil income which leads to an increase in government spending and ultimately leads to an increase in the GDP. In oil exporting countries, the revenues of exporting oil is considered as the public sector's revenues and it consists a part of the treasury budget. In Iran, the government has an active role in most manual and service monetary sections as the largest economy agent. Higher oil prices increases the cost of development and consequently the production will increase. One percent of negative shock of exchange rate increases the GDP to the extent of 0.11%. Since with the decrease in the exchange rate, the cost of imported parts and equipment and the cost of investment is reduced, which increases production. Positive shock of exchange rate has a negative and meaningful impact on GDP, which means that a one percent increase leads to a 0.0029 decrease in GDP. Because with the increase in the exchange rate, the cost of imported parts and equipment and investment costs will rise, which reduces production. Expected fluctuations and positive and negative exchange rate shock (unexpected fluctuations) have a negative, negative and positive impacts on GDP in Iran, respectively; thus the first research hypothesis is confirmed.

Table 2: the results of long-term estimation applying ARDL model

| Dependent variable | Independent variable | Coefficient | T statistics | \bar{R}^2 | D.W | The calculated F in White computational method | The calculated F in LM method |
|-------------------------------|---|-------------|--------------|-------------|------|--|-------------------------------|
| Logarithm of GDP | Intercept | 1.1 | 5.5 | 0.87 | 2.03 | 3.19 | 3.27 |
| | Oil price logarithm | 0.29 | 2.3 | | | | |
| | Money mass logarithm | 0.3 | 2 | | | | |
| | Logarithm of government expenses | 0.46 | 3.8 | | | | |
| | Logarithm of negative exchange rate shock | 0.11 | 2.6 | | | | |
| | Logarithm of Positive exchange rate shock | -0.0029 | -2.2 | | | | |
| | Logarithm of expected exchange rate | -0.9 | -2.2 | | | | |
| Private consumption logarithm | Intercept | 4.5 | 2.7 | 0.89 | 2.1 | 2.03 | 2.27 |
| | Oil price logarithm | 0.2 | 3.7 | | | | |
| | Money mass logarithm | 1.3 | 3.3 | | | | |
| | Logarithm of government expenses | -0.9 | -4 | | | | |
| | Logarithm of negative exchange rate shock | 0.18 | 1.2 | | | | |
| | Logarithm of Positive exchange rate shock | -0.13 | -4 | | | | |
| | Logarithm of expected exchange rate | -0.0029 | -2.2 | | | | |
| Investment logarithm | Intercept | 0.05 | 5.6 | 0.9 | 1.93 | 2.1 | 2.7 |
| | Oil price logarithm | 0.9 | 4.4 | | | | |
| | Money mass logarithm | -0.54 | -4.9 | | | | |
| | Logarithm of government expenses | -0.6 | -2.7 | | | | |
| | Logarithm of | 1.8 | 2.08 | | | | |

| | | | | | | | |
|------------------|---|-------|-------|------|------|------|------|
| | negative exchange rate shock | | | | | | |
| | Logarithm of Positive exchange rate shock | -0.59 | -2.7 | | | | |
| | Logarithm of expected exchange rate | -0.81 | -4.07 | | | | |
| Export logarithm | Intercept | 0.8 | 6.6 | 0.86 | 1.97 | 3 | 3.3 |
| | Oil price logarithm | 2.4 | 3.4 | | | | |
| | Money mass logarithm | 1.3 | 5.1 | | | | |
| | Logarithm of government expenses | -2.5 | -3.1 | | | | |
| | Logarithm of negative exchange rate shock | -2.3 | -2.95 | | | | |
| | Logarithm of Positive exchange rate shock | 1.5 | 5.5 | | | | |
| | Logarithm of expected exchange rate | -0.44 | -2.78 | | | | |
| | | | | | | | |
| Import logarithm | Intercept | -3.3 | -0.46 | 0.89 | 1.97 | 2.28 | 2.14 |
| | Oil price logarithm | 0.75 | 1.2 | | | | |
| | Money mass logarithm | -5.9 | -3.83 | | | | |
| | Logarithm of government expenses | 2.8 | 4.97 | | | | |
| | Logarithm of negative exchange rate shock | 0.49 | 4.48 | | | | |
| | Logarithm of Positive exchange rate shock | -3.04 | -8.4 | | | | |
| | Logarithm of expected exchange rate | -12.3 | -3.03 | | | | |
| | | | | | | | |

Source: Research findings

The Results of the Estimation of the Second Model

With the increase in the amount of money, the private consumption also rises. Thus a one percent increase in the amount of money will increase the private consumption up to 1.3% and the coefficient of this

variable is meaningful. Its mechanism is that by increasing the amount of money, the interest rates reduces and subsequently the private consumption increases. One percent increase in oil price will increase the private consumption to 0.2% and its coefficient is meaningful. With the rise in oil prices, a portion of oil revenues is devoted to the community by government which leads to an increase in demand and subsequently consumption increases. One percent rise in negative shock of currency leads to 0.18% increase in consumption. Exchange rate depreciation increases imports and results in increased consumption. Positive shock has a significant negative impact on consumption; in other words, a one percent increase leads to 0.13% decrease in consumption. With the positive currency shock, the currency increases and the import of goods decreases and consequently, the demand for goods and services reduces. The expected fluctuation and the positive and negative shocks of currency (unexpected fluctuations) have negative, negative and positive impacts on the private consumption in Iran, respectively and the second research hypothesis is confirmed.

The Results of Estimation of the Third Model

The amount of money has a significant negative impact on investment; in other words, one percent increase in the amount of money decreases the investment up to 0.54%. Increasing the money supply results in inflation and the production costs rise and consequently, the investment decreases. The price of oil has a significant positive impact on investment, i.e. one percent increase in the oil price increases the investment up to 0.9%. Increasing oil prices leads to increased government revenues and a part of this revenue is directed toward the production and investment sectors. One percent increase in negative shock of currency leads to 1.8% increase in investment. By reducing the price of the currency, importing technology from abroad become cost-effective and this increases investment. Positive shock of currency has a significant negative impact on investment; in other words, one percent increase in exchange rate reduces the investment by 0.59%. By increasing the price of the currency, the imported capital goods will be less and this reduces the investment. The expected fluctuations and positive and negative exchange rate shocks (unexpected fluctuations) have negative, positive and negative effects on investment in Iran, respectively and the third hypothesis is confirmed.

The Results of Estimation of the Fourth Model

The increase in money supply increase the export and one percent increase in the amount of money increases the export up to 1.3% and its coefficient is positive. Increasing the money supply results in inflation and this encourages the producers to export their goods. One percent increase in oil price leads to 2.4% increase in exporting and its coefficient is meaningful. The increase in oil price and injection of these revenues to the society increases inflation and consequently the producers export their goods. One percent of negative shock in currency decreases the export to 2.3%. Exchange rate decrease would decrease the foreign exchange earnings from exports and subsequently the export decreases. The positive shock of currency has a significant positive effect on export, i.e. one percent increase leads to 1.5% increase in export. Exchange rate increase would increase foreign exchange earnings from exports and increases export. Expected fluctuations and positive and negative shocks of exchange rate (unexpected fluctuations) have negative, positive and negative effects on Iran's export, respectively; thus, the forth hypothesis is confirmed.

The Results of Estimation of the Fifth Model

The amount of money has significant negative effect on import; i.e. one percent increase in the amount of money decreases the import up to 5.9%. Increasing the money supply results in inflation and devaluation of national currency and this reduces the import. Oil price has a significant positive effect on import and one percent increase in oil price increases the import up to 0.75%. With the increase in oil price the government revenues increase and the imports enhance. One percent increase in negative shock of currency increase import to 0.49%. The increase in the value of the national currency will increase the amount of import

goods. Positive exchange rate effects shock has a significant negative impact; i.e. one percent increase reduces the import to 3.04% and devalues the national currency. Expected fluctuations and positive and negative shocks of currency (unexpected fluctuations) have negative, negative and positive impacts on Iran's imports. Thus, the fifth hypothesis is confirmed.

Estimation of the Short Term Relation between Variables Applying Error Correction Model (ECM)

If there is a cointegrating *relation* between a set of variables error correction model (ECM) can be used, which relate the short run relation of the variables to their long run equilibrium.

Table 3- The results of long run estimation applying ARDL

| Dependent variable | Independent variable | Coefficient | T statistics |
|---|---|-------------|--------------|
| The difference of GPD logarithm | Intercept | 0.9 | 2 |
| | ECM(-1) | -0.15 | -5 |
| | The difference of oil price logarithm | 0.1 | 4.5 |
| | The difference of money amount logarithm | -0.14 | -4 |
| | The difference of government spending logarithm | 0.079 | 2.7 |
| | The difference of currency negative shock logarithm | 0.075 | 2.3 |
| | The difference of currency positive shock logarithm | -0.006 | -2.8 |
| | The difference of expected currency logarithm | -0.9 | -2.1 |
| The difference of private consumption logarithm | Intercept | -0.5 | -2 |
| | ECM(-1) | -0.1 | -4.1 |
| | The difference of oil price logarithm | 0.1 | 4.5 |
| | The difference of money amount logarithm | 6 | 3.2 |
| | The difference of government spending logarithm | -0.1 | -1.9 |
| | The difference of currency negative shock logarithm | 0.2 | 5.5 |
| | The difference of currency positive shock logarithm | -2.1 | -4.9 |
| | The difference of expected currency logarithm | -2.8 | -4.5 |
| The difference of investment logarithm | Intercept | -2.01 | -2.80 |
| | ECM(-1) | -0.4573 | -2.59 |
| | The difference of oil price logarithm | 0.1 | 2.79 |
| | The difference of money amount logarithm | 0.84638 | 5.59 |
| | The difference of government spending logarithm | -0.44 | -0.78 |
| | The difference of currency negative shock logarithm | 3.3 | 2.46 |
| | The difference of currency positive shock logarithm | -0.75 | -1.1 |
| | The difference of expected currency logarithm | -5.9 | 0.83 |
| The difference of export logarithm | Intercept | 2.8 | 0.97 |
| | ECM(-1) | -0.2 | -2.02 |
| | The difference of oil price logarithm | 0.49 | 0.48 |
| | The difference of money amount logarithm | 3.04 | 0.4 |
| | The difference of government spending logarithm | 12.3 | 1.03 |
| | The difference of currency negative shock logarithm | -0.5 | -2.065 |
| | The difference of currency positive shock logarithm | 4.3 | 0.36 |
| | The difference of expected currency logarithm | -2.03 | -0.94 |
| The difference of import logarithm | Intercept | -0.77 | -1.4 |
| | ECM(-1) | -0.8 | -2.007 |
| | The difference of oil price logarithm | 2.36 | 0.12 |
| | The difference of money amount logarithm | 2.3 | 0.33 |
| | The difference of government spending logarithm | -2.39 | -0.12 |
| | The difference of currency negative shock logarithm | 10 | 4.84 |

| | | | |
|--|---|------|------|
| | The difference of currency positive shock logarithm | -0.8 | -6.6 |
| | The difference of expected currency logarithm | -2.4 | -0.4 |

Source: Research findings

In the equation for GPD, the error correction coefficient is -0.15 which shows that in each year, 0.15 of imbalances become balanced and we need more than 7 years to balance the model. In the private consumption equation, error correction coefficient is -0.1 which shows that in each year, 0.1 of imbalances become balanced and we need more than 10 years to balance the model. In the investment equation, error correction coefficient is -0.4 which shows that in each year, 0.4 of imbalances become balanced and we need more than 2 years to balance the model. The error correction coefficient of imports is -0.8 which shows that in each year, 0.8 of imbalances become balanced and we need more than 1 years to balance the model.

Conclusion

In this article, Kandil, Berument and Nergiz Dincer's (2007) model was applied to find the effect of exchange rate shocks on macroeconomic variables; then, the effect of exchange rate fluctuation on economic activities of Iran was estimated applying auto-regressive model with Distributed Lags (ARDL). In this study, we applied the exchange rate fluctuations which were analyzed in both expected and unexpected components and the unanticipated components fluctuations include positive and negative shock. Based on the obtained results the following conclusions are made:

- 1- Expected fluctuations and positive and negative exchange rate shock (unexpected fluctuations) have a negative, negative and positive impacts on GDP in Iran, respectively.
- 2- Expected fluctuation and the positive and negative shocks of currency (unexpected fluctuations) have negative, negative and positive impacts on the private consumption in Iran, respectively.
- 3- The expected fluctuations and positive and negative exchange rate shocks (unexpected fluctuations) have negative, positive and negative effects on investment in Iran, respectively.
- 4- Expected fluctuations and positive and negative shocks of exchange rate (unexpected fluctuations) have negative, positive and negative effects on Iran's export, respectively.
- 5- Expected fluctuations and positive and negative shocks of currency (unexpected fluctuations) have negative, negative and positive impacts on Iran's imports.

Suggestions

Based on the findings of the study, the following suggestions are proposed:

Given that the currency shocks increase the investment risk, it is recommended that the state support the investors in case of such shocks to the extent possible to reduce the effect of such shocks on the economy. The government may follow appropriate fiscal and monetary policies at the time of the positive and negative shocks in the foreign exchange market focusing on boosting productivity and investment. So that national production and export growth could restore currency markets again a short time after the shock (especially the sharp rise in the exchange rate). In this context, the government requires to determine a change range in currency that is acceptable and tolerable by economy.

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