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Exchange Rate Uncertainty and Non-Oil Exports: The Case of Iran

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Abstract: Since the exchange rate volatility are one of the most important factors in exports, any exporter should be able to forecast correctly on the currency exchange rate for increasing or decreasing its export. In conditions when practically, it is not possible to forecast exchange rate variation, the uncertainty conditions of currency rate are developed for some exporters. With respect to the importance of exports in uncertainty conditions, this research studies the relationship and impacts of uncertainty in currency exchange rate on exports in Iran. The case study covers the years between 1978 to 2008. The results of this assessment have been generalized by using the generalized auto-regressive conditional heteroskedasticity (GARCH) and ordinary auto-regressive conditional heteroskedasticity (ARCH) show that uncertainty in real exchange rate during the period subject of study had negative impacts on exports in Iran.

Key words: Exchange Rate Uncertainty · Non-oil Exports · GARCH · ARCH · Iran

INTRODUCTION

Since exportation has special share in the economic growth of many advanced countries; as far as making those countries as the strongest countries, the effective factors; in turn, could pave way for progress of countries, particularly the developing countries. Since increase or decrease in currency exchange rate leads to the decrease or increase in exports, this research studies the impact of currency exchange rate uncertainty on exports.

By currency exchange rate uncertainty, it means doubts on behaviors of currency exchange rate, especially the time and amount of fluctuations in future rates of currency exchange [1]. The distinguishing point of this research lies in the fact that it works with many issues in advanced econometric subject during 1978-2008 compared to similar studies. This research gives an introduction that is followed by a literature review and uses reliability and Track, VEC and VAR tests to assess the model. The results and proposals of the research have been explained afterwards.

Literature Review: Syed Zahid Ali *et al*., [2] examine the repercussions of induced currency depreciation. His model captures the impact of fluctuations in the exchange rate through three broad channels. On the demand side, the exchange rate affects net exports through changes in relative competitiveness. Similarly, exchange rate changes affect interest rate parity that in turn affects the aggregate demand for goods and services through a change in real interest rate. On the supply-side, exchange rate depreciation has a negative effect since domestic firms adjust their prices in response to changes in the effective prices of foreign firms. His simulation exercise shows that the effect of induced currency depreciation depends largely on supply-side effects. In most cases, he finds that currency depreciation results in (i) a fall in output (ii) an increase in prices and (iii) an improvement in the balance of trade.Van Wincoop and Bacchetta [3] introduced a model in which, the uncertainty was due to the monetary, financial and technical shocks and the level of trade and welfare were compared in the agreements on floating and fixed currency exchange rate. They concluded that the trade level in any system could become less or more as the currency exchange rate fluctuates. In fact, it could be said that in general balance, a monetary expansion in the foreign country would lower the currency exchange rate and subsequently, increase exports. Hosseini pour and Moghaddasi [4] investigated the impact of exchange rate volatility on aggregate and sectorial Iranian export flows to the rest of the world, as well as on agriculture and industry sectors export. The ARDL bounds testing procedures were employed on annual data for the period 1970 to 2006 and various measures of volatility such as ARCH and GARCH models and moving sample standard

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deviation were employed. The results suggest that, depending on the measure of volatility used, either there exist no statistically significant relationship between Iranian exports flows and exchange rate volatility or when a significant relationship exists, it is positive. However this study found a strong evidence of a stationary long run cointegrating aggregate, agriculture, minerals, transport means and fats and oils exports demand functions but no evidence of a long run chemical exports demand relations were found. These results were however not robust as they showed great amount of sensitivity to different definitions of variable used. Finally they conclude that depending on the measure of volatility used, exchange rate volatility either does not have a significant impact on Iran's exports flow or it has a positive impact on agriculture, minerals, transport means and oils and fats exports and also on aggregate exports. On the other hand, the results of studies of Rose [5] showed The fluctuations of currency exchange rate increased payment balance. Hang-Jin Wei and Peter Clark [6] in a paper titled "Exchange rate volatility and trade flows" assessed currency rate fluctuations for some of the countries. First, they concluded that currency rate fluctuations in countries with advanced economy occur less than developing countries. Second, along with trades, those countries experience less currency rate fluctuations compared to other countries. Fewer currency rate fluctuations in those countries originate from their more stabilized economic policies. Sharifighaehsari and Alizadehnozari [7] in their papr show that Use of the appropriate category in the data collected in the investigation is very important and allows analysts and users to have a clear and rational picture, in the structure review presented. Tables using all goods and services dependent on exports to countries in the outside world and its image can be concluded. Therefore, using the techniques in using these tables an optimization can be reached for export-related activities in relation to the profiles of exporting countries, considering that no human actions are hundred percent efficient. Hence, the optimum use and prevention of waste facilities is something of fundamental importance in this point, which further finds that the issue of increasing exports and the increasing proportion of the population and increase in the quality impact in terms of economic and civil exchanges on other sectors of society are all discussed. Tochitskaya [8] in a paper titled "The Effect of Exchange rate changes on Belarus' Trade Balance" studied the relationship between changes in currency exchange rate and trade balance both in long and short terms. The results of his study showed that increase in currency exchange rate that leads to lowering the value of national currency could have positive impacts on trade balance both in short and long terms. Mundaca [9] in his theoretical study in connection with currency exchange rate uncertainty and optimized participation in international trade presented a model to study the impacts of fluctuation and changeability in currency exchange rate levels. The results of his studies show that currency exchange rate fluctuations lower exports and this is a true observation including conditions when exports seem highly profitable. Salmanpour *et al*. [10] investigated the exchange rate overshooting in Iran during 1959-2005. The value of the Iranian Rial has been depreciated per dollar in the recent decade and the exchange rate overshooting is said to be an important short-run phenomenon. This contribution studied the overshooting and undershooting of exchange rate in Iran by applying Dornbusch monetary model. In this study he has shown that whether or not the exchange rate in short-run deviates from long-run equilibrium magnitude and if it does so, by what velocity it runs towards long-run equilibrium magnitude. By using time series data for the period of 1995 to 2005, that important subject has been analyzed by employing error-correction and co-integration models. The econometric test results show that this theory works in Iran. Sorkh Kuh Azari [11] in his study worked on the impacts of real exchange rate uncertainty during 1993 to 2003. The results of his studies show that currency exchange rate uncertainty in long term had negative impacts on non-oil exports and the non-oil exports had been affected with -0.8 coefficient; thus, exporters in macro level do not take risk and in exchange rate uncertainty, they decrease their exports. Mehrabi and Javedan [12] studied the real exchange rate uncertainty on Iranian agriculture sector during 1969 to 2007. Their findings showed that there are strong and significant short-term and long-term relations among the variables in Iranian agricultural sector growth model and real exchange rate uncertainty had negative and significant impacts on the development of agricultural sector both in long-term and short-term. The error correction coefficient obtained in that study was -0.71 that with its negative and significant mark reveals high speed of adjustment process. Leita [13] showed that Successful countries in the export of engineering services, including some neighboring countries are allocated three to four billion dollars or more credits annually for exporting this services and finally achieve 2 to 3 times this figure. Furthermore,

activation of engineering designing part as industry development infrastructure in the country could be reduced foreign currency cost in the short-term considerably which will be operated as complement for foreign currency income development policy.

Data and Model: In this research, in order to study the relationship between exchange rate uncertainty and exports, information and statistics of the Iranian central bank has been used; however, due to lack of relevant seasonal data, the annual data of the central bank has been extracted seasonally by using the Boot, Feibes and Lisman (BFL) method [14-16].

The model used in this research is:

$$Export= f (REXH, GDP, UNCERT) \quad (1)$$

Ultimately, the export function is extracted as follows:

$$Ln(E)= a + BLN (U) + CLN (G)+LN(R) \quad (2)$$

The variables of the model are:

- By E, it means non-oil exports in Iran, as a dependent variable.
- By G, it means gross domestic product in Iran as an independent variable.
- By R, it means real exchange rate that is obtained from multiplying nominal exchange rate in price index of consumer in foreign country to the price index of consumer in local country.
- By U, it means exchange rate uncertainty as an independent variable. To calculate it, first, the relevant reliability test of the variable was performed, that showed the variable was reliable in first-degree differentiation. Then, in order to estimate the function of first differentiation of exchange rate logarithm through ARIMA models, first, we should be able to recognize if the model is AR or MA and/or it is ARMA; and then, specify the optimized lapse. In order to do so, the correlogram diagram is used and according to the diagram, it could be stated that since both partial correlation and autocorrelation are approximately not zero in four lapses, the first differentiation of the variable follows a combination of AR and MA to fourth lapse; and, we seek a combination that would include the minimum values of AIC and SC criterion as well as significant coefficients. In conclusion, it was specified that we have assessed a model based on the ARIMA ((2, 4).1.4) process.

First Stage: The Research Variables Reliability Test: This test has been performed for the five variables of non-oil exports, the nominal currency rate, exchange rate uncertainty, real exchange rate and GDP of Iran. The process is that, first, the durability test was performed based on the variables level in various lapses and select a lapse with least AIC (Akaike Info Criterion) and SC (Schwarz Criterion) statistics. Then, by comparing the Ricky Fuller statistic and the McKinnon critical values, the variable durability is studied. The results are listed in following table.

With respect to the results of the above-mentioned table, the unit root test on the nominal exchange rate variable level shows that, the hypothesis zero could not be rejected in 99% certainty level. For this reason, the exchange rate variable is a non-durable variable and could not be applied in the model. However, the hypothesis zero concerning the non-durability of first differentiation of exchange rate variable could be rejected with 99% certainty. Therefore, the first differentiation of exchange rate variable will be a durable variable that could be employed in the model. In addition, the exchange rate uncertainty variable in the first lapse has minimum value of AIC and SC statistics. Those tests show that the hypothesis zero concerning the non-durability of the variable is not rejected in 99% certainty level. As a result, the variable is in non-durability level. In the same manner, by first-degree, the differentiation test could be rejected in 99% certainty level and therefore, the first-degree differentiation of the variable of exchange rate uncertainty is durable. The unit root test on the real exchange rate variable level shows that the zero hypotheses concerning non-durability of the variable could be rejected in 99% certainty; hence, this variable will be in durability level and could be used in the model. In conclusion, the unit root test on GDP variable level shows that the cero hypothesis concerning the variable non-durability is not rejected in 99% certainty level. As a result, it will be in non-durability level; on the other hand, the zero hypotheses concerning the non-durability of first-degree differentiation of GDP variable is rejected in 99% certainty level; thus, the first degree differentiation of the variable is durable.

Second Stage: Before performing the cointegration test, the VAR model should be estimated by applying optimized lag. For that purpose, the optimized lapse determining test of VAR model was performed by using Schwarz criterion (SC), the Akaike (AIC), final prediction of error (FPE), Henan- Quinn (HQ) and LR correct picture proportion. In this approach, the lapse with least amount

of the above-mentioned statistics will be an optimized lag; that was determined to be three based on the entire criterion mentioned above. In next stage, the VAR model was estimated by employing lapse as three. The below table lists the results:

Table 1: Results obtained by unit root test of research variables

Name of variable	Optimized lag	Tests statistic	Critical value in 99% probability level
LEX	1	-2.60	-3.58
LGDP	8	-1.50	-3.44
LREXCH	1	-2.93	-3.58
UNCERT	1	-3.08	-3.45
D(LEX)	2	-4/26	-3.58
D(LGDP)	7	-4.23	-3.58
D(LREXCH)	1	-3.77	-3.58
D(UNCERT)	2	-6.30	-3.58

Source: Authors findings

Table 2: Determining optimized lapse of VAR model

	Criterion for selecting optimized lag				
	AIC	SC	HQ	FPE	LR
Optimized lag	3	3	2	3	3

Source: Authors findings

Table 3: Results obtained from performing Trace test

Critical amount in 95% level	Trace statistic
38.56	47.85
15.40	15.29
7.80	6.23
2.63	0.38

Source: Authors findings

Table 4: Results obtained from performing Max. Eigen

Critical amount in 95% level	Maximum eigen value statistic
23.16	27.58
7.59	6.08
5.17	4.40
2.63	0.38

Source: Authors findings

Table 5: Dependent variable: non-oil exports logarithm

LEX dependent variable		
Independent variable	Coefficient	Statistic "t"
Intercept	-2.81	-
L GDP	0.63	-3.27
LREXCH	0.69	-3.45
LUNCERT	-0.93	4.38

Source: Authors findings

Third Stage: the Cointegration Test: After performing the unit root test, in order to assure the absence of false regression among the research variables, the co-integration test was performed among research variables. The results of trace test and Max Eigen values are listed below:

As the above table shows, in first line in both tests, since the effect statistic and the max. Eigen statistic is larger than the critical values of the two tests; the hypothesis of absence of long-term relations among research variables is rejected and the alternative hypothesis has been accepted. That is, there is a long-term relation between the variables existing in the exports equations and since in performing this test, we will stop in the point where the absence hypothesis is rejected; the hypothesis test for the next lines of the two tests will not be performed.

Fourth Stage: After ascertaining the existence of a long-term relation among the variables existing in export equations, in next stage, that relation is applied in VAR model to obtain vector error correction (VEC) model. The results have been listed in following table:

L(Export)= -2.81 + 0.63 L(GDP) + 0.69L(REXCHF) -0.93L (UNCERT) (4/38) (-3.27) (-3.45) (3)

Based on the above equation, the coefficient of Intercept that shows average impact of other variables effective on exports does not exist in this equation and since statistic "t" is significant in 0.95 probability level, it shows that one percent increase in factors that affect exports- though not being considered in the estimated model- would decrease exports 2.81 percent. In addition, with respect to the statistic "t" as obtained for production variable, the mentioned coefficient is significant in 95% probability level in statistics terms, showing that per one percent increase in GDP, there will be 0.63 percent increase in exports in concerned period. In addition, the real exchange rate coefficient, with respect to the statistic "t" is significant in 0.95 percent probability and with respect to the coefficient; one percent increase in real exchange rate will increase exports for 0.69 percent. Ultimately, the coefficient of real exchange rate uncertainty variable is significant in 95% probability level as per the relevant statistic "t" showing that per one percent increase in exchange rate uncertainty, there will be 0.93 percent decrease in exports. All subjects mentioned above are in agreement with the theoretical and empirical basis of the research too.

CONCLUSION AND SUGGESTION

With respect to the findings of present study, following results are notable:

- Uncertainty in exchange rate has negative impact on exports; in fact, as the exchange rate uncertainty is lower, there will be more increase in exports.
- The real exchange rate has positive impacts on exports.
- The GDP has positive impacts on non-oil exports; therefore, by increase in GDP, the income and purchase power of the foreign countries increase, leading to growth in global demands of exports for our country.

With respect to the results of the research, it is suggested that after concluding the contract to its effective date, the exporters might obtain their needed money in advanced market basked on the agreed exchange rate for delivering a specific amount of foreign currency in future in order to avoid the risks of changes in currency exchange rate. In addition, exporters could perform arbitrage to gain profits from the difference in the local and foreign interest rates.

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