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Real Effective Exchange Rate and Trade Performance In Iran

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Abstract

The Purpose of this paper is to investigate the long-run effect of real effective exchange rate on Iran non-oil trade balance. The methodology is based on ARDL procedure that can be applied irrespective of whether the regressors are I(0) or I(1). The results show the real depreciation has not a favorable long - run effect on the non-oil trade balance of Iran from 1979 to 2001.

Keywords: real effective exchange rate, trade balance, ARDL procedure, Akaike information.

I- Introduction

A country accepts devaluation or allows its currency to depreciate to gain international competitiveness. Devaluation causes to increase exports by making them cheaper and to discourage imports by making them expensive, thus, improving the trade balance.

However, the inflationary effects of devaluation may take away any favorable effect that nominal devaluation may have on the trade balance. Thus, the appropriate measure of devaluation policy is the real exchange rate. Thus, only devaluation or depreciation of real exchange rate can increase a country's international competitiveness.

In a given period, a country's real or nominal exchange rate could depreciate against one currency and appreciate against another currency. Thus, the nominal or real effective (multilateral or trade weighted) exchange rate provides the overall value of a country's currency in nominal or real term.

However, a more comprehensive process of evaluating international competitiveness of a country is to study the trend of real effective exchange rate.

The purpose of this paper is to investigate the long - run effect of real effective exchange rate on Iran non-oil trade balance. To this end, section II

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provides a trade model. Section III reports the empirical results. Section IV concludes.

II- Long - run relation between trade balance and real effective exchange rate

There are few different approaches in the literature to evaluate the effects of devaluation on the trade balance. First, authors can estimate a general macro model. Second, they can test a condition known as Marshall - Lerner condition. Examples include, Houthakker and Magee (1969), Bahmani - Oskooee (1986, 1998) and Marquez (1990). The third approach is to estimate a direct relation between the trade balance and the exchange rate, in addition to other determinants of the trade balance. Bahmani - Oskooee (1991), Rose and Yellen (1989) are some example in this approach.

Since our purpose is the long - run relation between real effective exchange rate and the trade balance, the methodology is based on ARDL procedure. The main advantage of this estimation strategy lies in the fact that it can be applied irrespective of whether the repressors are I(0) or I(1), and this avoids the protesting problems associated with standard co-integration analysis which requires the classification of the variables into I(1) and I(0).

The technique requires a reduced form trade model. Following Bahmani - Oskooee (1991, 2001) a measure of trade balance is employed which is insensitive to units of measurement, the ratio of imports over non-oil exports (M/X). Bahmani-oskooee (2001) says, "There are two justifications for using this ratio. First, the ratio is not sensitive to units of measurement. Second, the measure could be interpreted as nominal or real trade balance. "This definition of trade balance from Bahmani - Oskooee (2001) yields the following trade model.

$$\text{Log}(M/X) = a + b\log y\,t + c\log yw\ t + d\log REER\ t + \varepsilon t \qquad (1)$$

Where M is nominal dollar imports; x is nominal dollar non - oil exports of Iran; Y is index of Iran GDP volume; YW is index of industrial countries GDP; and REER is index of Iran real effective exchange rate. Description of the variables is in table 1. Data of the variables have been constructed and published by the International Monetary Fund in its International Financial Statistics (IFS, 2002) from 1979 to 2001.

Because of importing more by a growing economy, estimate of b should be positive. Note that if economic growth causes to increase the production of import substitute goods, imports may decline as y increases, yielding a negative b. If an increase in world income is to stimulate Iran's non-oil export, estimate of C should be negative. If a real devaluation, an increase in REER is to increase X and reduce M, thus improve the trade balance, estimate of d should be negative.

Table 1 : Description of the Variables

Variables	Descriptions
M/X	Portion of nominal dollar impost to nominal dollar non-oil export
Y	index of Iran GDP volume
YW	index of industrial Countries GDP
REER	index of real effective exchange rate
LM/X	log (M/X)
LY	log (Y)
LYW	log (YW)
LREER	log (REER)
DL (M/X)	LM/X-LM/X(-1)
DLY	LY-LY(-1)
DLREER	LREER-LREER(-1)
DLYW	LYW-LYW(-1)

III- The Methodology and The results

We employ the testing and estimation procedure advanced in Pesaran et al. (1996) and Pesaran and Shin (1995) which is referred to as the ARDL procedure to examine the relationship between the logarithm of imports over non-oil exports ratio, the logarithm of Iran GDP volume index, the logarithm of industrial countries GDP index, and the logarithm of Iran real effective exchange rate index, using yearly observations over the period 1979 to 2001.

The ARDL procedure involves two stages. At the first stage the existence of the long - run relation between the variables under investigation is tested by computing the F-statistic for testing the significance of the lagged levels of the variables in the error correction form of the underlying ARDL model. However, the (asymptotic) distribution of this F - statistic is non - standard, irrespective of whether the regressors are I(0) or I(1). Pesaran et al. (1996) have tabulated the appropriate critical values for different numbers of regressors (k), and whether the ARDL model contains an intercept and/or trend. They give two sets of critical values. If the computed F-statistic falls outside this band, a conclusive decision can be made without needing to know whether the underlying variables are I(0) or I(1), or fractionally integrated. If the computed statistic falls within the critical value band, the result of the inference is inconclusive and depends on whether the underlying variables are I(0) or I(1). It is at this stage in the analysis that the investigator may have to carry out unit root tests on the variables.

The second stage of the analysis is to estimate the coefficients of the long - run relations and make inferences about their values using the ARDL procedure. Note that it is only appropriate to embark on this stage if you are satisfied that the long - run relationship between the variables to be estimated is not in fact spurious.

The error correction version of the ARDL model in the variables LMX, LY, LREER and LYW is given by:

$$DLMX = a_0+a_1DLMX(-1)+a_2\,DLY(-1)+a_3DLREER(-1) + a_4\,DLYW(-1) + \gamma_1\,LMX(-1) + \gamma_2\,LY(-1) + \gamma_3\,LREER(-1) + \gamma_4\,LYW(-1) + u_t \qquad (2)$$

It is not possible to know a priori whether Ly, LREER and LYW are the "long - run forcing" variables for LMX, so the current values of DLY, DLREER and DLYW have been excluded from (2). The hypothesis that will be tested is the null of "non - existence of the long - run relationship" defined by:

$$\text{Against} \begin{cases} H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0 \\ H_1: \gamma_1 \neq 0 \quad \gamma_2 \neq 0 \quad \gamma_3 \neq 0 \quad \gamma_4 \neq 0 \end{cases}$$

The relevant statistic is the familiar F - statistic for the joint significance of γ_1, γ_2, γ_3 and γ_4. The F- statistic for testing the joint null hypothesis that the coefficients of these level variables are zero (there exists no long - run relationship between them) is F(LMX/ LY, LREER, LYW) = 4.61

As we have already noted urder H_0 : $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$ this statistic has a non - standard distribution irrespective of whether LMX, LY, LREER and LYW are I(0) or I(1). The critical value bounds for this test are computed by Pesaran et al. (1996).

The relevant critical value bounds at the 95 percent level are given by 3.219 to 4.378 since F(LMX/LY, LREER ,LYW) = 4.61 exceeds the upper bound of the critical value band, we can reject the null of no long - run relationship between LMX, LY, LREER and LYW, irrespective of the order of their integration.

Consider now the significance of the lagged level variables in the error correction model explaining DLY, DLREER and DLYW to comput the F-statistic for the joint significance of LMX(-1), Ly(-1), LREER(-1) and LYW (-1). We obtain

F(LY/ LMX, LREER, LYW) = 1.72

F(LREER/LMX, LY, LYW) = 1.4

F(LYW/ LMX, LREER, LY) = 1.16. All of these three statistics fall well below the lower bound of the critical value band (which is 3.219 - 4.378), and hence the null hypothesis that the level variables do not enter significantly in the equations for DLY, DLREER and DLYW cannot be rejected. once again this conclusion holds irrespective of whether the underlying variables are I(0) and I(1).

The above test results suggest that there exists a long - run relationship between LMX, LY, LREER and LYW, and that the variables LY, LREER and LYW can be treated as the "long - run forcing" variables for the explanation of LMX.

The estimation of the long - run coefficients and the associated error correction model can now be accomplished using the ARDL procedure. This offers a choice between different model selection criteria. The Akaike information (AIC) the Schwarz Bayesian (SBC) and the R-Bar squared criteria select ARDL (1, 1, 0, 0) specifications, which the point estimates are similar. the estimate of the long - run coefficients based on the Akaike information criterion is in table (2). With the exception of the coefficient of LY all the other coefficients are statistically significant.

The estimated error correction model selected using the AIC is given in table (3). All the coefficients are statistically significant. The underlying ARDL equation also passes all the diagnostic tests.

The error correction coefficient, estimated at - 0.77975 is statistically highly significant, has the correct sign, and suggest a relatively high speed of convergence to equilibrium. The larger the error correction coefficient (in absolute value) the faster is the economy's return to its equilibrium, once shocked.

Table 2: Estimated Long Run Coefficients Using the ARDL Approach based on Akaike Information Criterion

Dependent Variable is LM/X		
Regressor	Coefficient	T-Ratio [Prob]
LY	-0.68768	-0.9808 [0.341]
LREER	0.68250	4.1258 [0.001]
LYW	-3.6207	-4.6626 [0.000]
INPT	17.9373	8.1936 [0.000]

Table 3: Error Correction for the Selected ARDL model based on Akaike Information Criterion

Dependent Variable is DL(M/X)		
Regressor	Coefficient	T-Ratio [Prob]
DLY	2.0346	2.5418 [0.021]
DLEER	0.53217	4.3357 [0.000]
DLYW	-2.8233	-3.3628 [0.004]
DINPT	13.9865	4.8482 [0.000]
ecm(-1)	0.77975	-6.4107 [0.000]

IV- Summary and conclusion

Due to the inflationary effects of nominal devaluation, real exchange rate is the best measure to evaluate the effects of exchange rate policy on the trade balance.

Furthermore, under the current floating exchange rate system, a more comprehensive measure of real exchange rate is a trade weighted bilateral rate called "real effective exchange rates" which used to evaluate international competitiveness of a country. Indexes of nominal and real effective exchange rates are constructed and published by IMF in its International Financial Statistics (2002) for Iran from 1979 to 2001.

The main purpose of this paper is to investigate where real devaluation have improved the trade performance of Iran. Thus, a trade model is borrowed from the literature and estimated using ARDL procedure. The results show the real devaluation has unfavorable long - run effect on the non-oil trade balance of Iran from 1979 to 2001.

References

1- Bahmani - Oskooee, M. (1986) Determinants of international trade flows: The case of developing countries, Journal of Development Economics, 20, 107-23.
2- Bahmani - Oskooee, M. (1991) Is there a long - run relation between the trade balance and the real effective exchange rate of LDCs? , Economics Letters, 36, 403 - 7.
3- Bahmani - Oskooee, M. (1998) Co-integration approach to estimate the long - run trade elasticities in LDCS, International Economic Journal, 12, 89-96.
4- Bahmani - Oskooee, M. (2001) Nominal and real effective exchange rates of middle eastern countries and their trade performance, Applied Economics, 33, 103 -111.
5- Houthakker, H. S. and Magee, S. (1969) Income and price elasticities in world trade, Review of Economics and Statistics, 51, 111 - 25.
6- Marquez, J. (1990) Bilateral trade elasticities, the Review of Economics and Statistics, 72, 70-7.
7- Pesaran, M. H., and Y. shin. (1995) an autoregressive distributed lag modeling approach to co-integration analysis, DAE working Paper, 9514, Department of applied economics, University of Cambridge.
8- Pesaran, M. H., and Y. shin. (1996) Co-integration and the speed of convergence to equilibrium, Journal of Econometrics, 71, 117 - 43.
9- Rose, A. K. and Yellen. J. L. (1989) Is there a J- Curve?, Journal of Monetary Economics, 24, 53 - 68.