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The effect of trade liberalization on trade balance of Iran

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Abstract

The main purpose of this study is to examine the effect of trade liberalization on the trade balance of Iran's economy from 1993 to 2023 using modern econometric techniques, namely the Auto-Regressive Distributed Lag (ARDL) model and the Johansen Co-integration technique.

Keywords: Trade Liberalization, Trade Balance, Openness, ARDL, Johanson Co-integration Technique
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1 Introduction

Cross-border trade is one of the blending forces of the universal economy. The burden on the process of economic blending over the last two decades, due to technological development, market structural changes, and the emergence of multinational firms, has increased; part of this is due to the increase in world trade. Trade liberalization and removing and/or decreasing price-interfering factors, in other words remove or decreasing the trade restrictions, has caused a competitive ambience in the world whose definite result is the provision of products based upon relative benefit. The General Agreement on Trade and Tariffs (GATT) has been the foundation of the movement towards global wide trade liberalization and nowadays this movement, with the help of the World Trade Organization (WTO), which has substituted the GATT in 1995, is being evolved and developed. One of the chief purposes of trade liberalization is the leap of economic growth and possession of static and dynamic supplies as a result of foreign trade through the specification of appropriate supplies, competition intensification, promotion of knowledge, investment and finally the rapid growth rate of capital asset and technical advancement. Trade obstructions and anti-export policies reduce the export growth to less than the potential situation, and more importantly than others are the import controlling factors (tariffs and non-tariff obstacles), although supports the fiscal balance, reducing the efficiency.

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2 Preliminaries

2.1 A Survey on Topic Literature

After World War II and the establishment of the United Nations for managing the political affairs, and the establishment ofthe International Monetary Fund and World Bank for managing the world's financial and monetary affairs, the General Agreement on Tariffs and Trade (GATT) was established in 1947 to manage the world's trade affairs. In theory the trade liberalization leads to higher imports and exports, but its influence on the overall trade balance is ambiguous and depends mostly on the relative effects of import and export growth and also on the variation of relative prices. From the view of supply, trade liberalization leads to economic growth, but from the standpoint of demand, this policy results in worse trade levels andthe inverse result in economic growth [2]. In recent years, one of the main issues of development economists has been determining the effect of trade liberalization on macroeconomic parameters in developing countries. Hence, according to global alterations in the field of trade liberalization and its effects on a state's economic circumstances, the current study can play a helpful role. There have been little studies made on effects of trade liberalization in trade level [8] with the survey over the influences of trade liberalization on trade balance in developing countries, have compared the ratio of import, export and trade balance to domestic gross income before and after trade liberalization and with the inspection of data and econometrics and reached to the results that trade liberalization leads to increase in export and import. However, the growth of imports is more than the growth. Thus, trade liberalization has worsened the trade balance and fiscal balance in surveyed countries. [4] has published an article as "trade liberalization effect on export, import, trade balance and growth, case study of Mexico (2005) by the use of the self-correlated distributing method. The applicable results of this survey reveal that trade liberalization has had significant effects on exports and imports during the survey period; its influence on exports has been insignificant, though. The examination results showed this fact that since the mid 1980s, the tendency for imports has had a greater growth in comparison with the intention to export, and this fact has worsened the growth rates with trade balance, which is one of the most important aspects of Mexico's slow growth in recent years. Amila Santos [7] have examined the effect of trade liberalization in export, import and fiscal balance in developing countries by the use of panel data and the use of cross section and time series in 22 developing countries in the mid 1970 and by applying the variations of global GDP rate and the rate of domestic GDP growth and domestic exchange rate and taxes on imports and exports and the trade liberalization dummy and terms of trade have seen that reduction in export and import duties affect the import and export growth meaningfully and of course one should pay attention that this effect is more noticeable in import, also the effect of trade liberalization regime, regardless of tax reduction, increases the imports growth more than export's. Also trade liberalization increases the elasticity of income for import and export demands almost equally but the elasticity of price for import increases more than export's. Finally, the net effect of trade liberalization regardless of variations in duties, worsens the trade balance by approximately 2 percent of GDP, but the influence on the current account is less than on the fiscal balance. Also [6] in a paper issued as "The influence of globalization over the pattern of Iran's import demand (1338-1381)" introduced two index of LIT (Balance of International Trade) and IIT (Intermingle of International Trade) as global indexes and then import demand function for Iran during the years 1338-1381 was estimated also applying IIT in import pattern, effects of globalization in Iran's imports during the mentioned period was inspected and evaluated by the use of the software PDS provided by The supreme Institute of Research and Planning and Development which represented the positive effect of globalization in Iran's imports' demand. Abrishami et at [1] investigated the effect of trade liberalization in import and export growth in 23 developing countries, such as Iran, by using the dynamic method of panel data during 1972-2002. The results of the equations' estimations revealed that the tax reduction on import growth is absolutely larger than that on export growth. The influence of trade liberalization on the elasticity of income for import and export didn't affect the pattern of steady influences, but inthe GMM pattern, the effects of trade liberalization in elasticity of income for export were larger than those for import, and its effect in elasticity of import price was larger compared to export. Therefore, it could be concluded that trade liberalization leads to a worsened trade balance situation and fiscal balances. Mohseni et al[3] far in a study issued as "Influences of Globalization over Iran's Foreign Trade", after surveying the pattern of import demand and export supply, introduced two indices of international trade balance as globalization indexes and applied them in IIT and LIT models. This research's findings imply that elasticity coefficients for the globalization in all sections of intermediate goods in import equations are more than those in export equations, which reveals that globalisation leads to a greater increase in imports than exports. In other words, the intermediate goods won't have the required skill and potential in order to be entered on global markets[5].

3 Theoretical Framework

3.1 Theoretical Foundations of Trade Balance

The trade balance is fundamentally determined by several key macroeconomic variables:

$$TB_t = f(Y_t, Y_t^*, E_t, T_t, OPN_t), \tag{3.1}$$

where TB_t is the trade balance, Y_t is domestic real income, Y_t^* is foreign real income, E_t is the real exchange rate, T_t represents trade barriers, and OPN_t denotes trade openness. The impact of exchange rate changes on trade balance is governed by the Marshall-Lerner condition:

$$|\eta_X + \eta_M| > 1, \tag{3.2}$$

where η_X and η_M represent price elasticities of exports and imports, respectively. Trade openness is measured as:

$$OPN_t = \frac{X_t + M_t}{GDP_t} \times 100. \tag{3.3}$$

Terms of trade are defined as:

$$TOT_t = \frac{P_t^X}{P_t^M} \times 100. \tag{3.4}$$

4 Introduction of Theoretical Pattern and Estimation of Research Pattern

4.1 Metodologhy

In this section after introducing the model's variables, along the introducing the theoretical pattern of trade balance we will analyze the mentioned pattern for Iran's economy within the years 1993-2023. The utilized model for inspection and estimation of trade liberalization effect on trade balance in this study is as follows:

$$\frac{TB}{GDP} = \theta + \theta_1 W_t + \theta_2 Y_t + \theta_3 P_t + \theta_4 Dm_t + \theta_5 TOT_t + \theta_6 LIB_t + \theta_7 OPN_t + \epsilon_t \tag{4.1}$$

where TB denotes the trade balance (the lagged dependent variable is included in the equation to control for adjustment dynamics); Y and W are domestic and foreign real GDP growth respectively to the fixed prices in 1376; P and TOT denote the change in (log) real exchange rate as a ratio between import prices to foreign prices and terms of trade which is defined as the ratio of the unit value of export to unit value of import, respectively. Dm is the growth rate of import duties and indicates all taxes level and custom unions on goods at the point of entrance into the country and OPN (openness) is the is the ratio of a country's trade (sum of export and import) to gross domestic product. This index reveals the globalization index whose one of the most important advantages is the simplicity in calculations. Lib, the trade liberalization dummy; is considered for reducing tariffs and removing non-tariff obstacles (getting the import permission, portion permits,...) and for the years in which liberalization was occurred equals one and for the rest is considered as zero. Based upon the country's third economical development plan with the commencement of trade liberalization procedure in country since the year 2002 this variable for the years before mentioned year is considered zero and for the years after 2002 is considered 1.

4.2 Econometric Framework

Given the mixed order of integration among variables, we employ the ARDL model. The general form of an ARDL$(p, q_1, q_2, \ldots, q_k)$ model is:

$$Y_t = c + \sum_{i=1}^{p} \phi_i Y_{t-i} + \sum_{j=0}^{q_1} \beta_{1,j} X_{1,t-j} + \sum_{j=0}^{q_2} \beta_{2,j} X_{2,t-j} + \cdots + \epsilon_t \tag{4.2}$$

The specific ARDL model for our study is:

$$\begin{aligned} \frac{TB_t}{GDP_t} = \theta_0 &+ \sum_{i=1}^{p} \theta_{1,i} \frac{TB_{t-i}}{GDP_{t-i}} + \sum_{j=0}^{q_1} \theta_{2,j} Y_{t-j} + \sum_{k=0}^{q_2} \theta_{3,k} W_{t-k} \\ &+ \sum_{l=0}^{q_3} \theta_{4,l} P_{t-l} + \sum_{m=0}^{q_4} \theta_{5,m} Dm_{t-m} + \sum_{n=0}^{q_5} \theta_{6,n} TOT_{t-n} \\ &+ \sum_{o=0}^{q_6} \theta_{7,o} OPN_{t-o} + \theta_8 LIB_t + \epsilon_t \end{aligned} \tag{4.3}$$

The Error Correction Model derived from ARDL is:

$$\Delta Y_t = c + \sum_{i=1}^{p-1} \psi_i \Delta Y_{t-i} + \sum_{j=0}^{q-1} \boldsymbol{\delta_j}' \Delta \mathbf{X}_{t-j} + \lambda ECT_{t-1} + u_t \tag{4.4}$$

4.2.1 Hypothesis Testing

The results of Stability Analysis on research variables with extended Dickey–Fuller test shows that trade balance, domestic real GDP growth, Openness and growth of import duties are stable and significant at 10 percent level but the foreign real GDP growth, the real exchange rate and terms of trade are not stable over their level. Also according to Phillips–Perron test, trade balance, domestic real GDP growth, Openness and growth of import duties are meaningful and stable over the 5 percent level; however, the foreign real GDP growth, the real exchange rate and terms of trade are not statble. For non-stable variables their first order difference with ADF and PP methods are investigated. The results imply that the above variables become stable with one difference.

Table 1: The results of Stability Analysis using ADF method

variables	Values	probability	lags
trade balance	-3.559506	0.0515	2
foreign real GDP growth	-3.0037	0.1489	0
domestic real GDP growth	-6.729699	0.0000	2
real exchange rate	-2.641109	0.2664	2
import duties growth	-3.727816	0.0661	1
terms of trade	-1.566946	0.7813	0
Openness	-4.925910	0.0025	1

Table 2: The results of Stability Analysis in first differences using ADF method

variables	Values	probability	lags
foreign real GDP growth	-4.44600	0.0085	0
real exchange rate	-9.096398	0.000	0
terms of trade	-8.487396	0.000	0

4.2.2 Auto Regressive Distributed Lags Estimation Model (ARDL)

Considering that all variables are not stable in their level and some of them will be stable at first-difference level. Therefore, OLS method cannot be used in estimating the model. So, the model will be estimated through ARDL. According the results of the estimation, terms of trade and also terms of trade with one year lag, foreign real GDP growth with one year lag, the real rate of exchange, openness and imports duties growth have positive effect on trade balance and domestic real GDP growth and trade liberalization dummy have negative effect on trade liberalization. Any increase in domestic real GDP growth will lead to an increase in imports which will worsen the trade balance. Also increasing the income of foreign countries will improve the trade balance by means of increased amount of export to foreign countries. Value of national currency will fall by the growth of real exchange rate and domestic product's prices will seems to be lower in comparison to foreign ones which lead to more export and fewer imports and as a result trade balance will be enhanced. At the other hand Increasing degree of economic openness, causes motivations and competitiveness in market and considering cheap labor, raw materials, markets and etc the countries will tend to provide their requirements from the country that has lower production costs. Iran possessing all these factors can improve its trade balance by further growth of exports. Considering high volume of imports into the country, the growth of import duties will reduce the import volumes and eventually will improve the trade balance. The trade liberalization dummy shows a negative relationship with trade balance. However, long-term relationships of the variables in model are examined and the results are given in Tab 4. The results showed a long-term relationship between variables. Terms of trade and trade liberalization dummy are significant at 1percent level, also domestic real GDP growth, foreign real GDP growth and real exchange rate at 5 percent level and import duties growth are significant at 10 percent level. But openness is not significant in long term for which economic sanctions against Iran

Table 3: Results of model estimation by ARDL

Variables	Coefficient	Sts.Error	T-Ratio	Sig
TB(-1)	-0.55440	0.16587	-3.3424	0.004
Y	-0.12242	0.050657	-2.4167	0.027
W	0.035841	0.025103	1.4278	0.171
W(-1)	0.067119	0.026777	2.5066	0.023
P	0.037885	0.013677	2.7700	0.013
TOT	0.92856	0.19666	4.7217	0.000
TOT(-1)	0.16525	0.30076	5.4927	0.000
OPN	0.037477	0.016051	2.3349	0.032
OPN(-1)	-0.030636	0.018096	-1.6930	0.109
DM	0.002009	0.001107	1.8150	0.087
LIB	-0.059565	0.012308	-4.8395	0.000
C	-0.10363	0.017187	-6.0296	0.000
Trend	0.00396	0.60623	6.5415	0.000
R-Squared	R-Bar-Squared	DW-Statistic		
93019	88091	2.1818		

Table 4: Long-term relationships of the variables in model by ARDL Method

Variables	Coefficient	Sts.Error	T-Ratio	Sig
Y	-0.078759	0.033197	-2.3725	0.030
W	0.066237	0.017698	3.7426	0.002
P	0.008884	2.7434	0.014	
TOT	0.16605	00.14756	11.2547	0.000
OPN	0.004401	0.01572	0.27995	0.783
DM	0.001292	0.64823	1.9940	0.062
LIB	-0.038320	- 0.006986	5.4853	0.000
C	-0.066670	0.009584	-6.9563	0.000
Trend	0.002551	0.26653	9.5730	0.000

can be mentioned as one of the main causes. Now accumulation of data between a set of variables were examined using error correction model (ECM). According to Tab 5, in the case of a shock or disturbance in long term, 55percent of errors in short-term imbalances are adjusted to the long-term balance. Foreign real GDP growth and domestic real GDP growth are significantly correlated, with correlation Coefficient of + 0.06 and -0.12. Terms of trade, with a correlation Coefficient of 0.9, affects the trade balances significantly also rate of exchange has a positive relation with trade balance and the related correlation Coefficient is 0.03. Imports duties correlation coefficient is 0.002 and it represent the less importance of this factor on trade balance. Also correlation coefficient of -0.05 for trade balance dummy represent negative effect of this variable of trade balance.

4.2.3 Johanson Co-integration technique for trade balance

According to less number of lag by Akaike information criterion (AIC) comparing the Schwarz Bayesian information criterion (SBC), one optimal lag can be defined in the model

Then numbers of integration vectors are specified and integration vectors are estimated.

Using 2 vectors effect method and maximum characteristic unit root test, 4 co-integrated vectors are defined at 95 percent and 90 percent level. Estimation of these vectors is as follows:

According to Tab. 8 there is a long term relation between the variables in this model and first vector support the economic interpretation of the theory and trade balance have positive relation with foreign GDP growth, rate of exchange, terms of trade, income tax growth and negative relation with domestic GDP growth which are significant at 5 percent level. But openness is not significant at long-term view.

Table 5: Result of Error Correction Model (ECM)

Variables	Coefficient	Sts.Error	T-Ratio	Sig
dY	0.12242	0.050657	-2.4167	0.025
dW	0.035841	0.025103	1.4278	0.169
dP	0.037885	0.013677	2.77	0.012
dTOT	0.92856	0.19666	4.7217	0
dOPN	0.037477	0.016051	2.3349	0.03
dDM	0.002009	0.001107	1.815	0.085
dLIB	-0.059565	0.012308	-4.8395	0
dC	-0.10363	0.017187	-6.0296	0
dTREND	0.003965	0.60623	6.5415	0
(-1) ecm	-0.5544	0.16587	-9.3712	0

Table 6: Choosing the optimal number of Lag by Johanson Co-integration technique

Order	LL	AIC	SBC
2	-99.8168	-204.8168	-276.5999
1	-179.8087	-235.8187	-274.0930
0	-262.8077	-269.8077	-274.5932

4.3 Cointegration Analysis

To verify long-run relationships, we employ the Johansen cointegration test based on the VAR model:

$$\Delta \mathbf{Z}_t = \mathbf{\Pi} \mathbf{Z}_{t-1} + \sum_{i=1}^{p-1} \mathbf{\Gamma}_i \Delta \mathbf{Z}_{t-i} + \mathbf{u}_t. \tag{4.5}$$

where $\mathbf{\Pi} = \alpha\beta'$ contains long-run coefficients, β represents cointegrating vectors, and α denotes adjustment parameters.

5 Concluding Remarks

Methodology of this study is based on econometrics method and Auto Regressive Distributed Lags model and Johansen co integration test are used for estimating the trade liberalization on trade balance in Iran. The results, however, are mixed for the impact on the overall balance. Growth of real terms of trade and terms of trade with one year lag, foreign real GDP with one year lag, real rate of exchange affect trade balance positively and improve the trade balance in Iran while any increase in domestic real GDP worsen the trade balance in Iran. Also openness growth in short- term point of view improves the trade balance but is insignificant at long- term estimations. growth of import duties and any increase in the final costs of imported goods and services, Leading to lower import demand and more competitiveness in export and excising exports over imports caused by trade liberalization will improved trade balance. So considering the meaning of trade liberalization as reduction and elimination of tariff and non-tariff obstacles by means of decreasing the import duties, although trade liberalization will increase imports and exports but higher import growth than export growth led to a deficit in trade balance therefore for achieving successful trade liberalization policies providing an appropriate macro-economic stability in the country is highly recommended .in other words before programming for globalization policies corrective actions in order to stabilize the economy, such as reducing budget deficits, inflation and should be done. In economic conditions with the lowest budget deficits and with balanced rate of exchange, the current account deficits with the full imports liberalization will be diminished. in this case import liberalization will stable the economic conditions on the country by decreasing the inflation and providing the Competition in the domestic market. Also with regard to targeted subsidies and elimination of subsidies, Energy production costs and cost of finished products made within the country will be raised. This will force manufacturers to reduce costs by using poor quality materials. This leads to reduction of international competitiveness of domestic products with similar foreign products and reduction in demand of foreign consumer regarding poor quality comparing similar ones. on the other hand it will lead to higher prices, inflation, lower demand from domestic consumers and demand for imports of foreign similar products. In any case, the lower demand for imports comparing the less demand

Table 7: Results of co-integration vectors estimation by Johanson technique

No. of co-integrated vectors		Trade Balance Method		
Type of the test				
H_0	H_1	values	Critical Value(95 percent)	Critical Value(90 percent)
λ max				
r =0	r =1	52.5476	45.63	42.7
$r \leq 1$	r =2	43.2486	39.83	36.84
$r \leq 2$	r =3	24.4737	33.64	31.98
$r \leq 3$	r =4	19.1497	27.42	24.99
$r \leq 4$	r =5	16.9896	21.12	19.02
$r \leq 5$	r =6	9.5781	14.88	12.98
$r \leq 6$	r =7	4.428	8.07	6.5
λ trace				
r =0	$r \geq 1$	170.4153	124.62	119.68
$r \leq 1$	$r \geq 2$	117.8677	95.87	91.4
$r \leq 2$	$r \geq 3$	74.6191	70.49	66.73
$r \leq 3$	$r \geq 4$	50.1454	48.88	45.7
$r \leq 4$	$r \geq 5$	30.9958	31.54	28.68
$r \leq 5$	$r \geq 6$	14.0061	17.86	15.75
$r \leq 6$	$r = 7$	4.428	8.07	6.5
Special values				
0.8265	0.76346	0.55771	0.47182	0.43239
0.27332	0.13722			

Table 8: Co-integrated vectors estimation

	First vector		2th vector		3th vector		4th vector	
variables	co-integrated vector	Normalized co-integrated vector	co-integrated vector	Normalized co-integrated vector	co-integrated vector	Normalized co-integrated vector	co-integrated vector	Normalized co-integrated vector
TB	2.5056	-1	-2.8185	-1	-4.1251	-1	-6.123	-1
Y	0.85273	-0.34032	0.96677	0.34301	1.409	0.34156	-1.965	-0.32092
W	-1.0088	0.40262	-0.35453	-0.12579	-0.95093	-0.23052	0.39946	0.065239
P	-0.88467	0.35307	0.23881	0.084732	0.18968	0.045982	-0.43816	-0.071559
TOT	-0.14044	0.56045	0.40985	0.14545	0.38425	0.93146	0.191957	0.31356
OPN	70.38273	0.15454	1.1039	0.39166	0.086931	0.021074	0.2579	0.04212
DM	-0.030257	0.012076	-0.037666	-0.013364	0.026543	0.006342	0.010435	0.0017042

for exports will lead to a worsening in trade balance. So to deal with such crisis government must support local manufacturers and prevent any loss in quality of domestic products or price increases and on the other hand and attract foreign investors by granting facilities.

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