Trade Potential and Among Indian Ocean Border Countries: Application of the Gravity Model

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Abstract

Recent development in the globalization process and interdependence of national economic follow the importance of financial market, economic liberalization policies, technology capital and laber mobility, expansion of consumption market. In this instance, economic integration, expanding trade flows, reduction of barriers and trade constraints are the main activities of national economies. Looking towards to regional union, trade flows, integration could facilitate the process of trade liberalization to help the more cooperation between partners to inter national economics.

The propose of this paper is two fold. First examine the succees and failure of the existing preferential trade agreements and regional economic groupings among the IOR-ARC countries. Secondly using the generalized gravity model and panel data during 1999-2004, explains the estimation results.

The results show that IOR-ARC potential trade including Iran, while export to others excluding Iran would increase lay 35 percent, would increase 20 percent. Imports from nonmember could be 15 percent higher as the gravity model predicts.

Keywords: Bilateral Trade Flows, Economic Integration, Gravity Model, Panel Data, IOR-ARC.

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1- Introduction

Recent developments in the globalization process follow the interderpendence of national economies and through huge changes in financial markets, economic libralization policies, thechnology, capital and labor mobility and goods market enhancement. Due to the establishment economic unions and integrating trade regions, economic integration could facilitate substantially the process of trade and financial liberalization in order to extend cooperation between countries worldwide.

Countries enjoying common economic interests and political cultural relationships, create economic integration to explimate free trade by various policies. Reducing trade limitations to the minimum extent, confront the nonmember countries to discriminating polices. (Rahimi Boroujerdi,1995). Basically, countries are trading partners make integrated relationship in order to make a set of economic activity aglomorations (Gurler, 2000). As a sample benefits of trade integration in Indian Border Countries help partners to achieve proper economic advantages. Thus, the establishment of the Indian block can be a suitable region for international economic activities. And secondly if on primarily case the condition of arrival at international market can be considered, the process of growth and development at national levels lead to forward. In this integration the Iraninan economy with several economic exports potential can be an effective member.

The purpose of this paper is to estimate trade potential of Indain Ocean Economic integration by emphasis on the membership of Iran. Accordingly we apply a generalized gravity model using panel data to estimate the relationship between trade flows and economic cooperation within several trade partners in the region over the 1999-2004 period.

2- Literature of the subject

Influenced by propagation of global economy and the procedure of globalization, our world is experiencing multiple fundamental changes, and meanwhile, international economic affairs and economic structure are hardly influenced by the widespread global commerce system and have experienced a lot of changes and are still changing.

Worldwide and region wide economic interdependence and economic contraction of national economies is one of the most important outcomes of

modern economy, which has lead different nations to nonstop activity and has made them to show passive and sometimes defensive reflexes.

2-1- Economic Integration

Economic Integration tells us about creation of a bigger economic unit which consists of some smaller national economic units. Beneficiary societies and groups in the economic section and foreign commerce work in this bigger unit and when they see positive results, they develop their activities and decision makings. To achieve such a goal, commercial obstacles between members will be removed and cooperation between members will be expanded in the fields of commercial, monetary, financial, and economic activities.

Economic integration is to research on prejudice commerce policies which is based on reduction and omission of commercial limitations in a country. In other words, member countries of economic integration combine free trade with supportive policies, and besides trying to reduce commercial and trade restrictions between each other, they face nonmember countries with prejudicial and supportive policies. In addition, being interested in commercial affairs and economic integration can be one way for fighting against globalization, and can save a lot of developing countries and their economies from the danger of global competition. Also in this way, competition advantage will be supported in different markets, and it brings us the increase of investment within the economic integration, and also with the increase of the volume of commercial and trade exchanges, economic welfare will be increased and this brings us a good start for economic growth.

Economic globalization and economic integration have the same tools used and besides taking advantage of the advantages of economic integration, paying attention to these two matters can support the situation of taking advantage of economic globalization, and can save national and regional economies from its hassles.

Free trade, usage of international investment, specialization in production, omission of commercial and trade restrictions and having access to broad and extended consumer markets are the common specifications of being in an economic integration and economic globalization which can help

to make a competitive condition here and can support the competition advantage of national economies. Therefore, presence in an economic integration can with lower means introduce national economies to the global economy, and can make them an conditions from competing in a global competition. In other words, economic and regional integration is a path to the global economy, because economic combining in economic and regional integration which operates on the basis of economic strategies and different similarities, is moving towards the global economy. Increase in competition, reach to bigger consumer markets, usage availability of financial sources and foreign investment, and reaching manufacturing technologies and situations for cooperation are some specifications of economic integration which leads to the global economy and helps to open national economic borders.

2-2-Economic cooperation among Indian Ocean Border Countries

The region related to the Indian Ocean consists of 45 developing countries. The region has observed recently crucial development through out expanding trade relations. It benefits from a large actual and potential market affiliating appropriate experiences and common abilities inspired a large regional organization vision with geographical extent and predictable increasing growth for economic cooperation capacity (Behrooz, 1997). Presence of different countries having different possibilities from an economic development point of view, different facilities and combination of new industrialized and developing countires which are the members of the region are positive characteristics of integration scheme.

Economic indicators of these countries show main changes in recent years. Besides indicators of the size of the economy (GDP) and market size (population) of integrated countries reveal considerable quantities, indicating potentials for bilatral trade in the form of a large market creation. Table 1 summerrizes important indicators being related to GDP, population, imports and exports.

Table -1: Economic indicators of Indian Ocean Countries in year 2004.

Value	Indicator
2612.6 billions dollor	GDP
847.7 million persons	Population
796.9 billions dollor	Imports
710.7 billions dollor	Exportes

Source: World development indicators (2004)

According to table (1), production ability of members is appropriate and implies that countries have potentials to construct an integration block. Also population indicator of these countries show an extensive international consumption market which is expected for member countries, export and import value of these countries can be increased through promoting trade integration.

In addition the table shoes that Singapore, India and UAE have respectively the highest annual growth of GDP in year 2004 while Australia, Oman and Yemen are in the lowest rate of GDP growth. In contrast, the highest annual growth rate of population belongs to UAE and Yemen and Kenya whereas the lowest growth rate is related to South Africa, Srilonka and Thailand.

Iran with a high valued GDP at about 163 billions and 67 millions population can play an important role for the integration implementation.

3- Gravity Model

The gravity model is one of the most appropriate models which has a vital importance in explanation of bilateral trade flows and shows a good expression of trade potentials. Controllability of data and an appropriate number of variables are some advantages the gravity model. This model shows a trade flow from country i to country j using the economic sizes (GDP) of both countries and their geographical distance. In this section , see the general frame of the gravity model:

$$X_{ij} = F(GPP_i, GDP_j, D_{ij}) \tag{1}$$

In this frame that bilateral trade flows are a straight function of economic size of both countries and a reverse function of the geographical distance between them.

Whereof in this model we suppose that constant variable is the same for all commercial partners and when we want to make an estimation they will reach a diagonal line. In other words, individual units which may consist of manufacturers, consumers, or member countries of economic and regional integrations, are heterogeneous and may have a lot of differences on issues such as historical, cultural, racial, political or other specifications, and they

may affect business and in our frame, they may have correlation with the main variables. One of the ways to overcome heterogeneousity, and control it by being concerned about its results, is to use the Panel Data method. In this method, we spot a specific constant variable for each of the partners. The diagonallity which is caused by individual effects will be recovered. In addition, for recovering the simplicity parameters, population variables, indicators size of country and consumer markets, economic structure are also added to the model so that we can have the Generalized Gravity Model.

3-1- Generalized Gravity Model

The model used in this paper is generalized gravity model in order to analyze bilatral trade flows and estimate the trade potential of the regional members by using Panel Data. Accordingly we test the results to consider fixed and individual effects of trading partners for elimination of heterogenity, which can be found between countries.

This model was firstly used by Tinbergur and poyhonen (1960), while other researchers such as Mayes (1978) and Zarzose & Lehmann (2000) have used various specifications of the gravity model. The model is specified as:

$$L_n X_{ijt} = \alpha_{ij} + \alpha_1 L_n Y_{it} + \alpha_2 L_n Y_{jt} + \alpha_3 L_n pop_{it} + \alpha_4 L_n pop_{jt} + DINT_{ijt} + U_{ijt} \qquad (2)$$

Where L_n denotes logarithm in natural base and X_{ijt} shows bilatral trade flows between country I and country i in time t, α_{ij} indicates the individual effects that are specified for each pair country of trading partners in a way that $\alpha_{ij} \neq \alpha_{ji}$.

Y_i and Y_j are GDP_s for exporter i and imprter j implying the size of each economy. So that it is expected by its increase, thecountry ability for production will be increased. Therefore the positive effect on trade flow will be bilatral. Popi and pop_i and pop_j indicate the population of exporter(i) and importer (j) countries. Which indicate the marketsize. As this variable is impressive on market size and economies of scale, an indifinit efect will be on bilatral trade flow. DINT is a dummy variable which stands for the impression of economic integration among countries in the region. This variable explains the effect of trade creation. The reason is that by

implementing integration, trade flows among the members may expand substantially. U_{ij} is an error term, which includes all other unexplained factors and its logarithm has normal distribution; $E(L_nU_{ij})=0$.

According to Linder's trade theory, countries with similar economic conditons have more chance to increase trade between each other (Arnon & et al, 1996). Accordingly dumies of DEXX and DEXM enter the model to show the degree of integration, which can be appeared between members.

Then, we apply the estimated gravity model to obtain fixed effects of the members and investigate the effect of variables that are constant during time. Variables such as distance, economic structure are consdered to be fixed during time. These variables are exculsive for each country and can be concerned with individual effects of sampling countries. Generally, we use the results obtained by the panel model defined in (1) to regress some more explanatory variables on the cross-sectional fixed effects of countries i and j (FX_{ij}). The equation is defined in (2) as:

$$FX_{ij}= \beta_0 + \beta_1 D_{jt} + \beta_2 STR_{ij} + \beta_3 DTRA_{ij} + \beta_3 DWAT_{ij} + \beta_3 DCUL_{ij} + \mu_{ij} \qquad (3)$$

In the above equation, FX_{ij} denotes individual effects. D_{ij} is the geographical distance between two countries (i,j), which proxies for transportation costs and it is expected that, the effect of this variable on trade flows will be negative. STR_{ij} is the economic structure based on difference of economies of exporter i and importer j. It is meaured as the absolute value of difference between economic structures of two countries proxied by the ration of primary products to GDP in i and j countries (STR_i and STR_j)[1]. It is expected the effect ot this variable on bilatral trading flows in positive. $DTRA_{ij}$, $DWAT_{ij}$ and $DCUL_{ij}$ denote dummy varables indicate the effect of joint geographical borders, transportation and cultural similarities on trade flows. It is expected the effect of mentioned dummy variables on bilatral trade flows is positive. μ_{ij} is the error term.

Considering the trade potentials of IOR-ARC integration by using the model in 1999-2004, we focus on 20 main trade partners that are chosen for the sampling trade partners. Bilatral trade flows among trade patners are

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1- $STR_{ij} = |STR_i - STR_j|$

chosen in a way that shows at least one millions dollars of trade amount. In addition the created Panel is balanced.

4- Empirical results

The estimated results of the model rely on various methods of the panel data. As table (2) reports, fieamer approve the selection of panel data results rather than plain ones. In addition, of two approaches in panel data, fixed effects and random effects, results obtained by fixed effects approach are selected as Houseman test confirms this.

Column 2 in the table shows the fixed effect results for estimated model just including traditional gravity variables (gross domestic product, population, and a dummy for trade integration). Column 3 indicates a re-estimation of the model, where the Linder's variable has been added, and column 4 consists of two other dummy variables, DEXX and DEXM.

Table 2: Results of Gravity Model estimation of Indian Ocean Integration

(4)	(3)	(2)	(1)
-	-	-	Constant
0.74* (1.94)	0.62* (2.03)	0.89* (2.51)	Y_i
0.62* (2.04)	0.51* (1.82)	0.25* (1.95)	Y_j
-0.58* (-1.84)	-1.15* (-1.94)	-1.31* (-2.08)	POP_i
-0.08 (-1.48)	-0.18 (-1.25)	-1.32 (-1.35)	POP_j
0.28* (1.90)	0.24* (1.71)	-0.30* (1.89)	DINT
-	-0.31* (-1.65)	-	LIN
0.18* (1.99)	-	-	DEXX
0.14* (2.09)	-	-	DEXM
0.95	0.94	0.96	R^{2-}
2080	2080	2080	Observation number
38.481(0)**	38.712(0)**	38.940(0)**	F test
38.852(0)**	22.781(0)**	23.542(0)**	Houseman test

-The calculated values of t- test are in parenthesis and * shows the significance at 5 percent level.
** shows the probability of the null-hypothesis acceptance.

According to the results, all coefficients are significant at the 5 percent significance level and have the expected sings excepts for population. The coefficient of GDP variables show that one percent increase will increase bilatral trade by 0.89 percent and 0.25 percent in the exporters and importers, respectively, implying the more income effect is exporters. The estimated coefficient of population in exporters in significant but has unexpected sign in all cases. This reveals a negative effect of population, which stands for the indirect market size in the Indian region.

The coefficient of integration dummy is estimated positively in the first, second and third cases. This coefficient shows that, trade potential of Indian region can increase by 35 percent. By using Linder variable, we are able to reduce the biasness of the results and obtain correct effect of trade integration in the region. Estimated coefficient of this variable shows by 0.31 percent effect of economic unsimilarities on bilateral trade flows. How ever, by substituting dummies DEXX and DEXM, we reach positive effects of these variables on the bilateral trade in the region, which means the membership countries of Indian region can export to nonmember countries by 20 percent and they can import from nonmember countries by 15 percent. Respectively With due attention to the combination of integration member of Indian ocean countries, existing the greater exports to nonmember counters than imports from nonmember countries seems logical.

The integration effect is again converted to a negative phase.

$$FX_{ij} = 15/92 \quad - \quad 0.42D_{ij} + 0.25\ STR_{ij} - 0.52DWAT$$
$$\quad\quad (35/48) \quad (-5/82) \quad (4/83) \quad\quad (-4/92) \quad\quad\quad\quad (4)$$
$$\overline{R^2} = 0.63$$

At this stage all coefficients are significant and except for dummy variable of common water border, all have the expected sign. Confident of distance variable shows 0.42 and stresses that countries with greater distance have less willingness to bilateral trade. Variables of economic structure and dummy variable of common water border show a significant effect on trade flows. Negative coefficient of common water border indicates marine transportation with less costs increase trade flows. In another words members of the region should try to decrease the transportation costs to

increase their trade potentials. Dummy variables of neighborhood and common culture been eliminated from second stage estimation because no significant coefficient were estimated for them. In addition the value of R^2 indicates a relatively goodness of fit of the model, in which the present variables explain 63 percent of changes in the cross-country effects.

5- Conclusion

Nowadays international relationships and economic interdependence observed in different countries of world, it can set the link of national economies on the basis of economic variables such as financial markets and capital, foreign investment, size of economy international trade, international production, … and provide integration. In this situation the role of economic integration is completely clear and important. Because increased trend to createconomic integration will follow different benefits and help the national economies to reach economic purposes.

Integration members of Indian Ocean countries and Iran country due attention to their national economies by being membership in Indain ocean economic integration. Resuls of this paper show that this economic integration can increase the trade potential of member countries 35 percent and present them the static and dynamic effects of trade.

In addition present results show economic integration membership of Indian ocean countries economic integration. Specially the size of population variables in this integration show the existence of essential potential to create an extensive common consumption market among member countries.

Also the results of gravity model show that by the influence of economic integration, exports of economic integration members of Indian ocean to nonmember countries could be increased 20 percent and their imports from nonmember countries could be increased 15 percent. If this amount of imports uses for goods and services; specially capitalment and intermediate, the member countries will reach suitable and desirable results.

From another side the results of gravity model estimation using panel data method signified that methods of fixed effects and random effects estimation than normal estimation of mentioned model, increase the possibility of reaching desirable results and release the study from unbiased

results. Because the related individual effects of trade partner countries could be completely effective at their bilateral trade.

According to this results, present paper suggests that Iran can enter to IOR-ARC and interests its benefits and advantages. This advantage includes trade potential and exports to other countries outside of IOR-ARC and imports from other countries outside of IOR-ARC.

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