Studying Iranian Economic Integration with OIC Members Using Gravity Model

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Abstract: OIC members have much potential in their economic development. Therefore their economic integration leads to more increment for partners and deal with global system as a unique organization. Consequently studying the convergence of OIC members and their encountered challenges has especial importance which can assist the policy makers to develop their commercial relationship and consequently employment enhancing and economic situation improvement in future planning. Therefore, in this research the commercial effects of selected OIC members during 2005-2011 were modeled using gravity method. Results showed that from the basic gravity equation, the economy size of other 7 OIC members is the main determinants in the Iranian bilateral trade relationship. Thereby, 1% increase in economy size other 7 OIC members, lead to 0.88% increase in the volume of trade inflows between considered OIC members.

Keywords: Economic integration; gravity model; OIC; Iran

1. Introduction

During 1990s, efforts had being made of regionalization around the world. The new wave of regionalization was generally as a result of European countries success in implementing the European Common Market and then European Union (EU) (Tayyebi and Moallemy, 2003). Advocates of free trade agreement predict that a country that signed trade agreement would benefit in term of trade volume which known as a trade creation. The idea of trade creation widely used in international trade as Viners (1950) in his seminal paper reveal that the expansion of intra bloc under custom union is welfare enhancing from bloc members countries as well as the world economy. In recent phenomena, the trend of country sign free trade agreement with other country or other regional groups are common. In fact, each country in the world at least has signed one free trade agreement either at multilateral level (WTO), regional level (such as AFTA, NAFTA, and EU) or bilateral level (such as US-Singapore) (Normaz and Rusmawati, 2009).

Basically, the regional economic integration was formed because of regional or geographical factors, none of the existence of regional economic integration based on ideology, culture or religion. Recent development of propose to establish an Islamic common market among the Organization of the Islamic Conference (OIC[1]) countries has seen as a positive movement towards regional economic integration so called 'faith-based integration' (Raimi and Mobolaji, 2008).

The history of economic cooperation among Islamic countries is back to September 1969, when Islamic leaders gathered in Rabat to participate in first meeting of the OIC. During the meeting, foreign Ministers of Islamic countries agreed the foundation of General Secretary of OIC. At the present time, most Muslim countries (in Middle East, East Asia and North Africa) are also members actively in several cooperation blocks such as ACC[2], ECO[3], GCC[4], and CAEU[5] etc. However, countries are found, Lebanon for example, not to be a member of any cooperation organization, while Mauritania is participating in seven economic integration plans. In addition, some of them have strong economic relationships with non-Islamic countries rather Islamic ones. All these reveal the fact that there is no a unique and harmonized arrangement among these countries to follow up their own current and future integration strategies. To achieve advantages of integration programs in the favor of today globalization, collaboration of all Islamic countries in an economic theme should be thus a necessity (Tayyebi and Moallemy, 2003).

Currently OIC has 57 memberships. The objective of the organization at the beginning serves as a collective of Muslim voice and ensuring to safeguard and protect of interest of the Muslim world. The OIC members are also heterogeneous group with uneven in term of development and growth pattern. Based on Income Classification from

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[1] . Organization of Islamic Countries

[2] . Arab Cooperation Council
[3] . Economic Cooperation Organization
[4] . Gulf Cooperation Council
[5] . Council of Arab Economic Unity

the World Bank, out of 57 OIC members, 12.5% are high income economies, 19.6% upper middle income economies, 40% are lower-middle-income economies and 32% are low-income economies. Most of the high income countries members are oil exporting countries with substantial growth potentials while others are among the least developed and highly indebted poor countries. Even though they are different in income, language, geographical location, races, cultural, however, as a Muslim they follow the same faith (Normaz and Rusmawati, 2009). The below figure illustrates the GDP of OIC members in comparison of Developing Countries on the World:
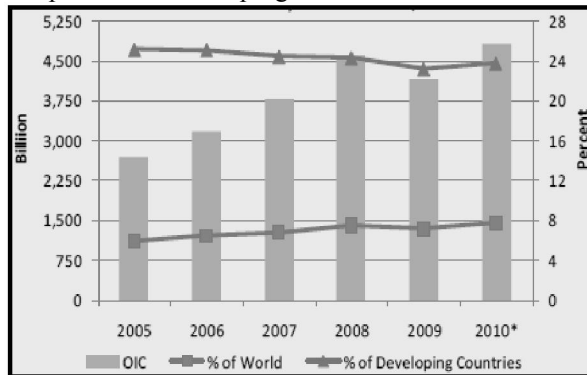
Fig1. GDP of OIC in comparison with Developing Countries and the World
Source: OIC annual economic report, 2010

In the view of this development, this study provides empirical evidence between explaining Iranian bilateral trade with 8 OIC members for the period of 2005 to 2011. This study employs the gravity type approach and fully utilizes panel data. The model is further augmented to include additional explanatory variables as a proxy for similarity in terms of country size and relative endowment to test the Linder hypothesis.

On the theory, economic integration is basically defined as a larger economic unit than a set of smaller national economies included. Hence, trade restrictions are properly given up and, on the other hand, collaboration in trade, monetary and fiscal activities are promoted among members of an integration block. The theory of economic integration expresses that common wealth countries make efforts to combine trade liberalization strategies with protective policies, to minimize trade restrictions amongst themselves accompanied by conducting discriminative policies for non-members. After integration, trade transactions followed by a decrease in costs and resources reallocation will result in an increase in products, trade and then economic welfare for members (Tayyebi and Moallemy, 2003). The economic integration relies upon economic

transaction promotion and unification of resources of two or several isolated systems that leads to a rise in the capability of the larger integration system. The weakest is a Preferential Trade Agreement (PTA), which allows for reduction in tariffs, but not their total elimination, followed by a Free Trade Agreement (FTA), Custom Union (CU) and the most advanced type of economic integration is Economic and Monetary Union, which not only sets up a CM, but also gives the responsibility for fiscal policy to a supra-national authority and adopts a common currency amongst of the member countries. These types of Economic Integration are also referred to as regionalism (Balassa, 1961).

According to the importance of economic integration several studies have been carried out such as: Caporale et al. (2001), analyzed trade specialization dynamics in two Eastern European countries (Romania and Bulgaria – EEC-2) vis-à-vis the core EU member states (EU-15) over the period 1990-2006 using the Gravity model. Specifically, they focused on whether there is a shift towards intra-industry trade leading to economic convergence and technological catch-up. They used recently developed static (FEM, REM and FEVD) and dynamic (GMM) panel data methods which take into account possible heterogeneity. Their empirical results indicated that intra-industry trade has indeed increased, but it is of the vertical rather than the horizontal type, resulting in complementary rather than competitive production patterns. Tayyebi and Moallemy (2003) afforded to explore the role of economic co-operations among about twenty selected Islamic countries. They conducted the hypothesis in which the more trade integration among the countries; the more trade flows will be realized. A Trade Gravity Model (TGM) is thus specified and can then estimate by econometric methods, illustrating how trade integration can create aforementioned impacts. As well known, the model is also reliable to consist of several qualitative variables that explain roles of a variety of scenarios such as the conduction of a possible regional economic integration, etc. overall, the estimation results lend support to a growing literature both theoretical and empirical that regional economic tightness has substantially led rises to trade flows of potential integrated Islamic nations. Most economic integration are based on geographical and economic purposes, however, Raimi, and Mobolaji (2008) proposed Muslim countries to have the economic integration based on faith namely 'faith-based integration'. Even though based on different level of income and development, they suggest that the integration may increase in term of promoting technological development, raise the level of human capital, improve product diversification and develop

stable institutions and infrastructure. Warin et al. (2009), investigated the feasibility of creating a common-currency union consisting of 16 countries in Southern Africa. They estimated an augmented-gravity model that includes public deficit, public debt, public expenditure, inflation, and the foreign reserves position. They also integrated Africa-specific variables such as existing economic blocs in the region, colonial heritage, and the convergence of living standards. Their analysis showed that the prospect for further integration in Southern Africa is promising, but many challenges still persist. The existing economic blocs can provide a first stepping stone to a larger currency union, but countries continuously have to cultivate good governance and fiscal discipline. Normaz and Rusmawati (2009) examined the bilateral export between Malaysia and 52 OIC members for the period of 1990 to 2006.Using a traditional gravity-equation framework, this study investigates to what extent export creation between Malaysia and the OIC members after being long term membership since 1969. The major finding is that the market size of members is important determinant for Malaysian trade. Furthermore, there is evidence Malaysia trade with high income economies more than other members. Empirical result also support that trade increases between Malaysia and OIC member if they are not similar in term of size and factor endowments.

Reviewing the previous researches indicated that there is a lack of literature in field of investigating the economic integration among OIC members, specially using the new GM approach based on panel data

models. Accordingly, this lack motivated the authors to carry out current study.

2. Material and Methods

The modeling of macroeconomic variables faces problems of endogeneity. As Frankel and Rose (2002) explain, by using the gravity model explanatory variables are truly exogenous. The gravity model is widely used as a benchmark to estimate trade flows between countries. Initially inspired by Newton's gravity law, gravity models have become essential tools in the analysis of international trade flows. The first applications were rather intuitive, without theoretical foundations. These included the contributions of Tinbergen (1962) and Pöyhönen (1963). Linnemann (1966) proposed a gravity model based on a Walrasian, general equilibrium approach. He explained exports of country i to country j in terms of the interaction of three factors: potential supply of exports of country i, potential demand of imports from the country j, and trade barriers. Potential export supply is a positive function of the exporting country's income level and can also be interpreted as a proxy for product variety. Potential import demand is a positive function of the importing country's income level. Barriers to trade are a negative function of trade costs, transport costs, and tariffs. Bergstrand (1989) also included per capita income, which is an indicator of demand sophistication (demand for luxury versus necessity goods), and incorporated factor endowment variables in the spirit of Heckscher-Ohlin and taste variables in the spirit of Linder:

$$LT_{ijt} = c_0 + c_1 LY_{it} + c_2 LY_{jt} + c_3 LP_{it} + c_4 LP_{jt} + c_5 LLIN_{ijt} + c_6 LD_{ij}$$
$$+ c_7 LEX_{it} + c_8 DU_{ij} + \varepsilon_{ijt} \tag{1}$$

Where:

LT_{ij} represents flows from country i to country j,

c_0 is the intercept,

Y_i and Y_j are the GDP of country i and j respectively,

LP_i and LP_j stand for population of country i and j respectively,

LIN_{ij} indicates the Linder variable,

D_{ij} represents the geographical distance between the economic centers of two partners,

EX_i states the volume of total export of country i,

DU_{ij} represents the trade integration dummy variable between country i and j

ε_{ij} is the error term.

Also, the Linder variable in practical is calculated as below:

$$Lin = ln \left((Yp_i - Yp_j)^2 \right) \tag{2}$$

Where Yp_i (Yp_j) is GDP per capita of exporter (importer). The closer the GDP per capita in two countries, the greater the value of bilateral trade between them. Therefore, the coefficient of Lin variable is expected to be negative.

Also, it is evident that the crucial source of the bias is as a result of failure to applying the OLS methods to deal with the heterogeneity among bilateral trade relationships. Accordingly, one of the solutions to control heterogeneity is the use of Panel Data procedure. One way to take into account the individuality of each two countries or each cross sections unit is to let the intercept vary for each country but assume that the slope coefficients in the model are constant across countries. In the literature, this kind of model is known as the Fixed Effect Model (FEM). The fixed effects model can be expensive in terms of degrees of freedom if we have

several cross section units. And so instead of treating intercepts as fixed, we can assume that there are random variables. This method is called Error Component Model (ECM) or Random Effect Model (REM). The challenge facing a researcher is to select between panel and pooling methods and if the panel approach has been selected, we should choose FEC or REM. We will implement this through F_{leamer} test and choose between pooling and panel. There is a formal test that will help us to choose between FEM and REM, which is called Hausman test. In technical words, H statistic test for the null hypothesis that explanatory variables and individual effects can be uncorrelated. The FEM estimates are consistent with the both null and alternative hypotheses, where the REM estimates are only compatible with the null hypothesis. Therefore, REM model is preferred if the null hypothesis holds, otherwise FEM can be applicable (Baltagi, 1999, Hsiao, 1986, Cheng and Wall, 2005).

According to the importance of GDP and per capita income similarity in economic integration establishment, this study considers the 8 countries of OIC members included: Iran, Egypt, Indonesia, Turkey, Malaysia, Saudi Arabia, Pakistan and Kuwait which have the great parallelism with D8 group. The Iranian bilateral trade partners cover 8 countries for the period of 2005 to 2011 accessed from the International Monetary Fund's Direction of Trade Statistics. The GDP, per capita GDP and population are from the World Bank Indicators. Finally data on geographical distance have been collected from Haveman's website, available at: http://www.eiit.org/Trade Resources/Data/Gravity

3. Results and discussions

Having applied Panel Data, we estimate the model using gravity approach, as specified in equation 1, for bilateral trade flows of Iran and other 7 OIC members during 2005-2011. The estimation results are summarized in table 1:

According to the results, as the value of F_{leamer} test shows, the null hypothesis of the same individual effects cannot be acceptable, that is implying that OLS results will bias and, more specially, there exists heterogeneity for each pair of trading partners. It means that the problem of heterogeneity should be controlled thorough concentration on different individual effects and the Panel Data is applied to enable us consider heterogeneous individual effects. In addition, the Hausman statistic approves that that explanatory variables and individual effects are not uncorrelated and FEM results are more reliable in comparison with REM.

Table1. The Gravity estimation results for panel 2005 to 2011

Explanatory Variables	FEM estimates
c_0	-6.005 (-3.57)*
LY_{it}	0.16 (2.11)*
LY_{jt}	0.88 (17.6)*
LP_{it}	0.63 (3.1)*
LP_{jt}	0.05 (1.69)**
$LLIN_{ijt}$	-0.46 (-5.23)*
LD_{ij}	-0.73 (-10.38)*
LEX_{it}	0.83 (8.82)*
DU_{ij}	0.52 (8.65)*
R^2 F_{leamer} Hausman statistic	0.91 12.015* -19.944*

Notes: Value of t-ratio and probability of null hypothesis acceptance for F and
Hausman statistics are available in parentheses.
* and ** denote 1% and 5% level significance, respectively.

Source: Research findings.

Estimation results obtained by FEM indicate that:

GDP coefficients of both exporter and importer have the positive sings, and as expected, are statistically significant at 99% confidence level. Also these coefficients interpret that 1% increase in economy size of Iran and other 7 OIC members; will increase the volume of trade inflows between considered OIC members equal to 0.16% and 0.88%, respectively.

Coefficients of population of both exporter and importer have the positive sings, and at least, are statistically significant at 95% confidence level. Also these coefficients show that 1% increase in population of Iran and other 7 OIC members lead to increase their total trade volume equal to 0.63% and 0.05%, respectively. Based upon this result, the Iran's economy would be more outward-oriented as its population grows.

Coefficient of Linder variable is significant in 99% confidence interval plus its expected negative sign. Also, the coefficient of Linder variable states that 1% increase in the economic similarity between Iran and other 7 OIC members, lead to 0.46%

increase in total trade volume between the considered OIC members.

Coefficient of distance variable is significant in 99% confidence interval plus its expected negative sign. In addition, the negative sign of coefficient of distance variable states that countries with more distance, show little interest to bilateral trade.

Coefficient of Iran's total export is significant in 99% confidence interval plus its expected positive sign. Also, this coefficient show that 1% increase in Iran's total export lead to 0.83 increase in the volume of trade flow between Iran and other 7 OIC considered members.

The coefficient of dummy variable of trade integration is significant at 99% confidence interval plus its expected positive sign. Also, the coefficient of this variable states that existence of trade integration between Iran and the other 7 OIC members, lead to 0.68% ([exp(0.52)-1]=0.68) increase in total trade volume between the considered OIC members.

4. Conclusion

This study examines the bilateral trade pattern between Iran and other 7 OIC trade partners using the powerful method namely the Gravity Model. Due to the presence of various individual effects and heterogeneity in trading-partner pairs, the method of panel data was appropriately applied to the estimation process. From the basic gravity equation, the economy size of other 7 OIC members is the main determinants in the Iranian bilateral trade relationship. Thereby, 1% increase in economy size other 7 OIC members, lead to 0.88% increase in the volume of trade inflows between considered OIC members.

Free trade is always the best policy; however, having regional economic integration if it gives economic benefit should be the second best policy. Iran, after being long term membership should see the important of trade relationship among OIC members. The Iranian should be fully utilized and exploited by all OIC members. The different in term of level of development or factor endowment should be seen as an opportunity creating business opportunity among members.

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11/29/2012

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