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Currency Union and Bilateral Trade: Evidence from OIC Countries

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Abstract

In recent years, there has been an increasing interest in currency unions internationally. The formation of currency union in Organization of Islamic Cooperation (OIC) has drawn much attention of Islamic countries. This paper aims to investigate the effect of currency union formation for trade among 49 Islamic countries over the period 1990-2012 by OCA and Augmented Gravity Model (AGM). The results show that common language, borders, and trade unions had positive and significant effect on trade in OIC countries; and being landlocked and distance between source and host countries had negative and significant effect on bilateral trade. Also, the currency union had positive and significant effects on trade in OIC countries. The evidence thus suggests that regional currency union arrangements stimulate bilateral trade in OIC rigorously.

***Keywords**: Currency union, Augmented Gravity Model, OIC, OCA Theory*

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1. Introduction

The evolution of regionalism during past three decades has enticed countries to exploit the world economic sources. In the international system national governments have also moved toward the formation of economic and trade blocks and unions. In general, governments have been preparing for globalization. Cultural, political, economic and other unifying factors provide the opportunity for governments to use their advantages and resources to boost their economic development. Countries do not have all production factors per se and have completed production chain among the member states through forming economic complexes in recent few decades. These organizations and governments generally aimed at increasing regional trade and improving economic power via elimination of tariff and customs and semi-customs impediments.

Islamic identity can provide common goals for Islamic countries to reach an economic unity. The membership component has been crucial to the birth of many of nowadays' unions. Thus, Islamic identity plays a crucial role in hammering out a union of Islamic countries. In addition to identity, economic and financial preparations could be an important factor in creation of this union. Formation of the currency union and Islamic common currency, long in the focus of some of leaders of Islamic countries, could provide the platform from which these countries target economic integrity and convergence. The idea of Islamic common currency was proposed by Malaysia during the 10th conference of OIC countries held on October 16th and 17th 2003 in Putrajaya, Malaysia. This country proposed *Dinar* for Islamic common currency. The profits emanating from adoption of a common currency was directly related to international trade. Common currency facilitates bilateral trade among union members through elimination of transaction costs and exchange rate volatility. Thus, currency union ruled out the currency conversion costs of trade and decreased exchange rate volatility (future uncertainty). For this reason, firms would

fully use their relative utility without having concerns about costs imposed by future changes in exchange rate. In fact, less uncertainty and low transaction costs boost bilateral trade and works towards their more economic convergence. Given the importance of this issue, the present study investigates effective factors on trade such as: language, common borders, GDP, distance between these countries, common currency, and OIC currency and trade unions through OCA in the framework of Augmented Gravity Model. Theoretical and practical literature of OCA and AGM is presented, and then, through a specification of proper econometric model and estimation of the model, results are examined in the theoretical framework of the study.

2. Literature Review

The benefit of adopting a common currency has direct international trade linkages. Sharing a currency union facilitates bilateral trade among the member states in the union by reducing transaction costs for cross-border business and eliminates the nominal exchange rate volatility among the union countries. Therefore, adopting a common currency will: i) avoid any transaction costs of exchanging foreign currency (i.e., for travellers); and ii) eliminate exchange rate volatility, which decreases uncertainty about the exchange rate in the future and causes firms to specialize their comparative advantage without worrying about losses due to future exchange rate fluctuations. Hence, low uncertainty of exchange rate volatility and low transaction costs lead to enhanced bilateral trade among the member states (Al-Shemari, 2007).

Rose (2000) makes the first notable attempt to estimate the impact of currency unions on trade flows. He looks at the effect of the currency union and exchange rate volatility on international trade. He examined the effect of currency union and exchange rate volatility on international trade through

AGM and Ordinary Least Squares (OLS). Compared to Standard Gravity Model (SGM), AGM includes more variables and a dummy variable for countries with common currency. The sample population included 186 countries for 5 intervals (1970, 1975, 1980, 1985 and 1990). Their findings indicated that two countries with common currency had more penchant for trade compared to countries with independent currency. Also, trade volume among countries with common currency was three times more than that among other countries, and the impact of common currency was significant in eliminating exchange rate volatility. A number of empirical studies were conducted following Rose (2000) in which criticisms regarding Rose's (2000) methodology were raised. Drawing upon combined data for a period of 1948-1997, Glick and Rose (2001) investigated the effect of common currency on trade among 217 countries. In the regression, they used fixed effects to examine the entrance and exit from the currency union. Their findings indicated that trade volume increased upon entry to the union, and decreased when they left the union. Nitsch (2002) investigated the effect of Franc Zone Currency Union and East Caribbean Currency Union (ECCU) on trade. He used cross-sectional approach and data for 23 African and 14 Caribbean countries with a total of 253 cases of trade per year. He covered years 1970-1995 through Gravity Model. His results indicated that Franc zone members' trade volume was 1.9 percent more than that for West African Economic and Currency Union (WAECU) and Central African Economic and Currency Union (CAECU). His findings indicated that trade was improved when a union was formed by a group of countries. His results were inverse but not significant for Eastern Caribbean, attributable to exclusion of some members from the data pool.

Chow and Kim (2003) investigated the possibility of formation of a currency union in Eastern Asia (South Korea, China, Malaysia, Singapore, Taiwan, Philippines). They showed that countries of East Asia were highly subjected to regional shocks, while European members of currency and economic union were not subjected to such shocks. They also indicated that

Asian countries had different economic structures, and most likely, were subject to asymmetrical shocks. According to OCA theory, the formation of currency union in Eastern Asia would be an expensive enterprise.

In a theoretical study, Mydin and Larbani (2004) investigated *Dinar* as a common currency for Islamic countries using nonlinear optimization approach. They reached results through mathematical model based on nonlinear optimization of Islamic *Dinar*. The study found *Dinar* a suitable currency for Islamic countries. Sato, Zhang and Allen (2008) investigated currency union formation in Eastern Asia using Johansen co-integration method for the period of 1978-2006. They found that some East Asian countries had the potential for forming a currency union. In other words, ASEAN member states could not potentially form a currency union without the participation of Japan. They also confirmed that China was not a good candidate for joining the currency. Shirono (2008) examined the formation of the currency union in Eastern Asia using gravity model for 17 countries in the period of 1970-1990. His research found that common currency increased the trade, and consequently, welfare in member states. Also, trade was significantly higher with Japan being a union member compared to that when Japan was not a member. According to his results, forming currency union increased convergence among these countries.

Zho and Kim (2009) investigated the optimal conditions of CFA currency zone for 1970-2004 using structural VAR method. Their findings showed that CFA countries' GDP was subjected to shocks from within the union, but shocks from outside union had little impact on their GDP. Also they found that CFA was not an optimum currency area, unless damages from shocks were being compensated by other profits from union formation. Mishara and Sharma (2010) studied the real exchange rate behaviour and optimum currency area using Generalized Purchasing Power Parity in Eastern Asia. In fact, the study investigated the symmetry of economic

fluctuations and exchange rate volatility for these countries through PPP. The study found that currency union was optimum for these countries. Also, Japanese Yen and US dollar exerted impact on this union. Lee (2011) investigated Islamic Dinar using VAR in OIC for the period 1970-2007. The study used VAR for examination of macroeconomic disorders in Islamic countries. The results indicated that, given the symmetry of macroeconomic disorders as a precondition for formation of optimum currency area, there is little prospects for formation of currency union for all Islamic countries; however, for different groups of these countries, trade cycles are symmetric, and thus, they could form currency union. Herman et al. (2011) investigated economic convergence in African countries using Generalized Gravity model. He found that current trade blocks in Africa had been moving to more economic convergence and could form a currency union through effective economic discipline and better governance. Lee, G. (2011) has investigated the effects of gold dinar in OIC countries. The preliminary findings of this study suggest the lack of broad linkages within the entire OIC, although there is scope among some smaller clusters for potential monetary integration based on the symmetry of their business cycles.

Regarding OIC currency union, Zarrra Nezhad, Farazmand and Fegheh Majidi (2012) examined the effect of a common currency on trade in OIC countries using panel data and gravity model. The results show that currency union has statistically positive and significant impacts on trade in OIC countries. Also, Rajabi, E. (2008) investigated the costs and benefits of currency union in Islamic common market. The results show that Islamic common currency can benefit Islamic Economies.

3. Theoretical Framework

The use of a gravity model and OCA[1] theory is wide ranging and includes applications within various fields concerned with the impact of institutional

1. Optimum Currency Area

trade: mechanisms of exchange rate policy, customs unions, currency unions, and international borders. Beside the expected impact of a common currency, international trade might be affected by other factors.

3.1. Traditional OCA theory

In traditional OCA theory, the following criteria have been deemed necessary for countries to join currency union: a) price and wage flexibility (Friedman, 1953). In case of shocks, unemployment or nominal exchange rate is adjusted; b) high dynamism of inter-zonal factors (Mundell, 1961) leads to absorption of shocks by countries without need for conversion of nominal exchange rates; c) high degree of openness of economy (McKinnon, 1963). More open economies alleviate the impacts of nominal exchange rate adjustments on competition. More open economy implies increasing costs of reallocation of resources to tradable and non-tradable sectors after adjustment of nominal exchange rate; d) high production diversification (Kenen, 1969), helps to overcome industrial specific shocks; consequently, the need for adjustment of nominal exchange rate is decreased; e) high financial convergence (Kenen, 1969), prevents the effects of asymmetrical shocks in financial transactions between countries, thus eliminating the need for adjustment of nominal exchange rates; f) convergence of inflation rate (Fleming, 1971). Difference in inflation rate exerts changes in transaction function and these changes create imbalance in current account; g) political factors (Mintz, 1970) imply political will for member integrity.

3.2. Modern OCA theory

Modern theory includes costs and benefits of the members of optimum currency area (OCA).

3.2.1. Advantages

I- Macroeconomic stability through solving anachronism issue (Giavazzi

and Pagano, 1988). When a country with low inflation rate joins the currency union, currency authority will be committed to anti-inflationary policies, and thus, convergence towards low inflation rate becomes the norm, and anachronism is ruled out. In limits of short-term perpendicular Philips curve, this leads to low inflation rate without increasing unemployment rate.

II- Boosting trade (Rose, 2001). Joining currency union boosts trade (through elimination of exchange rate volatility, transparency in prices, and higher financial integrity). This synchronizes trade cycles of the member states.

III-Saving foreign currency reserves (Mundell, 1973; Frankel, 1999). Joining currency union rules out member states' need to international reserves for trade between themselves; in addition, integration of reserves distributes risks.

IV- Political advantages (Gandolfo, 2002). Currency union enjoys higher leverage in international bargains compared to individual members of the union.

3.2.2. Disadvantages

I- Loss of independence in currency policy (De Grauwe, 1992). Joining the union decreases the degree of freedom to deal with external shocks. Some points should be noted here:

a- Symmetry of shocks: if countries face asymmetrical shock, and if shocks hit the leading country of the union, it would damage the union itself. Also, these shocks would intensify internal trade cycles. So, the degree of symmetry of shocks is highly important (Alsina et al., 2002)

b- Simultaneity in trade cycles. If a member state faces shocks, but the intersection point of trade cycles in members differs, then countries will need different policy options. This issue increases costs of identical currency policies, and thus, the degree of simultaneity of trade cycles among members will also be an important criterion.

c- The nature of shocks: costs of loss of a currency policy are different according to the nature of shocks (Gandolfo, 2002). Modern approach indicates that fixed exchange rate proves successful in dealing with currency shocks of demand and total supply shocks; however, fluid (floating) exchange rate has proved successful in dealing with total supply shocks.

II- High specification in production (Artis, 1991): fluid exchange rates distribute production sources among countries through hedging. In fixed exchange rate regimes, countries are encouraged to exploit their relative advantage (more specified and focused production). This increases the adjustment costs in dealing with asymmetrical shocks. Frankel and Rose (1997) claim that this impact is compensated for by boosting trade. Also, joining a currency union leads to synchronization of trade shocks. In fact, formation of OCA is an endogenous process.

III-Undesirable impacts of financial policies

a- Velasco (2001) indicated that fixed exchange rate regimes enjoy more discipline compared to fluid exchange rates. They maintain that in the case of considerable foreign currency reserves, in fixed exchange rate regimes, increasing public payments shrinks the reserves.

b- Feldstein (2005) indicated that there was the issue of signaling. Unit currency policy creates free riding through distracting financial policies (countries with lavish spending habits disturb the market through higher interest rates).

IV- Loss of independence in financial policy (De Grauwe, 1996). In the absence of financial discipline, union would be dissolved. This improves commitment to certain criteria.

In general, in optimum currency area (OCA) theory, six factors are necessary in formation of the currency:

0 Labor force mobility in currency area: physical mobility (absence of

working regulations, working permits, etc.) and cultural mobility (e.g. different language)

- 0 Economic openness along with capital mobility and price and wages flexibility
- 0 Risk Sharing System such as financial transactions mechanisms for money redistribution to economic sectors and regions through changes in first two factors. However, this factor faces difficulties in implementation, since wealthy regions do not share incomes with poorer regions.
- 0 Similar trade cycles
- 0 Production diversity
- 0 Similar preferences

Generally, OCA theory is an approach about currency integration which provides details of recent process of currency integration in Europe and elsewhere in the world. This approach helps identify and estimate costs and interests emanating from unit currency. Due to low operational precision and since sometimes OCA criteria are not interrelated, it is difficult to make a quantitative evaluation of it.

4. Model and Data

4.1. data

In order to estimate the aggregate trade model, the country level data is required. The present study used data from World Bank (Bhargava and Docquier) and Direction of Trade Statistics of IMF. Countries under study include 49 member states of IOC and time period is 1990-2011. Countries were selected according to limitations on access to their economic data. GDP data was provided from World Development Indicators of the World Bank according to US fixed prices in 2000. Distance from the World Bank location was provided according to Great Circle Distance Algorithm. Data on trade agreements was provided by the World Bank website. Language

and distance data was also provided by the World Bank. Exchange rate volatility between exporter and importer countries calculated in year *t*. First, we obtained monthly data of nominal exchange rate from International Financial Statistics of IMF, and then, its amount was calculated according to the following equation:

$$_{ijt} \quad Std.Dev \ln(EX_{ijt,m}) 0 \ln(EX_{ijt,m01}) \qquad \text{m=1, 2, …12}$$

Where *EX* is bilateral exchange rate between countries *i*, *j*، and m denoted month. This method has been used extensively by a large number of researchers such as Brodsky (1984), Kenen and Rodrik (1986), Frankel and Wei (1993), Dell' Ariccia (1999), Tenreyro (2004), Clark, Tamirisa and Wei (2004), and Al-Shemari (2006). This index denoted short-term bilateral nominal exchange rate volatility. Currency union is the only official currency union in the world, and does not include unofficial unions such as dollarization, or using other countries' currency without explicit integration. This fact brings about the real impact of currency union on trade. Data on currency unions has been provided by IMF. However, for GCC, methods were used by Rose (2000), Micco, Stein and Ordonez (2003), De Nardis and Vicarell (2003), and Flam and Nordstrom (2003).

4.2. Gravity model

Gravity model was used for the first time by Tinbergen in 1962 to explain bilateral trade flows. This model is a modified version of Newtonian Gravity Law. According to Newton Gravity Law, gravity between two masses is a function of their masses and distance between them. The gravity model used in economics examines the role of economic conditions of two regions and their geographical distance. According to this model, the bigger the size of the economies of two regions, or the less their geographical distance, the more the trade flows, human labor (migration), and information transactions

between two regions will be. Over time, other factors such as per capita GDP, regional agreements, and cultural and religious factors are added to gravity model. These models are effective tools and are used extensively in international trade to explain bilateral trade flows. In the framework of this model, motivations and distractors can be included qualitatively or quantitatively into the model and examine its impact on bilateral trade (Harith, 1998). Suppose that in simplest form, there is no motivation or distractor; hence, bilateral trade flows will be considered as a direct function of both countries' size of economy and inverse function of their geographical distance in a gravity model:

$$X_{i,j} \quad a\frac{M_1{}^{1} \quad M_2{}^{2}}{D_{i,j}{}^{3}} \tag{1}$$

Where $X_{i,j}$ is bilateral trade volume, a the proportion coefficient, M_1 the first region GDP, M_2 the second region GDP, and $D_{i,j}$ denotes geographical distance between two regions. In the model, *GDP* denotes the size of the economy of regions. In fact, with an increase in GDP of a country, its capacity to absorb and produce goods increases, i.e., supply and demand in trade between two countries increase. GPD is expected to have a positive effect on bilateral trade, and D_{ij} exerts its effect on trade flows. The more distanced two countries, the less their trade volume would be, since transportation costs and time increase. Given the negative effect of distance on trade flow, and the positive effect of economy size in GDP, trade flow model in equation above is considered to be more or less similar to Newton's Gravity Law, where gravity is a direct function of two masses and inverse function of their distance. In recent years, developments in trade gravity model have improved the international trade literature, including factors such as population, and some dummy variables in the model. In much of the research, an Augmented Gravity Model has replaced standard gravity model to include more control variables. This model is designed

based on Constant Elasticity of Substitution for utility function with complete specialization, homogenous preferences, and difference in goods according to their source of production. Anderson and Wincoop (2003) assumed the following function through utility equation:

$$U_j \quad (\quad _i \; ^{i(10\ )/} \; c_{ij})^{(\ 01)/} \tag{2}$$

Where country *j* consumers consume products of country *i or* imported goods from country *i are consumed* in country *j*, β is distribution parameter ($\beta > 1$) and σ is the substitution elasticity between products. Consumers of country *j maximize* its utility with respect to budget:

$$Y_j \qquad _i P_{ij} C_{ij} \tag{3}$$

Where Y_j denotes total expenditure of country *j* for its imported product and P_{ij} is the price of product imported from country *i*. Given the trade costs formulation (transport costs and other trade barriers), T_{ij} unit of goods is transported from country *i* to country *j*, and (T_{ij}—*1)* amount of goods is wasted en route. The price for goods obtained by the producer in country *i* is given by the following equation:

$$p_i \quad p_{ij} \big/ T_{ij} \tag{4}$$

Thus, nominal amount of exports of country *i* to country *j* is given by:

$$X_{ij} \quad P_{ij} C_{ij} \tag{5}$$

With maximizing Eq. (2), the following equations are obtained:

$$C_{ij} \qquad _i P_{ij} \big/ P_j \qquad ^{(10\ )} \frac{Y_i}{P_{ij}} \tag{6}$$

$$P_j \quad (\quad {}_i(\ {}_iP_{ij})^{10} \ )^{1/10} \tag{7}$$

$$X_{ij} \quad Y_i \ \frac{{}_iP_iT_{ij}}{P_j}^{1/10} \tag{8}$$

Where P_j is price index of country *j* consumer, which could be defined as resistance layer of multilayer trade.

Also, $X_{ij}$is the nominal demand of country *i* for country *j*. Assuming a trade balance in each country, the conditions for market clearance is as follows:

$$\begin{aligned} Y_i &\cong \quad {}_iX_{ij} \\ &\cong \quad {}_j\left[\ {}_{ij}P_{ij} / P_j \right]^{(10 \ )} Y_j \\ &\cong (\ {}_iP_i)^{10} \quad {}_j\left[\frac{T_{ij}}{P_i} \right]^{10} Y_j \end{aligned} \tag{9}$$

Indexed prices for above term in the market clearance conditions are as the following:

$$(\ {}_iP_i)^{10} \quad Y_i / \ {}_jY_j \ \frac{T_{ij}}{P_i}^{10} \tag{10}$$

Generalizing that to whole world Y_w or $(Y_w \quad {}_jY_j)$, the income share of country *j* is ($_j$ Y_j / Y_w). Replacing the response of indexed prices in the terms of nominal demand, bilateral trade equation will take the following form:

$$X_{ij} \cong \frac{Y_i Y_j}{Y_w} \left[\frac{T_{ij}}{P_i P_j} \right]^{(10)} \quad (11)$$

Where:

$$P_i \left[\frac{T_{ij}}{P_j} \right]_{j}^{10} \quad (12)$$

Gravity equation indicates that bilateral trade between two countries has negative relationship with average bilateral trade barriers and has positive relationship with country size. With entering multilateral resistance variables (price index for both countries) in gravity equation, bilateral trade between two countries is affected by price indices of these countries. The reason for multilateral resistance is that if a country faces more trade resistance by other countries, then it is likely that they have trade with its partner (Anderson and Wincoop, 2003).

Similar studies by Anderson and Wincoop (2003), Tanereiro (2004), and Péridy (2005) have been carried out. They assumed that transaction cost (T_{ij}) has five components: i. Transport cost (d_{ij}); ii. Trade barrier effect (t_{ij}); iii. Other trade barrier effects (u_{ij}); IV. Exchange rate volatility (r_{ij}); V. Specific bilateral impacts (s_{ij}).

$$T_{ij} \quad d_{ij}^{v} t_{ij}^{o} e^{u} e^{r_{ij}} e^{s_{ij}} \quad (13)$$

Distance between two countries acts as a proxy for transport costs. Trade barrier effect (t_{ij}) emanates from tariff and non-tariff barriers. (u_{ij}) is the variable of currency union, whose value is one if there is unit currency for countries *i* and *j*, and zero, if there is not. Nominal exchange rate fluidity

between countries *i* and *j* is denoted by (r_{ij}). (s_{ij}) includes time-invariant effects. This effect consists of variables such as common language and shared land borders, and if *i=j*, takes the value of one, and zero otherwise. Substituting term for trade cost in bilateral trade equation, the final form of gravity equation becomes as the following:

(14)

$$X_{ij} \quad \frac{Y_i Y_j}{Y_w} \quad \frac{T_{ij}}{P_i P_j}^{(10)}$$

$$\text{where} \quad T_{ij} \quad d_{ij}^{v} t_{ij}^{o} e^{u} e^{r_{ij}} e^{s_{ij}}$$

4.3. Model specification

The proper model for investigation of factors effective on international trade is gravity model, extensively used in international relations including trade and migration. According to this model, two categories of gravity and repulsion account for the trade flow from source countries to host countries. In the present study, to investigate the trade flow among Islamic countries, two-dimensional one-sided gravity model (i.e., one-sided in a sense that trade flow has been just from *i* to *j*) and combined data were used.

Equation (14) is the main gravity equation. For the purpose of estimation, it can be modified, for example, if the equation is divided to ($Y_i Y_j$), then we will have:

$$\ln\left(\frac{x_{ij}}{y_i y_j}\right) = -lny^{w} + (1-\sigma)\ln t_{ij} - (1-\sigma)lnp_i - (1-\sigma)lnp_j \qquad (15)$$

Where t_{ij}, p_i and p_j are unobservable. Specific variables are used to control p_i and p_j for OLS-adjusted estimations. This method is a standard method in the literature of econometrics with Rose and Wincoop (2001), Eaton and Kortum (2002), and Shirino (2008) being among its advocates. Trade barrier t_{ij} is measured by a series of observable variables. In fact,

gravity models per se do not expound specific rules about trade barriers. If we suppose that trade barriers are a linear arrangement of expenditure variables, then:

$$t_{ij} = (d_{ij})^{\rho} m^{(1-\delta_{ij})} \prod_{k=1}^{K} \gamma_k^{z_{ij}^k} \tag{16}$$

Taking logarithm of above equation, the following equation is obtained:

$$lnt_{ij} = \rho ln d_{ij} + (1-\delta_{ij}) lnm + \sum_{k=1}^{K} z_{ij}^k ln\,\gamma_k + v_{ij} \tag{17}$$

Where d_{ij} is distance between countries, *m* national currency costs, and δ_{ij} is imaginary variable for currency union (one, if the country is a union member), z_{ij}^k is the control variable, showing other trade costs; v_{ij} denotes error term. Replacing equation (17) in main equation, the gravity equation is obtained as follows:

$$\ln\left(\frac{x_{ij}}{y_i y_j}\right) = \beta_0 + \beta_1 \ln d_{ij} + \beta_2 \delta_{ij} + \sum_{k=1}^{K} \lambda_k z_{ij}^k - (1-\sigma)\ln p_i - (1-\sigma) p_j + \epsilon_{ij} \tag{18}$$

Where $\beta_0 = (1-\sigma)\ln m - \ln y^w$, $\beta_1 = (1-\sigma)\rho$, $\beta_2 = (1-\sigma)\ln m$, and $\lambda_k = (1-\sigma)\ln\gamma_k$.

The $\beta_2$coefficient denotes the impact of unit currency on bilateral trade. In this equation, a factor can make β_2 estimation biased. p_i and p_j price indices depend on trade costs. Ignoring this term is common in ad hoc gravity models which pose the issue of variable elimination. A method for solving this issue is assuming an imaginary variable of country in

the regression function to control price indices. Equation (18) is used here to obtain parameters of the model and comparative statics exercises are used to determine the impact of unit currency on international trade among OIC countries.

Trade costs control variables z_{ij}^{k} included imaginary variables of common language ($language_{ij}$) (taking one if countries speak the same language), common borders ($Border_{ij}$) (taking one if countries are neighbours), belonging to a trade block (FTA_{ij}) (taking one if both countries are the colony of a hegemonic power), and exchange rate volatility (EX_{ij}). These are standard variables and previous body of research has applied them, including research by Rose and Wincoop (2001), Glick and Rose (2002), and Shirino (2008). In the present study, the absence of a colonialist power rules out the related variable from the regression.

$Island_{ij}$ is a binary variable that takes a value one if either one or both countries are an island and zero otherwise; $Landlock_{ij}$ represents a binary variable that takes a value one if either one or both countries are landlocked and zero otherwise.

4. 4. Results

Regressions of the study include two dimensions of time and place. The time dimension is 22 years (a period from 1990 to 2011) and place has been 2352 incidences according to trade flow. Therefore, the number of observations for each variable has been 51744. In the regressions, time dimension is much smaller than place dimension. Thus, examining the reliability of variables and the problem of consideration hold no importance, and regression equation (15) can be directly estimated for both categories of countries via pooled least squares method. However, test of stationary of the variables was carried out, indicating that variables were stationary. The results are given in the Table 1.

Table 1: Stationary test of the variables with fixed components.

Variable	LLC	IPS	ADF	PP
$Ln(Export_{ij}/(Y_iY_j))_t$	-44.94	-47.21	6532.3	6604.12
$\ln(d_{ij})$	-41.80	-77.21	4313.1	33908.7
$\ln(EX_{ij})_t$	-82.49	-88.25	517820	19869.4

Source: Research findings

Table 2: Stationary test of the variables with fixed components and trend

Variable	*LLC*	*IPS*	*ADF*	*PP*
$Ln(Export_{ij}/(Y_iY_j)_t)_t$	-743.32	-46.54	12312.4	12543.6
$ln(d_{ij})$	-41.80	-34.60	2654.5	11342.1
$ln(EX_{ij})_t$	-133.35	-54.27	11456.1	12329.2

Source: Research findings

The results of stationary test were given in Tables (1) and (2). Based on *LLC*, *IPS*, *ADF*, and *PP* statistics, all variables with fixed components and fixed components and trend (except for common border variable in fixed component and trend) were stationary.

Before estimating the model, Hausman and *F*-tests were carried out with results given in Table (3).

Table 3: Hausman and *F*-test results

Test	χ^2	probe
Hausman of first regression	92.66	0.0000
Hausman of second regression	63.47	0.0000
F-test of first regression	36.98	0.0000
F-test of second regression	32.13	0.0000

Source: Research findings

Hausman test results indicated that models had fixed effects. Thus, regressions were estimated with fixed effects. In the following part, we estimate the second model using fixed effects. The results are given in Table (4).

According to estimation results, given the values of R^2, F and t-statistics, both estimated models are proper. Also, autocorrelation test of the error level indicated that there was no autocorrelation among error terms. Results of first and second regression are similar. Most coefficients for the variables in a traditional gravity model are significant and show the expected signs. In the present study, second regression was used to interpret the coefficients, quite common in previous body of research including Rose (2000), Rose and Wincoop (2001), Shirono (2008), etc. all variables incorporated into the research had been statistically significant and carried the expected signs. First regression was indicative of positive and significant effect of currency union with the coefficient 0.2. In fact, if both countries belonged to currency union, ceteris paribus, bilateral trade would rise 22 percent. Second regression provides estimation results with all control variables. The effect of currency union is to some extent larger (1.77), and statistically significant. In fact, currency union, ceteris paribus, would increase bilateral trade to 487

percent, which was consistent with previous research findings by Rose (2000), Rose and Wincoop (2001), etc. This reveals the high importance of forming currency union in trade among OIC countries.

Table 4: Model estimation results

Variable	First regression		Second regression	
	Coefficients	**t-statistics**	**Coefficients**	**t-statistics**
C	-46.04	-162.01	-47.46	-337.34
Currency union	0.2	1.97	1.77	11.21
$ln(d_{ij})$	-0.09	-2.94	-0.03	-2.16
(FTA_{ij})	0.47	1.79	1.13	6.47
$\ln(EX_{ij})$	-2.18	-2.58	-1.41	-1.32
$(language_{ij})$	2.18	10.82	1.31	11.71
$(Border_{ij})$	-	-	0.002	12.77
$(Landlock_{ij})$	-	-	-0.20	-0.14
$(Island_{ij})$	-	-	0.47	4.31
R^2	0.80		0.78	
$\bar{R}^2$	0.80		0.77	
F	130.25		38.31	

Source: Research findings
Comment: Time variable was incorporated into the model to eliminate time trend

The coefficient of dummy variable *FTA* shows that belonging to a regional trade union increases the trade by 209 percent, which is explained by the fact of lower tariffs among the member states, and consequently, lowers prices of imported goods compared to those in non-member countries, which boosts the trade among members. The coefficient for the

exchange rate volatility has the expected negative sign. Also, in this study the coefficient of exchange rate volatility is negative and statistically significant. With 1 percent increase in exchange rate volatility, the trade among these countries declines to 0.141 percent. Exchange rate volatility implies uncertainty and costs in all countries, which decreases trade among countries.

The coefficient of geographical distance is -0.03, indicating that, ceteris paribus, with increasing distance between the two countries, their trade declines as 3 percent. This could be attributed to increased costs of goods transport and also end-point costs of traded goods. The dummy variable of language is statistically significant with positive sign, indicating that, ceteris paribus, countries with similar language will do trade 270 percent more than countries with different languages. This also can be attributed to high-level political and economic relations, and consequently, higher level trade in countries with a common language.

Common borders are statistically significant with a positive sign. In fact, with everything remaining unchanged, countries with common borders do trade 2 percent more than those not having common borders. Again, this is explained by the fact that being landlocked decreases trade as 22 percent. The non-access to free waters could increase transport costs and end-point price, and subsequently, lower trade flow.

The variable for being located in the same continent or an island ($Island_{ij}$) is statistically significant with positive sign, as would be expected. In fact, location in the same island or continent increased trade 60 percent. In general, the results of estimation of first model confirm those of second model, consistent also with results of previous body of research.

5. Conclusion

Common currencies affect trading costs and thereby, the amounts of trade, output, and consumption. The present study was carried out to investigate

the effect of forming a currency union on the trade between OIC countries. The data from 1990-2012 and gravity model and OCA theory helped investigate the issue. According to findings of the study, GDP, common language, common borders, exchange rate volatility, and trade union (to which both host and source countries are a member) have significantly affected the trade flow from source to host countries. Currency union (unit currency) has had a positive and significant effect on trade flow in Islamic countries, and variable for exchange rate volatility of the currency union has not been significant. So, trade flow has been justified in the frame of gravity model. Generally, according to the estimation results, the impact of the proposed OIC monetary union is robust for exports volume, imports volume, and overall trade volume. In fact, the estimates suggest that a common currency in OIC will increase bilateral trade flows in the region substantially.

References

Al-Shammari N., (2007). "Exchange Rate Policy and International Trade", *International Research Journal of Finance and Economics*, 2, 23-66.

Anderson, J. and E. Van Wincoop, (2003). "Gravity with Gravity: a Solution to the Border Puzzle", *American Economic Review*, 93, 1: 170-192.

Artis, M. (1991). "One market, one money. An evaluation of the potential benefits and costs of forming an economic and currency union", *Open Economies Review*, 2, 315-321.

Baltagi, Badi, H., (2005). *Econometric Analysis of Panel Data*, John Wiley & Sons, Ltd, Third edition.

Brodsky, D., (1984). "Fixed Versus Flexible Exchange Rates and the Measurement of Exchange Rate Instability", *Journal of International*

Economics, 16: 295-306.

Buigut, Steven and V, T. NEVEN., (2009). "Benefits from Mutual Restraint in a Multilateral Currency Union",*World Development Vol.* 37, No. 3, pp.: 585–594.

Bystrom, N.E. Hans, Karin Olofsdotter, Lars Soderstrom., (2005). "Is China an optimum currency area?" *Journal of Asian Economics* 16: 612–634.

Carr'e, Martine, Collard, F., (2003). "Currencyunion: A welfare based approach", *European Economic Review* 47 (2003): 521 – 552.

Chow, Hwee Kwan. Kim, Yoonbai., (2003). "A common currency peg in East Asia?Perspectives from Western Europe," *Journal of Macroeconomics* No 25, pp.: 331–350

Clark, P., N. Tamirisa, and S. Wei, (2004). "Exchange Rate Volatility and Trade Flows-Some New Evidence", *IMF working paper*, May 2004.

De Grauwe, P. (1996). "Currency union and convergence economics", *European Economic Review*, 40, 1091-1101.

De Grauwe, P. (1997): *The Economics of Currency Integration*, Oxford University Press, 3rd edition.

De Grauwe, P., W. Vanhaverbeke, (1991). "Is Europe an Optimum Currency Area? Evidence from regional data", *CEPR Discussion Papers*, No. 555.

De Nardis, S. and C. Vicarell, (2003). "The Impact of the Euro on Trade the (Early) Effect is not so Large", *European Network of Economic Policy Research Institutes, working paper* No. 02/03.

De Nardis, S. and C. Vicarell, (2003). "The Impact of the Euro on Trade the (Early) Effect is not so large", *European Network of Economic Policy Research Institutes, working paper* No. 02/03.

Dell'Ariccia, G., (1999). "Exchange Rate Fluctuations and Trade Flows: Evidence from the European Union", *IMF staff paper*, 46, 3: 315-334.

Dominguez, K. and L. Tesar, (2006). "Exchange Rate Exposure", *Journal of International Economics,* 68, 1: 188-218.

Dominguez, K., (1998). "The Dollar Exposure of Japanese Companies", *Journal of Japanese Economics,* 12: 338-405.

Feenstra, R., (2002). "Border Effects and the Gravity Equation: Consistent Methods for Estimation", *Scottish Journal of Political Economy,* 94, 5: 491-506.

Feldstein, M. (2005). "The euro and the stability pact", *Journal of Policy Modeling*, 27, 421- 426.

Flam, H. and H. Nordstrom, (2003). "Trade Volume Effects of the Euro: Aggregate and sector estimates," *Institute of International Economic Studies*, Stockholm University.

Fleming, J.M. (1971). "On exchange rate unification", *Economic Journal*, 81, 467-488.

Frankel, J. and S. Wei, (1993). "Trade Blocs and Currency locks", *National Bureau of Economic Research working paper* No. 4335.

Friedman, M., (1953). *The Case for Flexible Exchange Rates, In: Essays in Positive Economics***,** The University of Chicago Press.

Gandolfo, G. (2002): *International Finance and Open-Economy Macroeconomics***,** Berlin: *Springer Verlag*.

Giavazzi, F., M. Paga0no, (1988). "The advantage of tying one's hand: EMS discipline and central bank credibility", *European Economic Review*, 32, 1055-1082.

Glick, R. and A. Rose, (2001). "Does a Currency Union Affect Trade? The Time Series Evidence," *European Economic Review,* 46:1125-1151.

Hallwood, p. W. Marsh, and J. Scheibe, (2006). "An assessment of the case for currency union or official dollarization in five Latin American

countries", *Emerging Markets Review7*: 52–66

Hause, J.C, (1966). "The Welfare Costs of Disequilibrium Exchange Rates", *Journal of Political Economy*, Vol. 74, No.4, From: J. Williamson, Ibid, P. P. 40

Kenen, P., (1969). *Theory of Optimum Currency Areas: An Eclectic View*, In: Mundell, R., Swoboda, A. (eds.): Currency Problems in the International Economy, University of Chicago Press.

Lee, G (2011). "Gold dinar for the Islamic countries?" *Economic Modelling* 28 (2011) 1573–1586

Mckinnon, R. (1963). "Optimum Currency Areas," *American Economic Review*, 53: 717-725.

Micco, A., E. Stein, and G. Ordonez (2003). "The Currency union Effect on Trade: Early Evidence from EMU", *Economic Policy*, October 2003.

Mintz, N. (1970). *Currency Union and Economic Integration*, New York University Press.

Mishra, R., & C. Sharma, (2010). "Real exchange rate behavior and optimum currency area in East Asia: Evidence from Generalized Purchasing Power Parity", *International Review of Financial An*alysis 19, 205–213.

Mundell, R., (1961). "A Theory of Optimum Currency Areas," *American Economic Review*, 60: 657-665.

Mundell, R., (1973a). "Uncommon Arguments for Common Currencies," In: Johnson, H. G. – Swoboda,A. K*: The Economics of Common Currencies*, Allen and Unwin, pp.114-132.

Mundell, R., (1973b). "A Plan for a European Currency," In: Johnson, H. G.

Mundell, R., (1997). "Optimum Currency Areas: New Analytical and Policy Developments," Updating the Agenda for Currency Union, In: Blejer, M.I. - Frenkel, J.A. - Leiderman, L. - Razin,A. (eds.): *IMF*, pp. 29-48.

MydinMeera, A. K. & M. Larbani, (2004). "The Gold Dinar: The Next Component in Islamic Economics, Banking and Finance", *Review of Islamic Economics,* Vol. 8, No. 1, pp. 5-34.

Nitsch, V., (2002). "Comparing apples and oranges: The trade effect of multilateral currency unions is small", *Mimeo*, Bankgesellschaft Berlin.

Peridy, N., (2003). "Exchange Rate Volatility, Sectoral Trade and the Aggregate Bias", *Review of World Economy*, 139, 3: 389-548.

Peridy, N., (2005). "Toward a New Trade Policy Between the USA and Middle-East Countries: Estimating Trade Resistance and Export Potential", *The World Economy*, 28, 4: 491-518.

Rajabi, E (2008). "Cost and Benefit of Common Currency in Islamic Common Market," *quarterly journal of management and development process,* 4 pp.53-35

Rose, A. and E. Van Wincoop, (2001). "National Money as a Barrier to Trade: The Real Case for Currency Union", *American Economic Review*, 91, 2: 386-90.

Rose, A., (2000). "One Money, One Market: Estimating the Effect of Common Currencies on Trade", *EconomicPolicy*, 30: 7-45.

Sato a, K. ZH. Zhang & D. Allen, (2009). "The suitability of a currency union in East Asia: What does the cointegration approach tell?" *Mathematics and Computers in Simulation* 79: 2927–2937.

Shirono, K., (2008). "Real effects of common currencies in East Asia", *Journal of Asian Economics* 19 (2008): 199–212.

Swoboda, A. K.*: The Economics of Common Currencies*, Allen and Unwin, pp.143-172.

Tenreyro, S., (2001). "On the Causes and Consequences of Currency Union", *Harvard University*, Photocopy.

Tenreyro, S., (2004). "On the Trade Impact of Nominal Exchange Rate Volatility", *Federal Reserve Bank of Boston*, working paper 03-2.

Tinbergen, J., (1962). "Shaping the World Economy", *Twentieth Century Fund*, New York.

Velasco. A., (1996). "When Are Fixed Exchange Rate Really Fixed?" *NBER Working Paper* 5842

Yeyati, L., (2003). "On the impact of a common currency on bilateral trade, *Economic Letters*, 79, 1: 125-9.

Zhao, X., & Y. Kim, (2009). "Is the CFA Franc Zone an Optimum Currency Area?"*World Development Vol. 37,* No. 12, pp. 1877–1886.