

Indonesia's Monetary Integration with OIC Member Countries: New Evidence (*Integrasi Monetari Indonesia dengan Negara-negara Ahli OIC: Suatu Pembuktian Baharu*)

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ABSTRACT

The purpose of this paper is to assess the co-movement of currency symmetry between Indonesia and the Organization of Islamic Conference (OIC) members. The contemporary progress of economic relations between Indonesia and the OIC members might push them towards monetary integration. By employing the Optimum Currency Area (OCA)-index, this study finds that Indonesia has a strong monetary integration with the OIC members. Indonesia is found to be within the top 10 prime converged countries in the OIC. This finding is clearly contradictory to previous studies that mostly identified little integration between Indonesia and other countries. The panel, fixed-effect least squares regression model estimates that the similarity in inflation is the only significant criterion in explaining the closer integration of Indonesia with the OIC. This study provides a new policy implication for Indonesia to integrate more widely within the canopy of the OIC: as long as price stability can be maintained, the potential for integration will be greater.

Keywords: Monetary integration; business cycle synchronization; Indonesia; OIC; OCA

ABSTRAK

Kertas ini bertujuan untuk menilai pergerakan simetri mata wang antara Indonesia dengan negara-negara anggota OIC. Perkembangan ekonomi semasa antara Indonesia dengan anggota OIC boleh menggalakkan mereka ke arah integrasi monetari. Dengan menggunakan indeks OCA, kajian ini mendapati Indonesia mempunyai integrasi monetari yang kuat dengan negara-negara OIC. Indonesia didapati berada pada 10 negara teratas utama yang menumpu dalam OIC. Penemuan ini jelas bertentangan dengan kajian terdahulu yang kebanyakannya mengenal pasti sedikit pengintegrasian antara Indonesia dengan negara-negara lain. Model regresi panel kesan tetap menganggarkan bahawa inflasi yang serupa adalah satu-satunya kriteria penting dalam menjelaskan integrasi Indonesia dengan OIC. Kajian ini memberikan asas baharu bagi Indonesia untuk mengintegrasikan secara lebih meluas dalam kanopi OIC: selagi kestabilan harga dapat dikekalkan, potensi untuk integrasi akan menjadi lebih besar.

Kata Kunci: Integrasi monetari; Sinkronisasi Kitaran Perniagaan; Indonesia, OIC, OCA.

INTRODUCTION

Monetary integration has been an intensified topic for the established economic blocks, and has been predominantly related to the proposal of forming a currency union. At the same time, some regional economic blocs have been at the stage of implementing a common market and then go a step further to form a single currency that is inspired by the success of the European Union in launching the Euro (De Grauwe 2014; Silva & Tenreyro 2010). For example, the Gulf Cooperation Council (GCC) planned to form a single currency called 'the Khaleeji' in the 2010 target year, but it failed to be implemented and is now being re-planned (Bacha 2006; Al-Mawali 2015). ASEAN is designing the ASEAN Monetary Unit (AMU), which is proposed as a parallel instrument for the ASEAN single currency (Watanabe & Ogura 2010). Two regional economic blocs in Africa – Central Africa and West Africa – have set the CFA Franc as a benchmark since 1945 (Uzonwanne 2012). In the context of Indonesia, previous studies reported that the synchronization of the

Indonesian Rupiah (IDR) with other countries is relatively weak (Bayoumi & Mauro 2001; Ng 2002; Huang & Guo 2006; Achsani & Partisiwi 2010; Lee 2011; Agustiar 2018). The weakness of Indonesia's integration with its neighbouring countries is primarily due to the instability of prices, currency asymmetry, low trade openness, and a business cycle that is non-synchronous with the global economy. The IDR depreciated by 600 percent during the financial crisis in 1997-1998 (Cole & Slade 1998). At present, Indonesia adopts a free-floating regime. Under this regime, the IDR has continued to depreciate by about 10 percent against the US \$ from IDR 9,500 per US \$ in 2000 to IDR 14,500 per US \$ in 2018. Depreciation of the Rupiah has caused some to predict further fiscal and current account deficit. Indonesia's current account balance showed a large deficit in the third quarter of 2018. It was recorded that the Indonesian current account deficit was US \$ 8.8 billion, which is equivalent to 3.37 percent of the GDP, and the budget deficit was equal to 1.72 percent of the GDP (Bank Indonesia 2018). The gains expected from IDR depreciation to push export competitiveness



have not appeared due to the large imported inputs of local export productions thereby pushing export costs higher.

Indonesia's share of the economy in OIC continues to strengthen and has achieved a strategic position in the past decade. Based on the statistics published by Sesric (2018), there are two dominant positions in Indonesia in the OIC. First, Indonesia is known to be an Islamic country with the largest population (250 million people) and has the largest GDP (already reached 1 trillion US dollars in 2017). Second, the share of Indonesian trade in intra OIC trade rose to almost 10 percent in 2017 (Sesric, 2018). UNCTADStat (2016) has issued a Trade Complementary Index (TCI), which is an indicator to measure the level of trade complementarity, for Indonesia against its trading partners in the OIC since 2000-2014: TCI of Indonesia-Pakistan (0.42 to 0.48), Indonesia-Saudi Arabia (0.40 - 0.43), Indonesia-Djibouti (0.39 - 0.54), Indonesia-Algeria (0.35 - 0.40), and Indonesia-Oman (0.38 - 0.46), respectively. Increasing the trade of Indonesia to the OIC members is an interesting issue to explore. Frankel and Rose (1998) found the relationship between trade intensity and monetary integration to be endogenous, however, the position of trade intensity as 'ex-ante condition' is far more important than vice versa.

Most of OIC member countries practise fixed currency regimes. Some 33 countries adopt a free-floating regime, while the remaining 14 countries use a fixed-rate regime (OIC 2012). The GCC countries peg their currency against the US \$; for example, West and Central African countries have long used a single currency pegged to the Euro. These three economic blocs in the OIC are like a quasi-monetary union (Houssa 2008; Adams 2005). The exchange rate of Islamic countries is vulnerable to external shocks due to their strong dependence on external markets (Ruzita et al. 2011). The various economic and political crises that struck the Islamic state encouraged them to make adjustments by changing their currency regime. Accordingly, Indonesia no longer maintains a managed floating regime, and now adopts a free-floating regime. If we use that logic, it is difficult for Indonesia to achieve symmetry of its currency volatility against the majority of the fixed regimes adopted in the Islamic Nations. Those with similarities, or the diversity of currency regimes among the OIC members, might lead them into particular clusters of integration, which is one of the interesting phenomena to observe.

This study aims to reassess the feasibility of Indonesia's monetary integration with the OIC based on the latest data. How close does Indonesia need to integrate with OIC countries and how should the economic cooperation be strengthened among them are important questions to answer. Observing the symmetry of macroeconomic shocks among Islamic countries would be a pre-beneficial condition in moving towards the OIC single currency project. Selected determinants of monetary integration, such as symmetry of currencies between countries, synchronization of business cycles,

price stability, and trade openness, will be tested using the OCA-index. This study involves 43 Islamic countries paired to Indonesia.

The contributions of this study are twofold. First, it can be seen from the theoretical concern that defines OCA as a regional-based currency bloc, preferably neighbouring countries. What happens if the scope of the study is extended beyond the block? Is the OCA theory still relevant to explain this phenomenon? Practically, currency integration should not be affected by distance because financial transactions can be easily and quickly processed between countries in a few seconds. In contrast, trade integration requires sufficient transportation time to distribute goods. Second, if the results of this study addressing the integration of Indonesia with the OIC countries proves to be strong, estimates of these results spark the question as to why Indonesia can be integrated into distant countries compared to its neighbours. Such an empirical gap might open up new space for more in-depth investigation, especially concerning what factors cause such phenomena. The novelty expected from this study is to provide a new discourse on Indonesia's integration in a wider market against the broader geographical context. Therefore, this study will clarify the two theoretical divergences: (1) how is it possible for monetary integration to occur with countries that are geographically not neighbouring each other? And, (2) can monetary integration occur without being preceded by trade integration. The structure of this paper is as follows. Section 2 presents the literature and empirical review. Section 3 provides the methodology for the estimation. Section 4 discusses the findings of this study, and the last section provides the conclusion and recommendations.

THEORETICAL AND LITERATURE REVIEW

THE THEORY OF MONETARY INTEGRATION

The theory of monetary integration derived from the theory of Optimum Currency Area (OCA) proposed by Robert Mundell (1961) through his seminal paper published in the American Economic Journal in 1961. The OCA theory became so popular that the Euro succeeded in realizing the long-term dream of forming a single common currency (the Euro) in 2000. The success of the Euro became a role model for many economic blocs to replicate. Islamic blocs, ASEAN, ECOWAS (Economic Community of West African States) have also launched plans for their respective regional currencies. Unfortunately, the results concerning a single currency are still far from reality. The Gulf States and the Middle East and North Africa (MENA), which have previously declared proposals towards a single currency, are currently weakening and being reviewed. ASEAN is preparing a parallel currency in the form of the ASEAN

currency unit as a maturation process towards the ASEAN single currency.

An OCA is typically a domain closer region, with a one-size-fits-all monetary policy that shares a common currency, common central bank, and against external shocks (Mongelli 2008; De Grauwe 2018). However, the geographic disparities among the Islamic countries are very serious. For example, the distance from Indonesia to Mozambique reaches 19 thousand km. Based on the proximity criteria alone, Indonesia would exit the currency union in the OIC. Fortunately, many studies have proven that distance is not the main obstacle in the formation of a single currency (Frankel & Rose 1998; Borzel et al. 2017), inasmuch as distance is less important in the era of trade openness than in the old era of a protective trading regime.

Mundell (1961) proposed a different approach from the mainstream in adjusting the balance of payments equilibrium through non-exchange rate instruments. Mundell (1961) said that if the factor mobility moves perfectly between regions (A and B), the economic depression occurring in country A will drive demand-shift to region B, and cause inflation in region B. By assuming perfect factor mobility, the unemployed from A are able to look for a job in country B, causing wages in country B to drop. McKinnon (1963) commented that the factor of production would be free mobility if inter-industrial structures between countries are relatively homogeneous. If not, workers would find it difficult to find a job in the new job place without a background of matching skills. De Grauwe (2014) contended that the labour mobility between countries is rigid, especially for white collar workers. They do not automatically decide to move at a time of temporary crisis. Moving to a new place for work is costly due to the differences in the employment institutions, reward systems, language, and culture.

The relation between trade intensity and currency union is endogenous. Frankle and Rose (1998) proposed that unfulfilled criteria before joining might be achieved after they enter into the union. They emphasized the principle of entering first, and symmetry afterwards. Rose (2000) conducted a systematic test to see the effect of a currency union on trade. His study indicated that a currency union increased trade almost 200%. The new countries joining the EU without fulfilling the Maastricht criteria 'ex-ante' enjoy faster economic growth 'ex-post' (Gouveia 2013). Nevertheless, Krugman (1993) suggested that trade openness will create an imbalance through specialization. Specialization will push industrial agglomeration against other regions and lead to growth centred polarization. By assuming the distance factor is an increasing return, the disparity among growth centres arises along with globalization (Sunley & Martin 2017).

Sharing in an OCA would lead to benefits (Tavlas 1993; Mollie 2017), such as (1) increasing trade resulting from the elimination of currency conversion costs, (2) driving price transparency and predictability, and (3)

having a common strategy in facing external shocks. However, a currency union also has costs in terms of the loss of flexibility of the individual country. In joining a currency union, the state will lose two national macroeconomic policies – monetary and exchange rate policies. If there are any shocks, the national monetary and exchange rate instruments do not function, except through the central bank union intervention. Only fiscal policy belongs to the national state. The European Union's experience shows that autonomous fiscal channels open the space for member countries to enlarge their budget deficit, which pushes them into debt crisis (Callegari et al. 2017).

LITERATURE REVIEW OF MONETARY INTEGRATION

The empirical study of monetary integration in the world is predominantly focused on the Euro area. Gouveia (2013) examined data from 12 European Union countries from 1981-2011 using the VAR model. The result was that symmetry and convergence between European Union countries had appeared before the Euro existed, and is still occurring until now. Although there is a moderate disparity within South European countries, such inequality has diminished along with increasing growth. Barbosa and Alves (2011) assessed the significant differences in labour costs, growth in output and trade after 10 years of Eurozone, mainly between core and peripheral countries. This is why some experts believed that the Euro area is not an Optimal Currency Area (Krugman 2013; De Grauwe & Vanhaverbeke 1993). In Africa, Adams (2005) highlighted the significant prospects of monetary integration in West and Central Africa, but Sheikh (2013) found a weak monetary integration among the Eastern African Countries.

The study of monetary integration in Islamic countries comes from assessing the feasibility of selected economic blocks, such as the GCC countries, MENA including Agadir Nations (Laabas & Liman 2002; Fasano & Iqbal 2003; Pattanaik 2007, Lee 2011; Abdelgani et al. 2011). The direction of the study has developed in several dimensions. Some highlight differences in the level of integration between oil producing and non-oil producing countries (Ruzita et al. 2011; Kandil & Trabelsi 2010). Abu-bader and Abu-Qarn (2006) compared the demand and supply shocks in the OIC and proved that demand shocks were more symmetrical than supply shocks. The latest study, Agustiar (2018) has succeeded in proving that heterogeneity in the OIC is not an important obstacle to forming a single currency.

A few previous studies have proven the weak monetary integration between Indonesia, OIC, and ASEAN. Lee (2011) excluded Indonesia as a potential country to join the OIC members. Similar findings also discounted Indonesia as a prime converged country to many other OIC members (Kandil & Tabesi 2010; Achسانی & Partisiwi 2010). Falianty (2006) nominated Singapore-Thailand,

Malaysia-Thailand, and Malaysia-Singapore as being ready to join an OCA for ASEAN + 5. Indonesia and the Philippines are far behind. Liu (2012) found two potential clusters of the monetary union between East Asia and ASEAN, namely (1) the Northeast Asia block – Japan, Korea, Hong Kong, and Taiwan, and (2) the Southeast Asia Block – Malaysia, Singapore, Thailand, and Indonesia). Majid et al. (2018) found that the Indonesian Rupiah (IDR) responds more to innovation in the foreign exchange market of Singapore compared to other ASEAN foreign exchange markets.

METHODOLOGY

THE OCA-INDEX

This study employs the OCA-index derived from Bayoumi and Eichengreen (1997). The OCA-index used in this study is not a new model, and has been frequently used by previous researchers. The OCA-index calculates the standard deviation (σ) of change (δ) in the nominal exchange rate between country i and country j . The closeness in the difference in the standard deviation between countries i and j indicates the degree of monetary integration. The smallest difference in the standard deviation of countries i and j means close integration. The change in the nominal exchange rate (e) in countries i and j can be written as follows:

For country i ,

$$\ln(e_{it+1} - e_{it}) \tag{1}$$

For country j ,

$$\ln(e_{jt+1} - e_{jt}) \tag{2}$$

Then, these two formulas can be used to develop the OCA-index, as suggested by Bayoumi and Eichengreen (1997), as follows:

$$OCA = \sigma(\delta \ln e_{ij}) \tag{3}$$

Where, OCA is the optimum currency area index, σ denotes the standard deviation, and e refers to the nominal exchange rate of countries i and j , δ denotes the change of e , \ln is natural logarithm, t refers to time, and i and j are countries i and j . Following Bayoumi and Eichengreen (1997), this study has classified the OCA-indices into three categories based on the classification, as follows:

1. Pairs of countries that have an OCA-index that varies from 0.0000 – 0.0250 are nominated as prime converged countries.
2. Pairs of countries that have an OCA-index that varies from 0.0251 – 0.0770 are nominated as converging countries.
3. Pairs of countries that have an OCA-index that is above 0.0770 are nominated as little converged countries.

PANEL REGRESSION ESTIMATION

In order to estimate the determinants of monetary integration, the study employs a panel least squares regression estimation. There are two reasons why the OCA criteria will be estimated by the panel regression model. First, the OCA index, which is calculated using the standard deviation of a country pair in the period 1986-2015, will only produce one standard deviation value. If the data are processed using a cross-section of 43 country pairs, the degree of freedom is too small. If we use time series data per year in each pair of countries, it is not possible to calculate the standard deviation with individual annual data. Second, the next possible alternative is to compile annual data into several groups. For this reason, this study uses panel data by dividing the data into three periods that vary every 10 years. By conducting a data panel for these three periods, 126 observations are generated from 43 countries.

This study selects four explanatory variables: (1) business cycle synchronization, (2) inflation similarity, (3) intra trade openness, and (4) size of the economy, as determinants of the OCA (Bayoumi & Eichengreen 1997). Business cycle synchronization is the logarithm of the

TABLE 1. Selected explanatory variables

Explanatory Variable	Definition	Formula
$\delta\gamma_{(ij)t}$	Business Cycle Synchronization	$\delta\gamma_{(ij)t} = -\sigma\left(\frac{y_{it}}{y_{jt}} - \frac{y_{i,t-1}}{y_{j,t-1}}\right) \tag{4}$
$\rho_{(ij)t}$	Inflation Similarity	$\rho_{(ij)t} = \frac{(p_{i(t+1)} - p_{it})}{p_{it}} - \frac{(p_{j(t+1)} - p_{jt})}{p_{jt}} \tag{5}$
$xm_{(ij)t}$	Intra trade openness	$xm_{(ij)t} = (x + m)_i + (x + m)_j \tag{6}$
$sz_{(ij)t}$	Size of the economy	$sz_{(ij)t} = \frac{\ln(y_i + y_j)}{2} \tag{7}$

standard deviation of the difference in relative output changes in the two countries. Intra-trade openness is the mean of the sum of exports (x) and imports (m) in the two countries in the OIC. Similarity to inflation is the difference from the consumer price index between two countries, and the size of the economy is GDP at constant prices measured by logarithm of total output ($GDPI_{ij}$) between two countries.

The panel fixed-effect regression model is as follows:

$$OCA_{(ij)t} = \beta_0 + \beta_1 \delta \gamma_{(ij)t} + \beta_2 \rho_{(ij)t} + \beta_3 xm_{(ij)t} + \beta_4 sz_{(ij)t} + e_{(ij)t} \quad (8)$$

Where, OCA denotes the optimum currency area, refers to the output shock that calculates the change in the Gross Domestic Product (GDP) in country i and country j . We subtract the value of GDP change from two countries to assess the closeness or the difference between two countries. A small difference in the GDP between two countries indicates a more synchronized output in both countries. refers to the inflation similarity, which is calculated by the mean of the consumer price index between two countries. It assumes that similar inflation between the two countries may lead to more symmetry in the exchange rate. denotes trade openness, which is calculated by the mean of the sum in the trade (export + import) of the two countries. A more open country (measured by summing export-imports from country trade) will have a greater chance of integrating with its trading partners. denotes the sum of the economic size of country i and country j . Countries with large economic size (measured by total GDP at current prices) may have the ability to integrate more than countries with smaller GDPs.

THE DATA

This study uses panel data, which includes a cross-section of 43 pairs of countries and three dynamic periods ordering from 1986-1995, 1996-2005 and 2006-2015. By multiplying the three periods of time by the 43 cross-sectional data, it produces 126 panel (balanced) observations. The data used in this study came from the SESRIC publication (<http://www.sesric.org/>), especially the data for the exchange rates, GDP, exports and imports, economic size and inflation. SESRIC regularly publishes time series of social and economic development for Islamic countries in collaboration with other international institutions.

EMPIRICAL RESULTS

THE DEGREE OF MONETARY INTEGRATION

This study has succeeded in assessing the feasibility of monetary integration between Islamic countries and Indonesia, using the OCA -Index. In Table 2, monetary

integration between countries is divided into three categories, prime, moderate and little converged countries. Indonesia has successfully integrated at the prime level with 28 countries, moderate level with 6, and the little category with 9 countries. This result confirms that Indonesia has been successfully integrated with 63 percent of Islamic countries. This result is relatively equalized compared with previous studies. For example, Bayoumi and Eichengreen (1997) proved that only 71 percent of 14 European countries were nominated as prime and converged and converging countries when it was assessed using the OCA -index. The OCA -index of Islamic countries moves from a minimum value of 0.00 to a maximum value of 2.9. The average value of the OCA -Index in Islamic countries is 0.41626; higher than the average of the OCA -index for the European Union and ASEAN (Horvart & Komarek 2003; Bayoumi & Eichengreen 1997; Falianty 2006). However, when the index is compared to European countries outside the Eurozone, the average value of the OCA -Index of OIC countries is smaller (Pilat 2011).

This study has contributed to the new discourse for Indonesia because many previous studies have assessed Indonesia as being in the category of countries that are somewhat reliant on neighbouring countries. Further information in Table 3 confirms the pattern of distribution of integration at the prime level where Indonesia has been successfully integrated with more than half of the Islamic countries in Africa, in the Middle East, and in South Asia. In contrast to neighbouring countries in ASEAN, Indonesia actually failed to be integrated at the prime level. Countries with a weak level of integration to Indonesia are economically strong, such as Brunei Darussalam, Turkey, Tunisia, Iran, Nigeria, Egypt, and Tunisia.

In Table 3, Indonesia is more integrated with three blocks – Africa, Middle East, and South Asia. About 90 percent of South Asian countries are closely linked to Indonesia, 80 percent to the Middle East countries, and 60 percent to African countries. The strong relationship between Indonesia and the Middle East countries is due to the increasing crude oil import of Indonesian from such countries. The demand for the Saudi Arabia Riyal is strengthening in line with the increasing flow of Indonesian labour, *haji* and *umrah* to Saudi Arabia. As for Africa this is more likely due to the similarity in the pattern of inflation and exchange rate movements in responding to external pressure. In South Asia, it is due to the strengthening of trade between Indonesia, Pakistan, and Bangladesh within the last decade.

There is not much difference in this result in comparison with the previous studies related to the Indonesia-ASEAN monetary integration. Indonesia's level of integration with neighbouring countries in ASEAN is considered weak. What are the prominent factors in explaining the weakness of Indonesia's integration with ASEAN countries? First, ASEAN countries, such

TABLE 2. Calculation of OCA-Index of Indonesia to the OIC members

Prime Converged Countries		Converging countries		Little converged countries	
Indonesia-Uganda	0.00074	Indonesia-Guinea-Bissau	0.02747	Indonesia-Nigeria	0.08777
Indonesia-Kuwait	0.00111	Indonesia-Guyana	0.03075	Indonesia-Iran	0.13560
Indonesia- Mauritania	0.00257	Indonesia-Sierra Leone	0.03594	Indonesia-Brunei	0.13640
Indonesia-Benin	0.00278	Indonesia-Algeria	0.04277	Indonesia-Libya	0.30433
Indonesia-Chad	0.00278	Indonesia-Afghanistan	0.05161	Indonesia-Turkey	0.55497
Indonesia-Mali	0.00278	Indonesia-Malaysia	0.07638	Indonesia-Egypt	1.23007
Indonesia-Niger	0.00278			Indonesia-Iraq	1.44514
Indonesia-Senegal	0.00278		Indonesia-Tunisia	2.78055	
Indonesia-Togo	0.00278		Indonesia-Mozambique	2.92353	
Indonesia-Burkina Faso	0.00278				
Indonesia-Cameroon	0.00278				
Indonesia-Cote d'Ivoire	0.00278				
Indonesia-Gabon	0.00278				
Indonesia-Guinea	0.00291				
Indonesia-Jordan	0.00376				
Indonesia-Comoros	0.00391				
Indonesia-Lebanon	0.00393				
Indonesia-Pakistan	0.00484				
Indonesia-Maldives	0.00589				
Indonesia-Morocco	0.01096				
Indonesia-Bangladesh	0.01206				
Indonesia-Gambia	0.01941				
Indonesia-Oman	0.02317				
Indonesia-Qatar	0.02317				
Indonesia-Saudi Arabia	0.02317				
Indonesia-Syria	0.02317				
Indonesia-UAE	0.02317				
Indonesia-Bahrain	0.02317				

Source: Author calculation

TABLE 3. Integration of Indonesia with OIC's regional blocs (calculated by OCA-Indexes)

Integration of Indonesia to OIC blocs	Prime converged countries	Converging countries	Little converged countries	N (observation)
Indonesia-African Block	16	3	5	24
Indonesia-Middle East block	9	0	3	12
Indonesia-South Asia block	3	1	0	4
Indonesia-ASEAN block	0	1	1	2
Indonesia-American block	0	1	0	1
Total	28	6	9	43

Source: Author calculation

as Malaysia, Brunei, and Singapore, are not the final destinations of Indonesian exports. These countries act as transshipment ports bridging Indonesia goods with China, Japan, and Korea. The trade volume between Indonesia and Brunei is relatively small, reaching only 0.3 percent. Second, the currency regime in

these three ASEAN countries is very different. Brunei has adopted a currency board regime that relies on the Singapore Dollar. Whereas Malaysia, since 2005 has eliminated pegging with the US \$, and moved to a floating exchange rate with basket currency framework (Abdul Karim et al. 2009).

Nine countries are integrated in the weak category with Indonesia; five with Africa, three with the Middle East, and one with ASEAN (see Table 3). Of the nine countries, some are experiencing an internal political crisis or civil war, such as Libya, Egypt, Iran, and Iraq. Such countries will certainly experience macro-fundamental instability in the form of high inflation pressures and trade embargoes. Nigeria and Mozambique, however, are not in a state of civil war. Nigeria, as Africa's biggest economy, has experienced an economic slowdown in the last decade, which has been marked by a decline in foreign trade and a growing number of poor people. Both Turkey and Brunei Darussalam have experienced an economic boom and better currency stability. The conclusion is that there are two contradictory circumstances that make little integration between Indonesia and the OIC members; that is, countries are experiencing severe economic slowdown due to an internal political crisis or civil war, and countries are experiencing rapid economic growth and stable currency volatility.

PANEL REGRESSION ANALYSIS OF OCA DETERMINANTS

This study has carried out testing steps to determine the best model in the regression panel used. The panel data includes 43 cross-sections, three periods, and 129 country pairs. The dependent variable is OCA. The independent variable is the synchronization of the business cycle (y), Inflation (p), intra-trade openness (xm) and economic size (sz). There are three panel regression models of which one must be chosen, namely, Common Effects (CE), Fixed Effects (FE) and Random Effects (RE). In the first step, this study applies the Chow test to determine which model is best between CE and FE. If P Value is accepted H_1 , the best choice is FE, whereas if the P Value is accepted by H_0 , the best choice is CE.

In Table 4, the cross-sectional value of Chi-square is 56.036222 with p value $0.0723 > 0.05$; this indicates that H_0 is accepted and means that CE is the best model compared to FE. The next process is to determine the best model between RE compared to CE using the Lagrangian Multiplier (LM) test. While the Hausman test is not needed because the Chow test chooses CE. To do LM test, first perform the Random Effects (RE) test by looking at the two-sided value of the Breusch-Pagan (BP) cross-section. The cross-sectional value of the Breusch-Pagan value is 0.003081, with a p value $0.9557 > 0.05$. The results received H_0 , which means the CE model is better than RE (Table 5).

TABLE 4. Chow test of Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	1.062134	(42.82)	0.4000
Cross-section Chi-square	56.036222	42	0.0723

TABLE 5. Lagrange Multiplier Tests for Random Effects (Two-sided: Breusch-Pagan)

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan (BP)	0.003081 (0.9557)	0.101226 (0.7504)	0.104307 (0.7467)

The selection of the best model using the Chow test and the Lagrangian Multiplier test (LM) involving 43 pairs of countries proves that the common effect (CE) is the best model. The next step is to test the robustness estimator of CE including autocorrelation, normality, heteroscedasticity and multicollinearity. The results show that CE suffers autocorrelation, which is indicated by the Durbin-Watson value of $2.631907 < \text{Durbin Upper (DU)}$ or $(4 - 2.631907) < \text{DU}$ from the Durbin-Watson table. This study is also tested the Jarque-Bera normality test, which produced a p-value of $0.000000 < 0.05$. This result shows that the residual is not normally distributed. This is probably because there are data outliers. We find outliers for three pairs of countries (Indonesia-Guinea, Indonesia-Iran, and Indonesia-Iraq) with absolute values for the standardized residuals > 3 . The results show that CE is not the best model after rechecking through robust estimators.

The second step is to retest the second option model (that is FE) by excluding outlier data using the White Test period. We also retested the autocorrelation and ensured that the residual data are normally distributed. The Glejser test for heteroscedasticity produces all p-partial t-values ($\text{prob}) > 0.05$, which indicates that the model is free from the problem of heteroscedasticity. The cross-section dependence test showed no cross-sectional dependence, as indicated by the p-value of $0.5672 > 0.05$. There is no multicollinearity among the independent variables. Such serial tests prove that FE is robust from the violations of classic assumptions (Table 6). Through this process, this study chose the panel fixed-effect regression model as the best model.

The final testing process begins by estimating the fixed effect of the White Period coefficient. The results of the panel fixed-effect estimation provide a more comprehensive explanation as to the OCA criteria for Indonesia. The model used is quite worthy (F significant value is in α 1 percent). The coefficient of determination (R^2) is 61 percent, which is slightly higher than in previous studies. Of the four explanatory variables used, only the similarity in inflation significantly affects the OCA-index at the 1 percent level of significance. The expectation that open trade and the size of the economy may appear to be the viable determinants is not proven.

This result indicates that a co-movement of price among the majority of the OIC members becomes a

potential source for monetary integration. Ishiyama (1975) identified that the difference in inflation and wage rates rising among participating countries is a reflection of different social preferences. Therefore, inflation and wage similarity are needed as 'ex-ante' criteria for OCA that reflect the symmetry between candidate countries.

It will be difficult to maintain the fixed exchange rate if there is an inflation differential between countries. For countries that have greater dependence on imports, their inflation rate is vulnerable to external influences (Echchabi et al. 2011; Bacha 2006; Soon et al. 2017). If there is a severe shock to the world's hard currencies, then

TABLE 6. Fixed Effects (FE) assumption test

Test	Result	Summary
The Glejser test	all p-partial t-values (Prob) > 0.05	the model is free from heteroscedasticity
Pesaran CD test	p-value of 0.5672 > 0.05	no cross-sectional dependence
Jarque-Bera test	p-value 0.1216 > 0.05	residual data have distributed normally
Correlation matrix	all coefficient correlation below 25 %	no multicollinearity among explanatory variables

TABLE 7. Descriptive Statistics of Selected OCA Criteria

	OCA	y	p	xm	sz
Mean	0.059988	0.002448	1.653218	7.047412	11.49855
Median	0.050835	0.001574	1.647076	7.103569	11.35840
Std. Dev.	0.049008	0.003497	1.171957	1.155591	0.306200
Jarque-Bera	195.3370	8740.847	12.21517	1.221896	13.43322
Probability	0.000000	0.000000	0.002226	0.542836	0.001211
Observations	120	120	120	120	120

TABLE 8. Correlation Matrix

	OCA	y	p	xm	sz
OCA	1.000000	0.113815	0.598349	-0.285092	0.011064
y		1.000000	-0.004254	0.045968	0.078011
p			1.000000	-0.203459	0.055515
xm				1.000000	0.245834
sz					1.000000

TABLE 9. Summary of Panel Fixed-Effect Least Squares estimation (White Period)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.700366	0.464467	1.507893	0.1357
y	1.648594	1.452556	1.134960	0.2600
p	0.028384	0.004810	5.900490**	0.0000
xm	-0.009005	0.004764	-1.890444	0.0625
sz	-0.054605	0.040514	-1.347790	0.1817

Effects Specification

Cross-section fixed (dummy variables)				
R-squared	0.753859	Mean dependent var		0.059988
Adjusted R-squared	0.614594	S.D. dependent var		0.049008
S.E. of regression	0.030425	Akaike info criterion		-3.870547
Sum squared resid	0.070350	Schwarz criterion		-2.848466
Log likelihood	276.2328	Hannan-Quinn criteria.		-3.455475
F-statistic	5.413154	Durbin-Watson stat		2.604978
Prob(F-statistic)	0.000000			

Note: Dependent Variable: OCA. Method: Panel Least Squares, periods included: 3, Cross-sections included: 40. Total panel (balanced) observations: 120. (**) identifies the level of significance at 1%.

the impact may spread through the rise in inflation in such importer countries. When inter-state inflation rates are low and similar over time it will encourage more balanced transactions and trade in foreign exchange accounts.

CONCLUSION

This study starts from a question concerning whether the contemporary increase in economic and trade relations between Indonesia and the Middle East (OIC) can open opportunities for Indonesia to increase its monetary integration. This question is interesting because, so far, the position of Indonesia's integration with its neighbours, including East Asian countries, is rather weak. How closely does Indonesia integrate with the OIC countries is a challenge to be investigated? Through such issues, this paper aims to specifically assess the feasibility of monetary integration with the OIC. This study measures Indonesia's monetary integration with 43 Islamic countries using the OCA index. Selected OCA criteria have been tested with the OCA-index using a panel fixed effects model.

This study found that the monetary integration between Indonesia and the Islamic countries is strong. There are 63 percent of state pairs that have successfully integrated with Indonesia. Only 20 percent of country pairs are nominated in the little integration. This finding clearly proves an empirical gap compared to previous studies (Bayoumi & Mauro 2001; Ng 2002; Huang & Guo 2006; Achسانی & Partisiwi 2010; Lee 2011; Agustiar 2018). Indonesia's monetary integration has so far been considered somewhat weak against its neighbouring countries, but this study found it to be strongly integrated with more than half of the OIC countries. The geographical proximity factor, by means of Mundell (1961), illustrated that, as one of the ideal conditions of Optimum Currency Area, it is not an essential factor. Countries can be integrated in monetary terms at a relatively far distance without any technical obstacles compared to trade integration.

This study shows that the similarity in inflation is an important explanation in clarifying why Indonesia is highly integrated with many OIC members. The policy implications proposed from these findings provide a lesson in that the similarity in the inflation is a triggering factor for Indonesia to enter into monetary integration on a wider scale. In the ASEAN region, Indonesia must minimize its inflation rate closer to that of its neighbours. A long-term level of inflation similarity is able to encourage more efficient trade, which, in turn, will encourage economic welfare. Unfortunately, Indonesia has failed to create price stability for many decades. Indonesia should choose a monetary contractive policy in order to limit the amount of money in circulation.

This study suggests that if Indonesia wants to strengthen monetary integration, it must start from

a policy to stabilize prices (inflation and currency). Price stability will create a synchronous business cycle and increase trade between countries. The effect of trade integration is necessary, but it requires plenty of time. Only countries that have an established stage of integration can adopt the integration process according to the theory. In the European Union for example, trade integration is the entry point for entering monetary integration. However, in many developing countries, it may follow the opposite direction: monetary integration (financial) may appear without trade integration. Further research should be directed at analyzing the factors that led to the emergence of monetary integration without trade integration.

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