
Financial Integration between Iran, OPEC and the Shanghai Organization

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Abstract

This article investigates the financial convergence between Iran, OPEC & the Shanghai Organization trade groups, of which Iran is a member. The analysis covers the period of 2005 to 2017. In order to examine the convergence dynamics of these financial markets; we have employed the Philips and Sul (2007) methodology, which uses a nonlinear time-varying factor model. This paper provides a comprehensive picture of the financial systems within Iran and its convergence clubs by testing the convergence of their money market with domestic credit to private sector by banks (% of GDP), deposit and lending interest rate, real interest rate, and capital market with Stocks traded, total value (% of GDP). The empirical findings show that money and stock markets of OPEC and the Shanghai group do not form a homogenous convergence club. Results show that Iran has convergence with some countries in OPEC and the Shanghai group in money and stock markets, which can be

explained by their similar economic indicators in both markets. Furthermore, the convergence speed between Iran and the Shanghai countries is higher than that of Iran and OPEC countries, which proves that joint trade agreements are stronger reasons for convergence than the oil factor. Iran should implement further structural reforms in order to achieve greater financial convergence with its joined groups.

JEL classification: G15, G21, C32, C33

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Introduction

Financial integration is the process through which financial markets of two or more countries or regions become more connected with each other. This process can take many forms, including cross-border capital flows (for example, firms raising funds on capital markets cross-border), foreign participation in domestic markets (for example, a parent bank's ability to set up a subsidiary abroad), sharing of information and practices among financial institutions, or unification of market infrastructures (IMF 2014). It can also have a regional or global dimension, depending on whether a country's financial market is more closely connected to neighboring countries or to global financial centers/institutions. From a theoretical point of view, integration may be signaled by the convergence of the asset prices with the same characteristics law of one price (Eyraud, Singh & Sutton 2017)

Financial or economic integration aims to globalize and draw countries closer to each other. Therefore, forming trade and economic groups, by discarding economic, commercial, and legal barriers, expanding financial and trade relations, and creating common interests among countries, provides the bases for closeness and therefore financial and economic convergence. Nowadays, countries are making efforts to approach other countries through different treaties, aiming to benefit from convergences and integrations. Iran, which is among these countries, aims at benefiting from the advantages of forming economic and trade alliances as well as expanding its international connections, has been planning to become a member of different groups such

as OPEC and the Shanghai group in the recent decade. The most important goals of OPEC, consisting of 14 countries, are coordinating and integrating oil policies of the member countries and identifying the best way of providing them with their separate or common interests (OPEC bulletin 2017). The Shanghai group, consisting of 8 member countries, is one of the prominent groups in the world which aims to achieve military integration and expansion of economic and trade relations (Shanghai Economic Prospect 2017).

Considering the fact that having commonalities, such as oil revenues and trade and even military relations, can provide the basis for convergence between countries, this study focuses on assessing financial integration between Iran and members of the Shanghai and OPEC groups, comparing the integration speed of Iran in these groups, and finally deciding which association (oil or trade) is a better ground for integration.

This study is organized as follows: Section 2 is a review of literature, section 3 is a review of the economic conditions of the OPEC and Shanghai members, section 4 focuses on the convergence methodology developed by PS (2007), Section 5 describes the datasets, Section 6 reports the results, and finally, the last section discusses the conclusions.

Literature Review

The majority of studies testing the convergence hypothesis have used beta convergence, sigma convergence, unit root tests, integration analysis or panel unit root tests with a stochastic trend. However, the previous literature has also identified a number of drawbacks in these approaches. Islam (2003) stated that beta and sigma convergence are more suitable for growth models, and other authors have indicated some difficulties related to their testing, in particular to generating inconclusive and biased results (Durlauf and Quah, 1999; Bernard and Durlauf, 1996). Concerning unit root tests and co-integration analysis, Apergis et al. (2014) pointed out that these fail to establish convergence when multiple steady-state equilibria occur in the sample data. Finally, panel unit root tests with a stochastic trend are appropriate for testing convergence, but they are very dependent on data homogeneity. Considering these issues, Färe et al. (2006) recommend examining convergence using cluster analysis. Therefore, we will use the methodology proposed by Phillips and Sul (2007; hereafter PS) to test the convergence of financial markets within CEE, using a non-linear, time-varying coefficient factor model. Rughoo and Sarantis (2012), Apergis et al. (2014) Ananchotikul and Zoli (2015), and Li et al. (2018) have emphasized a number of advantages of PS methodology. First, this approach

does not require specific assumptions concerning the stationarity of the variables, allowing testing and estimation of the convergence in the sample, and revealing the formed convergence clubs. Second, the model allows the estimation of the long-run equilibrium in a heterogeneous panel, including the history of a country in transition dynamics. Third, this algorithm enables the illustration of the transition path for each country, specifically, the behavior of a data series in relation to the panel average, which provides valuable information on individual behavior in the panel.

Benefits of a lack of financial convergence include a reduction in transaction costs, a more efficient allocation of resources, and risk sharing or decrease of market volatility (Prasad et al., 2003; Baele et al., 2004) will lessen the advantages offered by EU membership. Furthermore, divergence in the financial markets could result in a decrease in foreign investments. The PS (2007) methodology has been used to study convergence in different areas of financial markets. Apergis et al. (2011) investigated equity market convergence in 17 developed countries. Their findings revealed that international equity markets do not form a homogeneous convergence club, but rather a dichotomy. Apergis et al. (2014) tested convergence for 42 equity markets and showed that 37 equity markets form a unified convergence club. The volatility of stock prices also suggests more evidence of convergence than stock prices.

Caporale et al. (2014) analyzed the convergence in stock returns on both sectors and individual industries within sectors in five European countries (Germany, France, the Netherlands, Ireland and the UK) as well as the US, over the period of 1973-2008. In terms of sectoral indices, their results revealed convergence in the middle of the sample period, followed by divergence, and indicated four convergence clubs. According to their findings, the convergence process had not been influenced by EU policies. Rughoo and Sarantis (2012) analyzed convergence for deposit and lending rates for non-financial corporations between 2003 and 2011 in the EU15. Their findings indicated deposit and lending rate convergence until 2007; however, after 2008, due to the financial crisis, they suggested the convergence hypothesis should be rejected. A similar result was obtained by Rughoo and Sarantis (2014) for deposit and lending rates to the household sector for the same sample period in the EU15. Other studies also employed the PS methodology to test real GDP and income per capita convergence (Fritsche and Kuzin, 2011; Bartkowska and Riedl, 2012; Monfort et al., 2013; Borsi and Metiu, 2014) and price level convergence (Fritsche and Kuzin, 2011; Fischer, 2012) in the EU. Despite its benefits, the PS (2007) methodology has been rarely used for testing convergence in financial markets.

Econometric methodology: Convergence and cluster tests

The log t convergence test

The econometric approach proposed by PS (2007) uses a nonlinear time-varying factor model and provides the framework for modeling the transitional dynamics as well as the long run behavior. Assuming that we have panel data for a variable X_{it} where $i=1, \dots, N$ and $t=1, \dots, T$, N and T being the number of units and the sample size respectively, a simple linear factor model can be formulated as follows:

$$X_{it} = \delta_i \mu_t + \varepsilon_{it} \quad (1)$$

Where μ_t and ε_{it} are unobservable components. PS (2007) reformulated Equation 1, allowing for time variation in the loading coefficients. They allowed δ_i to have a random component, which absorbs ε_{it} . The new model has the following representation

$$X_{it} = \delta_{it} \mu_t \quad (2)$$

PS (2007) separated the common factors from idiosyncratic components, as follows:

$$X_{it} = g_{it} + a_{it} \quad (3)$$

Where g_{it} represents systematic components and a_{it} stands for transitory components. Equation 3 is transformed to the form of Equation 2, as follows:

$$X_{it} = (g_{it} + a_{it} / \mu_t) \mu_t = \delta_{it} \mu_t \quad \text{for every } i \text{ and } t \quad (4)$$

Where μ_t is a single common component and δ_{it} is a time-varying idiosyncratic element, which measures the economic distance between the common trend, μ_t and X_{it} . To test whether the components of δ_{it} are converging, PS (2007) defines the transition coefficient as:

$$h_{it} = \frac{X_{it}}{1/N \sum_{i=1}^N X_{it}} = \frac{\delta_{it}}{1/N \sum_{i=1}^N \delta_{it}} \quad (5)$$

The relative transition parameter h_{it} measures δ_{it} in relation to the panel average at time t and describes the transition path for country i compared to the panel average. Therefore, h_{it} measures country i 's relative departure from the common steady-state growth trend, μ_t . The transition curve average for all countries is equal to one for each set of data at any time. Consequently, convergence among all countries is achieved when h_{it} approaches 1, for every i ,

as t approaches ∞ . In the case of convergence within the clubs, the transition paths narrow to different steady state equilibria, which can be above or below the cross-section average of one.

PS (2007) proposed the log t regression to test the null hypothesis of convergence. However, it should be noted that PS (2007) defines two notions of convergence: in rates or relative convergence, (i.e. the studied variable has the same rate of change and the same value across the cross-sectional units). For relative convergence, the null hypothesis is formulated as follows: $H_0: \delta_i = \delta$ and $\alpha \geq 0$ against the alternative $H_1: \delta_i \neq \delta$ for all i or $\alpha < 0$

For absolute converge, the null hypothesis is:

$$H_0 : \delta = \delta \text{ and } \alpha \geq 0$$

As we can notice, the difference between the two concepts of convergence is given by the value of α . When μt follows either a nonstationary or a trend-stationary process, PS (2007) showed that it diverges at $O_p(t)$ rate as t approaches infinity.

Hence, if δit converges at a faster rate than $O_p(t)$ to the constant δ (i.e. when $\alpha > 1$), there is convergence in levels. If δit converges at a slower rate than $O_p(t)$ to the constant δ (i.e. when $0 < \alpha < 1$), the relative convergence holds. In order to estimate the log t test, first, a measure for the cross-sectional variance ratio $\frac{H_1}{H_t}$ is computed:

$$H_t = \frac{1}{N} \sum_{i=1}^N (h_{it} - 1)^2 \quad (6)$$

Second, the following OLS regression is performed:

For $t = [rT], [rT] + 1 \dots T$ with some $r > 0$; $L(t) = \log(t + 1)$ and $\hat{\alpha}_t$ where $\hat{\alpha}_t$ is the estimate of α in H . The test statistic is normally distributed, and at the 5% level, the null hypothesis of convergence is rejected. PS (2007) recommends starting the regression at some point $t = [rT]$, with some $r > 0$. Based on their simulations, PS (2007) have suggested $r = 0.30$ when T is small or moderate (for example, $T \leq 50$), and $r = 0.20$ when T is large (for example, $T \geq 100$). By employing the conventional t -statistic $b t$, the null hypothesis of convergence is rejected if $b t < -1.65$. The rejection of full convergence does not imply the absence of convergence in the subgroups of the panel, and therefore, PS (2007) have proposed a club-clustering algorithm to classify units in convergent clusters. The procedure is flexible and allows all possible configurations: overall convergence, overall divergence, converging subgroups, and diverging units.

Clustering algorithm

The algorithm, based on log t regressions, consists of four steps, which are briefly described below:

Step 1: Last observation ordering. Order the N units in the panel according to the last observation X_{it} .

Step 2: Core group formation. Select the core members in the panel by calculating the log t regression for the k highest members with $2 \leq k \leq N$ and calculate the convergence t -statistic, $t_{\hat{\beta}}(k)$. The core group size is chosen by maximizing $t_{\hat{\beta}}(k)$ subject to $\min t_{\hat{\beta}}(k) > -1.65$.

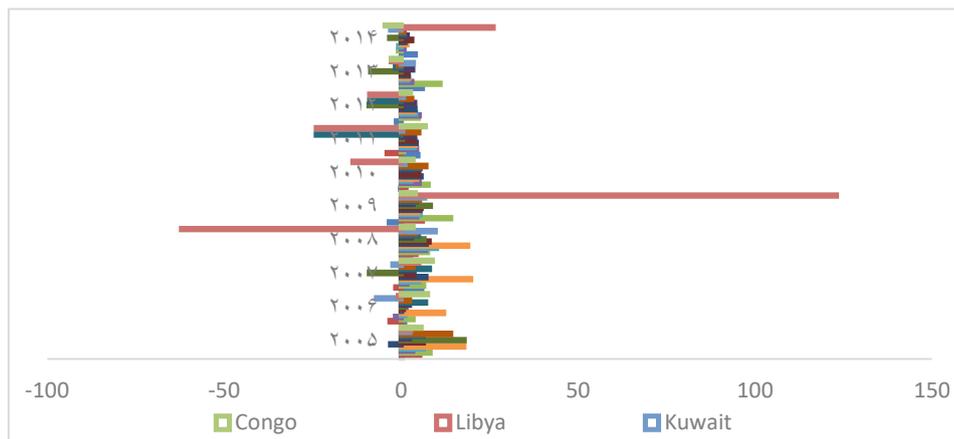
Step 3: Sieve individuals for club membership. Once the core group is formed, each remaining unit is added separately to the core group, and the log t is run. Include the new unit if the associated

$bt > c$, with c being a critical value ($c^3 0$). Repeat this procedure for the remaining units and form the first convergence club.

Step 4: Stopping rule. Form a second group for all units outside the convergence club. Run the log t regression for this set of units, and if convergence is detected within this new cluster, a second club is formed. If it is not, steps 1, 2 and 3 are repeated on the remaining units. If no subgroups can be found, then these units display a divergent behavior.

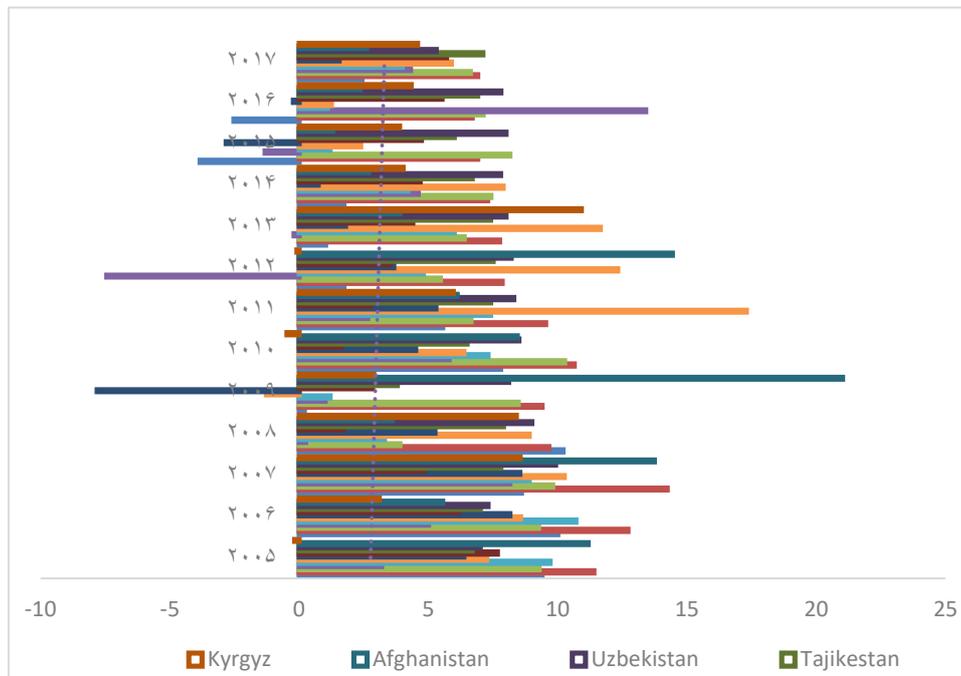
3. Overview of some of the OPEC & Shanghai economic indicators

Graph 1. GDP growth- OPEC



Source: World Bank

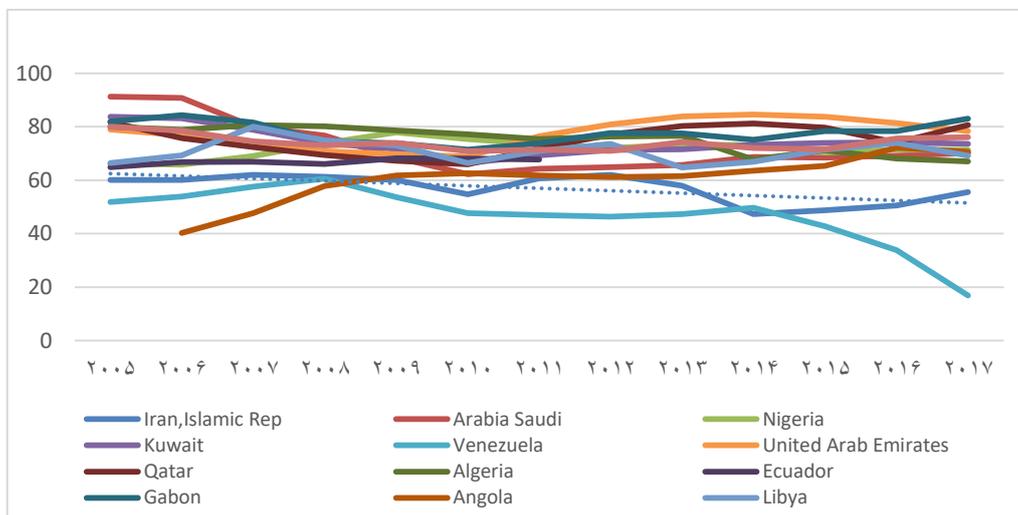
Graph 2. GDP growth- Shanghai



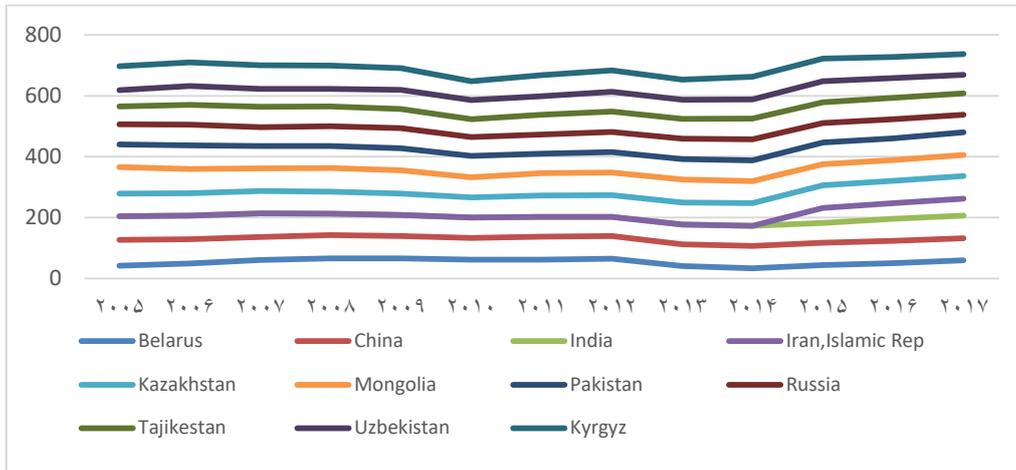
Source: World Bank

As presented in graphs 1 and 2, both groups consist of countries which are varying in terms of GDP (Countries with a high per capita income such as China and Qatar, and those with low per capita income such as Guinea). Moreover, GDP growth fluctuations are observed during the study, and almost all of the countries lack a stable growth. These fluctuations are more evident in OPEC countries. Furthermore, compared with OPEC countries, Shanghai countries have higher per capita incomes. Iran is also facing many fluctuations in GDP growth

Graph 3. Monetary freedom OPEC organization



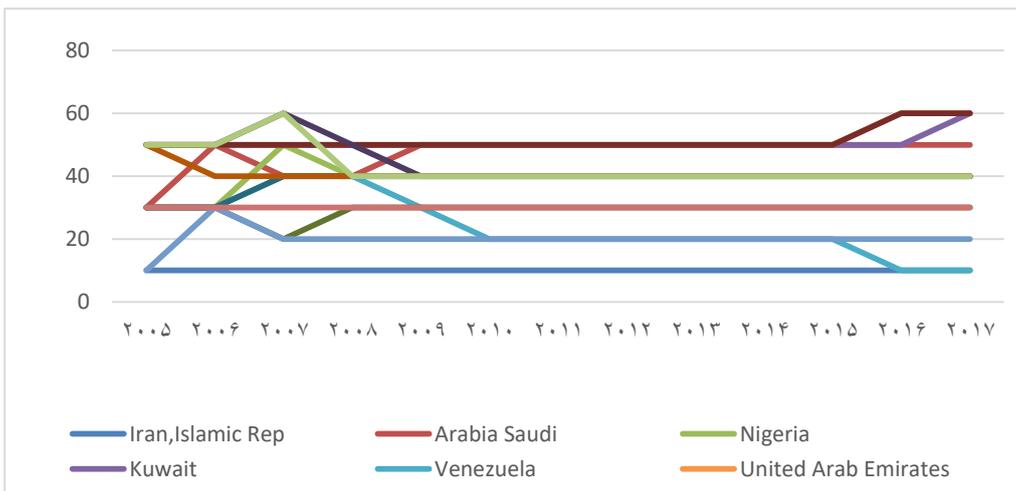
Graph 4. Monetary freedom- Shanghai organization



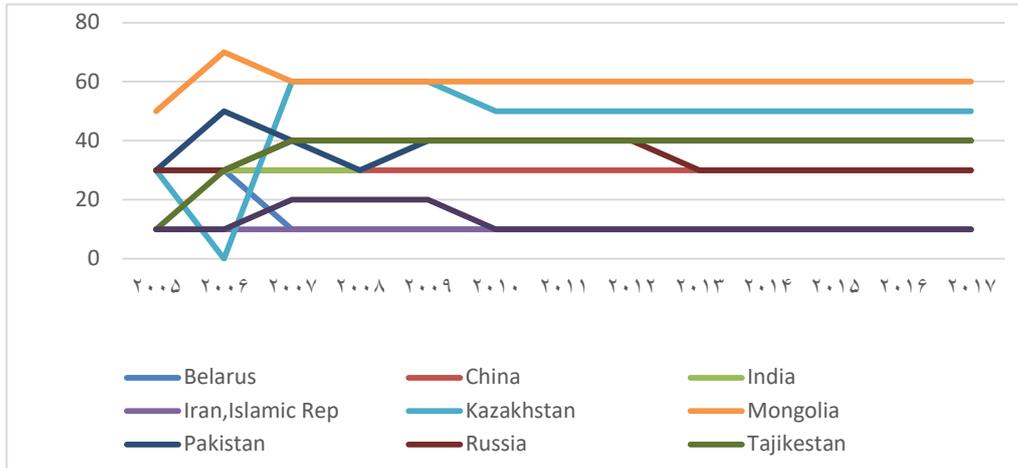
Source: Heritage Institute (Foundation)

Graphs 3 and 4 represent the monetary freedom index in OPEC and the Shanghai countries. Assessment of this variable reveals that, compared with the Shanghai countries, OPEC countries have closer correspondence regarding this variable, and that they have faced a decline in monetary freedom during the study period. Iran has also been facing the decline of its monetary freedom index from 2005 in such a way that it has degraded from the rank of 60th in 2005 to 55th.

Graph 5. Financial freedom—OPEC organization



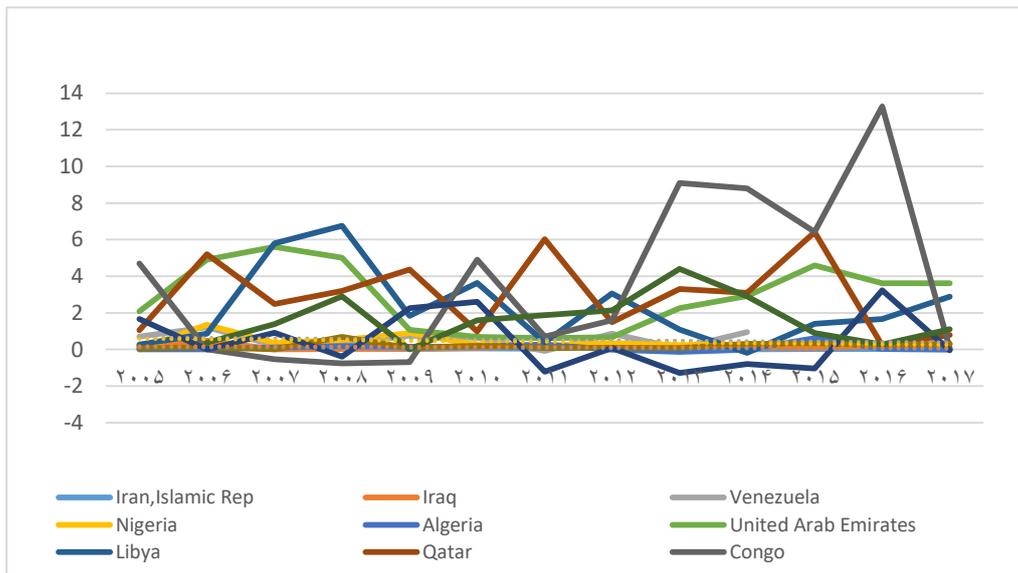
Graph 6. Financial freedom Shanghai organization



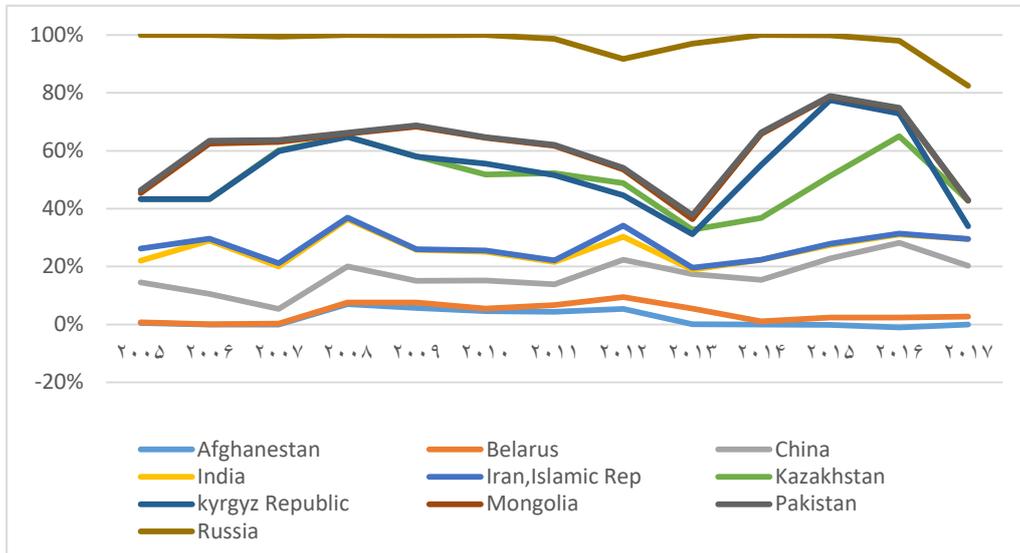
Source: Heritage Institute (Foundation)

As demonstrated, based on the data from Heritage Institute, the monetary freedom index is on a similar level in the Shanghai and OPEC countries, and Iran has the lowest rank (10) among these countries.

Graph 7. Net Capital Out flow-OPEC organization (% of GD)

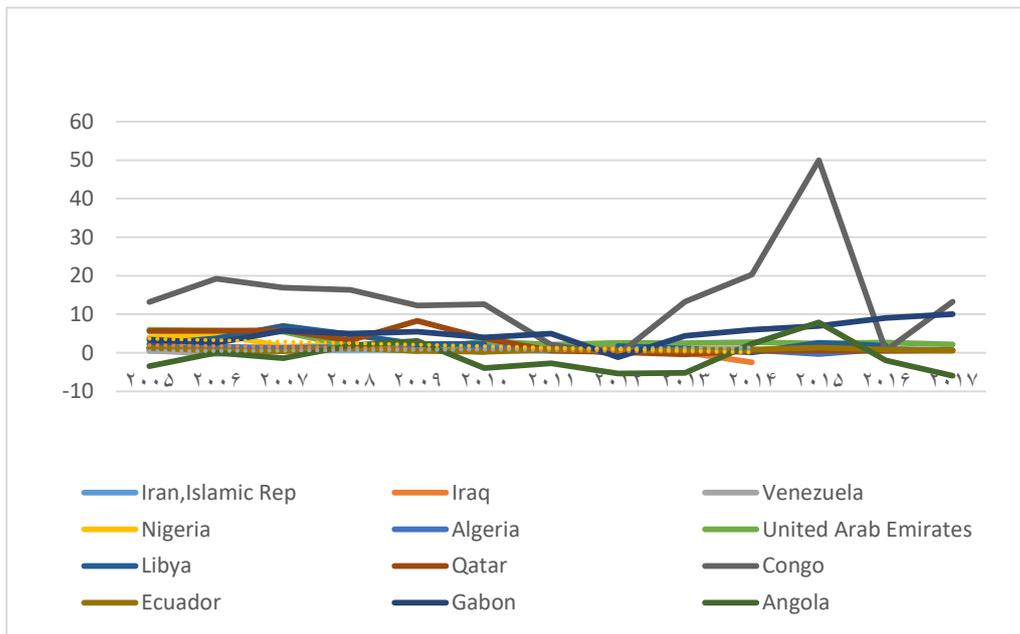


Graph 8. Net Capital Out flow-Shanghai organization (% of GDP)

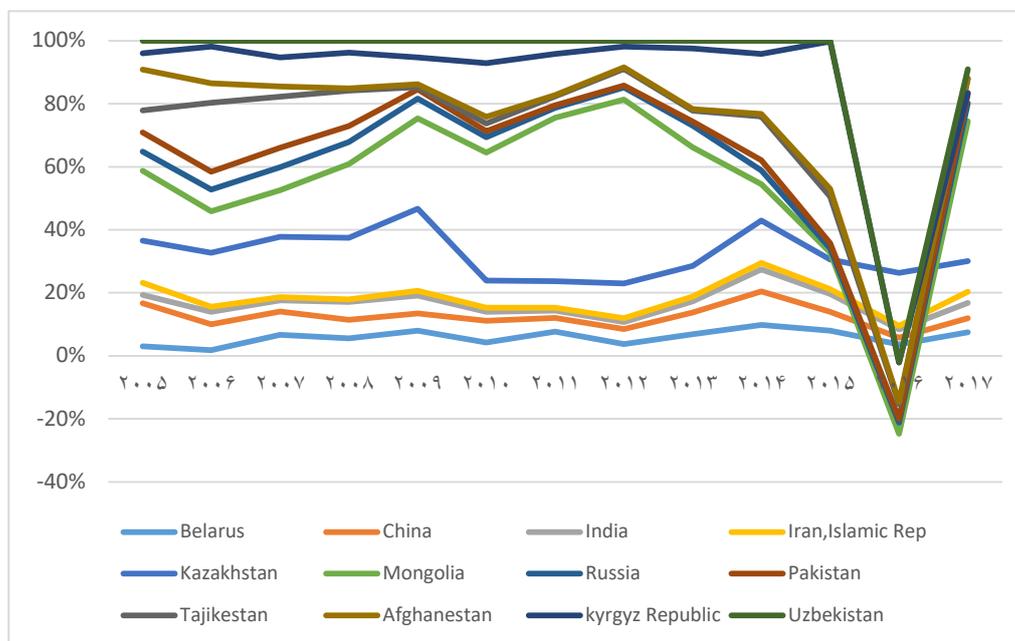


Source: World Bank

Graph 9. Net Capital Inflow-OPEC organization (% of GDP)



Graph 10. Net Capital Inflow-Shanghai organization (% of GDP)



Source: World Bank

Based on the graphs above (7 to 10), which represent the capital inflow and out flow in the Shanghai and OPEC countries, capital out flow has faced more fluctuations in the OPEC group, which can be due to the economic and political risks in the Middle East. Furthermore, capital inflow has been lower in OPEC countries and followed a somewhat more stable trend.

Therefore, analysis of significant real variables in the Shanghai and OPEC countries' economies shows that on average, the Shanghai countries have more correspondence, and that they are more homogeneous in terms of real indices.

Data

We included 14 countries from OPEC such as Qatar, Indonesia, Libya, United Arab Emirates, Algeria, Nigeria, Ecuador, Gabon, Angola, Equatorial Guinea and Congo. The SCO comprises eight member states, namely the Republic of India, the Republic of Kazakhstan, the People's Republic of China, the Kyrgyz Republic, the Islamic Republic of Pakistan, the Russian Federation, the Republic of Tajikistan, and the Republic of Uzbekistan.

In order to detect the presence of convergence and co-movements in the financial markets, we employed different series of data between 2005 and 2017. More specifically, we used World Bank yearly data for domestic credit to private sector¹,²Lending interest rate (%), Deposit interest rate (%), Stocks traded, total value (% of GDP) to analyze financial convergence in money and capital market between Iran and OPEC- Shanghai groups.

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Empirical results

Table 1 presents the results of the club clustering tests for financial markets within

OPEC and table 2 shows the result of the Shanghai estimation. We must first emphasize that the null hypothesis of convergence in the whole sample is rejected at the 5% level for all the analyzed indicators and the t -statistic of is below the critical value of -1.65 in all cases. Given the absence of convergence, we applied the PS methodology to test if different countries converge to multiple steady-state equilibrium.

1 Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of no equity securities, and trade credits and other accounts receivable that establish a claim for repayment. For some countries, these claims include credit to public enterprises.

2 Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.

It should be noted that the values provide important information on the speed of convergence. Thus, the higher the value of \hat{b} , the higher the rate of convergence. At the same time, the value of \hat{b} allows us to distinguish between different degrees of convergence. $0 < \hat{b} < 2$, this implies convergence in rates (i.e. relative convergence), while $\hat{b} \geq 2$ indicates convergence in levels (i.e. absolute convergence)

Table1. Convergence club classification for OPEC financial markets

| Club | countries | tb | \hat{b} |
|---|---|--------|-----------|
| Money market | | | |
| Domestic credit to private sector by banks (% of GDP) | | -0/33 | •/•• |
| Club1 | Algeria, Equatorial Guinea, Gabon, Libya, Nigeria, Ecuador, Venezuela RB, Indonesia, Iran Islamic Rep, Saudi Arabia | •/•• | •/•• |
| Not convergent Group 2 | Emirate, Kuwait | | |
| Lending interest rate (%) | | | |
| Club1 | Iran Islamic Rep, Iraq, Nigeria | •/•• | •/•• |
| Not convergent Group 2 | Algeria Indonesia Kuwait. Qatar Venezuela RB | -•/•• | -•/•• |
| Deposit interest rate (%) | | | |
| Club1 | Iran Islamic Rep Venezuela RB | -•/•• | -•/•• |
| Club2 | Iraq ,Nigeria | -•/•• | -•/•• |
| Club3 | Equatorial, Indonesia | •/•• | •/•• |
| Club4 | Guinea, Gabon, Libya, | -•/•• | -•/•• |
| Club5 | Kuwait ,Qatar ,Algeria | •/•• | •/•• |
| Club1+ Club2 | 4 | -••/•• | -•/•• |
| Club2+ Club3 | 4 | -••/•• | -•/•• |
| Club3+ Club4 | 5 | -••/•• | -•/•• |
| Club4+ Club5 | 6 | -••/•• | -•/•• |
| Stock market | | | |
| Stocks traded, total value (% of GDP) | | -••/•• | -•/•• |
| Club1 | Iran Islamic Rep, Saudi Arabia, Emirate | -•/•• | -•/•• |
| Not convergent Group 2 | Nigeria, Qatar | -••/•• | -•/•• |

Note: The null hypothesis of convergence is rejected at the 5% level if $tb < 1.65$

Table 2. Convergence club classification for Shanghai financial markets

| Club | countries | t_b | \hat{b} |
|---|---|------------|-------------|
| Money market | | | |
| Domestic credit to private sector by banks (% of GDP) | | -16/40 | -1/23 |
| Club1 | India, Mongolia, Russian Federation | 3 /44 | 1 /48 |
| Club2 | Iran, Islamic Rep, Belarus, Kazakhstan, Kyrgyz Republic, Pakistan, Tajikistan | 9 /01 | 0 /74 |
| Not convergent Group 3 | China | -239/29 | -1/57 |
| Club1 + Club2 | | -22/82 | -0/74 |
| Club2 + Group3 | | -65/08 | -1/20 |
| Lending interest rate (%) | | | |
| Club1 | Belarus, Iran Islamic Rep, Mongolia, Tajikistan | 1/58 | 1/7 |
| Not convergent Group 2 | Pakistan, China, India | -208/91 | -1/36 |
| Deposit interest rate (%) | | | |
| Club1 | Belarus, Iran Islamic Rep | -3/95 | 1/57 |
| Club2 | Pakistan, Tajikistan | -2/25 | -0/75 |
| Club3 | China Kyrgyz Republic | -0/43 | -0/20 |
| Club1+ Club2 | 4 | 1/53 -2 | 1/66 -22 |
| Club2+ Club3 | 4 | -1/01 | -28/20 |
| Stock market | | | |
| Stocks traded, total value (% of GDP) | | -30/91 | -2/54 |
| Club1 | Iran Islamic Rep, Russian Federation | 3/44 | 1/30 |
| Not convergent Group 2 | China, India, Kyrgyz Republic Pakistan | -47/48 | -2/94 |

Note: The null hypothesis of convergence is rejected at the 5% level if $t_b < 1.65$

Convergence of money markets in OPEC & the Shanghai organizations

Domestic credit to the private sector by banks actually demonstrates the banking sector depth. The banking sector can ensure efficient allocation of resources by transferring deposits they have collected to the necessary sectors of an economy. Credit is “one of the most critical mechanisms we have for allocating resources” (Cecchetti and Schoenholtz, 2011). Therefore, analyzing this variable between countries helps us determine the banking sector depth.

The core group for Domestic credit to private sector by banks in OPEC includes only Algeria, Equatorial Guinea, Gabon, Libya, Nigeria, Ecuador, the Bolivarian Republic of Venezuela, Indonesia, the Islamic Republic of Iran, and Saudi Arabia. In Shanghai, Iran has convergence with India, Mongolia, and the Russian Federation. As the value of b^{\wedge} is 48/1 in the Shanghai organization, the speed of convergence in Iran’s integrated club in the Shanghai group is higher than that of OPEC (0.02) for domestic credit to private sector by bank.

As mentioned before, the domestic credit to private sector by banks variable demonstrates the depth and share of money market in the economy. Analyzing the results reveals that countries which are in a convergent group in terms of lending and depositing interest rates, are also convergent in this variable, which shows the similarity between their infrastructures and banking sector depth.

As seen in table 1, estimated results for lending and deposit interest rates show that Iran has convergence with Venezuela RB in deposit interest rate and with Iraq and Nigeria in lending interest rate. Furthermore, these countries (Iran, Venezuela RB, Iraq & Nigeria) have a potential to connect with each other and create a convergence club in deposit interest rate. In the Shanghai group (table2), the core club includes Iran, Belarus, Mongolia, and Tajikistan, among which Iran has convergence with Tajikistan, Belarus, and Mongolia in lending interest rate and with Belarus in deposit interest rate.

Based on tables 1 and 2, and a comparison of convergence speeds between Iran and OPEC, and the Shanghai group, it is evident that the convergence speed in the money market between Iran and countries convergent with it is higher in the Shanghai group.

In order to analyze and justify convergence between countries, we need to assess their trade and financial relations first.

Table 11. Iran & Nigeria trade value

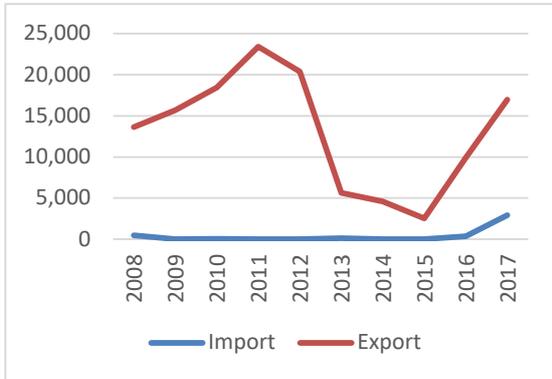
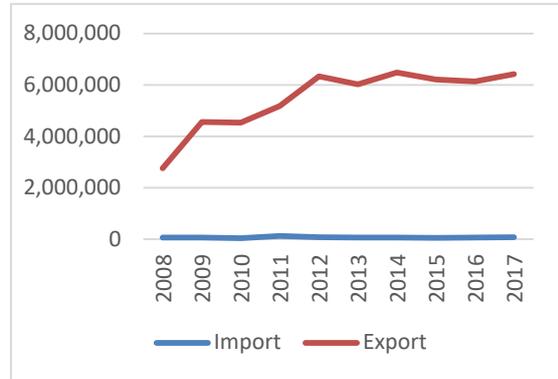


Table 12. Iran & Iraq trade value



Source: Trade map

Table 13. Iran & Venezuela trade value

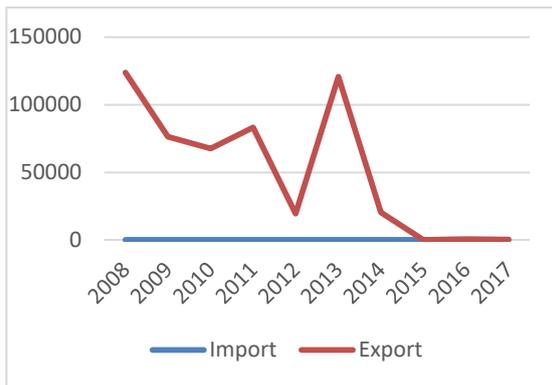
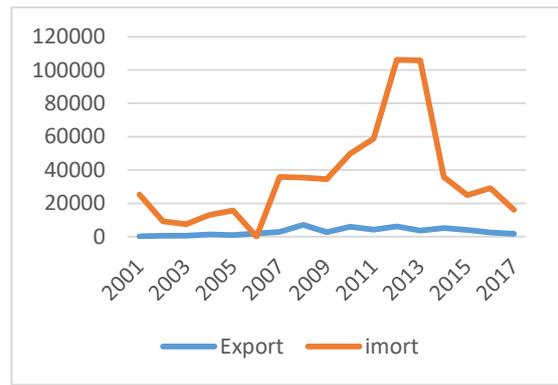


Table 14. Iran & Blarus trade value



Source: Trade map

Table 15. Iran & Tajikistan trade value

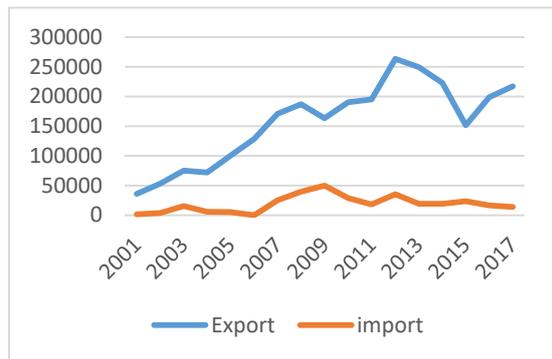


Table 16. Iran & Mongolia trade value



Source: Trade map

As evident in the tables related to trade value between Iran and other countries in the convergence club (tables 11 to 17), trade relations, which are the prerequisites of convergence, exist between these countries.

In order to analyze the necessary conditions, we need to analyze the money market and the significant variables in this market. In this section, in order to analyze the behavior of the selected variable and their progression trend, we have employed the Hodrick and Prescott filter introduced for the first time in 2002, which is one of the best ways of separating the long-run trend and behavior of a variable (Hodrick and Prescott, 1980). The results of the HP filter are evident in tables 17 to 24 for each variable and for OPEC and the Shanghai group.⁵

The proportionality of money distribution with the real sector variables demonstrates proper executive policies as well as consistency between different monetary parties such as the central bank, commercial banks, depositors, and loan recipients (Hossein Bazmohammadi, 2013). In case of incontinuity between these parties and inefficient policies, money distribution growth will be accompanied by inflation. Therefore, the inflation variable reflects the effectiveness of the banking system and monetary policies in an economy.

Therefore, inflation is analyzed in the OPEC and Shanghai group in tables 17 and 18. On the other hand, real interest and bank interest rate spreads are other tools for measuring banking system efficiency (Charles Morris, 1998). Real interest rate is defined as the subtraction of the expected inflation rate from nominal interest rate (real interest rate = nominal interest rate – inflation rate) which shows the real value of money. The effect of inflation on nominal interest rate is introduced in the Fisher effect. Negative real interest rate in consecutive years is an evidence of financial repression. The issue of financial repression was introduced by Mckinnon and Shaw in 1973. This hypothesis claims that factors such as defining highest and lowest bank interest rate, government ownership in banks or credit institutions, imposing restrictions on financial transactions between countries, setting restrictive rules and regulations, and creating closer association between governments and banks lead to financial repression (Maraseli and Darvishi, 2008). In communities facing financial repression, people constantly request loans and wait in lines for receiving loans which will not be used for production but for consumption and commerce, and this is why investment rate is low in these countries. Financial

⁵ The data are extracted form the World Bank.

repression in developing countries, especially those with an economy dependent on natural factors revenues, is more evident (Rezaei et al. 2015). In addition to real interest rate, bank interest rate spread reflects the financial system efficiency. Spread rate is defined as the difference between the loan interest rate that a bank charges and deposition interest rate that a bank pays, and negative real interest rate and Bank Interest rate spread fluctuations demonstrate problems in banking systems.

Table 17. Inflation, consumer prices (annual%)-OPEC

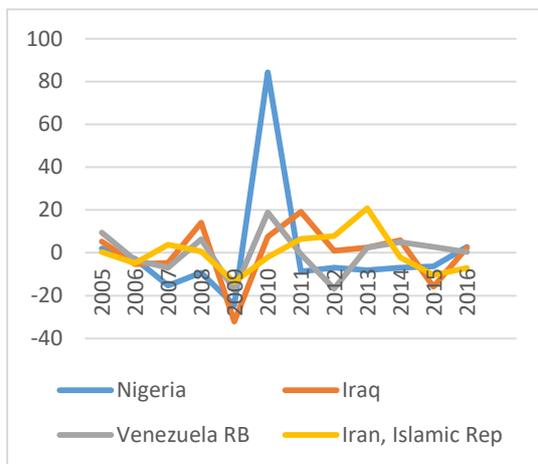


Table 18. Inflation, consumer prices (annual%)-Shanghai

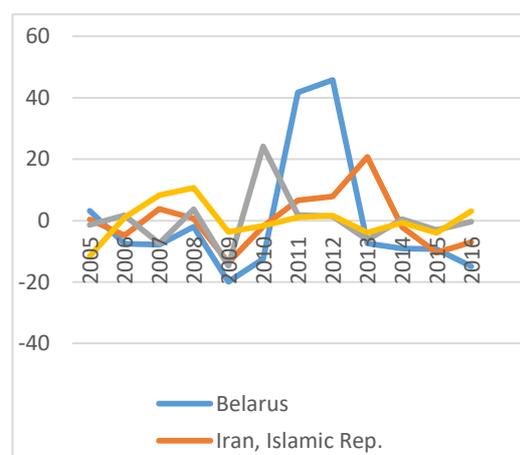


Table 19. Broad Money (%GDP)-OPEC

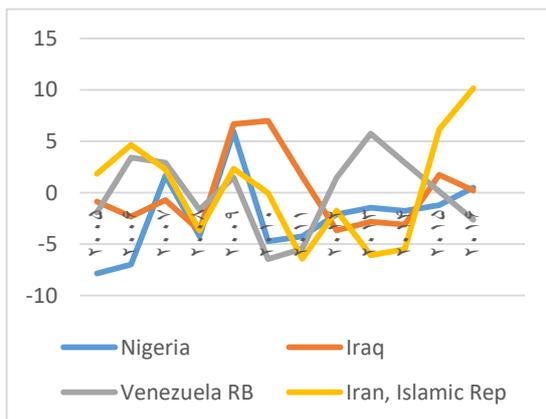
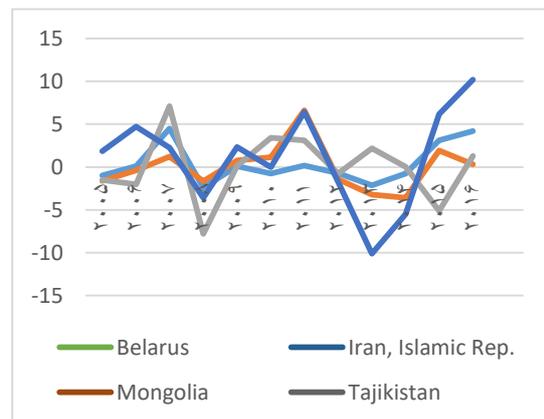


Table 20. Broad Money (%GDP) -Shanghai



Based on the discussion of the importance of the money distribution variable and its connection with the general price level growth, the graphs above show that money distribution growth is evident in countries convergent with Iran, and as these economies are also facing inflation, we can conclude

that money distribution growth has encountered inflation in these countries, which shows weaknesses in executive policies devised by financial institutions to preserve the money value.

Table 21. Real Interest Rate (%) –OPEC

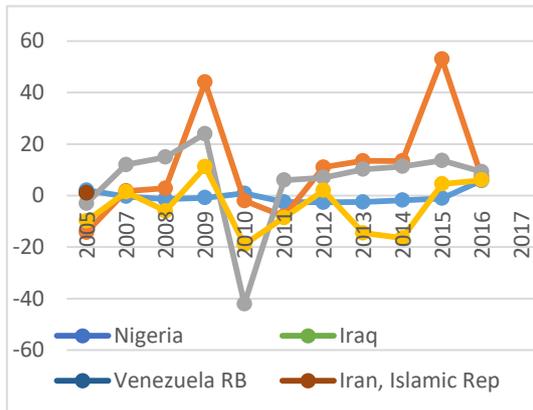


Table 22. Real Interest Rate (%) -Shanghai

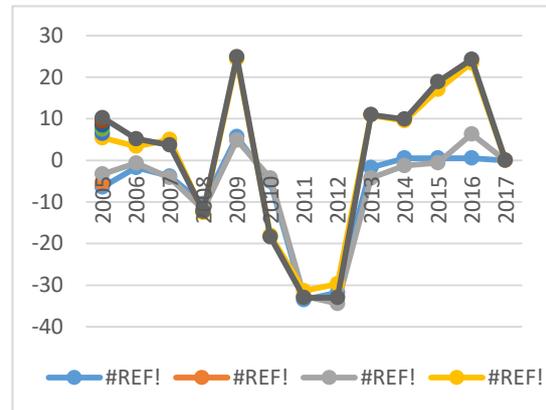


Table 23. Interest rate spread (%)–OPEC

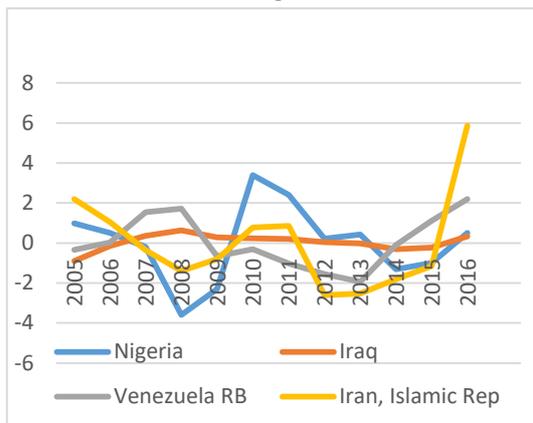
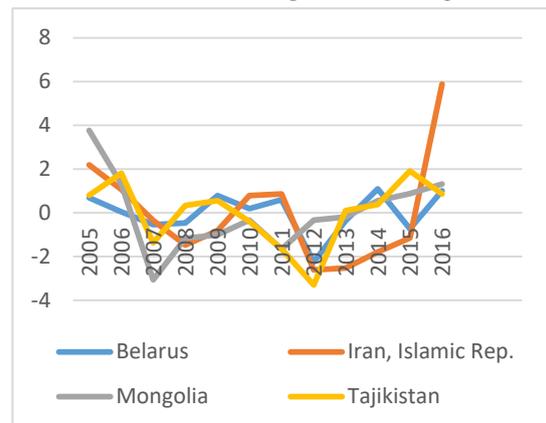


Table 24. Interest rate spread (%)–Shanghai



On the other hand, based on graphs 21 and 22, which represent real interest rates, countries convergent with Iran in both OPEC and the Shanghai group face fluctuations in real interest rate, and financial repression is evident in them. Moreover, bank interest rate spread fluctuations, too, show the inefficiency of the monetary sector in the economy of these countries.

Convergence of stocks markets in OPEC & the Shanghai organizations

Analyses of stocks traded, total value (% of GDP) in OPEC countries show that Iran, Saudi Arabia, & Emirates form an integrated group, and in the Shanghai organization, Iran has convergence with Russia.

The comparison of the convergence speed in the two groups shows that Iran's stock market enjoys a higher convergence in the Shanghai group.

In order to show the reason for this convergence, we should primarily consider their trade value as a necessary condition of convergence and then the degree of oil dependency in these economies and the relationship between their stock market and oil price.

Table 29. Iran & Saudi Arabia trade value

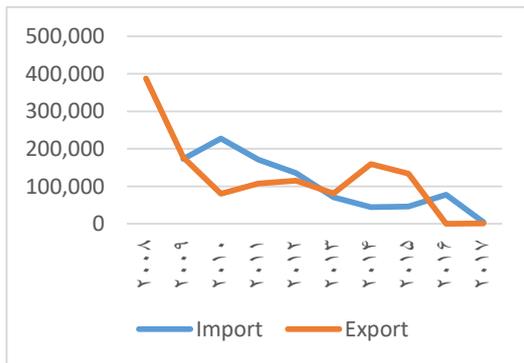


Table 30. Iran & UAE trade value

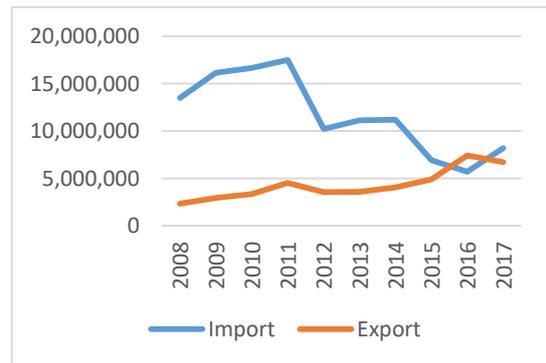
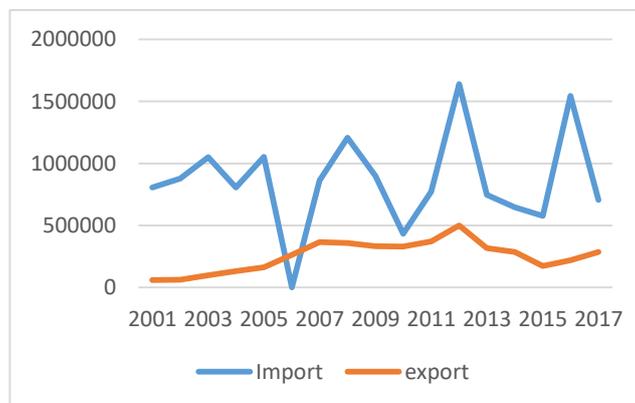


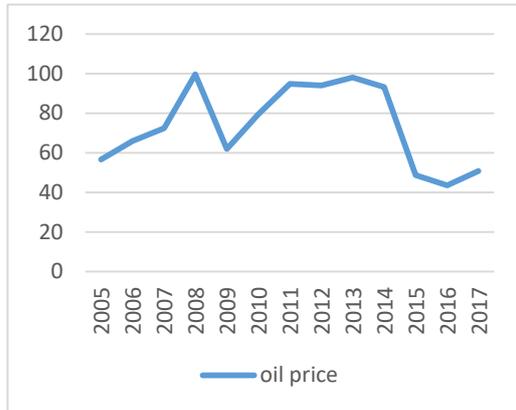
Table 31. Iran & Russia trade value



Source: Trade map

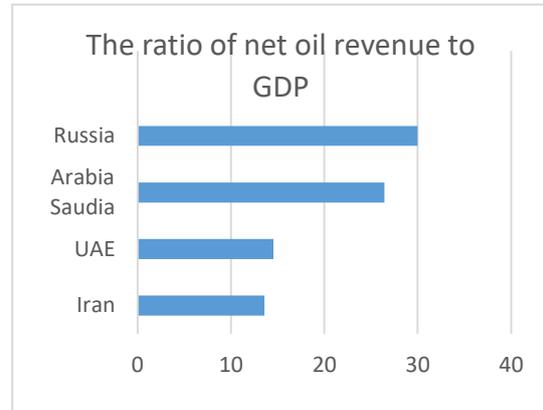
As demonstrated, trade and financial relations are necessary conditions for convergence in this group of countries. Moreover, the GDP of these countries is significantly dependent on oil revenues (graph 33), which means that different markets in these countries such as capital market are dependent on the oil market. Graph 32 represents oil prices from 2005 to 2017, and we can observe the changes in the ratio of stocks traded. In fact, the ratio of stocks traded to GDP in capital markets of the convergent countries is dependent on oil price.

Table 32. Oil Price



Source: World Bank

Table 33. The ratio of net oil revenue to GDP



Source: tradingeconomics.com

In order to analyze the behavior of stocks traded variable, we extracted the required data from the World Bank website and assessed them using the HP filter.

Table 34. Stocks traded, total value (% of GDP)-OPEC

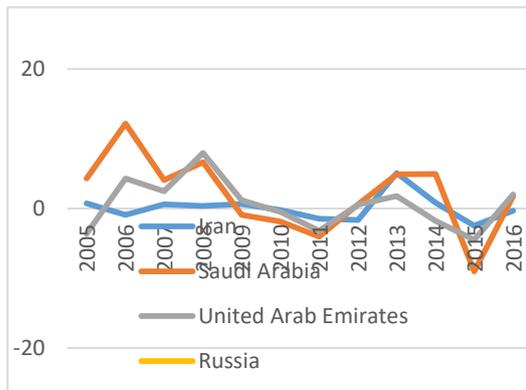
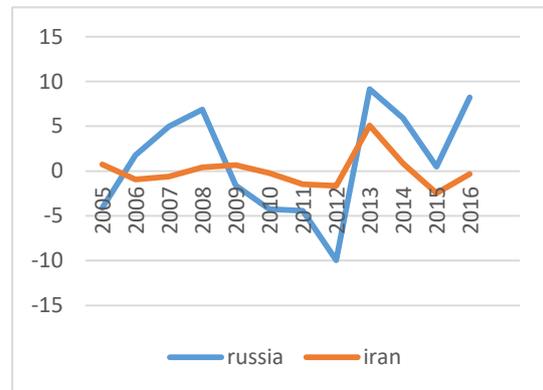


Table 35. Stocks traded, total value (% of GDP)-Shanghai



As represented in graph 34 and 35, the value of traded stocks in convergent countries of the two OPEC and the Shanghai group have had a consistent behavior with the behavior of oil price change. Moreover, based on the degree of dependency between economy and capital market, the dependency degree is higher and effectivity lags are reduced.

Conclusion

1-Understanding financial convergence is of major importance for countries' policymakers. This paper is aimed at investigating the convergence of financial markets in OPEC & the Shanghai Organization between 2005 and 2017. In order to obtain a comprehensive picture of the convergence in the regions, we investigated the money and capital markets. We applied a club clustering algorithm which uses a non-linear single-factor model with common and idiosyncratic components and has an endogenous technological progress, which differs across countries and over time (Phillips and Sul, 2007). The empirical results of this study revealed that the convergence hypothesis for financial markets in OPEC & the Shanghai Organization is rejected for all countries in the panel. The advantage of the employed methodology is that it allows the formation of convergence clubs in which diverse countries converge to different steady-state equilibria.

2-The clustering results show that Iran has formed convergence clubs with Venezuela, Nigeria, and Iraq in OPEC groups, and with Belarus, Mongolia, and Tajikistan in the Shanghai group, in money market and in lending and deposit interest rates. Furthermore, the domestic credit to private sector by banks (% of GDP) variable shows the similarity of money market depths in convergent countries, in such a way that all countries convergent with Iran are in one group regarding interest rate.

Analysis of real variables and money market for justifying the convergence proves that:

Iran had trade relations with all convergent countries, which of course had different values. Moreover, they also had proper political relations.

Iran is convergent with the group of countries, which are middle-ranking in terms of the monetary and financial freedom index, do not enjoy a consistent and stable economic growth and are facing fluctuations in their GDP growth. Moreover, they are facing capital outflow, which can result from political and economic risk in these countries.

a) Countries convergent with Iran, are not in an ideal position in terms of banking system efficiency indices (real interest and bank interest rate spreads) and are facing financial repression and bank interest rate spread fluctuation. Moreover, these countries are facing money distribution growth and inflation, which shows that their monetary policies are not applied properly, and liquidity and general price level stability goals have not been realized.

3-The results of the analysis of the stocks traded, total value (%GDP), variable shows that Iran is convergent with Saudi Arabia and Emirates in the OPEC group, and with Russia in the Shanghai group.

a) The analysis of the capital market of Iran and the convergent countries in both groups shows that Iran has trade relations with all of them. However, these relations have been unsteady due to their political status. Moreover, oil revenues commonality among these countries and dependence of their economies on these revenues have created the ground for convergence in capital markets in such a way that their capital markets are not exceptions. Furthermore, trade value in this market is dependent on oil price fluctuations.

4-Considering the fact that the speed of Iran's convergence with the Shanghai countries is higher, we can state that although the commonality of oil revenues is a factor causing convergence, it could not create the prerequisites for faster convergence, and forming trade groups for trade expansion is a more significant reason for initiation and expansion of financial convergence between countries.

It is clear that financial convergence is a gradual process that requires time to become complete. In order to continue this process, policymakers should adopt measures that will increase financial transparency, improve corporate governance, and strengthen the regulatory framework.

Our findings have important implications both for policymakers and investors. The existence of a highly fragmented financial market with high structural and institutional differences suggests the need for measures that will increase financial convergence between OPEC & the Shanghai Organization owing to rich higher economic growth in both regions. There are at least three key channels of transmission to growth. First, integration may stimulate capital accumulation through financial deepening in the host country. If capital is brought from outside, competition among financial institutions can be enhanced, particularly when the domestic financial sector contains few institutions and maintains high spreads between borrowing and lending rates; and economies of scale can be exploited by pooling larger amounts of savings. Second better resource allocation and importation of technology and knowledge may create opportunities for efficiency gains, and boost productivity, which is another source of growth.

Third, financial integration can also promote growth indirectly by exposing policy decisions and corporate actions to greater financial market scrutiny. Furthermore regional financial integration can bring a number of additional benefits for both the home and host countries:

- Cross-border financial activity (bank and nonbank) both follows and can be followed by cross-border trade, and thus could help foster wider regional economic integration.

- Regional banks (robustly supervised with sufficient high quality capital to support their cross border operations) and regional markets may have a better understanding of regional needs than global institutions. They may be able to provide expertise particularly suited to the host country, such as in the area of improving financial inclusion. The importance of commodity exports across the region is also fertile ground for transplanting expertise in trade and industrial credit.

- Regional integration can also alleviate the pressure on domestic markets arising from the significant growth of the non-bank financial sector (particularly pension funds) in recent years.

- Almost most of OPEC & the Shanghai Organization countries currently face the urgent need to improve their physical infrastructure. However, upgrades to logistics and transport infrastructure typically require sizeable investments, necessitating deep and well-developed financial markets. Moreover, the cooperation and coordination among financial authorities in these regions should be strengthened.

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