How Has coronavirus Outbreak Affected Regional Energy Integration? Lessons and Recommendations for Iran

Ehsan Rasoulinezhad

Assistant Professor, University of Tehran, Email: e.rasoulinezhad@ut.ac.ir

ABSTRACT

Making an agreement between Iran and an integrated countries bloc like Shanghai Cooperation Organization or Eurasian Economic Union to boost energy trade is considered as an efficient factor to improve multilateralism and regionalism of Iranian economy. However, the outbreak of COVID-19 has had caused serious and unprecedented consequences on globalization and regionalization. This research seeks to find out the relationship between COVID19 and regional energy integration for two cases of South Asia and the Eurasian Economic Union (EEU). To estimate the coefficients of variables, the panel data framework based on quarterly data over 2010Q1-2020Q2 is employed. The major results reveal that the COVID19 pandemic is found to be a serious challenge for regional energy integration in these two unions, particularly the integration of larger economies which are more developed and have a higher level of trade liberalization are disturbed by this pandemic. A policy implication based on the conclusions is that Iran may try to make regional energy integration with its neighbors and trading partners. However, to reduce the long-run negative impacts of pandemic, Iran and its energy trade partners should make a plan to determine types and magnitudes of negative impacts of pandemic, regulating monetary and fiscal policies to encounter with the negative influences. To the best of author's knowledge, despite some earlier researches in related to the effects of Corona on macroeconomic variables in different countries and regions, there is not any existing literature focusing on how the Corona affects the economic integration. Therefore, this paper tries to fill in this literature gap.

1. Introduction

The COVID19 pandemic has become one of the main global economic challenges and has affected harshly on many economic aspects of all countries in the world. Gopalan and Misra (2020) argued that this pandemic has affected all segments in economy and generated a domino effect on other aspects of society such as health and welfare. Therefore, it can be pointed out that the world economy is experiencing a new and unpredictable economic phenomenon that, on the one hand, all countries are dealing with, and on the other hand, it has challenged some accepted economic thinking.

One of the most important economic issues challenged by the Corona virus is economic convergence and globalization. Dunford and Qi (2020) believe that the pandemic encourages countries in the world to a transformation, nationalism, de-liberalism and even de-globalization. The global trade volumes between nations as an index for globalization fell by approximately 13%-32% in 2020 (WTO, 2020), meaning the negative effects of this pandemic on trade activities among countries. Yaya et al. (2020) declared that under the COVID19, countries are trying to limit their foreign trade and flows of people in order to lower economic vulnerability.

This unavoidable limitation on economic integration and globalization due to the pandemic disrupts macroeconomic variables of countries. Holod and Reed III (2004) argue that economic integration is a reliable way to reach a stable and positive economic growth. In other study, Kreinin and Plummer (1992) express that economic integration can improve the global quality of industrial productions. Furthermore, economic integration can help the countries to reduce poverty and increase welfare (e.g. see Goto and Hamada 1998; Behrens et al. 2007; Stal and Zuberi 2010; Nissanke and Thorbecke 2010 and Le Goff and Singh 2014).

Iran as a developing and oil-based economy is experiencing the double jeopardy of western sanctions and pandemic, the two exogenous factors that have slowed the process of economic globalization of this country. Eurasian Economic Union (Iran has a free trade agreement with this economic union since 2018) and South Asia (Iran has common border and sea transportation routes with this Asian region) are two cases with huge potential to make energy trade integration with Iran. According to Bagherian and Mehranzamir (2020), energy integration is a process to go to reach a higher cooperation and trade level in the field of renewable and non-renewable energy sources among integrated countries. This kind of integration would be addressed as an efficient tool to boost the regionalization and multilateralism of economy of Iran under unfair sanctions of western bloc and the negative consequences of pandemic. Moreover, Eurasian Union has a vision to establish a common market in the oil, gas and electricity (Mostafa and Mahmood, 2018) which help the members to engage in an integrated energy market to provide their consuming energy and sell their produced energy sources. Similarly, South Asian countries locating in a region of different climate conditions (Shukla et al. 2017) have sought to have energy market integration to make a more affordable and favorable energy prices in their market (Murshed, 2021).

The potential advantages of energy convergence and the existence of threats of COVID19 as a major challenge for global economy encourage and motivate me to do this research. On the one hand, Iran needs to boost level of economic convergence to reach a higher rate of economic growth and development, and on the other hand, it has to carry out different economic policies of protectionism to control the greater prevalence of the Corona. Therefore, the Corona-energy integration paradox needs further investigation with real data.

The paradox of the Corona-energy integration is the main purpose of this research for two cases of member states of the Eurasian Economic Union (EEU) and the South Asia region which have been trying to boost their level of economic integration with other countries in the world.

To the best of author's knowledge, despite some earlier researches in related to the effects of Corona and energy integration in different countries and regions, there is not any existing literature focusing on how the Corona affects the energy trade integration. Therefore, this paper tries to fill in this literature gap.

This paper is organized as follows: The literature gap that the paper wants to fill it in is discussed in Section 2. Next, data description and research methodology are represented. Section 4 argues the empirical results and the final Section concludes the paper with some insights for policy makers.

2. Literature review

To explore the literature gap, the existing studies can be classified into two strands. The first strand focuses on investigating the effects of the COVID19 on different economic aspects, whereas the second strand of literature concentrates on advantages of energy integration.

The first strand of literature consists of studies about the direct and indirect impacts of the coronavirus outbreak on economic aspects of countries. Nicola et al. (2020) explore the socio-economic impacts of the Coronavirus on global economy. They concluded that te pandemic increases the rate of poverty and unemployment leading to demand decrease in commodities market. In other study, Laing (2020) argues that impacts of COVID19 on industrial sector are so huge due to the decrease in demand side of industrial commodities market. This argument is in line with the findings of Shafii et al. (2020) who found out the negative impact of COVID19 on enterprises of Pakistan. Dunford and Qi (2020) define the COVID19 as a major reason to change the global order and de-liberalism. Chakraborty and Maity (2020)'s finding proves the role of the pandemic on change of global environment and human civilization. Brakman et al. (2020) and Schindler et al. (2020) discuss that the pandemic has serious effects on regional and global economic geography, leading to de-globalization of nations. Yaya et al. (2020) explain that de-globalization under the pandemic is due to the spread of uncertainty in economic and political relationship among nations. In other study, Kobrin (2020) argues that the pandemic increases the income

inequality and decrease the population mobility among countries which are two main signals for de-globalization. Gereffi (2020) points out that market failure and protectionism are the main causes of divergence between countries under pandemic circumstances. The concluding remarks of Elliott et al. (2020) reveal that the pandemic easily has lowered international cooperation chain meaning the new concept of divergence of countries. Moreover, Howard (2021) expresses that the pandemic has changes the consumers' tendencies to buy goods and services pivoting global economy to divergence.

The second strand of literature includes the studies relating to the economic and energy integration among countries. Sand-Zantman (2004), Dobrescu and Dobre (2014) and Geda and Hussein Seid (2015) argue that political interests can make strong regional economic communities which cannot be broken by any unpredicted economic phenomenon. Gancia et al. (2020) believe that trade flows are the main necessity of establishing an economic union. A more trade between member states of an economic union ensures the stability of union's structure in future. In other study, Basnet and Pradhan (2017) conclude that economic size, investment, trade flows, exchange rate and interest rate are variables that built the structure of economic integration between countries. In addition, Micallef (2020) believes that strong economic growth may be a major reason to reach a high rate of economic convergence. Taghizadeh-Hesary et al. (2020) propose the concept of "unity in diversity" as a policy to make a reliable regional economic integration. Thoumi (1989) expresses that economic integration depends highly on economic size and geographical distance. This expression is in line with Poulson (1990) and Rasoulinezhad (2017) who emphasize on impacts of integration on different macroeconomic variables. Chisik (2012) depicts that production with a higher quality and a better marketing may lead to a more appropriate structure of economic integration. Regarding the EEU member states, Rasoulinezhad (2020) focuses on impacts of energy trade on economic integration of the Commonwealth of Independent States (CIS) and concludes that since the CIS member states have almost comparative advantages in mineral resources and fossil fuels, they can improve their economic integration via trade I mineral resources and fossil fuels. Bagherian and Mehranzamir (2020) argue that energy integration can boost the process of energy transformation worldwide as an efficient policy to combat with environmental pollution.

3. Data and model specification

A vast number of scholars on energy, such as Peng et al. (2006), Rasoulinezhad (2017), Geldi (2012), He et al. (2018) and Van Tran et al. (2019) among others, included labour quality, difference in income, bilateral exchange rate, inflation rate, economic growth, trade openness in their empirical estimations to study the impact of these independent variables on different aspects of economic integration. Their major findings generally depicted that these independent variables are statistically significant and have impact on energy aspects. Hence to be consistent with the earlier studies, our econometric model by adding the COVID19 variable, takes the following equation:

ETI = f (LQ, DI, EXC, INF, GRO, TO, COVID)   (1)

Eq (1) expresses that energy trade integration (ETI) is a function of labour quality (LQ), difference in income (DI), bilateral exchange rate (EXC), inflation rate (INF), economic growth (GRO), trade openness (TO) and the dummy variable of COVID19 pandemic (COVID).

Since our samples are two panels of South Asian countries and Eurasian Economic Union (EEU), Eq (1) can be written as Eq (2) and (3):

Model I: South Asian energy integration

$$LETI_{i,t} = \alpha_0 + \alpha_1 LLQ_{i,t} + \alpha_2 LDI_{i,t} + \alpha_3 LEXC_{i,t} + \alpha_4 LINF_{i,t} + \alpha_5 LGRO_{i,t} + \alpha_6 LTO_{i,t} + \alpha_7 COVID_{i,t} + \varepsilon_{i,t}$$ (2)

Model II: EEU energy integration

$$LETI_{i,t} = \beta_0 + \beta_1 LLQ_{i,t} + \beta_2 LDI_{i,t} + \beta_3 LEXC_{i,t} + \beta_4 LINF_{i,t} + \beta_5 LGRO_{i,t} + \beta_6 LTO_{i,t} + \beta_7 COVID_{i,t} + \varepsilon_{i,t}$$ (3)

The data for the variables in Eq (2) and (3) are gathered from QSPD (Quarterly Public Sector Debt) database, Trade Map Quarterly time series and Statistics and Research Coronavirus pandemic (https://ourworldindata.org/coronavirus#coronavirus-country-profiles) and cover the period of 2010Q1-2020Q1 due to the reason of data availability. The variables used are energy trade (HS code 27), economic growth (%), official exchange rate (LCU per US $), dependency ratio (% of working-age population) as a proxy for labour quality, inflation rate (%), differences in per capita income (current US $), trade openness (the sum of a country's trade (commodities except energy sources) as a share of country's GDP in %) and a dummy variable of coronavirus pandemic (it takes 1 in first and

second quarters of 2020, otherwise zero in other quarters). The specific samples for this study include 5 Eurasian Economic Union's member states (i.e. Russia, Kyrgyz Republic, Kazakhstan, Belarus and Armenia) and 8 South Asian countries (Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan and Sri Lanka).

The expected signs of our variables are shown in Table 1. The difference in income is expected to have positive impact due to the Heckscher-Ohlin (H-O) theory emphasizing on the fact that countries with dissimilar incomes may have a higher trade interaction with each other (Rasoulinezhad, 2016 and 2018; Fu et al. 2020). Furthermore, there is an expectation of negative signs for inflation rate and bilateral exchange rate. This expectation is in line with a number of existing studies such as Watson (2016) and Khalighi and Shoukat Fadaei (2017). Moreover, a higher rate of labour quality, trade openness and economic growth is expected to have positive sign in our estimated model, while coronavirus may have negative impact on energy integration of South Asia region and EEU due to the policy of protectionism by states and lockdown to reduce the spread of pandemic.

Table 1: Expected signs of coefficients

Variable	Expected sign
Difference in income	+
Inflation rate	-
Bilateral exchange rate	-
Labour quality	+
Trade openness	+
Economic growth	+
Coronavirus pandemic	-

For estimating coefficients, it is necessary to check the preliminary tests. The first test is checking the existence of cross-sectional dependence among countries. Since the paper considers countries from economic unions, they have the same economic cooperation representing the probability of presence of cross-sectional dependency. To check it, the statistic of Pesaran (2004) 's test with H0 of no cross-sectional dependence, written in Eq (4) is applied. In addition, in order to do robustness checking, the Breush-Pagan (1980)'s CD test is carried out to ensure the reliability of cross-sectional dependency test.

$$Pesaran\ CD\ test = \sqrt{\frac{2T}{N(N-1)}}(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}) \quad (4)$$

$$Breusch - Pagan\ CD\ test = T\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}^2 \quad (5)$$

In Eq. (4), $\hat{\rho}_{ij}$ denotes correlation between the residuals. Next, the heterogeneity of the cross-sectional units should be explored by the slope homogeneity test. In this paper, Pesaran and Yamagata (2008) 's test based on two statistics represented in Eq. (6) and (7) is applied to check the slope homogeneity.

$$\hat{\Delta} = \sqrt{N}(\frac{N^{-1}\tilde{S}-k}{\sqrt{2k}}) \quad (6)$$

$$\hat{\Delta}_{adj} = \sqrt{N}(\frac{N^{-1}\tilde{S}-E(\tilde{z}_{it})}{\sqrt{var(\tilde{z}_{it})}}) \quad (7)$$

After that, the stationarity of variables should be checked. The Cross-Sectionally Augmented Dickey Fuller (CADF) (Eq. 5) proposed by Pesaran (2007) is carried out here which considers the cross-sectional dependency among countries. If the results of panel unit root test prove the existence of integration of series, we can perform panel cointegration test. To this end, the Westerlund and Edgerton (2007)' LM panel cointegration test with the following statistic (H0: there is cointegration) is conducted.

$$LM_N^+ = \frac{1}{NT^2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{w}^{-2}_i s_{it}^2 \quad (8)$$

In Eq (5), s_{it}^2 and $⟦w^2⟧_i$ represent the partial sums and long-run variances of residuals, repsectively. Next step is to estimate the long-run coefficients of variables which is done by AMG (Augmented Mean Group) estimators proposed by Eberhardt and Bond (2009).

4. Results and discussion

The first step before running the estimation is to find out the presence of cross-sections among series and slope homogeneity test. The findings of these two tests, reported in Tables 2 and 3, depict that there exists cross-sectional dependence in all series and also the coefficients of the units are heterogeneous.

Table 2: Results of cross-sectional dependence test

Sample	Variables	Bruesh-Pagan CD test	Pesaran CD test
Panel of EEU members	Energy integration	152.810*	28.903*
	Difference in income	161.482*	35.229*
	Inflation rate	68.848*	12.105*
	Bilateral exchange rate	130.192*	25.727*
	Labour quality	201.588*	41.692*
	Trade openness	178.492*	31.903*
	Economic growth	211.092*	46.355*
Panel of South Asian countries	Energy integration	142.493*	25.943*
	Difference in income	123.892*	24.110*
	Inflation rate	150.017*	26.511*
	Bilateral exchange rate	211.660*	40.101*
	Labour quality	129.493*	24.092*
	Trade openness	148.065*	30.770*
	Economic growth	63.594*	13.155*

Note 1: * denotes the H0 rejection at the 5% significance level
Note 2: all variables are considered in the logarithmic form
Source: Author's compilation

Table 3. Results of cross-sectional dependence test

Sample	Tests	Stat.	Prob.
Panel of EEU members	$\tilde{\Delta}$	13.116*	0.00
	$\tilde{\Delta}_{adj}$	19.498*	0.00
Panel of South Asian countries	$\tilde{\Delta}$	15.044*	0.00
	$\tilde{\Delta}_{adj}$	23.204*	0.00

Note 1: * denotes the H0 rejection at the 5% significance level
Note 2: all variables are considered in the logarithmic form
Source: Author's compilation

Next, the panel unit root test of CIPS is employed to find out whether the series are stationary. The results are listed in Table 4, The findings of the panel unit root test reveal that the series become stationary after the first differences or they are I(1).

Table 4: Results of panel unit root test

Sample	Variables	CIPS panel unit root test	
		At level	**At first differences**
Panel of EEU members	Energy integration	-1.87	-3.690*
	Difference in income	-2.69	-4.173*
	Inflation rate	-0.582	-2.760*
	Bilateral exchange rate	-2.011	-2.544*
	Labour quality	-1.50	-3.950*

Sample	Variables	CIPS panel unit root test	
		At level	**At first differences**
	Trade openness	-0.616	-2.618*
	Economic growth	-1.49	-3.763*
Panel of South Asian countries	Energy integration	-2.16	-5.104*
	Difference in income	-2.59	-4.519*
	Inflation rate	-0.669	-2.493*
	Bilateral exchange rate	-1.49	-3.805*
	Labour quality	-0.793	-2.511*
	Trade openness	-1.90	-3.859*
	Economic growth	-1.59	-3.807*

Note1: * denotes the H0 rejection at the 5% significance level
Note 2: all variables are considered in the logarithmic form
Source: Author's compilation

The results of panel unit root test allow to perform the panel cointegration test. The findings of the Westerlund and Edgerton's LM bootstrap panel cointegration test are reported in Table 5. According to the table, it can be concluded that there exists a long-run linkage between variables.

Table 5: Results of panel cointegration test

Sample	-	LM stat.	Bootstrap prob.
Panel of EEU members	With constant	-1.691	0.977
	With constant and trend	-2.058	0.964
Panel of South Asian countries	With constant	-1.782	0.981
	With constant and trend	-2.194	0.987

Note: The bootstrap is calculated based on 1000 replications
Source: Author's compilation

To explore the coefficients of the long-run relationships between variables, the AMG estimator is employed in this paper which considers heterogeneity and cross-sectional dependency among countries. The results of AMG estimation for the South Asian countries and EEU are represented in Tables 6 and 7 as follows.

According to Table 6, the estimated signs are in line with the expected ones. Labour quality has positive impacts on economic integration of South Asian members particularly the magnitudes of impacts are larger for the bigger economies such as India and Pakistan in this union. In regards to differences in income, the energy integration pattern in South Asia follows the H-O theory declaring that dissimilarity in income per capita is a major reason for dealing trade between countries. Moreover, the bilateral exchange rate and inflation rate have negative impact on energy trade integration of countries in this union. The magnitude of impacts is stronger for larger economies such as India and Pakistan. GDP growth is an accelerator for energy integration in this region. Furthermore, trade liberalization has positive coefficient depicting the positive relationship between trade openness and energy integration in South Asia region. The impact of COVID19 on energy trade integration of countries in this Asian region is found to be negative. The magnitude of negative impact is larger for stronger economies such as India, Pakistan and Bangladesh. For instance, the COVID19 outbreak has decelerated economic integration in India and Pakistan ain by approximately 0.18% ([exp(-0.21)-1]) and 0.17% ([exp(-0.19)-1]), respectively.

Table 6. Results of AMG estimation in regards to South Asia

Country	LLQ	LDI	LEXC	LINF	LGRO	LTO	COVID
Afghanistan	0.04	0.25	-0.08	-0.17	0.03	0.02	-0.02
	(0.00)**	(0.01)**	(0.00)**	(0.04)**	(0.00)**	(0.06)*	(0.00)**
Pakistan	0.41	0.52	-0.32	-0.29	0.41	0.36	-0.19
	(0.01)**	(0.00)**	(0.00)**	(0.01)**	(0.03)**	(0.00)**	(0.00)**
India	0.39	0.49	-0.47	-0.36	0.24	0.27	-0.21
	(0.00)**	(0.05)**	(0.06)*	(0.09)*	(0.01)**	(0.03)**	(0.00)**
Nepal	0.04	0.21	-0.10	-0.05	0.03	0.09	-0.02
	(0.00)**	(0.01)**	(0.00)**	(0.04)**	(0.00)**	(0.00)**	(0.04)**
Bangladesh	0.19	0.45	-0.16	-0.26	0.25	0.21	-0.14
	(0.04)**	(0.06)*	(0.00)**	(0.00)**	(0.02)**	(0.04)**	(0.00)**
Bhutan	0.03	0.09	-0.04	-0.00	0.03	0.09	-0.06
	(0.00)**	(0.00)**	(0.00)**	(0.01)**	(0.00)**	(0.00)**	(0.01)**
Maldives	0.11	0.03	-0.09	-0.09	0.00	0.04	-0.03
	(0.08)*	(0.01)**	(0.07)*	(0.07)*	(0.00)**	(0.00)**	(0.00)**
Sri Lanka	0.00	0.07	-0.05	-0.01	0.04	0.00	-0.05
	(0.01)**	(0.00)**	(0.03)**	(0.00)**	(0.00)**	(0.00)**	(0.01)**

Note 1: LLQ, LDI, LEXC, LINF, LGRO, LTO are logarithmic form of labour quality, difference in income, exchange rate, inflation rate, economic growth and trade openness, respectively. Moreover, COVID denotes the dummy variable of coronavirus outbreak.
Note 2: Numbers in parentheses are p-value. In addition, * and ** are H0 rejection at 1% and 5% of significance levels.
Source: Author's compilation

Regarding the estimation results for Eurasian Economic Union, it can be expressed that labour quality has positive impact on economic integration of all member states of this union. However, this positive impact is stronger for larger economies in this Union such as Russia and Kazakhstan. The main reason is that the economic production in larger economies in this union is labor-intensive than the smallest economies. Moreover, the difference in income shows the positive coefficient meaning that the countries in Eurasian economic union deal in trading with countries those have dissimilar income level. This result proves the existence of H-O theory in economic integration of Eurasian Economic Union. Furthermore, the estimation depicts negative coefficient of bilateral exchange rate pointing out the positive relationship running from depreciation of national currency on economic integration in this union. According to Table 7, the impact of inflation rate on economic integration of all member states in

Eurasian Union is negative and statistically significant meaning that any increase in general price

level of commodities may deaccelerate economic integration process of Eurasian Economic Union member states. In addition, economic growth and trade openness as expected play significant role for accelerating economic integration of the Union's member states.

Regarding to the coefficient of COVID19 variable, the estimation reveals the negative impact of these pandemic on economic integration of Russia, Kazakhstan, Kyrgyz Rep., Belarus and Armenia. As a highlighted point, the finding shows the larger magnitudes of pandemic's negative impact for smaller economies in this Union. Based on coefficients, COVID19 outbreak has deaccelerated economic integration of Russia, Kazakhstan, Kyrgyz Rep., Belarus and Armenia by nearly 0.28%([exp(-0.34)-1]),0.25%([exp(-0.29)-1]), 0.41%([exp(-0.54)-1]), 0.26% ([exp(-0.31)-1]) and 0.47% ([exp(-0.64)-1]), respectively. It proves that all the economic limitations like lockdown and demand shortage disturb more the

economic markets of smaller economies of Eurasian Union.

Table 7: Results of AMG estimation in regards to Model II (Eurasian Economic Union)

Country	LLQ	LDI	LEXC	LINF	LGRO	LTO	COVID
Russia	0.34	0.68	-0.03	-0.14	0.09	0.51	-0.34
	(0.00)**	(0.03)**	(0.02)**	(0.00)**	(0.00)**	(0.09)*	(0.00)**
Kazakhstan	0.25	0.43	-0.00	-0.17	0.23	0.49	-0.29
	(0.00)**	(0.06)*	(0.00)**	(0.04)**	(0.02)**	(0.00)**	(0.01)**
Kyrgyz Rep.	0.04	0.33	-0.25	-0.14	0.01	0.06	-0.54
	(0.00)**	(0.00)**	(0.08)*	(0.03)**	(0.00)**	(0.00)**	(0.06)*
Belarus	0.10	0.39	-0.19	-0.52	0.05	0.19	-0.31
	(0.07)*	(0.00)**	(0.00)**	(0.00)**	(0.06)*	(0.01)**	(0.00)**
Armenia	0.02	0.45	-0.23	-0.42	0.00	0.10	-0.64
	(0.00)**	(0.00)**	(0.02)**	(0.00)**	(0.00)**	(0.00)**	(0.08)**

Note 1: LLQ, LDI, LEXC, LINF, LGRO, LTO are logarithmic form of labour quality, difference in income, exchange rate, inflation rate, economic growth and trade openness, respectively. Moreover, COVID denotes the dummy variable of coronavirus outbreak.

Note 2: Numbers in parentheses are p-value. In addition, * and ** are H0 rejection at 1% and 5% of significance levels.

Source: Author's compilation

5. Conclusions

Energy integration has been considered as one of the main substantial and existing goals of economies in the world. However, since the last of 2019, the unprecedented crisis of COVID19 pandemic has posed a serious challenge to the goal of economic and energy integration. This problem is more considerable for Iran who has been trying to establish and improve a stable and reliable economic integration pace under circumstances of sanctions and the pandemic.

Regarding this problem, the paper seeks to explore the impacts of COVID19 on energy integration in the South Asia and the EEU member states for quarterly data over the period 2010Q1-2020Q2. In doing so, firstly the Breush-Pagan and Pesaran cross-sectional dependence tests and the slope homogeneity test of Pesaran and Yamagata were carried out and then the presence of unit root among series was examined by the Cross-Sectionally Augmented Dickey Fuller (CADF) approach. Next, to explore cointegration among series, the Westerlund and Edgerton (2007)' LM panel cointegration test was performed and finally the long-run relationships were estimated by AMG (Augmented Mean Group) estimators proposed by Eberhardt and Bond (2009).

The main concluding remarks based on the empirical findings are as follows:

i. Labour quality is a major factor to improve energy integration level in South Asia and the EEU. However, the influence of this factor on energy integration is more considerable for larger economies. The key reason is that in the larger economies, high-skilled labor force has play a more significant role in production processes.

ii. The integration pattern in South Asia and the EEU is based on the Heckscher-Ohlin (H-O) theory. In other words, dissimilarity in income per capita motivates the energy trade between member countries in these two unions.

iii. The relationship between official exchange rate and energy integration is found to be negative for both unions, meaning that any depreciation in national currency may accelerate the energy trade between countries.

iv. Inflation is an influential factor on energy integration in the South Asia and EEU. Increase in general price level of commodities in member countries of these two unions may reduce the speed of economic integration.

v. Economic growth and trade liberalization are two significant motivations for energy integration in these

two unions. Hence, any strategies and policies to increase GDP growth and trade openness may lead to stronger energy ties between member states.

vi. The COVID19 pandemic is found to be a serious challenge for energy integration in these two unions, particularly the integration of larger economies which are more developed and have a higher level of trade liberalization are disturbed by this pandemic. The finding of negative impact of the pandemic on economic integration is in line with Brakman et al. (2020), Schindler et al. (2020), Yaya et al. (2020) and Gereffi (2020).

A major policy implication based on the conclusions for Iran is that:

- The country of Iran needs to regulate and make a timeline for managing regionalization and multilateralism in and post-coronavirus periods. Establishing energy integration with regional countries and bloc such as EEU and South Asia is highly recommended due to its impacts on Iran's economic security and economic resilience.
- It is a fact that to overcome the long-run impacts of pandemic, Iran should make a plan to determine types and magnitudes of negative impacts of pandemic, regulating monetary and fiscal policies to reduce the negative impacts. This recommendation is line with the findings of Ahmadyan and Nasr Esfahani (2020) who proved the necessity of efficient policies to combat with negative consequences of COVID-19 on energy sector.
- Another policy implication is that due to the similar conclusions for the South Asian countries and the EEU, Iran can expand its interactions with them to get benefits of more efficient experiences in controlling the pandemic impacts.
- Moreover, to accelerating economic integration, strategies for controlling inflation rate and boosting virtual economy as a major instrument to increase trade openness under the pandemic in Iran is strongly recommended.
- It is an essential policy to boost up cooperation with the South Asia Subregional Economic Cooperation (SASEC) and Eurasian Union where various programs like energy market integration and common energy market are developed gradually.

References

Ahmadyan, A., and Nasr Esfahani, M. 2020. COVID and energy sector in DSGE model. Petroleum Business Review. 4 (4): 43-59.

Bagherian, M., and Mehranzamir, K. 2020. A comprehensive review on renewable energy integration for combined heat and power production. Energy Conversion and Management. 224. https://doi.org/10.1016/j.enconman.2020.113454

Basnet, H., and Pradhan, G. 2017. Regional economic integration in Mercosur: The role of real and financial sectors. Review of Development Finance. 7 (2): 107-119.

Behrens, K., Gaigne, C., Ottaviano, G., and Thisse, J. 2007. Countries, regions and trade: On the welfare impacts of economic integration. European Economic Review. 51 (5): 1277-1301.

Brakman, S., Garretsen, H., and Witteloostuijn, A. 2020. The turn from just-in-time to just-in-case globalization in and after times of COVID-19: An essay on the risk re-appraisal of borders and buffers. Social Sciences & Humanities Open. 2 (1). DOI: https://doi.org/10.1016/j.ssaho.2020.100034

Breusch, T.S., and Pagan, A.R. 1980. The lagrange multiplier test and its applications to model specification in econometrics. The Review of Economic Studies. 47 (1): 239-253.

Chakraborty, I., and Maity, P. 2020. COVID-19 outbreak: Migration, effects on society, global environment and prevention. Science of the Total Environment. 728. DOI: https://doi.org/10.1016/j.scitotenv.2020.138882

Chisik, R. 2012. Trade disputes, quality choice, and economic integration. Journal of International Economics. 88 (1): 47-61.

Dobrescu, E., and Dobre, E. 2014. Theories Regarding the Role of the Growth Poles in the Economic Integration. Procedia Economics and Finance. 8: 262-267.

Dunford, M., and Qi, B. 2020. Global reset: COVID19, systemic rivalry and the global order. Research in

Eberhardt, M., and Bond, S. 2009. Cross-section dependence in nonstationary panel models: A

novel estimator. URL: http://mpra.ub.uni-muenchen.de/17692

EEC.2020. EAEU zeroed duties on goods imported to prevent and avert spreading of coronavirus infection. URL: http://www.eurasiancommission.org/en/nae/news/Pages/25-03-2020-4.aspx [accessed on 30.04.2020]

Elliot, R., Schumacher, I., and Withagen, C. 2020. Suggestions for a Covid-19 Post-Pandemic Research Agenda in Environmental Economics. Environmental and Resource Economics. 76: 1187-1213.

Fu, D., Chen, Y., and Zhang, Y. 2020. Linder hypothsis revisited: Does it hold for services trade? Economics letters. 195. DOI: https://doi.org/10.1016/j.econlet.2020.109469

Gancia, G., Ponzetto, G., and Ventura, J. 2020. A theory of economic unions. Journal of Monetary Economics. 109: 107-127.

Geda, A., and Hussein Seid, E. 2015. The potential for internal trade and regional integration in Africa. Journal of African Trade. 2 (1-2): 19-50.

Geldi, H. 2012. Trade effects of regional integration: A panel cointegration analysis. Economic Modedlling. 29 (5): 1566-1570.

Gerefi, G. 2020. What does the COVID-19 pandemic teach us about global value chains? The case of medical supplies. Journal of International Business Policy. 3: 287-301.

Glencross, A., and McCourt, D. 2018. Living up to a new role in the world: The challenges of Global Britain. Orbis. 62 (4): 582-597.

Gopalan, H.S., and Misra, A. 2020. VOCID19 pandemic and challenges for socio-economic issues, healthcare and national health programs in India. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 14 (5): 757-759.

Goto, J., and Hamada, K. 1998. Economic Integration and the Welfare of Those Who Are Left Behind: An Incentive-Theoretic Approach. Journal of the Japanese and International Economies. 12 (1): 25-48.

He, W., Wang, B., Danish., Wang, Zh. 2018. Economic integration and agglomeration in a middle product economy. Energy Economics. 74: 263-274.

Holod, D., and Reed III, R. 2004. Regional spillovers, economic growth and the effects of economic integration. Economic letters. 85 (1): 35-42.

Howard, M.C. 2021. Who wants to reopen the economy during the COVID-19 pandemic? The daring and uncaring. Personality and Individual Differences. 168. DOI: https://doi.org/10.1016/j.paid.2020.110335

Huh, H., and Park, C. 2020. A new index of globalisation: Measuring impacts of integration on economic growth and income inequality. The World Economy. DOI: https://doi.org/10.1111/twec.12998

Khalighi, L., and Shoukat Fadaei, M. 2017. A study on the effects of exchange rate and foreing policyes on Iranian dates export. Journal of the Saudi Society of Agricultural Sciences. 16 (2): 112-118.

Kobrin, S. 2020. How globalization became a thing that goes bump in the night. Journal of International Business Policy. 3: 280-286.

Laing, T. 2020. The economic impact of the Coronavirus 2019 (Covid-2019): Implications for the mining industry. The Extractive Industries and Society. 7 (2): 580-582.

Le Goff, M., and Singh, R. 2014. Does trade reduce poverty? A view from Africa. Journal of African Trade. 1 (1): 5-14.

Micallef, B. 2020. Real convergence in Malta and in the EU countries after the financial crisis. Journal of Economic Integration. 35 (2): 215-239.

Mostafa, G., and Mahmood, M. 2018. Eurasian Economic Union: Evolution, challenges and possible future directions. Journal of Eurasian Studies. 9 (2): 163-172.

Murshed, M. 2021. Can regional trade integration facilitate renewable energy transition to ensure energy sustainability in South Asia? Energy Reports. 7: 808-821.

Nicola, M., Alsafi, Z., Sohrabi, C., Kerwan, A., Al-Jabir, A., Losifidis, Ch., Agha, M., and Agha, R. 2020. International Journal of Surgery. 78: 185-193.

Nissanke, M., and Thorbecke, E. 2010. Globalization, Poverty, and Inequality in Latin America: Findings from Case Studies. World Development. 38 (6): 797-802.

Peng, Sh., Thisse, J., and Wang, P. 2006. Economic integration and agglomeration in a middle product economy. Journal of Economic Theory. 131 (1): 1-25.

Pesaran, M.H. 2004. General diagnostic tests for cross section dependence to model specification in econometrics. Working paper No. 0435, University of Cambridge.

Pesaran, M.H. 2007. A simple panel unit root test in the presence of cross-section dependence. Journal of Applied Econometrics. 22 (2): 265-312.

Pesaran, M.H., and Yamagata, T. 2008. Testing slope homogeneity in large panels. Journal of Econometrics. 142 (1): 50-93.

Poulson, B.W. 1990. North America: A case for economic integration. North American Review of Economics and Finance. 1 (1): 1-8.

Rasoulinezhad, E. 2016. A panel data analysis of South Korea's trade with OPEC member countries: The Gravity model approach. Iranian Economic Review. 20 (2): 203-224.

Rasoulinezhad, E. 2017. Iran's trade modification under sanctions: An evidence of trade divergence and trade convergence trough the gravity model. Journal of Economic Cooperation and Development. 38 (4): 25-56.

Rasoulinezhad, E. 2018. Do BRICS countries have similar trade integration patterns? Journal of Economic Integration. 33 (1): 1011-1045.

Rasoulinezhad, E. 2020. Energy Trade and Economic Integration between the Commonwealth Independent States and China. Journal of Economic Integration. 35(1): 172-190.

Sand-Zantman, W. 2004. Economic integration and political accountability. European Economic Review. 48 (5): 1001-1025.

Schindler, S., Jepson, N., and Cui, W. 2020. Covid-19, China and the future of global development. Research in Globalization. 2. DOI: https://doi.org/10.1016/j.resglo.2020.100020

Shafi, M., Liu, J., and Ren, W. 2020. Impact of COVID-19 pandemic on micro, small, and medium-sized Enterprises operating in Pakistan. Research in Globalization. 2. DOI: https://doi.org/10.1016/j.resglo.2020.100018

Shukla, A., Sudhakar, K., and Baredar, P. 2017. Renewable energy resources in South Asian countries: Challenges, policy and recommendations. Resource-Efficient Technologies. 3 (3): 342-346.

Stal, G., and Zuberi, D. 2010. Ending the cycle of poverty through socio-economic integration: A comparison of Moving to Opportunity (MTO) in the United States and the Bijlmermeer Revival Project in the Netherlands. Cities. 27 (1):3-12.

Taghizadeh-Hesary, F., Yshino, N., Kim, Ch., and Morgan, P.J. 2020. Regional Economic Integration in Asia: Challenges and Recommended Policies. Journal of Economic Integration. 35 (1): 1-9.

Thoumi, F. 1989. Bilateral trade flows and economic integration in Latin America and the Caribbean. World Development. 17 (3): 421-429.

Van Tran, N., Alauddin, M., and Van Tran, Q. 2019. Labour quality and benefits reaped from global economic integration: An application of dynamic panel SGMM estimators. Economic Analysis and Policy. 63: 92-106.

Watson, A. 2016. Trade openness and inflation: The role of real and nominal price rigidities. Journal of International Money and Finance. 64: 137-169.

Westerlund, J., and Edgerton, D.L. 2007. A panel bootstrap cointegration test. Economics Letters. 97 (3): 185-190.

WTO. Trade set to plunge as COVID-19 pandemic upends global economy. URL: https://www.wto.org/english/news_e/pres20_e/pr855_e.htm [accessed on 30.08.2020]

Yaya, S., Out, A., and Labonte, R. 2020. Globalisation in the time of COVID-19: repositioning Africa to meet the immediate and remote challenges. Globalization and Health. 16. DOI: https://doi.org/10.1186/s12992-020-00581-4