

Energy Trade and Economic Integration between the Commonwealth Independent States and China

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Abstract The main purpose of this study is to conduct the traditional economic, political, and geopolitical factors to uncover the relationship between different factors and the volume of China's energy importing from the Commonwealth of Independent States. We conducted a panel data framework for our sample during the period between 2001 and 2017. My paper's main findings reveal that the economic sizes of Commonwealth of Independent States members have a positive effect on China's energy import flow from the Commonwealth of Independent States. Furthermore, the amount of the Commonwealth of Independent States 's annual energy exports to countries other than China has a significant negative effect on the level of China's energy imports from the Commonwealth of Independent States. In regard to geographic distance, findings showed a negative sign of its coefficient meaning that geographical distance might decelerate energy trade flows running from the Commonwealth of Independent States to China. I also discovered that China's foreign direct investment in Commonwealth of Independent States states might determine and accelerate energy export flows running from the Commonwealth of Independent States to China. Finally, our major findings proved the evidence of a positive relationship between political risk in the Commonwealth of Independent States and the energy importing flows of China.

Keywords: Energy Exports; Influencing Factors, China, the CIS Region.

JEL Classifications: C21, C23, F10, F14

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I. Introduction

Trade is one of the main instruments that can be utilized to promote economic integration between countries. Balwin and Venables (1995) believe that countries can establish significant economic ties through bilateral and multilateral trade. Soete and Van Hove (2017) state that trade flows between countries can mobilize culture, labor, capital, knowledge, etc., which improves economic cooperation and integration.

China is one of the biggest world energy consumers and plays a remarkably important role in global energy trade flows. According to the British Petroleum Energy Outlook of 2018, China's primary-energy consumption increased from 202 million Ton of Oil Equivalent (TOE) in 1970

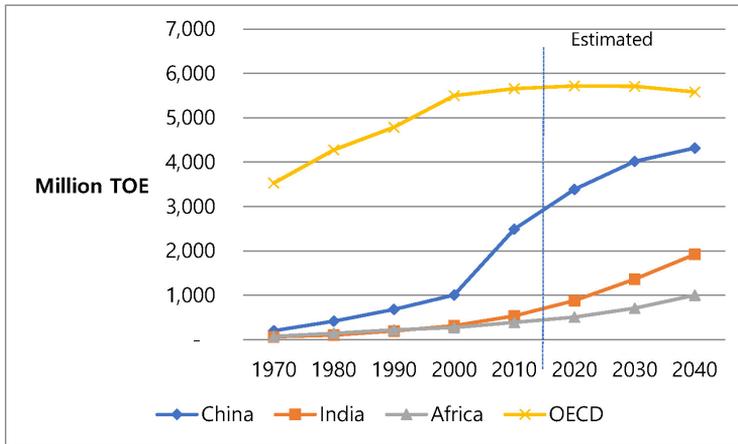
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to 2,491 million TOE in 2010, and it can be predicted that it will rise to over 4,300 million TOE by 2040. Figure 1 presents a comparison between primary-energy consumption in China and various other regions between 1970 and 2040.

Figure 1. Primary-energy consumption by region



(Source) Author's compilation from the British Petroleum Energy Outlook 2018.

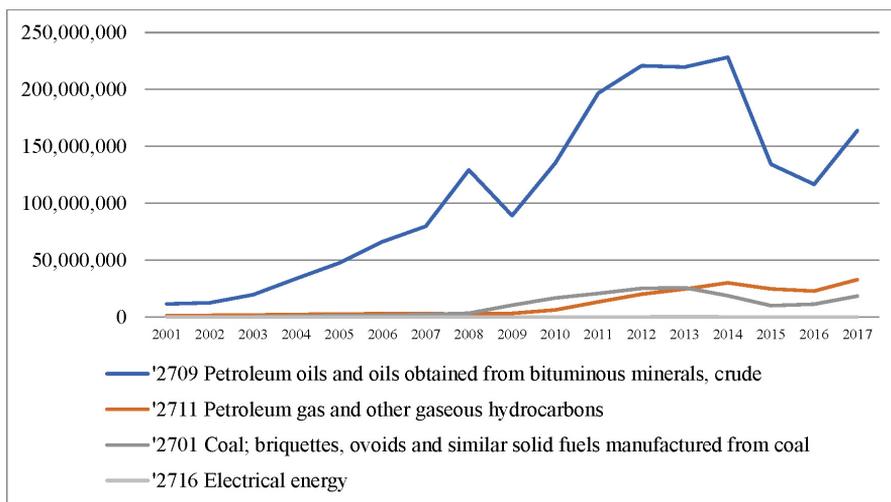
As it is shown in Figure 1, China is experiencing a sharp increase in energy consumption caused by its rapid industrialization and urbanization (Shao *et al.* 2017). The speed of China's industrialization and urbanization has led to an increase in its energy consumption, which has a direct impact on China's dependence on importing energy from different regions. Adams and Shachmurove (2008) argue that by 2020, China will require rapidly increasing imports of oil, coal, and gas. Notably, this growth in energy consumption is not very sensitive to China's rate of economic growth.

On the basis of Figure 2, according to the Trade Map database, China's energy import volume in four primary-energy harmonized codes (2709, 2711, 2701, and 2716) increases from 13,227 million US dollars to nearly 215,734 million US dollars, in 2001 and 2017, respectively. Moreover, it can be seen from Figure 2 that crude oil (HS code 2709) makes the largest contribution to China's energy imports volume, whereas electrical energy (HS code 2716) accounts for the lowest share of China's worldwide energy imports.

Among all energy producers, as a large, potential, nonrenewable energy exporter, the Commonwealth of Independent States (CIS)-which was created to manage the collapse of the Soviet Union (Kubicek 2009)-has considerable advantages in conducting energy trade with China. Apergis and Payne (2010) consider the CIS region, dominated by Russia, one of the largest and most influential oil and natural gas exporters in the world, has significant potential to be a reliable energy provider for neighboring energy importers, particularly for China, which shares

a common geographical border with some of the CIS member states (i.e. Russia Kazakhstan Tajikistan and Kyrgyzstan). Furthermore, Chinese energy imports from Central Asia can contribute to increasing Chinese energy security levels as well as those from East Asia. Qiang and Xing-Kaing (2009) discuss Chinese energy strategy, and that diversification of their energy imports from different regions will enable China to shore up its energy security. To this end, the CIS region can become a key player in ensuring China's energy security. This argument aligns with Taghizadeh-Hesary. (2013), Taghizadeh-Hesary *et al.* (2019), and Rasoulinezhad *et al.* (2019), who all mention the importance of diversifying energy imports to ensure energy security in Asia. Consequently, securing the supply of energy might also contribute to increasing agricultural supply and food security (Taghizadeh-Hesary *et al.* 2019), which is an important goal for the current Chinese economy.

Figure 2. Energy imports volume of china, 2001~2017 (in thousands of US dollars)



(Source) Author's compilation from TradeMap.

Table 1 reports statistics regarding energy trade flows running from the CIS to China during the period between 2015 and 2017. It is evident that petroleum oil and oil obtained from bituminous minerals (HS code 2709) dominate energy trade flows. In 2017, China's imports of this commodity from the CIS comprised 19.2% of total CIS energy exports worldwide and nearly 15% of total Chinese energy imports worldwide. It is interesting to note that imports of electrical energy (HS code 2716) from the CIS are very important for China. Contributions of China's electrical energy imports from the CIS to its total electrical energy imports from other countries were 52%, 48.5%, and 44.8% in 2015, 2016, and 2017, respectively.

Table 1 presents data for energy trade flows running from the CIS to China during the 2015~2017 period.

Table 1. Energy trade from the CIS to china, 2015–2017 (in millions of US dollars)

Year	China's energy imports from CIS			Contribution of China's energy imports from CIS to CIS's energy exports to the world			Contribution of China's energy imports from CIS to its energy imports from the world		
	2015	2016	2017	2015	2016	2017	2015	2016	2017
2709	19,281	18,097	25,313	15.2%	17.9%	19.2%	14.3%	15.5%	15.4%
HS code									
2711	8,257	6,380	7,603	13.9%	46.9%	13.9%	33.1%	27.7%	23%
2701	1,046	1,124	2,238	10.4%	12.1%	15.8%	10.3%	9.7%	12%
2716	175	155	139	15.4%	15.2%	12%	52%	48.5%	44.8%

(Note) The numerals 2709, 2711, 2701, and 2716 are HS codes and indicate “Petroleum oils and oils obtained from bituminous minerals, crude,” “Petroleum gas and other gaseous hydrocarbons,” “Coal; briquettes, ovoids, and similar solid fuels manufactured from coal,” and “Electrical energy,” respectively.

(Source) Author's compilation from TradeMap.

According to the importance of the energy trade between the CIS and China, which may enhance their economic integration, the main question of this research is “which and what economic factors affect the CIS-China energy trade as a link to their economic integration?” Despite the existence of some academic studies such as Golobokov (2015), Orlov (2016), and Malle (2017), I did not find any similar research, a fact that supports the novelty of this study.

To conduct this research and answer the main question, I employ an econometric model using a panel framework over the period between 2001 and 2017. The variables are based on the traditional, economic, political, and geopolitical (TPG) factors introduced by Shao *et al.* (2017). The findings reveal the significant effects of TPG factors on the energy trade between the CIS and China, which also provides implications regarding their effects on China-CIS economic integration.

The remainder of this paper is organized as follows. First, Section 2 provides a brief review of the relevant literature. Next, Section 3 presents information regarding the study's data and methodology. Section 4 discusses the empirical results, and the last section concludes the paper.

II. Literature Review

The trade flows between CIS member states and China, especially in the field of energy, have recently been drawing the attention of a number of scholars. Some studies such as Chenard (1994), Davis (1997), Kandogan (1999), Roberts and Wehrheim (2001), and Sergi (2018) argue that foreign trade development is an essential policy for CIS member states because it enables them to improve their production capacities, promote their national commodities, and diversify commodities in their local markets. Moreover, several scholars, such as Lin and Wang (2012),

Ge and Fan (2013), Dong and Kong (2016), Li *et al.* (2017), and Zou *et al.* (2018), explain that rapid economic development in China caused a sharp increase in energy demand, leading to a higher volume of worldwide energy imports. The need to expand CIS' foreign trade and the high Chinese demand for energy imports makes energy trade between China and CIS member states possible. Hirschhausen and Waelde (2001) investigated energy sector reforms in Eastern Europe and the CIS. The major result of this study was the conclusion that these nations will reach a high level of energy integration with big economies such as China. This will enable them to quickly develop their energy sectors as well as increase export revenues. Kakachia (2011) posited that the CIS region has become the focus of considerable international attention due to its energy production potential. In line with this finding, Kubicek (2013) believed that because of its geographical situation, China might be in the best position to fully leverage the energy capacity of the CIS region. He concluded that the CIS region offers an attractive market and source for investment. Its security norms also correspond well with central Asian government priorities. However, the power of CIS member states in energy markets and energy exports to China differs significantly. Newnham (2011), Nurgaliyeva (2016), and Bastsaikhan and Dabrowski (2017) argued that after the collapse of the Union of Soviet Socialist Republics (USSR) in 1991, Russia has tried to dictate the terms of energy volumes and prices to other CIS members, indicative of its dominance in the energy sector of the CIS region. However, this fact does not lower the potential of other CIS member states to independently develop their energy sectors. For instance, Karatayev and Clarke (2014) expressed that Kazakhstan under the shadow of Russia has eliminated many different technical, institutional, social, and economic barriers and is developing remarkable energy trade capacities. In another study, Vidadili *et al.* (2017) discussed the energy export development of Azerbaijan in the region. In the early 1990s, this country followed a strategy of exploration and exploitation of carbon hydrogen resources in the Azerbaijani sector of the Caspian Sea. In order to provide safer export routes for the energy resources of Azerbaijan to world markets, they oversaw the construction of pipelines and became the transit country for the exportation of central Asian countries' energy resources. The importance and capacity of the energy sector in other CIS member states is addressed by Valigholizadeh *et al.* (2013) for Armenia, by Liu and Pistorius (2012) for Kyrgyzstan, and by Chomakhidze *et al.* (2017) for Georgia.

The next group of literature focuses on the factors affecting trade patterns. Howell and Chaddick (1994) tried to discover whether political risk affects foreign investment and trade. They found out that it depends on profit and loss consequences for businesses. Oh and Reuveny (2010) discussed how political risk reduces trade flows in importer and exporter countries. Dimic *et al.* (2016) investigated the effect of political risk on trade flows. The major findings asserted that the political risk effect originates in emerging economies, whereas it is not evident in developed countries. In another study, Braga-Alves (2018) argued that an increase of political

risk levels leads to an increase in trade risk between countries, which ultimately reduces trade flows. Another important factor influencing trade flows between countries is economic growth, as indicated by annual changes in the GDP. Korhan *et al.* (2015), in line with Alesina *et al.* (2000), Bond *et al.* (2005), and Zahanogo (2016), mentioned that a higher economic growth rate indicates a better performance of the national economy, which accelerates trade flows. Zahanogo (2016) believed that by developing the size of an economy, trade flows enable a country to more fully capture the potential benefits of increasing returns to scale and economies of specialization. Besides economic size, geographical distance also plays a major role in determining the volume of trade flows. Rasoulinezhad and Kang (2016) proved that geographical distance as a proxy for transportation costs negatively affects trade flows between countries. The negative impact of geographic distance on trade flows between nations have been proven by many scholars such as Black (1973), Melitz (2007), Chen (2015), Jabalameli and Rasoulinezhad (2018), Rasoulinezhad (2019), and Rasoulinezhad and Jabalameli (2019). Moreover, numerous studies discussed the relationship between Foreign Direct Investment (FDI) and trade flows. For instance, Liu *et al.* (2001) discovered a positive relationship between FDI and trade in China. Aizenman and Noy (2006) proved that there are bi-directional linkages between FDI and trade. He *et al.* (2009) investigated the relationship between the American and Japanese FDI into China and the growth of the US trade deficit with China. The results indicated that an increase of FDI by the US in China led to a boost in China's exports to the US. Szkorupova (2014) showed that FDI improves the production capabilities of a nation, which leads to an increase in trade flows with other countries.

My paper contributes to the earlier literature by expressing the following points. The first important point is that this study is the first trade study that considers the determinations of the CIS's energy export flows to China. Considering that most prior studies conducting gravity trade model suffered because of the inclusion of variables in a rational framework, TPG factors are employed in this research to uncover the relationship between various factors and China's energy importing volume from the CIS. TPG, a framework proposed by Shao *et al.* (2017), integrates a series of factors that influence trade flows between nations into the model.

III. Data and Research Methodology

This research includes as the independent variable energy export volume from the CIS (which consists of eight member countries including the Russian Federation, Kazakhstan, Ukraine, Belarus, Azerbaijan, Uzbekistan, Turkmenistan, and Kyrgyzstan)¹⁾ to China over the period

1) - I only considered the CIS members who export energy sources to China. Hence, Georgia, Moldova, Armenia, and Tajikistan, which did not export any energy commodities to China, are not in our list.

between 2001 and 2017. This period was chosen on the basis of China's participation in the World Trade Organization in 2001, which was the starting year of China's regional and global economic integration. To analyze energy export patterns between the CIS and China, I specify energy export (*ENEX*) in thousands of US dollars. This variable contains five HS codes-2790: petroleum oils and oils obtained from bituminous minerals, crude; 2701: coal, briquettes ovoids, and similar solid fuels manufactured from coal; 2716: electrical energy; 2711: petroleum gas and other gaseous hydrocarbons; and 2710: petroleum oils and oils obtained from bituminous minerals. In addition, I follow Shao *et al.* (2017) in terms of explanatory variables by using the exporter's GDP in thousands of US dollars, the exporter's annual energy exports quantity to the world (*ENEXW*) in thousands of US dollars, geographic distance from China (*GDIS*) in kilometers, China's FDI in thousands of US dollars, and the exporter's political risk (*PR*). These definitions, units, and the sources of series data are represented in Table 2.

Table 2. Description of variables

Variable	Definition	Units	Data Sources
<i>ENEX</i>	CIS's energy exports to China	thousands of US dollars	Trade Map
<i>GDP</i>	The exporter's GDP	thousands of US dollars	World Bank
<i>ENEXW</i>	The exporter's annual energy exports quantity to the world	thousands of US dollars	Trade Map
<i>GDIS</i>	Geographic distance from China	kilometers	CPII database
<i>FDI</i>	China's direct investment in the exporter	thousands of US dollars	Statistical bulletin of China's outward FDI
<i>PR</i>	The exporter's political risk	-	World Bank

(Source) Author's compilation.

In this paper, I adjust the model used by Shao *et al.* (2017) for this analysis. On the basis of their econometric panel model, which contains (TPG) variables, and the series, my panel equation is thus given by the following:

$$\ln ENEX_{ijt} = \delta_1 + \delta_2 \ln(GDP_{it} / GDP_{jt}) + \delta_3 \ln ENEXW_{it} + \delta_4 \ln GDIS_{ijt} + \delta_5 \ln FDI_{ijt} + \delta_6 \ln PR_{it} + \varepsilon_{ijt} \quad (1)$$

where *ENEX* indicates CIS's energy exports to China; *GDP* and *ENEXW* represent gross domestic product and the exporter's annual energy exports quantity to the world; *FDI* denotes China's FDI in the exporter; and *PR* denotes the exporter's political risk.

In regard to the variables, it should be mentioned that many scholars have proven the linkages between the series and trade flows. For instance, the impact of GDP on trade between nations was verified by a number of researchers such as Popova and Rasoulinezhad (2016), Rasoulinezhad and Seong Kang (2016), and Rasoulinezhad (2017). The negative effects of geographical

distance on trade flow are discussed in earlier studies (Rasoulinezhad and Jabalameli 2018, Brei and Von Peter 2018). Although Khoon Goh *et al.* (2013) demonstrated the influence of FDI on trade flows, Rotunno (2016) showed a linkage between political stability and trade flows. In addition, Shao *et al.* (2017) confirmed the relationship between total energy export volumes and energy export flows to a particular nation.

To conduct an estimation of coefficients, I ran the random effects (RE) estimator, which enabled me to include time-invariant variables (e.g. geographical distance) in the final results. Other panel estimators, such as fixed effects (FE) and FE Poisson maximum likelihood (ML), cannot estimate the coefficient of time-invariant variables (Cestepe *et al.* 2015). Therefore, the most appropriate estimator for my model is RE, which was structured as follows:

If the basic framework of the panel data is assumed to be:

$$y_{it} = x'_{it}\beta + z'_i\alpha + \varepsilon_{it} = x'_{it}\beta + c_i + \varepsilon_{it} \quad (2)$$

where x_{it} contains regressors, $z'_i\alpha$ denotes the individual effect. If the unobserved individual heterogeneity can be considered to be uncorrelated with the included variables, Equation 2 can be rewritten as:

$$y_{it} = x'_{it}\beta + E[z'_i\alpha] + \{z'_i\alpha - E[z'_i\alpha]\} + \varepsilon_{it} = x'_{it}\beta + \alpha + u_i + \varepsilon_{it} \quad (3)$$

This RE equation expresses that u_i is a group-specific random element (Greene 2011).

In addition, the Poisson pseudo-ML (PPML) estimator as proposed by Silva and Tenreyro (2006) is applied to conduct a robustness check for empirical estimations. If nonlinear least squares and optimize sums of squared residuals are assumed, the estimator of the model becomes as follows (Magerman *et al.* 2016):

$$\hat{\beta} = \arg \min SSR(\beta) = \arg \min \sum [Y - \exp(X\beta)]^2 \quad (4)$$

The first-order conditions for Equation 4 will be:

$$\frac{\partial \hat{\beta}}{\partial \beta} = \sum [Y - \exp(X\beta)] \exp(X\beta) X = 0 \quad (5)$$

where $Y - \exp(X\beta)$ is the model to be estimated and $\exp(X\beta)X$ indicates the weights of each observation in minimizing errors.

On the basis of Equation 5, the Poisson model is:

$$\Pr(Y = k|x) = \frac{\exp(-\lambda)\lambda^k}{k!} \tag{6}$$

In Equation 6, $Y \geq 0$, and $Y \geq 0 \Rightarrow Y \geq 0$. Hence, the ML optimization is specified as follows:

$$\hat{\beta} = \text{argmax} [-\exp(X\beta) + Y(X\beta) - \ln(Y)] \tag{7}$$

and by conducting first-order conditions of Equation 7:

$$\frac{\partial \hat{\beta}}{\partial \beta} = \sum [Y - \exp(X\beta)] X = 0 \tag{8}$$

IV. Empirical Results

A. Preliminary tests

To conduct correct and reliable panel estimations, various preliminary tests should be applied. The first preliminary test contains a cross-sectional dependence (CD) test to discover whether there are any breakpoints in our series. To this end, the Pesaran residual CD test is conducted by the pairwise correlation coefficients $\hat{\rho}_{ij}$ as follows:

$$CD = \sqrt{\frac{2}{N(N-1)}} \sum_{i=1}^N \sum_{j=i+1}^N \sqrt{T_{ij}} \hat{\rho}_{ij}$$

The results of this test, as listed in Table 3, depict the acceptance of the null hypothesis (no CD in residuals) at the 5% level. Hence, all variables show evidence of cross-sectional independence.

Table 3. Cross-sectional dependence test results

Variables	Pesaran's CD test	p-value
<i>LENEX</i>	26.11	0.32
<i>LGDP</i>	28.49	0.58
<i>LENEXW</i>	19.24	0.18
<i>LGDIS</i>	24.33	0.44
<i>LFDI</i>	29.64	0.61
<i>LPR</i>	31.93	0.73

(Source) Author's compilation from Eviews 9.0.

On the basis of the lack of CD of the variables, the common panel unit root tests, i.e., the ADF-Fisher Chi-square and the Phillips-Perron-Fisher Chi-square tests, can be used to analyze the stationarity of the time series data.

The results of applying the panel unit root test are reported in Table 4.

Table 4. Panel unit root test results

Variable	ADF-Fisher Chi-square	Phillips-Perron-Fisher Chi-square	Stationary
<i>LENEX</i>	25.46 [0.81]	19.06 [0.28]	No
<i>D(LENEX)</i>	185.03 [0.00]	218.47 [0.00]	Yes
<i>LGDP</i>	18.44 [0.82]	14.17 [0.36]	No
<i>D(LGDP)</i>	157.49 [0.00]	327.18 [0.00]	Yes
<i>LENEXW</i>	10.61 [0.72]	16.22 [0.93]	No
<i>D(LENEXW)</i>	277.01 [0.00]	316.37 [0.00]	Yes
<i>LGDIS</i>	9.82 [0.24]	17.36 [0.00]	No
<i>D(LGDIS)</i>	312.92 [0.00]	291.28 [0.00]	Yes
<i>LFDI</i>	15.26 [0.82]	27.61 [0.24]	No
<i>D(LFDI)</i>	247.42 [0.00]	231.83 [0.00]	Yes
<i>LPR</i>	21.93 [0.11]	31.38 [0.45]	No
<i>D(LPR)</i>	288.52 [0.00]	321.72 [0.00]	Yes

(Note) Numbers in brackets indicate *p*-values.

(Source) Author's compilation from Eviews 9.0.

On the basis of the results of two panel unit root tests, as shown in Table 4, all of the series are nonstationary at levels and stationary (rejecting the null hypothesis) at their first difference standing for I(1).

Next, a preliminary test is the cointegration test, which is performed by conducting the Pedroni panel cointegration test to explore a long-run equilibrium relationship between the series. The most significant results are reported in Table 5. The majority of all statistical tests reveal H0 rejection (no cointegration at the 5% significance level). Hence, the results proved that there is evidence of a long-run relationship between variables.

Table 5. Pedroni panel cointegration test results

	Statistic	Prob.	Weighted statistic	Prob.
Panel <i>v</i> -statistic	1.83	0.42	0.21	0.27
Panel <i>rho</i> -statistic	-2.38*	0.00	-1.58*	0.00
Panel PP-statistic	-3.27*	0.00	-4.02*	0.00
Panel ADF-statistic	-3.66*	0.00	-3.52*	0.00
Group <i>rho</i> -statistic	-1.28*	0.05	-	-
Group PP-statistic	-2.49*	0.00	-	-
Group ADF-statistic	-4.10*	0.00	-	-

(Note): * shows statistical significance at the 5% level.

(Source) Author's compilation from Eviews 9.0

In addition, the Kao cointegration test is employed to conduct a robustness check. Table 6 presents the results of the Kao test, which rejected the H0 of no cointegration at a 0.05 significance level.

Table 6. Kao residual cointegration test

Series: <i>LENEX LGDP LENEXW LGDIS LFDI LPR</i>		
ADF	t-statistic	Probability
	4.329	0.02

(Note) *ENEX* indicates CIS's energy exports to China. *GDP* and *ENEXW* show the exporter's GDP and the exporter's annual energy exports quantity to the world. *GDIS* is geographic distance from China, whereas *FDI* and *PR* show foreign direct investment and the exporter's political risk, respectively.

(Source) Author's compilation from Eviews 9.0.

B. Empirical econometric estimation

On the basis of cointegration test findings that support the existence of a long-run linkage between the series in our panel equations, the panel data estimation approach, i.e., the RE estimation, is applied to reveal the effects of regressors on the CIS's energy exports to China. Because my model contains geographic distance, which does not change between countries over time, I used this type of panel data estimation. Furthermore, the PPML is also conducted as a robustness check.

The findings of conducting RE and FMOLS estimations are presented in Table 7.

Table 7. Panel estimation results

Dependent variable	Independent Variables	RE		PPML		Mean of coefficients
		Coefficient	P-value	Coefficient	P-value	
CIS's energy exports to China	The exporter's GDP	0.42	0.00	0.36	0.00	0.39
	The exporter's annual energy exports quantity to the world	-0.23	0.02	-0.33	0.00	-0.28
	Geographic distance from China	-0.12	0.00	-0.27	0.00	-0.19
	China's direct investment in the exporter	0.38	0.04	0.68	0.01	0.53
	The exporter's political risk	0.23	0.00	0.41	0.00	0.32

(Source) Author's compilation from Stata 15 and Eviews 9.0.

My main findings, also listed in Table 7, are as follows:

- i. The estimation findings reveal that economic size, as measured by GDP, has significant positive impact on CIS energy exports to China. A 1% increase in the energy exporter's GDP in the CIS region leads to an increase in energy exports to China by nearly 0.39% (average of the coefficients estimated by FE and PPML). This finding is aligned with Rasoulinezhad and Wei (2017), who proved the positive effect of GDP on China's energy imports from

- OPEC member countries. On one hand, any increase in the GDP of energy producers leads to an improvement in their oil and gas sectors by increased investment in infrastructure to develop their production and export capacities. On the other hand, the growth of China's GDP means there is a higher energy need in industry and transportation in particular.
- ii. In regard to main variables, the quantity of the CIS's annual energy exports to countries other than China has a significant negative effect on China's energy imports from the CIS. A 1% increase in the CIS's energy exports to other countries leads to an approximately 0.28% reduction in China's energy imports from the CIS. This result is in line with Osakwe *et al.* (2018), who argue that export diversification can balance export volumes among various trade partners.
 - iii. In regard to geographic distance acting as a proxy for transportation cost, the negative sign of its coefficient indicates that geographical distance may decelerate energy trade flows running from the CIS to China. A 1% increase in this variable reduces Chinese energy imports from the CIS by about 0.19%. This finding is in line with Hallefjord and Jornsten (1986), Luoma *et al.* (1994), Fratianni and Kang (2006), Huang (2007), Ekanayake (2010), Tamagawa (2011), Håkanson (2014), Brei and Von Peter (2018), and Molaepour *et al.* (2018), who demonstrated the negative effect of distance in trade flows between nations.
 - iv. The estimated results affirm the significant positive coefficient of China's FDI in CIS member states. A 1% increase of direct investment by China into the CIS may accelerate energy export volumes by nearly 0.53%. This result corroborates the work of Santiago (1987), Dritsaki and Stiakakis (2014), and Sunde (2017), who discovered a positive relationship between FDI and trade flows, but it contradicts the work of Kiran (2011) who asserted that there exists no evidence of causality between FDI and trade.
 - v. Among all of my regressors, the sign of the coefficient for PR is most interesting. A 1% increase in the CIS's PR may lead to an approximately 0.32% increase in China's energy imports from this region. This finding indicates that China's good diplomatic relationships with CIS member states and its diplomatic power to engage in any PRs in the CIS lead to an improvement in its energy trade relationship with CIS states.

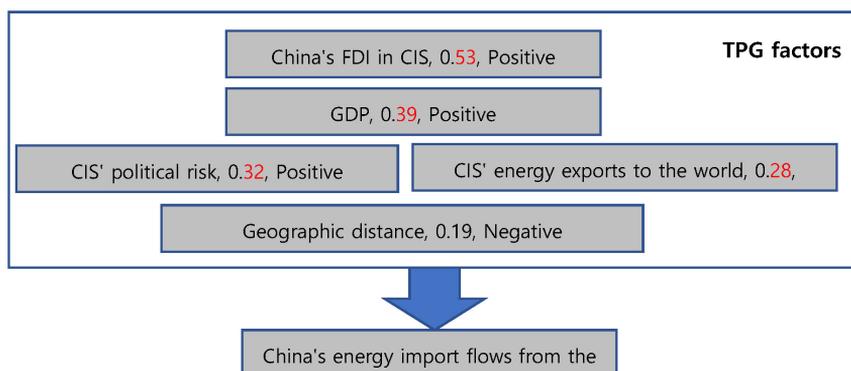
V. Conclusions

The division of the USSR into 15 countries (known as the CIS), as well as China's energy-based economy and energy demand acceleration since the beginning of the 2000s, has given rise to the forging of the CIS-China energy ties and caused a special energy trading pattern running from CIS member states to China. This unique energy trading pattern may

be considered a key instrument to encourage the economic integration of China with CIS states. In this paper, I sought to empirically discover what determines China's energy importing pattern from the CIS in order to uncover policies that will further China-CIS economic integration. To this end, I used the model of Shao *et al.* (2017) with datasets over a period between 2000 and 2017. The conducted variables in this study were based on the TPG factors proposed by the model of Shao *et al.*

The main findings of my paper reveal that a 1% increase in the energy exporter's GDP in the CIS region leads to an increase in energy exports to China by nearly 0.39%. In other words, by developing the economic size of CIS nations, inward FDI from other nations in their energy projects may result in an increase in energy production capacity and a higher level of trade flows into these nations. As Pan and Nguyen (2018) mention, economic growth and exports are interrelated. Furthermore, the annual amount of energy the CIS exports to countries other than China has a significant negative effect on China's energy imports from the CIS. In fact, because of limitations on increasing energy production (Owusu and Asumadu-Sarkodie 2016), a greater distribution of produced energy sources in the CIS to nations other than China may lead to a reduction of the CIS's energy exports to China. It can be concluded that by any increase in the diversification of the CIS's energy exporting markets, China's energy imports from the CIS may decrease, which ultimately means that China will have higher energy security risks. Hence, de-diversification in CIS energy exporting markets may be considered to be a key to Chinese energy security. In regard to geographic distance, findings indicated a negative sign of its coefficient, meaning that geographical distance may decelerate energy trade flows running from the CIS to China. Our results regarding the negative linkage between distance and trade flows is supported by a number of earlier studies such as Rasoulinezhad and Seong Kang (2016), Rasoulinezhad and Wei (2017), Liaqat *et al.* (2018), and Rasoulinezhad (2018). Other results of this study include the fact that China's FDI in CIS states can determine and accelerate energy export flows running from the CIS to China. Our findings corroborated the results of Feng *et al.* (2009) and Doku *et al.* (2017), who expressed the importance of China's FDI into oil and gas field projects in Russia, the biggest member of the CIS. Finally, our major findings verified evidence of a positive relationship between PR in the CIS and energy importing flows to China. This result is in line with Peyrouse (2016), who posited that China, with its remarkable diplomacy, has increased its presence and influence with CIS member states. This solid political tie led to the development of a strong economic and trade relationship between China and the CIS, which cannot be easily destroyed even considering CIS's political instability.

On the basis of the achieved coefficients of TPG factors in the panel data model framework, the rank of influential factors (according to their magnitude) on China's energy import flows from the CIS is as Figure 3:

Figure 3. Rank of influential TPG factors on China's energy import flows from the CIS

(Source) Author's compilation.

On the basis of the empirical results, it can finally be concluded that lowering PR, increasing capital flows, empowering the national economies of CIS members, and improving transportation routes in the region are all essential factors for achieving a higher degree of economic integration between China and the CIS. Among these factors, increasing China's FDI flows in this region and increasing the GDP of CIS members play important roles in forging a stronger China-CIS economic integration tie.

Last, I present some recommendations for future studies related to economic integration based on energy trade flow patterns between China and the CIS. The current situation of political tension between Russia and Ukraine may be an influential factor in the future of CIS-China energy trade flows. Hence, considering it as a variable might be a good way to attain better academic results. Furthermore, the long-run energy strategies of China, such as the Energy Production and Consumption Revolution Strategy (2016~2030) and long-term economic and social development targets such as China Dream (Li *et al.* 2018), may negatively affect China's nonrenewable energy imports from the CIS in terms of reducing CO₂ emissions. Therefore, investigating the effects of China's long-run energy strategies would be of interest to many policymakers.

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