

The Impact of Logistic Performance Index and Ease of Doing Business on Trade Volume in Eurasian Countries: A Gravity Model

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Abstract

One key indicator of a nation's effectiveness in trade-related logistics operations is the logistics performance index (LPI), which has grown significantly. On the other hand, information about how simple it is to conduct business in a nation is provided by the Doing Business (DB) index. In light of the growing trends of globalization and regional integration, it is critical to comprehend how logistics performance and doing business impact trade volume. To shed light on the theoretical and practical implications of improving logistical efficiency for regional development, this study examines impact of the logistics performance and doing business on trade volume in Eurasian countries. By utilizing panel data approach, we estimate the baseline gravity model and the special gravity model augmented with LPI and DB variables over the sample period from 2000 to 2023 in order to evaluate the importance of logistic services and the ease of doing business on trade volume. Our empirical research conducted over the previous twenty-three years demonstrates that trade volume is strongly positively impacted by logistics performance and doing business. One of the most crucial contributors to economic growth is trade volume, higher ratings on the Logistics Performance Index are typically associated with stronger rates of economic growth. Therefore, to promote economic development, officials in the Eurasian region are urged to give priority to investments in logistical infrastructure and optimize trade-related procedures. Further enhancing regional integration and promoting economic growth across Eurasian countries can be achieved through enacting policies targeted at minimizing logistical obstacles and strengthening cross-border collaboration.

1 Introduction

The economy and logistics have a significant mutual impact, as supported by a variety of evidence. Logistical relevance requires a deeper grasp of logistics as seen from the supply chain perspective. As a result of globalization, supply chains now compete with one another rather than just between individual companies. Facilitating the processes of retailers, wholesalers, and manufacturers by linking suppliers to ultimate consumers is the main function of the logistics concept. Logistics encompasses more than just transportation; it also includes handling, inventory control, warehousing, procurement, and packaging. The influence of logistics on international trade patterns is visible at the micro level. To interpret and monitor the nation's logistics activities from macro-level Logistics Performance Index (LPI) was created to assess and track country-specific logistics activities. The aforementioned index highlights the diverse aspects of logistics and its important function in augmenting the operational dynamics of global trade. LPI promotes changes that will help national economies and the international trading system by highlighting the significance of logistics variables in trade performance. The Logistics Performance Index (LPI) has a major impact on a nation's business-friendly environment, which in turn influences how appealing that nation is to foreign and local investors. LPI assesses various aspects that are crucial for supply chain management and logistics, including the effectiveness of trade and transportation infrastructure, the ease of arranging shipments, the quality of logistics services, the capacity to track and trace shipments, and the promptness of shipments.

This study examines the relationship between trade volume in Eurasia and logistics performance and ease of doing business using the augmented gravity model. The main goal of this paper is to present new empirical estimates on the relationship between logistics and ease of doing business that are particular to trade volume in the Eurasia region. Eurasia has two meanings according to the Britannica dictionary. The first is a single, enormous landmass made up of the European and Asian continents. In a second sense, it refers to the socio-political entity within this continent and is a geological and geopolitical phrase. Geographers define the term "continent" culturally rather than physically, even if there is disagreement about the location of the territorial border between these two continents. thirteen countries are included in the Eurasia classification of the Organization for Economic Co-operation and Development (OECD): Afghanistan, Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Republic of Moldova, Tajikistan, Turkmenistan, Ukraine, Uzbekistan. However, due to data availability the sample of this study consists of Afghanistan, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan and Uzbekistan. For logistics performance, the LPI index and doing business index data (panel data set covering the years 2000-2023) published by the World Bank, International Monetary Fund (IMF) and OECD database were used. The capacity of its member nations to engage in trade with one another and the rest of the globe allows Eurasia to grow. To achieve stronger and more competitive trade in

the region, logistics components that have a significant impact on trade will need to be designed into a comprehensive reform program to remove logistics barriers. To boost the region's competitiveness in global value chains, the study's findings confirm the significant influence that ease of doing business and logistics performance have on trade volume.

The arrangement of the article is as follows. The literature on LPI, DB, and international trade is reviewed in Section 2. The empirical inquiry, including with the data, variables, gravity model, and findings, are explained in Section 3. Finally, Section 4 presents a summary of the study's primary conclusions.

2 Related Literature

2.1 Logistic performance index

The most advanced manifestation of the transportation notion is logistics. Logistics adds value to nations in a variety of domains, including the political, military, strategic, social, psychological, and cultural ones. Crucial data regarding a nation's logistics operations is provided by LPI. This data contains details on the survey, customs laws, the cost of logistics across the nations, and the state of the infrastructure supporting various kinds of transportation. Using its methodology, it offers an assessment of nations' logistical conditions across six distinct sub-dimensions. The logistics performance index uses a '1' (lowest) to '5' (best) grading system to represent logistics performance (Pelit, 2023).

The effectiveness of a nation's logistics system and its capacity to engage in international trade are both measured by the LPI. One of the most important instruments for assessing and enhancing supply chain logistics performance is the Logistics Performance Index (LPI) (Jiang et al., 2009). The World Bank created this benchmarking tool, which enables comparisons across 167 nations (Arvis et al., 2012). Authorities may benefit from a more impartial and trustworthy benchmarking tool thanks to the updated Logistics Performance Index, which is based on global statistical data (Beysenbaev & Dus, 2020). A rise in the Logistics Performance Index (LPI) has a favorable effect on a nation's ability to compete internationally; this link is robust and good for all levels of economic growth (Zekić et al., 2017). Marti et al. (2014) stated that enhancing any of the Logistics Performance Index (LPI) elements can greatly increase trade between developing nations, especially those in Africa, South America, and Eastern Europe and they also explained six components of LPI as follow:

Customs: it gauges the effectiveness and efficiency of the process for dispatching customs officers (i.e., the quickness, ease of use, and consistency of customs agencies). This is predicated on the several administrative processes connected to carrying out the trade laws that are now in effect and collecting import/export duties on products and services.

Infrastructure: it assesses the standard of the nation's communications and transportation networks. It has to do with the process utilized to get goods to the final customer and is outside of the complete control of businesses. Measuring how firms manage the resources at their disposal, however, is crucial since it will determine their competitive advantage or disadvantage.

International shipments: it gauges how simple it is to plan shipments at reasonable costs.

Logistics competence and quality: it assesses the level of proficiency and caliber of logistics services. It demonstrates how specific members of the organizational structure act, expressing the caliber of customer service and enhancing the bond between businesses and customers.

Shipment tracking and tracing: it evaluates these activities. Determining the precise location and the path taken by every shipment until it reaches the final recipient is crucial. This component involves every link in the supply chain for the items, therefore traceability is the outcome of industry activity as a whole.

Timeliness: it gauges how quickly shipments are delivered. This is a crucial issue to take into account because it is unacceptable to miss delivery deadlines given the intense competition that currently exists. This has led to the requirement for ever-more complex computerization procedures.

2.2 Trade in Eurasian countries

According to economic theory, there is a casual relationship between facilitation trade, increasing trade revenue, and increasing human development (Wilson et al., 2003).

Diverse practices aimed at enhancing trade serve as significant policy instruments for addressing inequalities among countries that hold prominent places in the economic literature, by enabling developing countries to carve out a space for themselves in international markets and increase their trade volume, thereby generating foreign exchange earnings (Yilmazer & Nuhoglu, 2021). Numerous empirical studies have also highlighted the impact of international trade on countries' economic growth, making it a focal area in the literature.

Due to the strong relationship between trade and economic growth, policies aimed at enhancing trade become a crucial strategy, especially for developing countries, prompting policymakers to focus on expanding the scope of trade (Sakyi et al., 2017). The importance of international trade is also evident in the works of organizations such

as the OECD, the World Economic Forum, and the World Bank, which have identified indicators to facilitate trade to serve the purpose of increasing trade (Aynagöz Çakmak, 2016).

The impact of total trade volume on key macroeconomic variables and its significance for economic growth, as well as the distinct effects of exports and imports on growth, are of considerable importance. Developed countries, benefiting from knowledge accumulation and technology diffusion advantages, derive more benefits from trade in terms of rapid income growth and economic expansion compared to developing countries (Sakyi et al., 2017). As it can be seen from the Table 1, the share of international trade on GDP is quite crucial also in Eurasian countries. even though the existence of fluctuation in specific time, the percentage tend to increase during the given time period.

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|-----|--------|--------|--------|--------|--------|--------|-------|--------|--------|
| AFG | - | - | - | - | - | - | 46,71 | 51,41 | - |
| ARM | 75,78 | 71,68 | 76,08 | 87,20 | 92,47 | 96,11 | 69,49 | 79,67 | 101,01 |
| AZ | 69,48 | 72,60 | 90,08 | 90,40 | 91,67 | 85,82 | 72,02 | 76,29 | 87,08 |
| GEO | 96,77 | 98,77 | 96,83 | 104,04 | 111,76 | 118,60 | 93,88 | 102,82 | 115,64 |
| KZK | 64,97 | 53,05 | 60,31 | 56,83 | 63,53 | 64,86 | 57,03 | 58,67 | 68,11 |
| KRG | 125,13 | 110,96 | 105,82 | 100,62 | 98,88 | - | - | - | - |
| TAJ | 54,61 | 49,94 | 55,72 | 53,79 | 55,85 | 56,05 | 55,75 | 71,83 | - |
| TRK | 91,09 | 81,30 | 62,05 | 53,58 | 50,90 | 44,29 | 35,94 | 33,06 | - |
| UZB | 36,36 | 30,75 | 29,19 | 47,78 | 71,21 | 72,52 | 61,84 | 63,85 | 71,58 |

Table 1: Trade/GDP (%) Source: World Bank

2.3 Doing Business Index

Doing Business indicators, that cover various factors, including investor and worker protection, are based on a survey of international enterprises operating in a country's essential economic areas (Høyland et al., 2012). Thus, it makes it possible to use estimators that emphasize in the long-term economic reactions to regulatory reforms in countries as opposed to cross-country variance, which can be easily polluted by omitted variables (Eifert, 2009).

The foundation of Doing Business is the idea that clear regulations promote economic activity. These regulations should establish robust property rights, enable voluntary trade between economic actors, make it easier to settle business disputes, and protect contractual partners from abuse and arbitrariness. It is commonly utilized by researchers as seen in the relevant literature and by multinational companies when deciding where to invest (Pinheiro-Alves & Zambujal-Oliveira, 2012; World Bank, 2020).

Laws and regulations as well as administrative burdens form the foundation of Doing Business. The Doing Business report calculates the difficulties, costs, and time a typical mid-sized Corporation would need to establish its operations, obtain loans, register property, manage construction permits, import and export items, and apply for bankruptcy, and also how well investors are protected (Corcoran & Gillanders, 2015). Regulations that are efficient, transparent, and available to the people for whom they are intended are far more effective in fostering growth and development (World Bank, 2020).

Doing Business data, which can be compared to 190 economies through the use of standardized case studies, focuses on 12 regulatory domains that impact domestic small and medium-sized enterprises in the principal business center of an economy (World Bank, 2020).

| 2019 Ranks | AFG | ARM | AZE | GEO | KAZ | KGZ | RUS | TJK | UZB |
|-----------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Dealing with construction permits | 183 | 62 | 59 | 21 | 37 | 90 | 26 | 137 | 132 |
| Ease of doing business | 173 | 47 | 28 | 7 | 25 | 80 | 29 | 106 | 69 |
| Enforcing contracts | 181 | 30 | 13 | 12 | 4 | 134 | 22 | 76 | 23 |
| Getting credit | 104 | 48 | 1 | 15 | 25 | 15 | 25 | 11 | 67 |
| Getting electricity | 173 | 30 | 39 | 43 | 68 | 143 | 7 | 163 | 36 |
| Paying taxes | 178 | 52 | 39 | 14 | 64 | 117 | 57 | 139 | 69 |
| Protecting minority investors | 140 | 120 | 105 | 7 | 7 | 128 | 72 | 128 | 37 |
| Registering property | 186 | 13 | 44 | 5 | 24 | 7 | 12 | 77 | 72 |
| Resolving insolvency | 76 | 95 | 47 | 64 | 42 | 78 | 57 | 153 | 100 |
| Starting a business | 52 | 10 | 9 | 2 | 22 | 41 | 39 | 35 | 8 |
| Trading across borders | 177 | 43 | 71 | 45 | 105 | 89 | 99 | 141 | 152 |

Table 2: Ranks of doing business (2019) for the countries Source: World Bank

To gain a comprehensive understanding of the economic climate of the countries included in the study, it is beneficial to examine the 'Doing Business' sub-indices. Georgia ranks lowest in the sub-indices for dealing with construction permits, registering property, starting a business, and paying taxes, while Kazakhstan ranks lowest in

enforcing contracts, Azerbaijan in getting credit, Russia in getting electricity, and Armenia in trading across borders.

As evident from the Table 2, both Kazakhstan and Georgia have relatively low rank values in the sub-indices. This suggests that these sub-indices should be carefully considered to enhance investor confidence and promote economic growth in these countries.

3 Empirical Investigation

In this section, we estimate the baseline gravity model and the special gravity model augmented with LPI and DB variables over the sample period from 2000 to 2023 in order to evaluate the importance of logistic services and the ease of doing business on trade volume. For this purpose, we selected 10 Eurasian countries¹ and generated 10 different date set including other 9 countries for each one. To mitigate the consequences of the heteroscedasticity issue, we employed a fixed effect estimation approach, given the nature of our balanced panel dataset. Prior to conducting fixed effect estimation, we performed the Levin, Lin, and Chu test as a common unit root test for each dataset and variable². It has been verified that all variables are stationary as a result of their logarithmic forms.

3.1 Model and Data

Baseline Gravity Model:

The Gravity model is based on the concept that the trade volume between two countries is inversely influenced by the distance between them. This concept can be expressed as follows:

$$Trade_{i,j} = \frac{GDP_i^\alpha GDP_j^\beta}{Distance_{i,j}^\theta} \quad \text{Eq. 1}$$

by taking the natural logarithm to Eq. 1, we can obtain an econometric specification of the gravity model as follows:

$$\ln(Trade_{i,j}) = \alpha \ln(GDP_i) + \beta \ln(GDP_j) - \theta \ln(distance_{i,j}) \quad \text{Eq. 2}$$

Using the relationship expressed in Eq. 2 and based on the study of Trotignon, (2010) we can develop an operational framework for estimating specifications that adopted throughout this paper as follows:

$$\ln(Trade_{i,j,t}) = \delta_0 + \delta_1 GDP_Dist_{i,j,t} + \delta_2 REMOT_{i,j,t} + \delta_3 SCALE_{i,j,t} + \delta_4 CAP_endw_{i,j,t} + \delta_5 LND_endw_{i,j,t} + \varepsilon_{i,j,t} \quad \text{Eq. 3}$$

where dependent variable and independent variables are presented in Table 1. The GDP difference between main country (i) and partner country (j) is represented by GDP_Dist variable while the geographical distance between them is represented by REMOT variable. The SCALE variable captures importance of populations of two countries. CAP_endw and LND_endw stands out the physical capital per worker and land area per worker, respectively.

| Variable | Explanation | Formula | Data Source |
|----------------------|--|--|---------------------------|
| $\ln(Trade_{i,j,t})$ | Natural log of trade volume | $\ln(\text{Import from partner} + \text{Export to partner})$ | IMF |
| $GDP_Dist_{i,j,t}$ | GDP Distance | $\ln[\max((GDP_i - GDP_j) - \min((GDP_i - GDP_j)))]$ | IMF |
| $REMOT_{i,j,t}$ | Relative Distance | $\ln\left(\text{distance}_{i,j} * \frac{GDP_j}{GDP_{world}}\right)$ | Google Maps, IMF |
| $SCALE_{i,j,t}$ | Proxy for population | $\ln(\text{population}_i * \text{population}_j)$ | OECD |
| $CAP_endw_{i,j,t}$ | Difference btw capital endowment per labor force | $\ln \left[\max \left\{ \left(\frac{\text{Capital Stock}}{\text{Labor Force}} \right)_i, \left(\frac{\text{Capital Stock}}{\text{Labor Force}} \right)_j \right\} - \min \left\{ \left(\frac{\text{Capital Stock}}{\text{Labor Force}} \right)_i, \left(\frac{\text{Capital Stock}}{\text{Labor Force}} \right)_j \right\} \right]$ | OECD IMF World Bank |
| $LND_endw_{i,j,t}$ | Difference btw land endowment per labor force | $\ln \left[\max \left\{ \left(\frac{\text{Land Area}}{\text{Labor Force}} \right)_i, \left(\frac{\text{Land Area}}{\text{Labor Force}} \right)_j \right\} - \min \left\{ \left(\frac{\text{Land Area}}{\text{Labor Force}} \right)_i, \left(\frac{\text{Land Area}}{\text{Labor Force}} \right)_j \right\} \right]$ | OECD IMF World Bank |
| $LPI_{j,t}$ | Logistic Performance Index | Index calculated by IMF | IMF |
| $DB_{j,t}$ | Doing Business Score | Index calculated by IMF | IMF |

Table 3: Variables

Augmented Gravity Model:

In order to investigate the impacts of logistic services and ease of doing business on trade volume between Eurasian countries, we extend baseline model presented by Eq. 3 with LPI and DB variables as follows:

$$\ln(\text{Trade}_{i,j,t}) = \delta_0 + \delta_1 \text{GDP_Dist}_{i,j,t} + \delta_2 \text{REMOT}_{i,j,t} + \delta_3 \text{SCALE}_{i,j,t} + \delta_4 \text{CAP_endw}_{i,j,t} + \delta_5 \text{LND_endw}_{i,j,t} + \delta_6 \text{LPI}_{j,t} + \delta_5 \text{DB}_{j,t} + \varepsilon_{i,j,t} \quad \text{Eq. 4}$$

Due to lack of capital stock data of Afghanistan Kyrgyzstan and Uzbekistan, we add only Land Endowment to baseline model for them.

3.2 Estimation Results and Findings

According to the estimation results of baseline model in Table 3, the coefficients for GDP distance have negative values against the neoclassical theory. In other word, as difference in GDP across countries increase, the trade volume decreases. When we look at the coefficients for REMOT variables, as geographical distance decreases, the trade volume increases as we expect theoretically. However, geographical distance are statistically insignificant for half of sample countries. The economic scale calculated by population of countries have been founded as statistically significant on trade volume except for Azerbaijan and Kazakhstan.

When examining factor endowment, a positive coefficient indicates traditional trade and inter-industrial trade, while a negative coefficient confirms that GDP per capita is a key determinant of intra-industry trade (Linder, 1961), (Frankel, 1997). According to this hypothesis, it can be suggested that the GDP per capita has a substantial impact on the volume of trade in Azerbaijan and Georgia. In contrast, Kyrgyzstan engages in traditional and inter-industrial international trade with its trading partners. On the other hand, land endowment has a greater impact on trade volume compared to capital endowment for all sample countries.

| | Constant | GDP_dist | REMOT | SCALE | CAP_endw | LND_endw |
|------------|---------------------|---------------------|----------------------|-------------------|----------------------|--------------------|
| AFG | 35,067* (8,031) | -0,763* (0,292) | -0,514* (0,137) | 1,076* (0,272) | - | -3,491* (0,670) |
| ARM | 79,410* (23,254) | -0,258 (0,370) | -2,271* (0,386) | 2,725* (0,870) | 0,231 (0,308) | 2,596* (0,479) |
| AZ | 28,880 (31,310) | -0,483 (0,374) | 0,007 (0,548) | 1,141 (1,103) | -0,908*** (0,496) | 0,627 (0,850) |
| GEO | 29,687* (9,490) | -1,095* (0,204) | 0,128 (0,154) | 1,321* (0,348) | -0,698* (0,218) | 0,993* (0,333) |
| KRG | 58,941* (3,381) | -0,403* (0,091) | 0,313 (0,916) | 2,040* (0,916) | 0,105** (0,475) | -0,101 (0,184) |
| KZK | 59,655* (2,982) | 1,021* (0,115) | -0,143* (0,047) | 1,755* (0,074) | - | -0,516* (0,813) |
| RUS | 25,665* (7,664) | -0,588** (0,278) | 0,062 (0,042) | 0,793* (0,193) | 0,041 (0,112) | 0,125 (0,092) |
| TAJ | 35,914* (6,792) | 0,148 (0,439) | -0,316*** (0,171) | 1,170* (0,299) | 0,175 (0,229) | -0,317 (0,577) |
| TRK | 34,397* (5,266) | -0,414* (0,136) | -0,061 (0,134) | 1,269 (0,160) | 0,072 (0,174) | 0,807* (0,288) |
| UZB | 15,123* (4,951) | -1,231* (0,179) | -0,165* (0,060) | 0,287* (0,096) | - | 0,705* (0,204) |

*: p-value <0,01 **: p-value <0,05 ***: p-value <0,10

Table 4: Estimation Results of Baseline Model

Table 4 shows the results of the fixed effect estimation for the augmented model, including the LPI and DP variables. Based on these results, it can be concluded that the difference in GDP between countries has a detrimental impact on the volume of trade. The estimated coefficients for the REMOT variable are negative. This finding indicates that the trade volume between the country in question and its trade partner is negatively affected by the relative distance, which includes the proportion of the country's GDP in the world GDP, as we expect theoretically.

The coefficients for Capital endowment indicate traditional trade and inter-industrial trade in Georgia, Turkmenistan, and Tajikistan. Unlike them, Kazakhstan's international trade is primarily driven by intra-industry trade, as indicated by our baseline model estimation. Similarly, land endowment has a greater influence on trade volume than capital endowment.

| | Constant | GDP dist | REMOT | SCALE | CAP endw | LND endw | LPI | DB |
|------------|-----------------------|--------------------|---------------------|---------------------|---------------------|--------------------|--------------------|---------------------|
| AFG | 19.121* (7,114) | 3,031* (0,832) | 0,255 (0,276) | 0,295 (0,644) | - | -6,023* (1,509) | 3,023 (2,696) | 0,214* (0,051) |
| ARM | 38,661*** (20,661) | 0,902 (0,838) | -2,670* (0,547) | 1,765*** (0,891) | -1,105** (0,488) | -1,278 (1,046) | 1,732** (0,604) | 0,055* (0,015) |
| AZ | 130,95 (103,89) | -7,786* (2,317) | -4,813** (1,707) | 6,294*** (3,454) | -4,757 (1,251) | 3,109 (3,657) | 1,721* (0,391) | 0,336* (0,081) |
| GEO | 67,991* (20,048) | -4,562* (1,116) | -2,065* (0,568) | 2,451** (0,860) | 3,440* (0,912) | -2,234 (2,773) | 1,584* (0,414) | 0,146* (0,031) |
| KRG | 34,596 (8,985) | -0,415 (0,211) | 1,118 (0,239) | 1,191 (0,275) | 0,878 (0,178) | -2,377 (0,537) | 1,785* 0,409 | 0,039* (0,015) |
| KZK | 9,516* (3,026) | -0,716* (0,209) | -1,369* (0,160) | 0,368* (0,144) | - | -4,689* (0,416) | 1,622* (0,459) | 0,024* (0,006) |
| RUS | -9,098 (25,438) | 0,975 (0,759) | -0,223* (0,052) | 0,353 (0,484) | 0,061 (0,225) | 1,109** (0,437) | -0,347 (0,494) | 0,019 (0,019) |
| TAJ | 51,992* (5,478) | -0,735* (0,235) | -0,848* (0,177) | 1,727* (0,264) | 0,565** (0,209) | 1,757* (0,536) | 0,641 (0,194) | 0,041*** (0,021) |
| TRK | 50,857** (19,091) | 0,318 (0,398) | -0,405* (0,143) | 1,602* (0,529) | -0,631 (0,517) | 1,770** (0,731) | 1,205* (0,426) | 0,041*** (0,022) |
| UZB | 28,810 (23,107) | -5,648* (1,871) | -0,807** (0,353) | 2,063*** (1,131) | - | -0,108 (0,734) | 1,399* (0,276) | 0,051** (0,019) |

*: p-value <0,01 **: p-value <0,05 ***: p-value <0,10

Table 5: Estimation Results of Augmented Model

The logistic performance, a key variable in this study, is found to be both statistically significant and meaningful in explaining the trade volume among 10 Eurasian countries. As we anticipated, the LPI has a favorable and statistically significant impact on trade volume, with the exception of Afghanistan, Russia, and Tajikistan. Furthermore, we found that another crucial factor in determining the "Doing Business" score exhibits both statistical significance and a positive relation. Based on these estimation results, logistic developments are considered more significant than ease of doing business for Eurasian countries when comparing DB with LPI.

3.3 Robustness Check

To test biasness and consistency of estimated results, we conduct heteroscedasticity test for panel period. As can be seen in Table 6, the null hypothesis are rejected for almost all models and overwhelming majority of residual series of estimated models are heteroscedastic. To cope with the implications of heteroskedasticity and obtain reliable coefficients, we adopt fixed effect estimation methodology and use robustness standard errors against type 1 and type 2 errors. Even though we cannot achieve unbiasedness estimators for gravity model, our estimators that we use in this paper are consistent.

| | Baseline Model | | | Augmented Model | | |
|------------|------------------|---------|--------------------|------------------|---------|--------------------|
| | Likelihood Ratio | P-Value | Decision | Likelihood Ratio | P-Value | Decision |
| AFG | 21.916 | 0,0091 | heteroskedasticity | 366,2564 | 0,0000 | heteroskedasticity |
| ARM | 22.275 | 0,0044 | heteroskedasticity | 95.721 | 0,0000 | heteroskedasticity |
| AZ | 68,280 | 0,0000 | heteroskedasticity | 154.061 | 0,0000 | heteroskedasticity |
| GEO | 7.4113 | 0,2845 | homoskedasticity | 69,3451 | 0,0000 | heteroskedasticity |
| KRG | 33,762 | 0,0000 | heteroskedasticity | 66,869 | 0,0000 | heteroskedasticity |
| KZK | 21,277 | 0,0064 | heteroskedasticity | 99,935 | 0,0000 | heteroskedasticity |
| RUS | 15,315 | 0,0505 | homoskedasticity | 64.271 | 0,0000 | heteroskedasticity |
| TAJ | 47,840 | 0,0000 | heteroskedasticity | 106,151 | 0,0000 | heteroskedasticity |
| TRK | 7,6809 | 0,4652 | homoskedasticity | 33,1133 | 0,0001 | heteroskedasticity |
| UZB | 4.7448 | 0,7845 | homoskedasticity | 79,288 | 0,0000 | heteroskedasticity |

Null hypothesis: Residuals are homoskedastic at 5% significance level

Table 6: Panel Period Heteroskedasticity LR Test

4 Conclusions

To examine the influence of logistic performance and ease of doing business on trade volume among Eurasian countries, we expand the existing trade volume theory, commonly referred to as the "Gravity Model," by incorporating LPI and DB score. To this end, we estimate baseline model and augmented model by using annual

data from 2000 to 2023 for each individual country in Eurasia. According to our estimation results, as logistic performance of countries improves, the significance of the relative distance between Eurasian countries fades away. Rather than the ease of doing business, the logistic performance over performs on trade volume among them. While these indicators have a crucial impact on the trade volume of peripheral countries in the Eurasia region, the economic size and factor endowments remain important for central countries like Russia and Kazakhstan that primarily export products with low demand elasticity such as energy.

A rise in exports will help the nations above' economies flourish since it will enable them to manufacture and export high-tech goods with significant added value, which will ultimately serve as the engine of economic expansion. Since raw and intermediate goods are traded internationally, trade volume boosts economic growth, logistical efficiency, and convenience of doing business. This arrangement creates a mutually supporting spiral.

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