Analysis of relationship between trade costs and Uzbekistan`s bilateral trade: theories and concepts

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A B S T R A C T

This paper examines the factors affecting Uzbekistan's bilateral trade flows, especially the relationship between trade costs and trade volume over the past decade. It uses a variety of tests, a gravity model, and an OLS regression method. The obtained results are similar to the previous literature, but some unexpected results were observed. It also provides conclusions and recommendations for future problems through the analysis of the results obtained. The main independent variable trade cost showed its expected result. A percentage increase in trade costs will reduce Uzbekistan's bilateral trade volume by 0.03%. Its relationship with bilateral trade is negative and significant.

JEL classification: F1, F4

Introduction

It is known that reducing the trade cost in international trade is one of the most important issues developing countries facing today. In particular, since the first years of independence, Uzbekistan has been implementing important reforms to increase international trade. In Uzbekistan, the cost of trade costs gradually declined under the period 2006-2017, declining towards the end period almost 3.5 times and amounting to 5,090 US dollars per container of goods. The export rate of goods decreased from 79 to 54 days. However, this process will not be easy for the country, as Uzbekistan is one of the world's double landlocked countries. This, in turn, creates difficulties in international trade and increases trade costs. The one of the main problems of Uzbekistan in international trade field is lanlockedness (LLCD), since it creates extra costs on trade and creates difficulties to compete with other markets Ramesh and Paudel (2018). Raballand (2003) investigated effect of LLCD on international trade of CA by using a restricted sample of 46 CIS membership countries, 18 of them landlocked countries, under the period 5 years (1995-1999), and concluded that LLCD decreases trade by much more 80%[1].

This paper examines the determinants affecting Uzbekistan's bilateral trade flows, especially trade costs and trade volume nexus over the past decade. It also provides conclusions and recommendations for future problems through the analysis of the results obtained.

The article consists of the following parts: Part 2 explains previous literature concepts and results of empirical studies on trade and trade costs nexus obtained by the researchers, Part 3 aims to explore basic modeling and methodology. Section 4 provides the analysis of the results obtained by OLS regression and various tests, while Section 5 provides an overview of the paper.

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[1]Raballand, G., 2003, " Determinants of the negative impact of being landlocked on trade: an empirical investigation through the Central Asian case", Comparative Economic Studies 45: 520–536.

Theoretical background

Applied economists divide trade barriers into two types: natural and artificial barriers Baldwin & Taglioni (2006). However, these barriers create different costs in international trade for instance distance is natural barrier for trade and it creates transport, storage and shipment costs, and import tariffs are considered as artificial barriers, therefore, they also create extra costs for importing firms. Vast amount of empirical studies have been done in order to measure influence of trade costs on exports and imports, and showed different determinants which increase trade costs.

Obstfeld and Rogoff (2000) states that trade costs are major determinants to explain all important issues of international trade.

Fackler and Goodwin (2001) investigated the impact of price differences between importing and exporting countries on trade costs, and concluded that when price difference oversteps trade costs increases.

Transportation costs play important role in trade. In international trade theory, transport costs were introduced to explain the differences between traded and non-traded commodities (Samuelson 1954). Usually such costs would be depended on geographical and political factors and they treated as an exogenous variable of the trade in trade models. Nevertheless, it is also admissible that transport costs may depend (inversely) on the quality of transport infrastructure. Hence, differences in the quality of infrastructure across countries may cause time consuming carriage of goods and explain differences in transport costs, which in turn may be able to account for differences in competitiveness.

Bougheas, Demetriades, and Morgenroth (1999) studied the impact of infrastructure on trade volume via its influence on transportation costs, and found that there is positive and significant impact level of infrastructure on trade volume. The results show that the difference in the transport cost of between economies is one of the major factors determining their competitiveness in the international market. Better transport services and infrastructure facilitate access to the international market and increase sales.

In trade literature, transport costs can be manifested in several dimensions. First, they can reflect a direct measure of the cost for a given mode of transport (rail, road, etc.), measured as costs per mile or kilometer. A most studies document a decline in direct transport costs for goods over the past ten years, as a result of improvements in transport infrastructure Glaeser and Kohlhase (2004) state that railway costs decreased by a factor of about 8 over 110 years.

Suresh and Aswal (2014) investigated the factors of manufacture exports of India with developed and developing economies. The authors employed augmented gravity model to run their empirical research. The obtained results proved that GDP and difference in GDP per capita positively impacts on India`s manufacturing exports. In contrast, the study showed that distance one of the elements of trade costs negatively correlated with manufacturing exports. Additionally, India`s manufacturing exports to developed countries more severely affected by trade costs than exports to developing markets

Tebekew (2014) studied the factors of Ethiopia's exports employing an augmented gravity model, covering the period (2004 -2012). The research results confirm that, exchange rate and distance, as proxies of trade costs, have illustrated negative and significant affect on bilateral trade of Ethiopia.

Bahmani-Oskooee and Kantipong (2019) analysed impact of exchange rate uncertainty on bilateral trade flows between China and Thailand. Both linear and non-linear ARDL imports and exports models revealed that exchange rate uncertainty has short term impact on Thailand`s exporting and importing industries.

Borchert, I., Yotov, Y.V. (2017) investigated distance and trade nexus. The empirical findings illustrate that geographical distance still harnesses exports of low income countries. Authors warn that this issue prevents poor countries` integration into global markets and expand income differences between rich and poor countries.

Önsel Ekici, Kabak, and Ülengin (2016) state that efficient logistic systems may accelerate national SME`s entering into global markets and decrase trade costs.
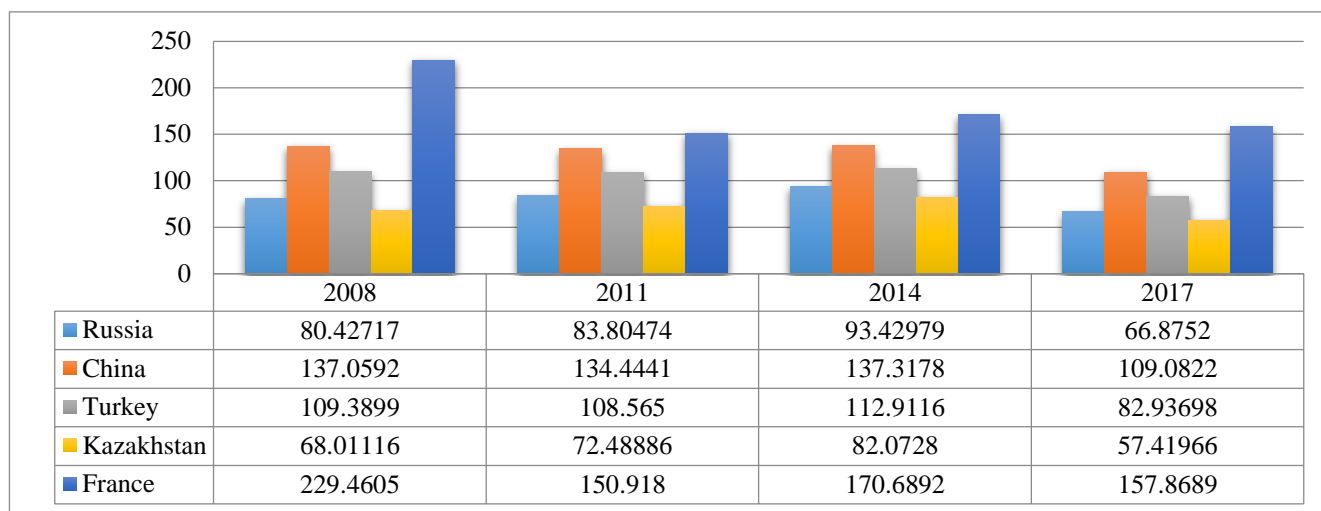
Current trade dynamics of Uzbekistan

According to, report by the State Statistics Committee, in January 2020, Uzbekistan's foreign trade turnover amounted to $ 2.9 billion, compared to 251.9 million USD in the same period in 2019. It was noted that in the foreign trade turnover of Uzbekistan the volume of exports amounted to 1.2 billion USD (growth rate - 4.9%) and imports reached - 1.6 billion USD (growth rate - 8.7%). During the reporting period, foreign trade exhibited trade deficit 373.8 million USD.
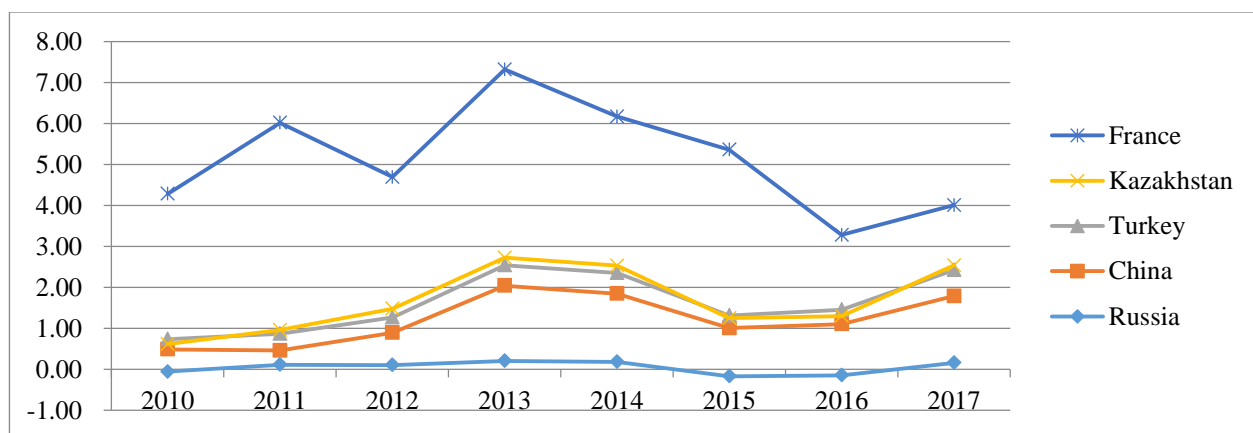
Fig-1. Recent trends of export growth of Uzbekistan with major trading partners
Source: ESCAP World Bank database

According to Fig-1 Uzbekistan`s export with its major trading partners flows have decreased from 2014 to 2015, but in last years` trend is showing overall growth of exports. Uzbekistan has trade relations with more than 129 countries. A relatively significant share of foreign trade turnover is in the People's Republic of China (17.5%), the Russian Federation (16.0%), Kazakhstan (7.4%), the Republic of Korea (6.5%) and Turkey (5.7%).), Afghanistan (1.7 percent) and Germany (1.6 percent). Among the 20 largest foreign economic partners, six countries have a positive foreign trade balance, including Afghanistan ($ 48.3 million), Turkey ($ 26.9 million), and Tajikistan ($ 18.9 million), Kyrgyzstan ($ 14.3 million), the UAE ($ 4.3 million), and Iran ($ 2.3 million). The passive foreign trade balance with the remaining 14 countries is maintained.

	2008	2011	2014	2017
Russia	80.42717	83.80474	93.42979	66.8752
China	137.0592	134.4441	137.3178	109.0822
Turkey	109.3899	108.565	112.9116	82.93698
Kazakhstan	68.01116	72.48886	82.0728	57.41966
France	229.4605	150.918	170.6892	157.8689

Fig-2. Changes of bilateral trade cost of Uzbekistan and its main trading partners.

Source: ESCAP World Bank database

Fig-2. Illustrates that overall trade costs plummeted in recent decade. Especially, bilateral trade cost between Uzbekistan and France has fluctuated but plunged drastically. We can conclude from the notations above Uzbekistan is doing great deal job on the way of decreasing trade cost.

Basic modeling

In this section, we clarify the gravity model on estimating influence of trade cost on bilateral trade of Uzbekistan with its trading partners. Research shows that many scientists used various gravity models in their studies. This model was employed by Bergstand (1985), Deardorff (1997), Robinson and Thierfelder (2002), Rutherford and Tarr (2003), Lloyd and Mcclaren (2004). Such articles of many scholars have added an important contribution to development of gravity model field.

The formula of the gravity model, which is commonly exploited in empirical observations follows as:

$$Y_{mnt} = G \frac{X_{mt} X_{nt}}{D_{mnb}} \quad (1)$$

Y_{mnt} –exhibits bilateral trade between partners m and n, at period t X_{mt} , X_{nt} – size of the economy of countries, at time t, (GDP of trading partners a and b), D_{ab} stands for – distance between capital cities of the partners m and n, G is gravity constant term.

The gravity model was first employed by Tinbergen (1962) and Poyhonen (1963) in order to investigate patterns of international trade. In his model Tinbergen's model investigated affect of trade barriers on mutual trade of 42 economies. Additionally, the scientist explored the influence of trade agreements between partner economies on cross-border studies. Leamer and Stern (1970) tried to observe the affect of transaction costs on sales, but they failed to obtain the expected results because their model was not based on theoretical rules of trade field.

Methodology and data

This paper employs data on factors of foreign trade flows of Uzbekistan and its major trading partners (Russia, China, France, Iran, Kazakhstan, Switzerland, and Turkey) under the period 2008 and 2017. Most data evolved from World Bank database (ESCAP World bank Trade cost data, WITS World bank bilateral trade data, and etc.).

Main subject of this paper is to examine varying the affects of the variables on trade flows in Uzbekistan and its selected partners for a given period. Relying on our expectations, economic size of countries correlates positively on trade flows, the other regressors such as trade cost, distance, and exchange rate show negative relationship. Following the previous literatures, gravity model is used to estimate the affect of different types of variables on bilateral trade flows between Uzbekistan and partner countries over time. The calculations are carried out using the OLS regression:

$$ln\,Y_{mnt} = ln\,\beta_0 + \beta_1\,ln\,\text{LGDP}_{mt}$$
$$+ \beta_2\,ln\,\text{LGDPUZ}_{nt}$$
$$+ \beta_3\,ln\,\text{LDIST}_{mn} + \beta_4\text{TC}_{mnt} + \beta_5 ln\text{LERP}_{mt} + \beta_6 ln\text{LERU}_{nt} + ln\,\theta_{mnt}$$

$m= 1$ (Uzbekistan) $n = 2, 3, 4,...,$ (partner countries)
$t = 1992, 2001, 2002,..., 2017$
Y_{abt} : stands for Uzbekistan`s export and import flows with country n in year $t,$ for measurement export flows in thousand USD.

LGDP_{mt} and LGDPUZ_{nt} : are Uzbekistan`s and GDP per capita of partner country n in year t. *Per capita* GDP is gross domestic product over by midyear population. Data are in current U.S. dollars.

TC_{mnt}: denotes trade cost between Uzbekistan and trading partners. The database is developed by world bank, it illustrates all trade costs including bilateral costs which is involved in all traded products internationally, and internal costs which is involved in all traded products domestically. Another advantage of this database is it captures all trade costs besides tariff and transport costs which were suggested by Anderson and van Wincoop (2004).2 The estimation formula of international trade cost was generated by Novy (2012) [3], and it follows as:

$$\tau_{xykt} = \left(\frac{C_{xykt}C_{yxkt}}{C_{xxkt}C_{yykt}}\right)^{\frac{1}{2}} - 1 \qquad (1)$$

τ_{xy} stands for bilateral geometric average trade costs between country x and country y

C_{xy} stands for bilateral trade costs from country x to country y

C_{yx} stands for bilateral trade costs from country x to country y

C_{xx} stands for domestic trade costs of country x

C_{yy} stands for domestic trade costs of country y

k is for sectors and t time

LDIST_{mn}: denotes distance in kilometers between Uzbekistan`s capital city and partner country n capital city

LERP_{mt} and LERU_{nt}: exhibit exchange rate of Uzbekistan and partner country (in USD) in year t, the data is employed from World Bank database

θ_{mnt} and β_0: Error term and fixed value

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[2] Anderson and van Wincoop (2003) initiated the idea of micro-founded measure of trade costs while Jack, Meissner, and Novy (2008) solves algebra result.

[3] Chen and Novy (2009) study trade costs at disaggregated sectoral level. σk becomes elasticity of substitution between varieties within sector k

Results and discussions

We can see in Table 3 regression results have shown expected signs. The main independent variable trading cost showed its expected result. A percentage increase in trade costs will reduce Uzbekistan's bilateral trade volume by 0.03%. and, its relationship with bilateral trade is negative and significant.

Surprisingly, the variable per capita GDP of the partner countries has a negative impact on Uzbekistan's bilateral trade. The GDP per capita of the partner country has indicated negative and strong impact on trade. However, Uzbekistan's GDP per capita has shown a positive and strong correlation with bilateral trade, which means that any increase in GDP per capita will increase bilateral trade by 13%. Chi and Kliduff (2010) studied determinants influencing on United States apparel trade. They run a pooled OLS and involved tariffs, GDP per capita, and FTA as specific determinants in their gravity model. Results proved that United States and partner countries` GDP per capita positively and significantly correlated with apparel imports.

The exchange rates of the countries showed negative results as expected. Their relationship with bilateral trade is negative and significant. Coric and Pugh (2008) used the meta-analyzes research method to study the effects of exchange rate on trade. Their research produced two different results. In the first case, 33 experiments showed that the exchange rate has a negative effect on trading volume. The second case, based on 25 studies, found that the exchange rate has weak influence on trading volume.

According to trade theory, the distance between countries, creates additional transport costs and negatively affects the volume of bilateral trade Anderson and Yotov(2010). The longer the distance, the fewer countries trade with each other, especially for landlocked countries. If countries have access to seaways, they can trade with each other, regardless of distance. Because seaways are cheap and fast routes. In our study, we can see the positive effect of distance on bilateral trade. This unexpected result can be explained as follows: the selected trading partners are mainly countries close to Uzbekistan, and the volume of trade between them has increased sharply in recent years, so the impact of distance has a positive impact on bilateral trade.

Hausman test result is pointing out that heteroscedasticity does not exist in our model with 0,752 *p value*, and this ensures reliability of our results.

Table-1

Regression results of the model

	LGDP	LGDPUZ	TC	LERP	LERU	LDIST	cons
LY	-0.679***	1.135***	-0.0304***	-0.0453	-1.663***	1.099***	18.82***
	(0.0868)	(0.271)	(0.00189)	(0.0329)	(0.390)	(0.190)	(1.702)
Hettest	chi2(1) = 0.10 Prob > chi2 = 0.7526						
N	66	66	66	66	66	66	

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table-2 shows results of normality test of Skewness and Kurtosis. Results exhibit that trade cost (TC) and distance (LDIST) variables are normally distributed in the model with 0,245 and 0,084 probabilities respectively.

Table-2

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	joint adj chi2(2)	Prob>chi2
C	66	0.0252	0.0202	8.96	0.0113
C	70	0.0150	0.0580	8.33	0.0155
LGDPUZ	70	0.5820	0.0000	14.60	0.0007
TC	70	0.1059	0.6846	2.89	0.2355
LERP	70	0.0016	0.9655	8.68	0.0130
LERU	70	0.0007	0.2100	10.87	0.0044
LDIST	70	0.7776	0.0264	4.95	0.0841

Conclusion

This article analyzes the factors affecting on the volume of bilateral trade of Uzbekistan. It uses a variety of tests, a gravity model, and an OLS regression method. The obtained results are similar to the previous literature, but some unexpected results were observed.

In particular, contrary to the results of previous literature, partner countries` the GDP per capita has negatively affected the bilateral trade flows of Uzbekistan. However, Uzbekistan's GDP per capita shows a positive and strong correlation.

At the same time, the distance variable also showed an unexpected result, which had a positive impact on Uzbekistan's bilateral trade. This result contradicts to the results of previous empirical studies.

Nevertheless, our main variable, trade costs, showed a negative and significant result, as expected. In recent years, the Uzbekistan`s government has implemented a various reforms to increase foreign trade activity, which in turn has led to a reduction in trade costs and a sharp increase in exports. However, lots of work remains to be done in order to reduce domestic and foreign trade costs. These include abolition or reduction of import tariffs on imported products from partner countries in exchange for reduction of import tariffs to our national products, to increase number of companies which produces AI or various computer software since exporting AI and software do not require transportation costs. Assisting exporting countries to advertise their products in global markets this helps to foreign consumers to get information about national products.

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