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**Master's Thesis of Public Administration**

**An Analysis of the Pattern of Trade  
of Kazakhstan:  
The Gravity Model Approach**

**카자흐스탄 무역 유형에 관한 분석:  
Gravity 모형 접근법**

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# **Abstract**

## **An Analysis of the Pattern of Trade of Kazakhstan: The Gravity Model Approach**

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The aim of this study is on the basis of the gravity model to examine Kazakhstan's trade flows, in order to describe trade relations of Kazakhstan and its top ten trade partners. Dependent on natural resources economy of Kazakhstan made it interesting to construct the gravity model using the data of trade volume of Kazakhstan excluding oil and gas sector.

Examining the gravity model within the Kazakhstan context this research studied the relationship between bilateral trade flows and the following factors: GDP, distance, population, adjacency, history, and previous year trade value.

A regression analysis was utilized in order to test the data, which were collected from the World Bank, CEPII, and the Statistics Agency of the

Republic of Kazakhstan. Trade value is used as dependent variable. GDP, per capita GDP, distance, adjacency, history, and trade value of the previous year are used as independent variables.

An analysis of the data revealed that the obtained gravity model had a good quality. Independent variables as GDP, history, and previous year trade value had a significant positive effects to the Kazakhstan's trade flows, showing that trade flows between two countries depend on trade partners' economic size, the existence of previous year bilateral trade value, and their common history of the Soviet Union regime.

The insignificance of population variable showed that Kazakhstan's bilateral trade flows did not depend on the size of countries' internal market. Distance, and adjacency, population variables appear to be statistically insignificant, which can be explained by the specification of the Kazakhstan's transportation system.

**Keywords:** Gravity Model; Kazakhstan; international trade

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## **List of Abbreviations and Acronym**

CEPII	Centre D'Études Prospectives et D'Informations Internationales
EU	European Union
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
USSR	Union of Soviet Socialist Republics
USA	United States of America
WTO	World Trade Organization

## 1. INTRODUCTION

Integration influence on independent states' foreign trade politics formation is carried out during the development of international relations in the context of globalization.

Moreover, in recent decades globalization of economic processes continue and faster than with the release of growing volume of international trade. Creating the GATT and then the WTO, various forms of preferential trade agreements, the establishment of international institutions to facilitate and promote trade, anyway facilitates the exchange of goods and services.

The process of international trade by itself represents an alternative production technology, modifies and internationalizes traditional technologies. Global production model becomes more and more common, in which the various intermediate components manufactured in different countries on different continents, and many large manufacturing firms corporations became transnational long time ago. Almost all countries, with few exceptions, are heavily involved in international trade.

The continuing growth of the world economy accompanied by a struggle for new markets, the expansion of the former. This struggle is often hidden, covert, but that it does not lose its sharpness.

World trade volume exceeded 18.2 trillion. In 2013 with the figure of 4.16 trillion dollars China went to the first position, ahead of the United States (3.57 trillion dollars), Japan (1.7 trillion dollars), EU (1.7 trillion dollars).

Searching country's new commercial niches, companies rely on both their natural governmental competitive advantages, and the newly created as a result of technological breakthroughs. On the one hand, almost all countries seek to eliminate barriers to international trade. A striking example is the WTO. In trade without borders online trade has an indicative achievement, which in 2013 reached 1.25 trillion.

Geopolitical position of Kazakhstan, located in the center of the Eurasian continent, at the junction of Europe and Asia, its vast territory, rich natural resources determine the special mission of the republic. Thus, formation of foreign trade relations of Kazakhstan took place during the development of the integration of several levels: global and regional. Different levels of the integration processes, respectively affected the country's economy, primarily by changing the dynamics, composition and direction of foreign trade cooperation. Her participation as an equal subject of international relations and multilateral interests of the country necessitate and facilitate orientation of the country in the Euro-Atlantic and Asia-Pacific regions.

Today Kazakhstan trades with more than 170 countries in the world. Country's foreign trade structure was changed within these 23 years of independency. The main trade partners of Kazakhstan today are Russia, the USA, Switzerland, the EU, China and the others.

According to the World Bank's report "Kazakhstan: the advantages of

foreign trade and openness for economic development" (2012) trade structure of Kazakhstan expands. Export markets of Kazakhstan is getting much more diversified year by year. Kazakhstan, which already had a geographically diversified export profile a decade ago, is now more diversified . Moreover, an expert from the World Bank argue that Kazakhstan, which has managed to diversify the geography of foreign trade, is rapidly reducing level of Russia as an export market. In 1996-1998, Russia accounted for 43 percent of all Kazakhstan's exports. By 2008, this figure fell to 11 percent of the total . The total volume of exports has changed significantly in favor of the EU ( with more than 20 percent to more than 50 percent ) and China (from 7 percent to 14 percent).

Significant position in the international economic integration takes foreign trade. Through international trade the limitations of resources and the narrowness of the domestic regional and national market overcomes, it becomes possible to mass production, increases the degree of utilization of equipment, increases the effectiveness of the introduction of new techniques and technologies, increasing accumulation, economic growth, more rational use of natural resources and labor.

New trends in the global economy and international economic integration create the preconditions to overcome resource limitations and narrowness of the domestic regional and national market, creating the possibility of mass production, increase the load of equipment, increasing the efficiency of the introduction of new techniques and technologies of increasing

accumulation, the rate of economic growth, a more rational use of natural resources and labor force.

Kazakhstan as a participant in international relations every year increases the number of trading partners, thus increasing the economic and technological potential of the country.

In this connection, the main purpose of this article - is to consider the possibility of a link in the construction trade relations of Kazakhstan with other countries on the basis of the gravity model.

At the current stage of economic science development, there are several basic models of international trade, such as the Ricardian, Heckscher-Ohlin models, and the model of monopolistic competition. All these models are usually developed to explain the well-known stylized facts about international trade, and they are mainly concentrated on the responses to questions about why countries trade with each other, and why it is the structure of trade, as it is in reality. However, none of the classical economic theory in its pure form does not address routing trade flows. In order to analyze the trade routes of the impact they have on the trade volume it is most often used gravity model of international trade. Originally dependence of trade flows from countries participating in GDP and the distance between economies such as gravity was discovered econometrically and did not contain theoretical justification, except purely intuitive. However, in recent years it has been suggested several

theoretical models based on different theories of international trade, which are reduced to the form of the gravitational equations trade.

The basic idea behind the approach of the gravity model of trade, is that the volume of trade of one country to another is directly proportional to the economic size of these countries due to the fact that their size determines, respectively, the supply and demand for export and import, and inversely proportional to the distance between these countries, as well as costs of trade in goods with increasing distance between the partners.

Moreover, gravity model allows in a relatively simple way to take into account the only key factors in the equation of bilateral trade between countries.

In addition, except the standard economic variables used in the modeling of foreign trade (the value of GDP, the value of foreign trade taxes, transportation costs, exchange rates, and etc.), gravity models allow us to consider the influence of institutional factors such as the level of government regulation of the economy, the cultural differences, the level of infrastructure development, the presence and level corruption, etc.

The aim of this work is to construct a theoretical form of spatial gravity trade model and its empirical verification of data on foreign trade of Kazakhstan. This model, after appropriate econometric test can serve as a tool that allows you to take into accounts the spatial effects of trade for Kazakhstan.

In this regard, this study is to be conducted for the data of Kazakhstan's bilateral trade volume with its top ten trading partners.

Kazakhstan is a country economically dependent on natural resources that are mined in the country. In this paper, in order to examine other sectors of the economy that is not being actively developed in Kazakhstan, the data of trade volume between Kazakhstan and its trade partners was represented without oil and gas sector.

Thus, the gravity model in this research will be obtained in order to analyze the influence of special factors to the Kazakhstan's bilateral trade flows, excluding oil and gas industry.

Examining the gravity model within the Kazakhstan context this research will study the relationship between bilateral trade flows (without oil and gas sector) and following factors:

- Distance between Kazakhstan and top ten countries;
- GDP of examined countries;
- Population of examined countries;
- Adjacency of the trade partners;
- Historical background;
- Previous year trade value.

In order to achieve this goal, the work will be set and will solve the following problems:

- First of all, to construct a theoretical model of the gravity model of Kazakhstan's foreign trade, adapted to the modern realities.
- Secondly, to analyze the foreign trade reaction extent from the various factors on the change.

The remainder of the thesis is organized as follows. Chapter 2 reviews some of the theoretical foundation of the gravity model. Chapter 3 provides characteristics of the Kazakhstan's economy, trade and the economic challenges that it faced. Chapter 4 provides an overview of the data and the variables. Chapter 5 and 6 presents the results of the analysis and conclusions respectively.

## 2. THEORETICAL FOUNDATIONS OF

### THE GRAVITY MODEL

As a foundation of this analysis I used the gravity model based on the assumption that the volume of bilateral trade flows is directly proportional to the size of the economy, and inversely proportional to the distance between them and other trade barriers. It is obvious that this model has a similarity with Newton's law of universal gravitation it was called "gravity" model.

The idea of using the gravity model in the analysis of international economic relations based on the assumption that trade flows are positively dependent on the GDP of the two countries, i.e. coefficient of GDP received as a result from the regression analysis must be positive and negative depending upon the distance between countries, affecting the potential transport costs. The greater the distance between the objects, the higher the transport costs and the result is smaller bilateral trade, so the estimate of the coefficient of the distance between the countries are supposed to be negative.

One of the first works, where the gravity model of foreign trade was used, was Tinbergen's book "Shaping the world economy" (1962).

According to the author of the article, the model used was quite simple. He suggested the equation, which related the volume of exports from one country to another, with the following explanatory variables:

- GDP of the exporting country;

- GDP of the importing country;

the geographical distance between the two countries.

It should be noted, that the author has written this equation at once, so it was not entered individual export's demand and supply functions. Thus, the tested ratio described only trade, not affecting the price issue, moreover, it was carried only static analysis. It means that the development of the situation in time was not considered. Selection of the above variables the author explained as follows:

- the volume of export of goods that a country can provide depends on the size of its economy (the GDP);

- the quantity of goods that can be sold in any country depends on the size of its market (the GDP);

trade volume should depend on the transportation cost of goods, which, by assumption of the author, should be proportional to the distance between the countries.

Many authors also noted that in addition to purely economic parameters, some role in determining the volume of trade between countries is likely to play political or semi-economic factors (Tinbergen 1962; Frankel J. & Shangjin W. 1993). The value of such special trade relations evaluates by introducing the so-called "dummy" variable.

For example, in Timbergen's (1962) work "dummy" variable was variable characterizing the trade preferences, that was exist within the British Commonwealth of Nations. When the trade flows between the two countries-members of the British Commonwealth was analyzed, this "dummy" variable was assigned a positive value, indicating that the exported goods used a favored special regime in the importing country. If it was considered the two countries were not members of the British Commonwealth, this variable had the zero value, indicating the absence of a special favored regime.

Many authors use as a "dummy" variable following characteristics: neighborhood, border effect, the state regulation of the economy, the cultural differences, the level of infrastructure development, availability and the level of corruption, and others.

In this regard, the gravity model is often used to evaluate the assessment of effects of regional trade agreements concluded by the group of countries. The basic idea is to add a "dummy" variable in a standard gravity model, reflecting the impact of regional trade agreements on the level and direction of trade flows.

Jaime E. Anderson and Eric Van Wincoop (2003) offered a closest version to the traditional gravity model, which has been added to the variable multilateral resistance. The advantage of this model is its rigorous theoretical foundation.

According to the Anderson and Van Wincoop (2003) for two traded with each other regions "multilateral resistance" is an average of these two regions trade barriers, which can appear when they trade with the rest of the world. The higher the barrier, the stronger regions will tend to trade with each other. Application of multilateral resistance variable allows not only simply display gravity model in theory, but also to get the correct assessment of its member variables.

The model of Anderson and Van Wincoop (2003) is based on the standard gravitational dependence, where the size of the economy determines the size of the trade displacement. Based on the obtained theoretical dependence authors make three conclusions:

1. In relative terms trade barriers lower trade between large countries more than trade between a small countries.
2. In relative terms trade barriers increase trade between regions within a small country more than interregional trade within a large country.
3. In relative terms small countries trade more within its own borders, comparing to the total volume of trade.

Baxter and Kouparitsas in their article "What determines bilateral trade flows?" (2006) tried to identify factors that have a significant effect to the foreign trade volume, and as a basic model for empirical estimates they used gravity model of foreign trade.

As an independent variable, the authors used the value of total trade flows between the two countries (exports from country i to country j and from country j to country i).

As the variables that could explain the empirical evaluation, the authors considered indicators that can be divided into the following 7 groups:

- Gravity variables;
- The factors of production;
- The stage of development;
- The similarity of the economy structure;
- The impede the free flow of goods and capital;
- Monetary Union;
- The volatility of the exchange rate;

The first group, which the authors call "gravity variables", is mainly composed of the variables that were considered in academic papers earlier. There are the quantities that are traditionally part of the standard gravity model of foreign trade. This group of variables used by the authors in the future for all model specifications: the purpose of their work was to verify which variables besides the "gravity" could influence the volume of foreign trade. The first of the "gravity variables" is the distance between two countries, which exchange products. This value has a direct influence on the size of the trading costs: other things being equal, it is assumed that the further apart are two considered countries, the higher the

transportation costs, and, respectively, the lower the mutual trade. The second "gravity variable" also is quite traditional. It is the presence of a common land border. As the authors note, studies show that the volume of trade dependence on the distance between the countries is nonlinear: trade is more intense between countries, which have a common border, than between countries located at the same distance from each other, but no common border possess. It can be noted that a meaningful interpretation of this phenomenon may be, for instance, the fact that trade between the two neighboring countries of goods necessary to pass only one boundary and, consequently, only one customs. Another variable, which the authors attributed to the "gravity" group are cultural differences. The most common measure of this indicator is the presence of a common language in the countries under consideration.

Moreover, the same set of variables authors included a dummy variable that indicates whether one of the countries was ever considered as a colony of another country (in this case, the variable took the value "1"). Another dummy variable was taken to be equal to the value "1" if the two countries were considered a colony of a third country. In fact, these variables are assumed as another indicator of cultural similarity, however, they can be characterized as economic proximity as well: if in colonial times between these regions it was set certain economic relations, it is logical to assume that gaining the independence it is much easier to preserve existing trade links than looking for new one.

Finally, in the article the last variable in a series of "gravity" advocates the scale of economies of the countries in question. Along with the distance between countries it is one of the most traditional variables in the literature of the gravity model of foreign trade. The hypothesis is that, other things being equal, the greater the economy, the more products it will export and import, respectively, the greater the volume of bilateral trade with other countries. As a measure of the scale of the economy the authors chose the GDP per capita.

The next group of variables, which was tested at the work of Baxter and Kouparitsas (2006), this group of production factors. In accordance with the Heckscher-Ohlin model, the volume of trade between any two countries should be greater, the greater the differences in the availability of two countries with these production factors.

In the model the authors use three main factors of production: human capital, physical capital and land.

As a measure of human capital authors use two variables. The first is the product of the average number of years of schooling in the two countries (or sum in logarithmic representation). According to the authors, this variable is not widely used in the literature. Nevertheless, the article assumes that it reflects the scale of the human capital provision in the two economies, the same as the GDP of countries reflects the size of the economies.

The second measure of human capital is more traditional and it is the ratio of the maximum of average number of educational years to the minimum number of educational years.

Similarly, at the research it was lined up the two measures of physical capital and the two measures of land supply, and, respectively, instead of the average number of years of education it was used the average provision of one worker with the physical capital and the amount of agricultural land per capita.

The authors emphasized that the difference in the level of the tested countries' development had an effect to the volume of bilateral trade between them. In order to account this difference it was used two variables in the article.

The first is a dummy variable that takes the value "1" if the pair of the two countries are developed countries or developing countries, and the value "0", if one of these countries - developed, and the other - growing. The authors notes that in the literature there is no clear evidence of how the built variable can effect to the volume of bilateral trade. On the one hand, stated in the article, the research of Helpman and Krugman (1985) suggests a large and growing trade between developed countries at the expense of the goods produced under the conditions of monopolistic competition. On the other hand, according to the Heckscher-Ohlin model, the largest volumes of trade should be observed between countries, the

most different from each other.

The second variable, which is introduced by authors in order to account the difference of countries' level of development, reflects the difference in the structure of production in these countries.

This index takes values from 0 to 1. In the first case, this means that the countries in a question are absolutely the same structure of production, and in the second case, that these countries specialize in completely different industries.

In the mentioned studies Anderson, Baier, Bergstrand and others gravity equation specification of trade flows is derived from the assumption that the mechanism of the process of international trade is based on the assumptions of the monopolistic competition model (differentiated products).

Deardorff's article "Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World?" (1997) is devoted to the problem of identifying the link between Heckscher-Ohlin model (the classical the model of international trade) and the gravity model.

The author notes that the rigorous theoretical foundation for the gravity model did not exist until recently. Although in recent years a number of studies aimed to find this foundation, none of them at that time could not tie the theoretical assumptions, underlined the Heckscher-Ohlin model, with the traditional form of the gravity equation of trade. The main

objective of the article is to find these relations.

The paper considers two main cases: free from barriers trade and trade with barriers.

The first case is much less interesting than the second, since it implies the absence of a key element of the gravity equation of trade - the distance (or, in general, geographical barriers) between the exporter and importer. In this regard I will study only the second case described in the Deardorff's article - trade with barriers.

In the model, which the author offers, it is assumed an existence of positive barriers in order to trade any goods between any of the countries. In this case there is no requirement in relation to the absolute magnitude of these barriers, the main condition is that they are always positive.

The author points out that, in accordance with the Heckscher-Ohlin model, the two countries can not trade with each other if they have the same prices for the factors of production: in this case, and the cost of production should be the same, therefore, under perfect competition, foreign producers can not to compete with the internal because of nonzero transportation costs.

However, as noted in the article, in the real world there is trade between almost any pair of countries, therefore, it is needed to assume the existence of different prices for the factors of production in each pair of countries.

Furthermore, one of the basic assumptions of the model is that the number of products greater than the number of production factors, perhaps even indefinitely.

In the case of the trade barriers absence, different prices for the production factors in different countries are very much restricted to the quantity of goods, which any two countries could be performed simultaneously. However, if trade barriers still inserted in the model, then, according to the author, the previous sentence is voided, as now some products can be non-tradable. In this case, one country can simultaneously have local goods and goods made abroad in the market, if the difference between the production cost of local and abroad goods is exactly equal to the difference between the transportation costs.

If the transportation costs of each product between any pair of countries are fixed, than consumers in each country will buy any particular item only from one manufacturer -internal or located in another country (depending on the ratio of costs of production and transportation).

Further, the author makes a strong enough generalizing assumption: It is further assumed that each product is produced in only one country. This assumption equates the two situations: the first one consists in the fact that consumers in the tested country will buy every single item in the country, depending on the total costs of production and transportation, and the second is that each product is produced only in one country and,

consequently, consumers from all other countries will buy this commodity only from this country.

The article emphasizes that in reality it is two very different situations, but from these country's consumer's perspective concerns they are identical: consumer buys the item only from one manufacturer of fixed country. Further model development is based on this assumption with reservations about his imperfections.

At the end, Deardorff makes the conclusion, that the gravity model is reconcilable with several modifications of the Ricardian and Heckscher-Ohlin models.

In 2010 Asian Development Bank made a research "The Role of Trade Facilitation in Central Asia: A Gravity Model" that examined the relationship between bilateral trade flows and trade facilitation in Central Asia countries (including Kazakhstan). Also, they estimated the gains in trade derived from improvements in trade facilitation for the Central Asian countries. Trade facilitation is measured through the World Bank's Logistic Performance Index (LPI). The results showed that there were significant gains in trade as a result of improving trade facilitation in these countries. Furthermore, intraregional trade increased by 100 percent. Among the different components of LPI, it was found that the greatest increase in total trade came from improvement in infrastructure, followed by logistics and efficiency of customs and other border agencies. Also, the

results showed that the increase in bilateral trade, due to an improvement in the exporting country's LPI, in highly sophisticated, more differentiated, and high-technology products was greater than the increase in trade in less sophisticated, less differentiated, and low- technology products. This was particularly important for the Central Asian countries as they try to reduce their dependence on exports of natural resources and diversify their manufacturing base by shifting to more sophisticated goods. As Central Asia countries looked for markets beyond their borders, trade facilitation will have an important role to play.

### **3. AN OVERVIEW OF KAZAKHSTAN'S TRADE**

#### **3.1. Kazakhstan's Economic development**

In 1991, the Republic of Kazakhstan gained its independence and today it is a presidential republic. Kazakhstan is divided into 14 administrative regions, with the capital Astana.

Kazakhstan is located at the crossroads of two continents - Europe and Asia. The geographical center of the European-Asian subcontinent is precisely in Kazakhstan. Kazakhstan occupies an area equal to 2724.9 square kilometers and is located to the east of the Caspian Sea and Volga plains to the mountainous Altai foothills of the Tien-Shan in the south and south-east to the West Siberian lowland in the north. The length of its territory from west to east is more than 3000 km from north to south - 1700 km on. By territory Kazakhstan is the ninth biggest country in the world after Russia, Canada, China, the USA, Brazil, Australia, India and Argentina.

In the east, north and north-west Kazakhstan borders with Russia (border length 6477 km), in the south - with the states of Central Asia - Uzbekistan (2,300 km), Kyrgyzstan (980 km) and Turkmenistan (380 km), and in the south-east - China (1460 km). The total length of Kazakhstan's borders is almost 12.2 thousand km, including 600 km along the Caspian Sea.

Kazakhstan is located in the center of the Eurasian continent, almost equidistant from the Atlantic and Pacific Oceans, as well as significantly removed from the Indian Ocean. Such a deep continental location largely determines its natural conditions.

More than a quarter of the country is steppe, half of the country are deserts and semi-deserts, the rest quarter are the mountains, the sea, lakes and rivers.

### Map of Kazakhstan



Figure 1. Map of Kazakhstan

Kazakhstan is still largely a country with a so-called primary economy. Mining, and agriculture are much more developed than the secondary and

tertiary sector (processing and service industries), but with vast variety of minerals.

Kazakhstan consists of five major economic regions.

North Kazakhstan: the development of agriculture, mining of iron ore and coal, machinery, petroleum and ferroalloys, energy.

East Kazakhstan: non-ferrous metallurgy, energy, engineering and forestry.

Western Kazakhstan - the largest oil and gas producing region, engineering, instrumentation, production of construction materials including limestone, chalk, cement.

Central Kazakhstan: ferrous and nonferrous metallurgy, machinery, and animal husbandry.

Southern Kazakhstan: cotton, rice, wool, grain, fruit, vegetables, tobacco, grapes, hemp; nonferrous metallurgy, instrumentation, light and food industries, fisheries and forestry sectors are developed.

Thus, according to the scientists, Kazakhstan ranks sixth in the world in terms of natural resources.

There are 110 chemical elements in the Mendeleev's table, and it was identified 99 chemicals elements in Kazakhstan's bowels, 70 of them are explored, but 60 elements are extracted and used. Kazakhstan is one of the

richest countries in the world on oil, gas, titanium, magnesium, tin, uranium, gold and other base metals.

Today it is known 14 prospective oil pools located virtually across Kazakhstan's territory, where only 160 oil and gas fields are explored and the amount of recoverable oil reserves equals to 2.7 billion tons. Total oil reserves in the north of the Caspian Sea are estimated very impressive size - 3-3.5 billion tons of oil and 2-2.5 trillion cubic meters of gas.

In territory of Kazakhstan it was predicted about 300 significant deposits of gold, 173 of which have been explored in detail.

The Kazakhstan Republic is now explored more than 100 coal fields.

During these years of Soviet power, Kazakhstan became a major industrial and agricultural region, where were created powerful centers of energy, metallurgy, fuel, chemical and engineering industries. It was a major producer of non-ferrous and ferrous metals, uranium, coal, oil, grain, and livestock products. Its enterprises in individual years of Soviet power, which were most favorable for the development of the entire economy of Kazakhstan, as well as for production activities of its individual businesses, manufactured (produced) a number of products that significantly exceeded the current level of production.

In addition, it should be noted that the intra-continental position of Kazakhstan, its distance from the sea routes and international traffic arteries pose serious challenges to its economic development. In addition,

as a result of a deliberate policy of the Soviet period, its transport and communications systems rather connecting Kazakhstan with Russia than with the different levels of development and remote regions.

After gaining the independence in the period from 1991 to 1997, Kazakhstan has enjoyed economic recession. The country's economy was in a high inflation environment, the imbalance of revenues and expenditures of the budget system, sustainable budget deficit, rising energy prices, uncontrolled monopoly producers.

Consider the data of inflation of Kazakhstan according to the Statistics Agency of the Republic of Kazakhstan:

**Table 1. Inflation of Republic of Kazakhstan from 1991 until 2012**

<b>Year</b>	<b>Inflation of the end of the year</b>
1991	147,1%
1992	2960,8 %
1993	2165,0 %
1994	1158,3 %
1995	60,3 %
1996	28,7 %
1997	11,2 %
1998	1,9 %
1999	17,8 %
2000	9,8 %
2001	6,4 %
2002	6,6 %
2003	6,8 %
2004	6,7 %
2005	7,5 %
2006	8,4 %
2007	18,8 %
2008	9,5 %
2009	6,2 %
2010	7,8 %
2011	7,4 %
2012	6,0 %

**Adapted from and updated: the Statistics Agency of the Republic of Kazakhstan**

In 1995, Kazakhstan's economy has slowed the pace of the economic recession and the significant reduction in the rate of inflation has been achieved by using the tools of monetary policy. Taken measures allowed to curb hyperinflation, inflation rate decreased from 2265% in 1993 to 60% in 1995. Thanks to further economic reforms in Kazakhstan, in 2012 inflation was 6%, while in 2014 analysts predict inflation level around 8.5%. It can be explained by two factors - the adjustment of the national money of Kazakhstan in February 2014 and the problems of ensuring the Kazakh oil market.

Change of GDP growth in Kazakhstan also shows the development of the national economy.

**Table 2. GDP growth rate of Kazakhstan, 1993-2013, %**

<b>Year</b>	<b>GDP growth rate, %</b>
1993	-9,2
1994	-12,6
1995	-8,3
1996	0,5
1997	1,6
1998	-1,9
1999	2,7
2000	9,8
2001	13,5
2002	9,8
2003	9,3
2004	9,6
2005	9,7
2006	10,7
2007	8,9
2008	3,2
2009	1,2
2010	7,3
2011	7,5
2012	5,5
2013	6

**Adapted from and updated: the Statistics Agency of the Republic of Kazakhstan**

**Table 3. GDP and GDP per capita of Kazakhstan, 2004-2013, %**

<b>Year</b>	<b>GDP, \$US</b>	<b>GDP per capita, \$US</b>
2004	43,151,647,003	11,580
2005	57,123,671,734	12,570
2006	81,003,864,916	13,900
2007	104,849,886,826	15,230
2008	133,441,612,247	15,460
2009	115,308,661,143	15,990
2010	148,047,348,241	16710
2011	188,048,960,311	17,710
2012	203,517,198,089	18,860
2013	224,414,773,751	20,550

**Adapted from and updated: the Statistics Agency of the Republic of Kazakhstan**

In general, today thanks to strong economic growth and relatively low level of inflation it could be argued that the process of reform in Kazakhstan was able to implement a "soft landing".

### **3.2. BILATERAL TRADE WITH TOP TEN TRADE PARTNERS**

One of the most important sectors of the economy of Kazakhstan is the foreign trade, which is developing dynamically and characterized with active orientation. It is clear that global integration processes, which are increasingly involved in transit economy, including Kazakhstan, had a marked influence on the development of foreign trade.

Liberalization of foreign trade, as a necessary condition for the gradual opening of national markets, has had a positive impact on the subsequent recovery of the economy.

Foreign trade has a great importance for the implementation of market reforms in Kazakhstan, as well as for the formation of the country's position in the international division of labor, determines the most effective forms and directions of use of the economic potential of the country.

As it can be seen from table above during 1997-2010 the foreign trade value of the Republic has steadily increased from 9,056.9 million \$ US to the 109,072.6 million \$ US.

**Table 4. Trade value, exports and imports of Kazakhstan, 1997-2010**

Years	Trade value		Export		Import	
	million, \$US	%, to the previous year	million, \$US	%, to the previous year	million, \$US	%, to the previous year
1997	9056,9	-	5250,2	-	3806,7	-
1998	10152,1	112,1	5911,0	112,6	4241,1	111,4
1999	10797,8	106,4	6497,0	109,9	4300,8	101,4
2000	9648,0	89,4	5334,1	82,1	4313,9	100,3
2001	9526,7	98,7	5871,6	110,1	3655,1	84,7
2002	13852,2	145,4	8812,2	150,1	5040,0	137,9
2003	15085,1	108,9	8639,1	98,0	6446,0	127,9
2004	16254,3	107,8	9670,3	111,9	6584,0	102,1
2005	21 335,4	131,2	12926,7	133,6	8408,7	127,7
2006	32877,5	154,1	20096,2	155,5	12781,3	152,0
2007	45201,2	137,5	27849,0	138,6	17352,2	135,8
2008	61 927,2	137,0	38250,3	137,3	23676,9	136,4
2009	80511,7	130,0	47755,3	124,8	32756,4	138,3
2010	109072,6	135,5	71 183,6	149,1	37889,0	115,7

Adapted from and updated: the Statistics Agency of the Republic of Kazakhstan

During the reporting period it is observed annual increase in both exports and imports in the foreign trade structure of Kazakhstan and stable trade surplus, which undoubtedly indicates the positive results of economic reforms in the country. But on closer inspection, in particular, if we take the index of the physical volume of foreign trade, exports and imports of Kazakhstan for 1998-2010 presented in Table 4, we can see that the foreign trade of Kazakhstan defeated cyclical fluctuations (ups and downs).

Geographic focus of Kazakhstan's foreign trade has a positive trend, which is expressed in overcoming the total dependence of foreign trade value of the republic from a single trading partner in Russia, as we know, happened historically. That is why Kazakhstan's foreign trade headed for the diversification of trade relations. So, if in 1997 47.1% of foreign trade value belonged to the Russian by 2010 its share was 18.3%, and the rest part of Kazakhstan's foreign trade value is relatively evenly distributed among other trading partners.

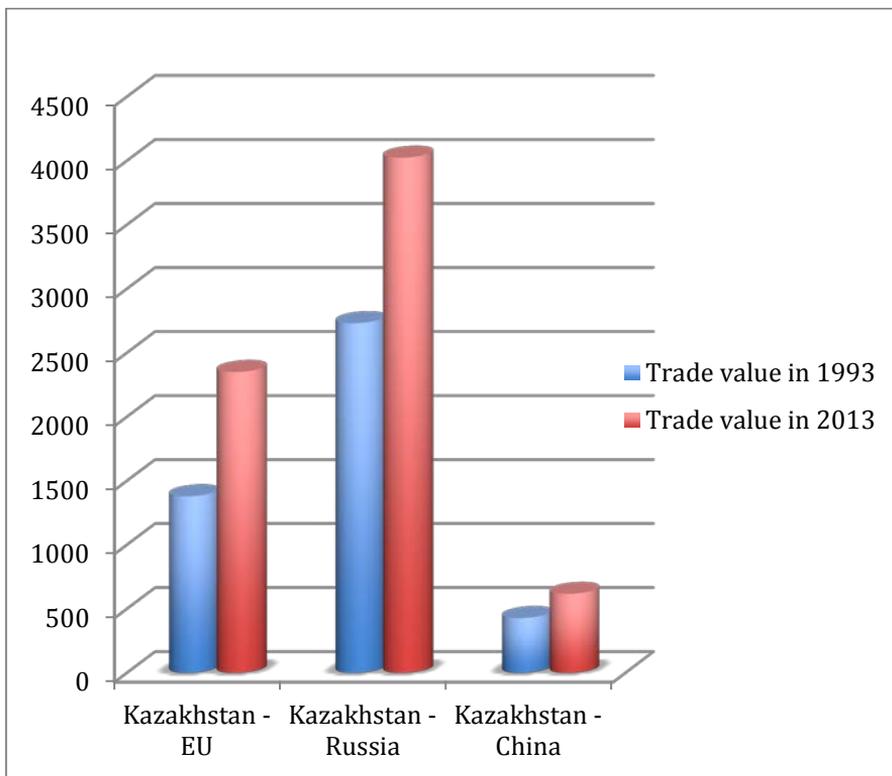
But, nevertheless, in spite of trade relations with over 180 countries round the main trade partners of Kazakhstan is narrow and limited to the 11 countries of Iran, Italy, China, the Netherlands, Russia, Turkey, Ukraine, France, Switzerland, Germany, Japan, and their accounted for the analyzed period on average 70% of all trade relations, and the share of the rest only 30% (about 170 countries).

Moreover, among these 11 countries the lion share of Kazakhstan's turnover belongs to only three or four of them. For example, in 2010 they were Russia (18.3%), Italy (12.1%), China (11.2%), Switzerland (10.5%), in other words 52.1% of the foreign trade turnover of Kazakhstan depends on four partner countries. Of course, it does not fit with the counties the interests of diversification of external relations, and any changes in policy and economy of these countries may influence a significant impact on the weakening of the economic independence of Kazakhstan.

As well as trade value during 1997-2010, geographical diversification of exports of Kazakhstan has a positive result. So, in 1997 Russia was the main country where Kazakhstan exported its commodity (45.1%), as well as the Netherlands (9.7%), China (5.7), Switzerland (3.6%), Germany (3.3%), Italy (2.7%), Ukraine (2.3%), Turkey (1.3), Japan (0.8%), Iran (0.9%), France (0.2%), but by 2010. Kazakhstan's exports significantly differentiated as follows: the first place of export partner was Italy (16.7), next was by China (10.8%), Switzerland (15.8%), Russia (8.7%), France (7.6%), the Netherlands (6.5%), Iran (2.9%), Ukraine (2.8%), Turkey (2.7%), Japan (1.1%), Germany (0.9%).

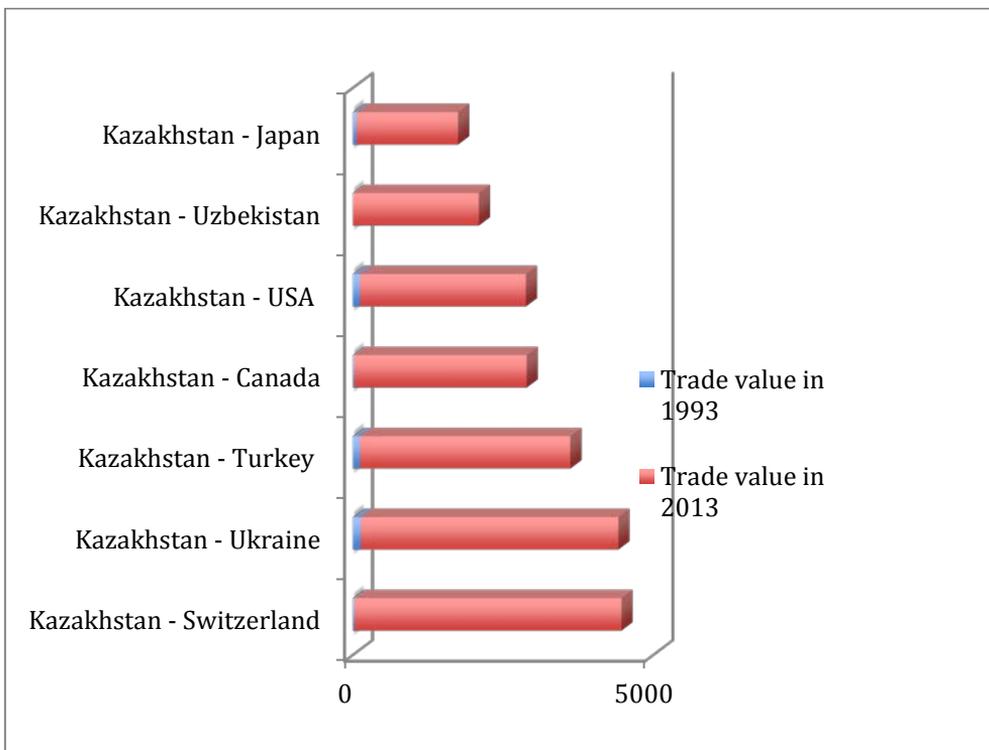
Charts 1 and 2 illustrate the changes and shifts of Kazakhstan's top ten partners by the trade flows in 1993 and 2013.

**Chart 1. Trade flows of Kazakhstan's top three trade partners from 1993 to 2013**



**Adapted from and updated: the Statistics Agency of the Republic of Kazakhstan**

**Chart 2. Trade flows of Kazakhstan's top seven trade partners from 1993 to 2013**



**Adapted from and updated: the Statistics Agency of the Republic of Kazakhstan**

Thus, it can be assumed, that the differentiation of geographical structure of Kazakhstan's trade flows exists, but only within these major trading partners.

In this regard, in order to strengthen the economic independence and sustainable economic growth requires further expansion and improvement of the geographical structure of Kazakhstan's trade, both within these countries and with the rest of 170 partner countries.

## **4. RESEARCH FRAMEWORK**

### **4.1. Data and variables**

In this research in order to create a gravity model of international trade of Kazakhstan I used the data of the bilateral import and export trade flows between Kazakhstan and its main trade partners. As samples I selected Kazakhstan's top ten trade-partners: European Union, China, Switzerland, Ukraine, Turkey, Canada, the United States of America, Uzbekistan, Japan, and Russia.

There are several reasons for that:

1. As it was discussed at the Chapter above, nowadays these top ten countries are Kazakhstan's top trade partners, and every year from 2004 we could see the growth of the bilateral trade flows between Kazakhstan and these countries. That is why in this paper, using the gravity model I can analyze the reasons of this fact and results can be implemented in the future, in order to develop trade relations of Kazakhstan with these analyzing countries and others.

Moreover, the obtained results can be used to advance the limitations that interfere to increase the trade value with Kazakhstan's trade partners.

2. According to the World Bank report "Kazakhstan: the advantages of foreign trade and openness for economic development" (2012), for nearly 20 years of independence geography of Kazakhstan's foreign trade

is changing and last years it is changing to Asia, primarily to China. For the period of 1995-2010 the share of European countries in the Kazakhstan's exports rose from 21% to 36%, Asia from 8.5% to 26.6% and countries of Commonwealth of Independent States fell by almost 5 times.

The geopolitical position of Kazakhstan in the global economy is quite complicated. On the one hand, the country is situated in the heart of Asia, at the same time and at the intersection of transport routes (rail, air, road, etc.), connecting Europe and Asia. On the other hand, Kazakhstan being a locked state has no access to the seas and oceans that in some cases adversely affect the country's foreign economic relations, because the maritime transport is the main form of transport in international shipping.

Despite the geographical location of Kazakhstan it's the trade-partners are spread all over the world. Kazakhstan's top trade countries are located in different continents:

- a. in Europe;
- b. in Central Asia;
- c. in South-East Asia;
- d. in North America.

In this context, Kazakhstan's geographical location and the geographical differentiation of its trade partners were the next reasons for choosing

these countries as a samples for the constructed gravity model.

In this research, the variables were defined as following:

➤ **Depended variable:**

- Bilateral trade value ( $T_{1j}$ ) (exports and imports) between Kazakhstan and one of the trade partners.

It is known, that more than 70 percent of the commodity basket of Kazakhstan's exports is concentrated in the energy and mineral resources. But in this paper I would like to pay attention to the other sectors of the economy of Kazakhstan, which has some growing process during last years. According to World Bank report (2012), that was mentioned above, even with excluding energy and minerals resources, it was observed increasing process of exports in other sectors. Structural changes indicate that Kazakhstan's structure of exporting goods extends constantly, even if this process of changing is relatively slow, but it was obvious during the last decade. Thus, in this paper bilateral trade value between Kazakhstan and its top ten trading partners from 2004 to 2012 was used with the exception of oil and gas sector data.

In addition, distance has a special role in the gravity model of trade. Pipeline and rail transport system are the most usable transport system for oil and gas commodity transportation. These transport systems are quite inflexible from a technological and geographical point of view, although they are effective for these specific goods. Moreover, for the trading

process of such specific resources as oil and gas there are some factors, which can influence to the process of trade more than economic reasons (for example: political situation of the countries, etc.). The effect of these aspects to the trade volume is difficult to calculate or predict. So, I consider it as a next reason for the exclusion of oil and gas sector data.

Bilateral trade value data was taken from the Kazakhstan's official statistics ([www.stat.gov.kz](http://www.stat.gov.kz)).

➤ **Independent variables:**

- GDP of Kazakhstan and its trade partners ( $GDP_1$ , and  $GDP_j$ ). These variables were used in order to measure trading partners' economic size.

In this paper the analyzing period is from 2004 until 2012. So, the data of this period of GDP of the countries in observation was taken from the official website of the World Bank ([www.worldbank.org](http://www.worldbank.org)).

- Distance ( $D_{1j}$ ) in kilometers between the Kazakhstan's capital (Astana) and capital of trading partners'. The studies of gravity models explains distance variable as a variable, which represents transport costs, transaction costs, and communication costs.

These data was taken at CEPII source (Centre D'Études Prospectives et D'Informations Internationales) (<http://www.cepii.fr>).

Brussels was used as a capital of the European Union. In the other cases of the tested countries it was used official capitals: Moscow for Russia, Washington for USA, Tashkent for Uzbekistan, and etc.

- Population (**Population<sub>1</sub>**, **Population<sub>j</sub>**) is a number of populations of countries in consideration. This variable is needed in order to examine the domestic size of

The data was obtained from the World Bank's official statistics.

- History (**History<sub>1j</sub>**) is a dummy variable demonstrating the influence from history, if country j belonged to USSR in the past, then History=1; otherwise History=0.

It is well known that before the proclamation of its independence in 1991, Kazakhstan was part of the USSR. In addition, the Soviet Union as a state had existed about 70 years, which is composed of 15 union republics. This historical fact has left its mark not only on the economic development of Kazakhstan, but also on all incoming formerly part of the USSR countries.

People from former USSR countries want to maintain a sufficiently close relationship due to the mixed population, mixed marriages, elements of common cultural space, the lack of a language barrier, and others. Considering these factors, I also decided to test the impact of this historical fact on trade and partnerships of modern Kazakhstan with other countries in this paper, by introducing a dummy variable "History".

- Adjacency ( *Adjacency<sub>1j</sub>* ) is a dummy variable indicating the effect from the common territorial border, if country *j* share the territorial borders with Kazakhstan, then Adjacency=1; otherwise Adjacency =0.

Besides having a huge territory Kazakhstan borders with 5 countries: Russia, Uzbekistan, Turkmenistan, China and Kyrgyzstan. This fact also requires consideration, as many studies show there are more intensive trade between countries that have a common border than between countries located at the same distance from each other, but there is no the common boundary. Note that a meaningful interpretation of this phenomenon may be, for instance, the fact that trade between the two neighbouring countries necessary to stop only one boundary and, consequently, only one customs. In this connection, the influence of this fact will also be analyzed in this paper, by including a dummy variable “Adjacency”.

- Bilateral trade value of the previous year  $T(t - 1)_{1j}$  between Kazakhstan and its trade partner.

Also in this paper, I examined the effect of the trade values of the past years on the period under consideration. For this purpose, it was introduced a variable “Bilateral trade value of the previous year”, which had a value of past year trade flows. This variable needed to explore the effect of previous year trade value to the year under the review.

Currently, this variable was used with the exclusion of oil and gas sector data. Since as it was mentioned above it was done in order to examine production capacity of other developing sectors in Kazakhstan.

## 4.2. Model

Deardorff (1998) suggested in his work the following logarithmic expression as a basic trade gravity model's equation:

$$(1) \quad \ln T_{ij} = \alpha + \beta_1 \ln(GDP_i * GDP_j) + \beta_2 \ln D_{ij} + \varepsilon_{ij}$$

where:

- $\alpha$  is the constant of proportionality;
- $T_{ij}$  is bilateral trade (exports and imports) between country  $i$  and country  $j$  and is a dependent variable;
- $GDP_i$  and  $GDP_j$  are a gross domestic products of country  $i$  and country  $j$  (independent variables);
- $D_{ij}$  is a distance between country  $i$  and country  $j$  (independent variables);
- $\varepsilon_{ij}$  is a random error;
- $\beta_1$  and  $\beta_2$  are coefficients.

This Equation (1) shows that the trade can exist because of the demand, but the demand comes from the income. Thus, there is a positive relation between the bilateral trade volume and countries' under consideration economic gross. The volume of the bilateral trade is negatively related to

the distance between these analysed countries. So, we can assume that the far countries from each other, the more it increases transport cost and it can lead to the lack of the communication in information.

Moreover, it can lead not only to the spatial distance, but also to the cultural and economic differences, etc.

In accordance with the classical formulation of the gravity model of international trade, I assumed that the volume of bilateral trade between two countries depends positively on the size of the economies and negatively depends on the distance between the two countries. Thus, the classical gravity model describes the dependence of the bilateral trade of the country's GDP and distance between them.

But in a real situation, there are many other factors that can influence the trade levels among the countries. For example: history, taxes, economic barriers, or regional integration.

In this connection, in this work I extended Deardorff's basic trade gravity model's equation by including the additional factors, which in my opinion can affect bilateral trade of Kazakhstan.

Thereby, in order to explore the influence of other factors on Kazakhstan's bilateral trade flows except economic gross and distance I extended Deardorff's basic trade gravity model's equation (1) and included four new variables:

1. Population of Kazakhstan and its top ten trade partners from 2004 to 2012;
2. Adjacency;
3. History;
4. Bilateral trade value of the previous year.

The extended gravity equation can be represented as follows:

$$\begin{aligned}
 (2) \quad \ln T_{1j} = & a + \beta_1 \ln(GDP_1 * GDP_j) \\
 & + \beta_2 \ln D_{1j} + \beta_3 \ln(Population_1 \\
 & * Population_j) + \beta_4 History_{1j} \\
 & + \beta_5 Adjacency_{1j} + \beta_6 \ln T(t-1)_{1j} + \varepsilon_{ij}
 \end{aligned}$$

where:

- $T_{1j}$  is a volume of bilateral trade (sum of export and import) between Kazakhstan and country  $j$ ;
- $GDP_1$  is a volume of gross domestic products of Kazakhstan;
- $GDP_j$  is a volume of gross domestic products of country  $j$ ;
- $D_{1j}$  is distance between Kazakhstan and country  $j$
- $Population_1$  is a volume of Kazakhstan's population;
- $Population_j$  is a volume of population of country  $j$ ;
- $History_{1j}$  is a dummy variable demonstrating the influence from history, if country  $j$  is a former USSR country, then  $History=1$ ; otherwise  $History=0$ ;

- ***Adjacency<sub>1j</sub>*** is a dummy variable of the common border, if country *j* share the territorial borders with Kazakhstan, then Adjacency=1; otherwise Adjacency =0;
- ***T(t – 1)<sub>1j</sub>*** is a bilateral trade value of the previous year between Kazakhstan and country *j*;
- *ε<sub>ij</sub>*, random error;
- and *β1, β2, β3, β4, β5* and *β6* are coefficients.

According to the hypothesis of gravity model we can assume the following.

Since the higher GDP of the considered countries, the more its internal market and the more it attracted for imports from other countries. Moreover, the country with the highest GDP has large production capacity and increasing its export based on comparative advantage. All this will lead to an increase in the bilateral trade volumes in connection with which the estimated coefficient  $\beta_1$  with a positive sign.

Distance variable measures geographical distance between two countries, representing the trade barriers between countries, implying as a resistance element of trade between countries. At the basis of the gravity model theory the coefficient of distance variable indicates the faster increasing trend of trade with closer countries than with the countries, which are far away. In this regard, I expect a negative sign for Coefficient  $\beta_2$ .

The population variable performs as a proxy variable for economic sizes of countries, specifically their domestic market size. Countries with large population have strong demand for the commodity, and it can be presumed as a foundation for high level of export in these countries. The scholars assume that countries with larger population are likely to trade more than countries with lower population. Therefore, the estimated coefficient  $\beta_3$  expected to be positive.

As it was mentioned before history dummy variable was applied as an explanatory variable of sharing common history of Soviet Union. We expect coefficient  $\beta_4$  with a positive sign because as it was assumed common history simplifies and promotes trade negotiations.

The next dummy variable that was used in the model was adjacency variable that represented the existence of common territorial boundaries between Kazakhstan and its top ten trade partners. Coefficient of common territorial boundaries  $\beta_5$  expected to be positive, since according to the basis of gravity model adjacency leads to the decline of transaction costs.

At the end, the presence of trade relations in the previous year should positively influence on future bilateral trade as well. In this connection it is expected the coefficient of bilateral trade value of the previous year  $\beta_6$  with a positive sign.

Using this Equation (2) it was estimated the regression analysis and the result were analysed.

## 5. RESULTS OF REGRESSION ANALYSIS

In order to test my gravity model, using estimated the gravity model for bilateral trade flows of Kazakhstan and its top ten trade partners for the period of 2004-2012, we proceed to analyze the results of the model, which are presented in the Table 5.

**Table 5 - Regression results**

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	-0.456715049	1.172593756	-0.389491285	0.697910339
Distance log (X1)	-0.246525089	0.159906092	-1.541686661	0.126953919
Adjacency (X2)	-0.111490903	0.155645029	-0.716315218	0.475807397
History (X3)	0.263702432	0.131598026	2.003847925	0.048348158
GDP log (X4)	0.171517351	0.047086228	3.642622442	0.000468735
Population Log (X5)	0.053904157	0.042901107	1.256474747	0.212468761
T (t-1) log (X6)	0.791575538	0.045285354	17.47972521	1.48601E-29

<i>Regression Statistics</i>	
Multiple R	0.965843575
R Square	0.932853811
Adjusted R Square	0.92799987
Standard Error	0.33299795
Observations	90

An indicator of R squared is almost close to 1, indicating a good quality model (R Square = 0.933). The regression equation obtained qualitatively. The accuracy of the regression equation selection is high. As we can see at

93.2% of cases of X changes lead to changes in Y. In other words, the independent variables explain ninety per cent of the movements in the dependent variable.

In connection with which we can claim that the analysed model is effectively explains Kazakhstan's bilateral trade flow. The results showed above, successfully classifies the factors influencing Kazakhstan's bilateral trade, and is well relevant to examine the bilateral trade flows between trade-partners.

According to regression coefficients, we get the extended Equation (3) of gravity model as following:

$$(3) \quad Y = -0,456 - 0,246 X1 - 0,111 X2 + 0,263 X3 + 0,172 X4 - 0,053 X5 + 0,791 X6$$

Using the obtained results of the gravity model of Kazakhstan's trade I would like to begin to examine the results of the statistically significant variables.

The variable History was chosen in order to identify the Historical links between former USSR countries. Among the countries under the consideration Kazakhstan, Uzbekistan, Russia and Ukraine were identified as former USSR countries.

As I emphasized at the previous Chapter, long-term coexistence of people within one state (the USSR), creates a strong relationship in a variety of

fields and forms (due to the mixed population, mixed marriages, common historical past, elements of a common cultural space, the lack of a language barrier, etc.). Moreover, in general there was low level of international and interconfessional conflicts in the USSR. As a result it is obvious that there is an existence of the desire of the broad masses of the population of former USSR countries to maintain fairly close mutual relations.

According to the Table 5 it can be assumed that variable History is statistically significant with the positive coefficient  $\beta_3$ , as we expected in the Chapter 4. It can be presumed that if variable "History" increases for 26,3 percent that the bilateral trade increases for one percent.

Hence, it is seen that according to the gravity model, in case of Kazakhstan the assumption that common history aspect simplify and promote trade negotiations and positively correlate with trade value is correct.

However, in order to explain the influence of history factor to the trade value of Kazakhstan more complete we should also look to the economic structure or to the technological interdependence of enterprises in the USSR. The fact that on the basis of the former Soviet countries interaction, as at the international level and at the level of business entities, there was a high degree of economic interdependence can be named as a fact of regional economic relations peculiarities on the post-Soviet space.

The Soviet economy was developed as a highly complex, where the individual parts were closely related to each other, where the economy of the individual republics was associated with numerous industrial and technological chains. Among the all options of economic development of planned economies, which included, for example, the Chinese script, when the economy of each province was formed almost as a closed structure, only to a small extent associated with other provinces, the Soviet Union used a variant, which was based on a high level of economic integration of its territorial units. A typical feature of the Soviet economy was the highest specialization of enterprises - in many cases, the production of a particular product was concentrated on a single plant and spatial variation of enterprises were usually located in different republics. The whole system was operated by the high centralization of relations between enterprises. A variety of experiments with decentralization of economic mechanism were unsuccessful. In this connection, after the collapse of the USSR complete rupture of economic ties was impossible and forcing the newly independent states to maintain certain formats of international cooperation and relationships. Unfortunately, nowadays the tendency of technological interdependence of enterprises among former USSR countries continues. It can be the other factor that make history variable significant in this model.

The next variable, which can be obtained as statistically significant in defining the Kazakhstan's trade flow, is GDP. As it was expected the

coefficient of this variable is positive. The results of the model support the assumption and indicate that increasing GDP for 17,2 percent will increase the bilateral trade of Kazakhstan for 1 percent. This result is projected by the previous studies; most of them assume that the country with the biggest economic size has large production capacity, which increase its export. Therefore, it can be determined that the higher GDP of country 2 the more country 1 trade with the country 2.

In this regard, the gravity model of Kazakhstan proves classic gravity model's hypothesis: the greater the economy of the trade partner the greater the volume of bilateral trade with this country or the more Kazakhstan trade with this country.

Bilateral trade value of the previous year ( $T(t-1)_{ij}$ ) variable is strongly statistically significant and as it was expected its coefficient has a positive sign. This result predicts the fact that countries had trade experience before (or in this case specifically one year before) has a positive influence to the trade value under examination.

In other words, probably the previously existing trade relationships help to establish further activities. Moreover, current trade practice between countries can be explained as a fact reducing transactional costs as well as History variable.

In examined Kazakhstan's gravity model it can be assumed that bilateral trade value increase to 1 % if  $T(t-1)_{ij}$  variable increase to the 79,1%. So,

this variable positively correlates with Kazakhstan's trade volume.

According to the results in this gravity model Population, Distance and Adjacency variables are not significant and do not effect to the trade value between Kazakhstan and its top trade partners.

Many gravity analyses explain population variable as a variable that shows influence of domestic market of the country. They presume that the larger the market the higher the level of trade. However, this examined model had the statistical insignificance of the population variable. Thus, in case of Kazakhstan the size of internal market do not effect to the bilateral trade volumes.

The interesting fact that was obtained in examined gravity model of Kazakhstan is statistical insignificance of Distance and Adjacency variables.

The theoretical foundation of the gravity model explain Distance variable as a factor representing transport costs, which could appear in trade activities. And basic gravity model's idea is that the smaller the distance the greater the bilateral trade between countries.

There are many studies that claim that adjacency is an aspect that resulting the growth of trade value around 65% if countries share borders (Head, 2003) and may lead to transportation costs as well.

In order to explain insignificance of Distance and Adjacency variables, it

is better to look at the geographical location of Kazakhstan and its logistic system.

First of all, Kazakhstan is a landlocked country and geographically situated in the middle of the Eurasian continent. There is only one Caspian Sea in the west, which should be classed as the largest lake in the world, but because of its huge size it is called Sea. The geographical position of Kazakhstan caused the specificity of modern conditions of transportation system in the country.

The transport complex of Kazakhstan is represented by rail, river, water, road and pipeline transport.

Pipeline transportation system is a transportation system, which was designed in order to transport such special products as natural gas and oil. As it was explained in the chapters above, in this research the data of oil and gas sector was excluded. Since that, pipeline transport was not taken into consideration.

Rail transport is an economical way to deliver large shipments of inexpensive bulk over long distances.

Road transport is the most flexible way of ground transportation. It is used to transport high-value goods mainly for short and long distances. But unlike rail transport, road transport is more expensive for a long distance range, i.e. the farther the point the commodity is arriving, the more expensive the cost of delivery.

Air transport is used to transport little sized, but expensive goods. This form of transport is the most expensive.

Water transport provides inexpensive way of transport commodity over long distances, but for a long time. But due to the geographical position of Kazakhstan and the lack of seaports in the country this type of transport is underutilized.

Rail transport is the most widely used in Kazakhstan and in its International Trade. The peculiarity of this type of transport is that the farther point the commodity arriving, the cheaper cost of commodity transporting. Furthermore, due to the fact that in Kazakhstan this type of transport progress slowly, international logistics in Kazakhstan did not changed a lot during these years. Thus Kazakhstan has fulfilled its international transport routes of commodity and has been using them for many years.

In order to delivery commodity from or to Kazakhstan from or to Europe, USA and other countries, which are situated far from Kazakhstan, Kazakhstan mostly send products by train to seaports in Russia or China and then by the ships they can be send to the final destination. It means that in order to trade in international level Kazakhstan should not only take into account it's own transportation system, but the whole transportation path from country to country should be constructed first.

In connection with that, geographical position of Kazakhstan and widely

used rail transport are the reasons of Distance and Adjacency variables insignificance.

Particular situation in transport and logistics system in Kazakhstan can be named as additional factor of bilateral trade value of the previous year ( $T(t-1)_{ij}$ ) variable significance. Assimilated transport logistic path can strongly affect international trade in developing countries with poor transport infrastructure. In other words, conformed transport logistic path influence to the future trade relations between trade countries.

## 6. CONCLUSION

Having gained its independence 14 years ago today Kazakhstan is a developing country with a good potential. At the beginning of Kazakhstan's pace there were a great economic recession and significant rate of inflation, which were defeated by using the tools of monetary policy. International trade played an important role in the economic growth of the country. Every year it become obvious the existence of expanding trade flows. In this regard, this study was constructed in order to explain bilateral trade flows between Kazakhstan and its top ten trade partners (the European Union, China, Switzerland, Ukraine, Turkey, Canada, the United States of America, Uzbekistan, Japan, and Russia) on the basis of gravity model.

The idea of the gravity model is that the trade value is positively dependent on the economic sizes of the two countries, and negatively depends upon the distance between countries. In other words, bilateral trade volume increases with the countries' economic sizes and decreases with their geographical distance.

It is well known that the existence of natural resources in Kazakhstan's territory is one of the most important factors of its economical growth. According to the World Bank report (2012) structure of exporting goods in Kazakhstan increase and change every time, even if this process is slow but it became obvious during the last decade. Therefore, in order to

analyze other developing sectors of Kazakhstan's economy the data of bilateral trade value was used with exception of oil and gas sector.

The results that were obtained above discovered that Kazakhstan's trade value strongly depend on trade partner's economic size (GDP), their common history and the existence of previous year bilateral trade value.

GDP variable has significant positive effect to the trade value between Kazakhstan and its trade partner. Therefore, trade flows between two countries depend on trade partners' economic size. The classic gravity model's hypothesis: the greater the economy of the trade partner the greater the volume of bilateral trade with this country or the more Kazakhstan trade with this country, was confirmed.

The significance of dummy variable history showed its influence to the Kazakhstan's trade flow. Historical links between countries also helps to simplify and promote trade negotiations and positively correlate with trade value of Kazakhstan. It was assumed, that former USSR countries could easier build trade relations, presumably because of the mixed population, mixed marriages, elements of a common cultural space, the lack of a language barrier, etc. At the same fact this result was explained by the other reason: the technological interdependence of enterprises in the USSR. The gravity model showed that specific economic structure of USSR still has some impact of Kazakhstan's economy. And it can be examined as a negative result of this gravity model.

Kazakhstan's international trade dependency of the history factor does not help increase trade value of Kazakhstan, and accordingly negatively effect to the economy of the country.

Bilateral trade value of the previous year variable positively influence to the trade value as well. It can be explained by the poor transport logistics in Kazakhstan. Conformed transport logistic path can strongly affect international trade in developing countries with poor transport infrastructure.

Population variable was statistically insignificant. In this regard, this variable didn't influence to the Kazakhstan's trade flow, and it was claimed that Kazakhstan's bilateral trade flows don't depend on the size of countries' internal market.

The interesting detail that was obtained in this study is that Distance and Adjacency variables appear to be statistically insignificant.

According to the basis of the gravity model, distance between countries, being a factor representing transport costs, which could appear in trade activities negatively effect to the trade value. At the same time, adjacency variable positively effect to the trade flow, because it reduces transportation costs.

The insignificance of these variables was explained by the fact that Kazakhstan was landlocked country and its transport complex characteristics. Transport system of Kazakhstan represented mostly with

the rail transport, which did not change much these years. Moreover, the cost of commodity rail transporting become cheaper the further point of the commodity arriving. So, rail transport recognized as cheap transportation system, that was why it did not effect to the trade flow of Kazakhstan.

According to the empirical results of the analyzed model there are some suggestions, which could be proposed. First of all, the result of the gravity model showed the rail transport system is very important to the Kazakhstan's trade and economy. So, Kazakhstan should progress it in order to positively effect to the bilateral trade of the country, what increase the economy as well.

Second of all, the dependency of the trade value by the historical fact should be reduced through improvement of productive capacity of Kazakhstan. It will led to diversification of its list of trade partners.

At the end, past relationships and experiences play important role in trade relations, selecting a trade-partner Kazakhstan should focus not only to the economically strong countries, but also to the countries with unrealized economical potential.

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## APPENDICES

**Table of data**

<b>Countries</b>	<b>Trade value log</b>	<b>Distance log (X1)</b>	<b>Adjacency (X2)</b>	<b>History (X3)</b>	<b>GDP LOG (X4)</b>	<b>Population log (X5)</b>	<b>T(t-1) log (X6)</b>
Kazakhstan - EU 2004	8.542	8.634	0	0	26.768	36.122	8.491
Kazakhstan - EU 2005	8.717	8.634	0	0	27.086	36.136	8.542
Kazakhstan - EU 2006	9.303	8.634	0	0	27.495	36.152	8.717
Kazakhstan - EU 2007	9.433	8.634	0	0	27.893	36.169	9.303
Kazakhstan - EU 2008	9.648	8.634	0	0	28.225	36.186	9.433
Kazakhstan - EU 2009	9.215	8.634	0	0	27.990	36.215	9.648
Kazakhstan - EU 2010	9.521	8.634	0	0	28.219	36.232	9.521
Kazakhstan - EU 2011	9.124	8.634	0	0	28.534	36.249	9.521
Kazakhstan - EU 2012	9.405	8.634	0	0	28.541	36.261	9.124
Kazakhstan - China 2004	7.597	8.022	1	0	25.146	37.507	7.685
Kazakhstan - China 2005	8.072	8.022	1	0	25.582	37.521	7.597
Kazakhstan - China 2006	8.223	8.022	1	0	26.115	37.537	8.072
Kazakhstan - China 2007	8.643	8.022	1	0	26.626	37.555	8.223
Kazakhstan - China 2008	8.827	8.022	1	0	27.125	37.572	8.643
Kazakhstan - China 2009	8.690	8.022	1	0	27.078	37.603	8.827
Kazakhstan - China 2010	8.861	8.022	1	0	27.500	37.622	8.690
Kazakhstan - China 2011	8.914	8.022	1	0	27.950	37.641	8.861
Kazakhstan - China 2012	9.258	8.0229	1	0	28.146	37.66	8.914
Kazakhstan - Switzerland	6.447	8.666	0	0	23.505	32.34	7.462

2004							
Kazakhstan - Switzerland 2005	6.130	8.666	0	0	23.813	32.355	6.447
Kazakhstan - Switzerland 2006	5.882	8.666	0	0	24.214	32.372	6.130
Kazakhstan - Switzerland 2007	6.313	8.666	0	0	24.578	32.392	5.882
Kazakhstan - Switzerland 2008	6.988	8.666	0	0	24.971	32.417	6.313
Kazakhstan - Switzerland 2009	7.004	8.666	0	0	24.796	32.456	6.988
Kazakhstan - Switzerland 2010	7.196	8.666	0	0	25.121	32.480	7.004
Kazakhstan - Switzerland 2011	7.399	8.666	0	0	25.542	32.506	7.196
Kazakhstan - Switzerland 2012	7.349	8.666	0	0	25.578	32.530	7.399
Kazakhstan - Ukraine 2004	6.695	8.225	0	1	21.752	34.199	6.620
Kazakhstan - Ukraine 2005	6.853	8.225	0	1	22.316	34.201	6.695
Kazakhstan - Ukraine 2006	7.055	8.225	0	1	22.889	34.205	6.853
Kazakhstan - Ukraine 2007	7.445	8.225	0	1	23.428	34.211	7.055
Kazakhstan - Ukraine 2008	7.786	8.225	0	1	23.902	34.217	7.445
Kazakhstan - Ukraine 2009	7.702	8.225	0	1	23.327	34.239	7.786
Kazakhstan - Ukraine 2010	7.307	8.225	0	1	23.728	34.249	7.702
Kazakhstan - Ukraine 2011	7.482	8.225	0	1	24.148	34.260	7.307
Kazakhstan - Ukraine 2012	7.994	8.225	0	1	24.305	34.272	7.482
Kazakhstan - Turkey 2004	5.985	8.566	0	0	23.551	34.542	5.730
Kazakhstan -	6.158	8.566	0	0	24.040	34.564	5.985

Turkey 2005							
Kazakhstan - Turkey 2006	6.649	8.566	0	0	24.484	34.588	6.158
Kazakhstan - Turkey 2007	7.302	8.566	0	0	24.940	34.612	6.649
Kazakhstan - Turkey 2008	7.514	8.566	0	0	25.302	34.637	7.302
Kazakhstan - Turkey 2009	6.881	8.566	0	0	24.984	34.675	7.514
Kazakhstan - Turkey 2010	7.153	8.566	0	0	25.407	34.702	6.881
Kazakhstan - Turkey 2011	7.648	8.566	0	0	25.704	34.729	7.153
Kazakhstan - Turkey 2012	7.839	8.5661	0	0	25.801	34.759	7.648
Kazakhstan - Canada 2004	4.811	9.086	0	0	24.506	33.806	4.204
Kazakhstan - Canada 2005	5.109	9.086	0	0	24.920	33.824	4.811
Kazakhstan - Canada 2006	5.091	9.086	0	0	25.388	33.843	5.109
Kazakhstan - Canada 2007	5.230	9.086	0	0	25.752	33.863	5.091
Kazakhstan - Canada 2008	6.048	9.086	0	0	26.050	33.887	5.230
Kazakhstan - Canada 2009	5.720	9.086	0	0	25.786	33.925	6.048
Kazakhstan - Canada 2010	6.235	9.086	0	0	26.199	33.950	5.720
Kazakhstan - Canada 2011	5.853	9.086	0	0	26.535	33.974	6.235
Kazakhstan - Canada 2012	6.054	9.086	0	0	26.638	34	5.853
Kazakhstan - USA 2004	6.462	9.164	0	0	26.995	36.019	6.391
Kazakhstan - USA 2005	7.153	9.164	0	0	27.340	36.037	6.462
Kazakhstan - USA 2006	7.137	9.164	0	0	27.746	36.078	7.153
Kazakhstan - USA 2007	7.504	9.164	0	0	28.04	36.077	7.137
Kazakhstan - USA 2008	7.798	9.164	0	0	28.306	36.1	7.504
Kazakhstan - USA 2009	7.460	9.164	0	0	28.139	36.135	7.798
Kazakhstan -	7.513	9.164	0	0	28.426	36.157	7.460

USA 2010							
Kazakhstan - USA 2011	7.663	9.164	0	0	28.703	36.179	7.513
Kazakhstan - USA 2012	7.823	9.164	0	0	28.826	36.201	7.663
Kazakhstan - Uzbekistan 2004	5.231	7.018	1	1	20.067	33.593	5.427
Kazakhstan - Uzbekistan 2005	5.483	7.018	1	1	20.521	33.613	5.231
Kazakhstan - Uzbekistan 2006	5.778	7.0184	1	1	21.045	33.636	5.483
Kazakhstan - Uzbekistan 2007	6.408	7.0184	1	1	21.573	33.662	5.778
Kazakhstan - Uzbekistan 2008	6.814	7.018	1	1	22.039	33.690	6.408
Kazakhstan - Uzbekistan 2009	6.223	7.018	1	1	22.054	33.733	6.814
Kazakhstan - Uzbekistan 2010	6.577	7.018	1	1	22.485	33.776	6.223
Kazakhstan - Uzbekistan 2011	7.077	7.018	1	1	22.866	33.817	6.577
Kazakhstan - Uzbekistan 2012	7.165	7.018	1	1	23.066	33.846	7.077
Kazakhstan - Japan 2004	5.801	8.623	0	0	26.026	35.190	5.557
Kazakhstan - Japan 2005	6.601	8.623	0	0	26.288	35.199	5.801
Kazakhstan - Japan 2006	7.028	8.623	0	0	26.589	35.209	6.601
Kazakhstan - Japan 2007	7.468	8.623	0	0	26.847	35.221	7.028
Kazakhstan - Japan 2008	7.485	8.623	0	0	27.195	35.232	7.468
Kazakhstan - Japan 2009	6.782	8.623	0	0	27.087	35.258	7.485
Kazakhstan - Japan 2010	6.997	8.623	0	0	27.424	35.271	6.782

Kazakhstan - Japan 2011	7.090	8.623	0	0	27.735	35.288	6.997
Kazakhstan - Japan 2012	7.283	8.623	0	0	27.820	35.300	7.090
Kazakhstan - Russia 2004	8.439	7.992	1	1	23.962	35.308	8.565
Kazakhstan - Russia 2005	8.726	7.992	1	1	24.499	35.312	8.439
Kazakhstan - Russia 2006	9.384	7.992	1	1	25.107	35.319	8.726
Kazakhstan - Russia 2007	9.274	7.992	1	1	25.637	35.328	9.384
Kazakhstan - Russia 2008	9.357	7.992	1	1	26.124	35.339	9.274
Kazakhstan - Russia 2009	8.999	7.992	1	1	25.671	35.365	9.357
Kazakhstan - Russia 2010	8.462	7.992	1	1	26.142	35.382	8.999
Kazakhstan - Russia 2011	9.515	7.992	1	1	26.604	35.4	8.462
Kazakhstan - Russia 2012	9.655	7.992	1	1	26.740	35.416	9.515

국문초록

# 카자흐스탄 무역 유형에 관한 분석:

## Gravity 모형 접근법

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본 연구의 목적은 gravity 모형에 기반하여 카자흐스탄의 무역 흐름을 살펴보는 것인데, 이는 카자흐스탄과 10대 교역 대상국의 무역관계를 살펴보고자 하는 의도가 있다. 카자흐스탄의 경제는 천연자원에 의존적이기 때문에 오일과 가스 분야를 제외하고 무역량에 관한 데이터를 이용하여 gravity 모형을 구축하였다.

카자흐스탄의 맥락에서 Gravity 모형을 분석하기 위해서 본 연구는 양자간 무역흐름과 GDP, 거리, 인구, 인접성, 역사 그리고 전년도 무역가치 등의 요인들과의 관계를 살펴보았다.

회귀분석을 실시하여 데이터를 분석하였는데, 데이터는 세계은행, CEPII, 카자흐스탄 통계청 등으로부터 수집하였다. 무역가치가

종속변수로 사용되었고, 1 인당 GDP, 거리, 인접성, 역사, 전년도 무역 가치 등이 독립변수로 사용되었다.

분석 결과, gravity 모형의 유효성을 확인할 수 있었다. GDP, 역사, 전년도 무역가치 등의 독립변수는 카자흐스탄의 무역 흐름에 통계적으로 유의미한 양(+ )의 관계로 영향을 미쳤다. 두 국가의 무역 흐름은 무역 대상국의 경제규모, 전년도 무역가치의 존재, 그리고 구소련 연방에서 공통적인 역사적 경험이 있는지 등의 여부에 따라 달라지는 것으로 나타났다.

인구 변수는 통계적으로 유의미하지 않았는데 이는 카자흐스탄의 양자간 무역 흐름이 국가의 내수 시장 규모와는 관련이 없다는 것을 의미한다. 거리, 인접성, 인구 등의 변수는 통계적으로 유의하지 않았는데, 이는 카자흐스탄의 교통 체계에 의해 설명될 수 있다.

주요어: Gravity 모델, 카자흐스탄, 국제 무역

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