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**Working Paper**

## Measuring impacts and financing infrastructure in Kazakhstan

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**ADB Working Paper Series**

**MEASURING IMPACTS AND  
FINANCING INFRASTRUCTURE  
IN KAZAKHSTAN**

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No. 1159  
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**Asian Development Bank Institute**

Bibigul Aidarkhanova holds a PhD in economic science.

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**Abstract**

This paper studies the impacts of the infrastructure project on economic development in Kazakhstan. We first overview the macroeconomic situation and the development of public–private partnerships in Kazakhstan. In the empirical part of this research, we use the “difference-in-difference” (DiD) approach to assess the economic impact of the “Korgos–Zhetygen” railway construction. We further distinguish between effects for the short term (2009–2012) and medium term (2013–2017). In the study we consider the impact of the railway construction at two levels: the subregional (rayon) level and the regional (oblast) level. Our study finds that the infrastructure project had a statistically significant and positive impact on economic sectors, such as construction, agriculture, and industry, in the subregions under study compared to the control group. Furthermore, the results of the regional model showed that the construction of the railway has a statistically significant and economically growing impact on the tax revenues and regional GDP of the considered region. We found a more statistically significant impact on the increase in regional GDP of the region under study in the medium term by 18% of the mean regional GDP due to the railway construction. We also found a statistically significant and economically growing impact on tax revenues, increasing by 24% of the average taxes in the short term and by 42% in the medium term. Our study finds that the influence of the railway on macroeconomic indicators of the region under study has increased since its construction and in recent years has achieved a greater effect. In general, our study shows that the spillover effects of the project are significantly important for the local economy and can stimulate economic activity at the subregional and regional levels.

**Keywords:** public–private partnership, PPP, investment assessment, infrastructure project, econometric model, difference-in-difference method, DiD model, macroeconomic analysis

**JEL Classification:** L33, E6, H54, O22, R42

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## 1. INTRODUCTION

Current challenges in the global economy require new development models and mechanisms of interaction between the state and private investors. At present, new forms of cooperation between the state and the private sector, namely public-private partnerships (hereinafter PPPs), are becoming increasingly important. A public-private partnership (PPP) is positioned as one of the most favorable prospects for solving problems associated with the interaction between the state and the private sector. In particular, public-private partnership projects in various forms are actively gaining popularity in many countries as a tool for creating new infrastructure and providing public services. Indeed, the importance of PPPs is underlined in the newly developed institutional framework of CAREC 2030, which reinforces the strong participation of countries and development partners and enhances engagement with the private sector and civil society. Kazakhstan has also gained considerable experience in implementing PPP projects in various sectors, especially in the fields of infrastructure, transport, and services.

In this study we will conduct a case study that will measure the impact of the PPP project in Kazakhstan in the case of railway construction on the country's economic development by subregion and region. In conducting this study, we reviewed the literature of leading international and Kazakhstani scientists on the development of PPPs and methodologies for assessing the impact of the implementation of PPP projects on economic performances. The issues regarding public-private partnerships, the theory of finance in the investment process, financial analysis, and planning are studied in the works of international scientists such as (Delmon 2010; Cruz and Marques 2011; Encinas 2013; Kumar et al. 2018). The theoretical basis of issues relating to effective state-private partnership in Kazakhstan was formed by the works of Kazakhstani scientists (Mataev 2011; Toksanova et al. 2016). Summarizing the views of modern foreign and Kazakhstani scientists, we revealed that essential differences in approaches to the evaluation of public-private partnership projects stem from the basic principles that ensure the appropriateness, validity, and possibility of organizing a PPP. After analyzing different scientific literature regarding public-private relations, we concluded that they are based on different approaches related to the measuring impacts and financing infrastructure. As the scientist Dr. Yoshino said, in order to evaluate and outline the future impact of the proposed infrastructure project, the government needs to be prepared and have the necessary tools to assess the impact accurately (Yoshino et al. 2015).

Additionally, the legal framework in Kazakhstan regulating the financial interaction between the state and private business in the course of the implementation of investment projects was analyzed in this study. In particular, we examined legislative acts in the field of PPPs in Kazakhstan such as the Law of the Republic of Kazakhstan "On concessions" (2006); "On amendments and additions to certain legislative acts of the Republic of Kazakhstan concerning the introduction of new types of public-private partnership and expansion of their application" (2013); "On amendments and additions to certain legislative acts of the Republic of Kazakhstan on public administration" (2014); "On public-private partnership" (2015); and other legislative instruments of the Government of the Republic of Kazakhstan for regulating PPPs in Kazakhstan. The developed legal framework and various government regulating mechanisms of PPPs in Kazakhstan indicate that the Republic of Kazakhstan is one of the countries that has significant potential for PPPs with the aim of increasing private investment in infrastructure, thereby enhancing economic growth and sustainable development.

The scientific study is conducted by measuring the impact of the construction of the “Khorgos–Zhetygen” railway in Kazakhstan on the economic development by subregions and regions. The difference-in-difference approach is chosen in order to measure the impacts and financing infrastructure in Kazakhstan, based on research papers developed by scientists such as Yoshino N. and Abidhadjaev U. on measuring the impact of investment in infrastructure.

The research study performs the following analyses:

- Analysis of the macroeconomic development in Kazakhstan in recent years, including the dynamics of the economic growth of GDP and external trade on the world market;
- Analysis of investment financing in Kazakhstan, including foreign direct investment and investment in fixed capital;
- Analysis of the legislative frameworks for harmonizing regulatory and institutional regimes of PPPs in Kazakhstan;
- Analysis of the development of PPPs in Kazakhstan, including forms and the current state of PPPs;
- Analysis of challenges and opportunities for PPP development in Kazakhstan.

In the main research part of this study, we evaluate the measurement of the investment effect in infrastructure on the basis of the case of “Khorgos–Zhetygen” railway construction in Kazakhstan. By assessing the impact of the implementation of the PPP project in Kazakhstan we use the difference-in-difference method, which is differentiated into the pre-construction and operating phase impacts. Measuring the impacts of the implementation of the considered infrastructure project on the macroeconomic development in Kazakhstan includes an assessment of the impact on regional gross domestic product (hereinafter regional GDP) and tax revenues by region and production volume in major sectors of the economy, such as construction, industry, and agriculture, by subregions. In conclusion, several policy recommendations, which show how the development of transport infrastructure supported by PPP mechanisms can contribute to inclusive economic growth are presented.

## **2. ECONOMIC BACKGROUND**

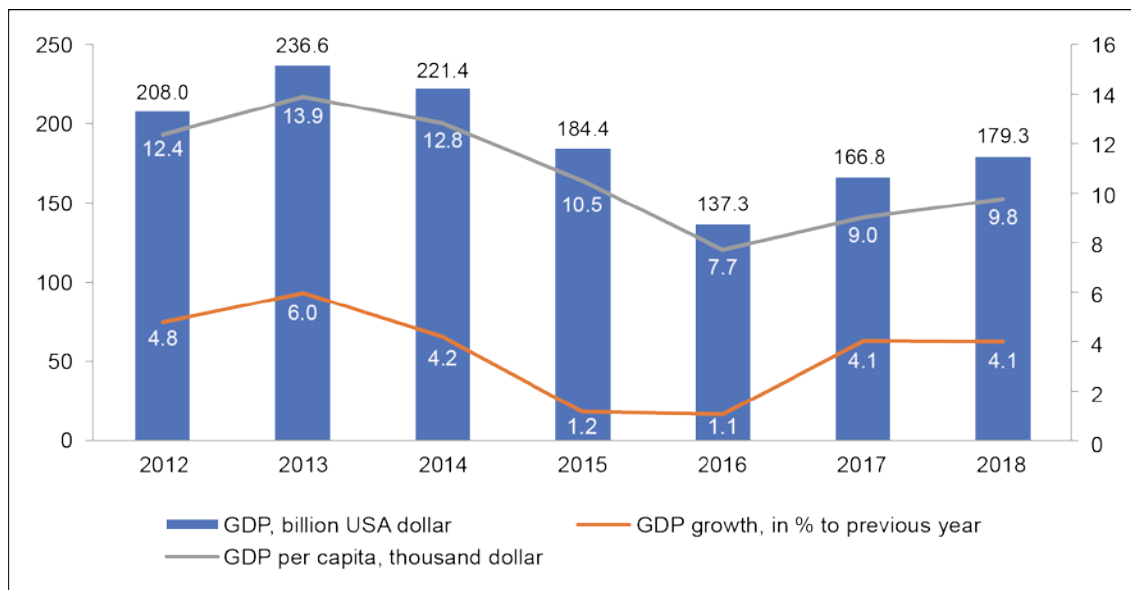
### **2.1 Economic Growth of GDP**

The macroeconomic situation in Kazakhstan has changed over the years depending on the influence of various external and internal factors. Indeed, the economic growth of Kazakhstan has been very volatile over the past ten years. For example, it ranged from 10.7% in 2006 to 1.1% in 2016. Meanwhile, the average rate of GDP real growth was 5.5% over the period 2005–2016.

Recently, from 2014 to 2016, Kazakhstan experienced a slowdown in economic growth and accelerated prices. As illustrated in Figure 1 below, Kazakhstan’s real GDP growth shrank from 6% in 2013 to 1.1% in 2016 (Figure 1). This was spurred by deteriorating domestic demand. Moreover, the oil price drop that was observed in 2015 also affected the economy of Kazakhstan. The oil price shock, as well as the deteriorating external demand from the People’s Republic of China and the Russian Federation for Kazakhstan’s crude oil, iron ore, and metal products, had a negative impact on Kazakhstan’s economic growth trends. However, in 2017–2018, the recovery of world

prices on the commodity markets boosted economic growth rates in Kazakhstan. During 2017, Kazakhstan's GDP reached 51.6 trillion tenge in current prices, having increased by 4.1% in real terms, which is significantly above the 1.1% in the period 2015–2016.

**Figure 1: GDP of Kazakhstan**



Source: Author's own using data from Committee of Statistics of RK.

In recent years, Kazakhstan's economic growth has accelerated significantly, mainly due to the mining, manufacturing, and transport sectors. A favorable external environment, including higher than expected growth in major trading partners and a recovery in commodity prices, further supported the domestic economy. This led to an improvement in the current account balance and an increase in budget revenues to the oil fund.

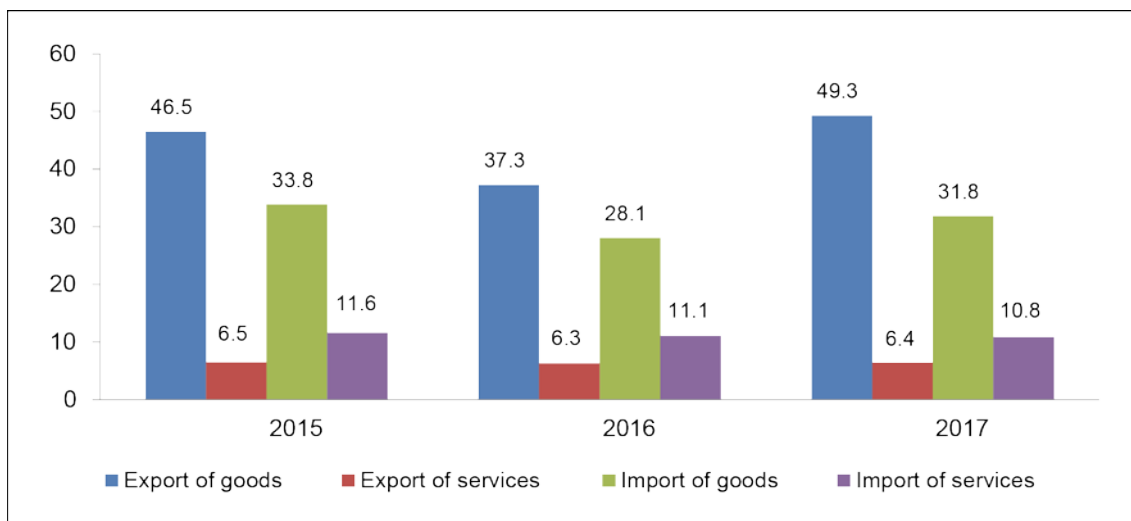
## 2.2 Foreign Trade

A significant impact on the macroeconomic development of Kazakhstan is exerted by external trade in foreign markets, most of which are occupied by energy carriers such as oil, gas, and ferrous and nonferrous metals. The dynamics of the value of exports and imports in Kazakhstan in recent years are shown in Figure 2. It can be seen that changes in world oil prices on world commodity markets have a significant impact on changes in Kazakhstan's export value.

The world average Brent oil prices in 2017 were determined to be at the level of \$54.4 per barrel, which is 23.5% higher than in 2016 (\$44 per barrel), while at the end of the year the price of Brent crude oil exceeded the threshold of \$66 per barrel. As a result, the export of goods according to the classification of the balance of payments amounted to \$49.3 billion, having increased over the year by 32.3% or by \$12 billion. The cost of exporting oil and gas condensate (55% of total exports) increased by 37.8% both due to an increase in contract prices and because of an increase in quantitative supplies, including those related to the launch of industrial production at the Kashagan field. Exports of ferrous and nonferrous metals increased by 52.2% and 27.3%, respectively.



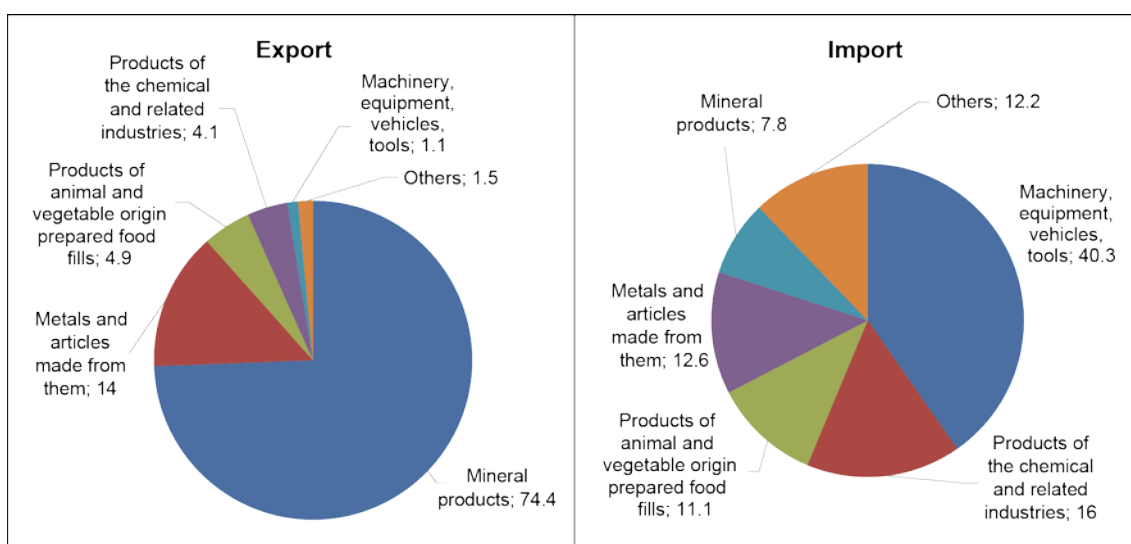
**Figure 2: Foreign Trade of Kazakhstan (\$ billion)**



Source: Author's own using data from Committee of Statistics of RK.

Imports of goods according to the classification of the balance of payments increased by 13.5% and amounted to \$31.8 billion. Import value increased in all groups of primary commodity nomenclature. In particular, imports of intermediate consumption of industrial goods (36.4% of official imports) increased by 15.4% and amounted to \$10.7 billion and imports of investment goods increased by 13.9% to \$10.1 billion.

**Figure 3: Commodity Structure of Export and Import of Kazakhstan in 2018, %**



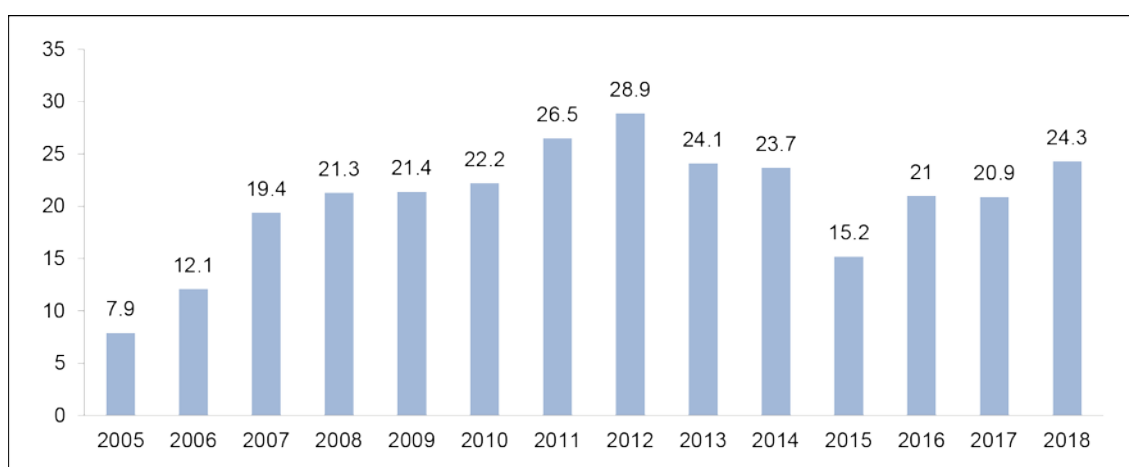
Source: Author's own using data from Committee of Statistics of RK.

From the point of view of external trade partners, the key trading partners for Kazakhstan are countries such as the Russian Federation, the PRC, and the EU. In particular, trade with the PRC reached \$13.1 billion, with the EU \$21.7 billion, and with the Russian Federation \$13 billion in 2016.

## 2.3 Foreign Direct Investment

Kazakhstan ranks first in the region in terms of foreign direct investment (FDI) per capita and for the ratio of FDI to GDP. Since 2005, Kazakhstan has attracted about \$265 billion of gross foreign investment, ahead of other CIS countries. The annual gross inflow of FDI into the Kazakhstani economy for 2005–2017 is shown in Figure 4.

**Figure 4: Gross Inflows of Foreign Direct Investment**  
(\$ billion)

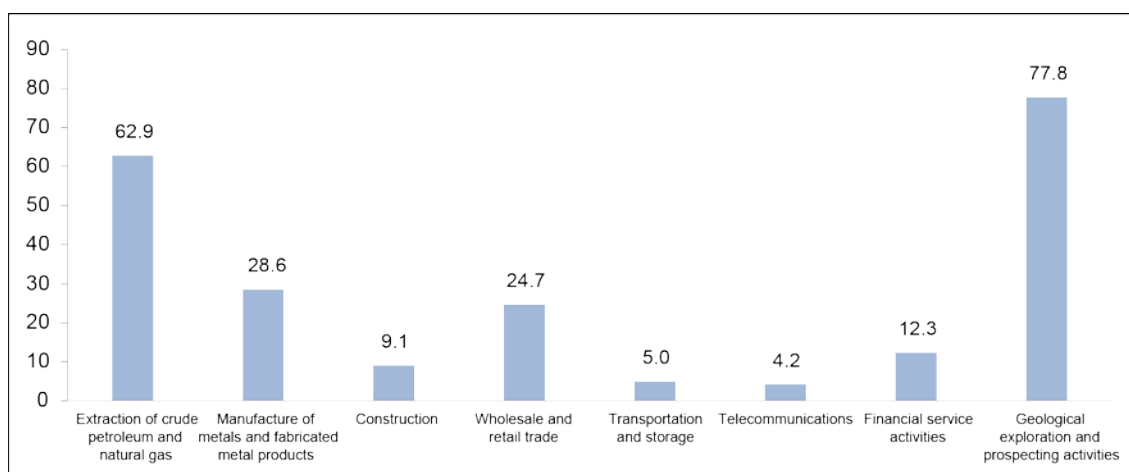


Source: Author's own using data from Committee of Statistics of RK.

In general, the gross inflow of FDI to Kazakhstan in 2017 was determined to be \$20.9 billion. The FDI inflow in Kazakhstan has a different structure of investment volume in various sectors of the economy, as shown in Figure 5. Oil, gas, and extractive industries continue to be the most attractive sectors for investment, including more than half of the accumulated FDI inflows in Kazakhstan (a total of \$62.9 billion over the period 2005-2017 in the extraction of crude oil and natural gas, and a total of \$77.8 billion in geological and prospecting activities, respectively). However, manufacturing, wholesale and retail trade, financial services, and construction attracted meritorious investments of 13.1%, 9.3%, 4.8%, and 3.3% of total FDI during the period 2005-2017, respectively, reflecting the relative success of Kazakhstan's efforts to diversify the economy.

The balance of the financial account in Kazakhstan in 2017 had a negative balance (the difference between the change in net foreign assets and the net change in external liabilities) and a volume of up to \$5.7 billion (\$8.4 billion in 2016). The net incurrence of liabilities was higher than the net acquisition of financial assets (Table 1), which mainly provided by the net capital inflow in financial transactions or "net borrowing from the rest of the world." In 2017, net capital inflows to the country were mainly provided by operations of the general government and other sectors, and net outflows were due to operations of the banking sector.

**Figure 5: Total Gross FDI Inflow in Kazakhstan by Types of Economic Activities over the Period 2005–2017**  
(\$ billion)



Source: Author's own using data from Committee of Statistics of RK.

**Table 1: Financial Account Balance in Kazakhstan**  
(\$ million)

Indicator	2015	2016	2017
<i>Financial account</i>	-9,195	-8,449	-5,704
<i>Net acquisition of financial assets</i>	-6,430	9,255	1,791
Direct investment	3,316	3,464	696
Portfolio investment	-9,525	-1,250	-3,247
Financial derivatives	60	-22	-32
Other investment	-282	7,063	4,374
<i>Net incurrence of liabilities</i>	2,764	17,703	7,495
Direct investment	6,379	16,780	4,542
Portfolio investment	-3,637	-1,997	2,151
Financial derivatives	75	3	-147
Other investment	-53	2,918	949

Source: National Bank of RK.

In the structure of financial accounting by type of investment, the net capital inflow was recorded for direct, portfolio, and other medium-term and long-term investments, and the net outflow for other short-term investments. With regard to FDI, the net capital inflow (negative balance) amounted to \$3.8 billion, compared with \$13.3 billion in 2016. The net growth in direct investment financial assets in 2017 amounted to \$696 million (\$3.5 billion in 2016). The net occurrence of FDI obligations was recorded at 4.5 billion US dollars (16.8 billion US dollars in 2016).

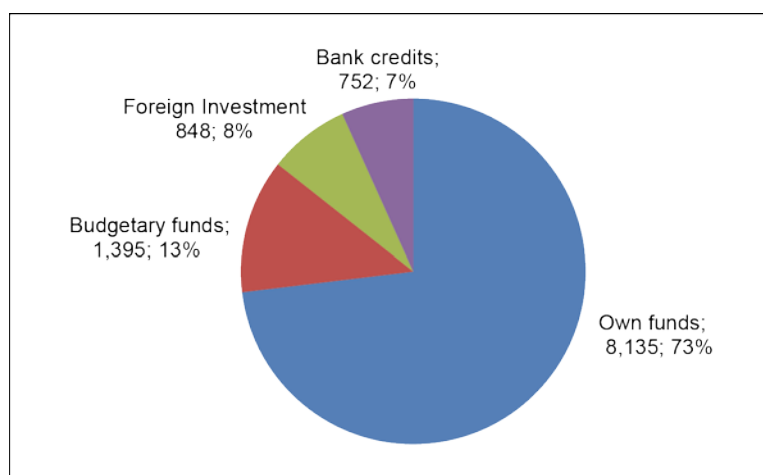
In the structure of gross inflow of FDI by country, first place is occupied by the Netherlands (28.9% of the gross inflow of FDI in 2017), followed by the US (17.9%), Switzerland (14.1%), the Russian Federation (5.9%), Belgium (5.1%), the PRC (5.2%), France (3.9%), Great Britain (2.5%), and the Republic of Korea (2.4%). Kazakhstan is one of the main recipients of Chinese FDI in the framework of the Belt and Road Initiative (BRI). In terms of its geographical location and existing economic ties, for Kazakhstan, this program plays a significant role in its development on the international market.

According to the World Bank: Doing Business Rankings 2018 report, Kazakhstan ranked first in the world in protecting foreign investors and minority shareholders, compared with third place in 2017. Government policies have encouraged foreign investment through measures such as a reduction and, in some cases, five-year tax waiver, government subsidies, and partial or full exemption from duties and taxes on equipment and other materials.

## 2.4 Investment in Fixed Capital

During 2017, the volume of investment in fixed capital increased by 5.8%. In terms of the structure of investments in fixed capital by types of industries, the largest share in the structure of investments in fixed assets was made up of the mining industry (34%), transport and storage (14%), manufacturing (14%) and operations with real estate (13%). At the same time, an increase in investment inflow was recorded in agriculture (by 27.8%), wholesale and retail trade (24%), and hotel and restaurant services (50%),

**Figure 6: Structure of Investments in Fixed Capital by Sources of Financing in 2018**  
(billion tenge and share in %)



Source: Author's own using data from Committee of Statistics of RK.

Investments in fixed capital in 2018 amounted to 11,130 billion tenge. Figure 6 shows the structure of investments in fixed capital by sources of financing in Kazakhstan. In particular, the largest share in the financing structure is held by own funds – 73%; followed by budget funds – 12%; foreign investments – 8%; and bank loans – 7%. The growth rate of investment in fixed capital in 2018 increased by 17.5% compared to 2017. According to the types of economic activities, mining and quarrying (40%), manufacturing (20%), real estate operations (19%), and transportation and storage (10%) remained the most attractive for investment. Currently, one of the goals of state investment policy is to invest in infrastructure, stimulate the development of the nonoil sector, and increase the role of the private sector in the economy.

### 3. DEVELOPMENT OF PPPS IN KAZAKHSTAN

#### 3.1 Legislative Framework

The stage of preparing PPPs in Kazakhstan began from the first years of independence and was initially considered an element of managing state assets, which was due to the presence of large reserves of natural and energy resources, and industrial and transport potential. The main regulatory legal acts regulating relations between the state and business were the Civil Code of the Republic of Kazakhstan, and the laws of the Republic of Kazakhstan “On Privatization,” “On Joint-Stock Companies,” and “On Public Procurement.”

The first instrument regulating public-private partnerships in Kazakhstan was a concession that was originally considered to be the transfer of property, land, and/or natural resources to a foreign legal entity or individual – the concessionaire, i.e. it was determined through the prism of a lease (property lease) contract, although at the same time in the concession relations there could be other elements of contract. To implement this mechanism, the first Law of the Republic of Kazakhstan “On Concessions” was accepted on 23 December 1991, which regulated the organizational, economic, and legal conditions for granting facilities to a concession only to foreign investors in the territory of the Republic of Kazakhstan. The law was operated until 1993. With the adoption of the new Law of the Republic of Kazakhstan “On Concessions” on 7 July 2006, a legal framework was created allowing the private sector to invest financial and technological resources for the implementation of investment projects using the concession mechanism not only for foreign investors but also for domestic investors. In general, a number of laws and by-laws were adopted, on the basis of which a single law “On Public-Private Partnership” was implemented on 31 October 2015, which contains the fundamental norms and principles that are the basis for regulating public-private partnerships in various spheres of the economy.

In 2011, Kazakhstan adopted the first policy document on PPP issues, the “PPP Development Program in Kazakhstan for 2011–2015,” whose goal was to create a legislative and institutional framework for implementing investment projects using public-private partnership mechanisms in Kazakhstan. One of the main directions of the Program is the introduction of project financing to attract institutional investors both to PPP projects and to the economy of Kazakhstan as a whole. The government of Kazakhstan has been trying to implement PPP principles in a stepwise manner. Ongoing structural and institutional reforms include those under the “100 Concrete Steps” program and the “Strategic Plan for Development of Kazakhstan until 2025.” Concurrently, the government continued to encourage infrastructure development by implementing several strategic programs, such as “Nurly Zhol” and the “State Program for Industrial and Innovative Development for 2015-2019,” aimed at enhancing transport infrastructure, transit potential, and diversification of the economy. According to these programs, Kazakhstan’s industrial development is seen as the main condition for the growth of the national economy. Thus, there is a required legislative base and conditions are created to facilitate the growth of the activity of PPP projects in Kazakhstan.

### 3.2 Institutional Forms

In Kazakhstan, public-private partnerships in terms of implementation are divided into institutional and contractual. An *institutional public-private partnership* is carried out by a public-private partnership company in accordance with the public-private partnership agreement. A *contractual public-private partnership* is implemented by concluding an agreement on public-private partnerships, including the following types: concessions; trust management of state property; property (rental) of state property; leasing; contracts for the development of technology, prototyping, pilot testing, and small-scale production; life cycle contract; service contract; other contracts that meet the characteristics of public-private partnerships.<sup>1</sup> While implementing certain types of contractual public-private partnership, the provisions of the relevant laws of the Republic of Kazakhstan are applied, including the features provided with the Law of the Republic of Kazakhstan “On Concessions.”<sup>2</sup>

Depending on the form of ownership, management, and financing, the following main PPP models can be distinguished, although in their pure form these models are rare and various mixed forms are used.

- *The operator model*, characterized by a clear division of responsibilities between the private partner and the state while maintaining control functions over the state, has become widespread in waste processing.
- *The cooperation model* is implemented through a joint project company of the state and a private investor when specific services are insufficiently defined and it is difficult to make them separate objects of taxation and depreciation.
- *The concession model* is valid in industries with a long experience of implementation of projects, usually infrastructure, as well as in cases where the transfer of property rights from the state to a private partner is excluded for political or legal reasons.
- *The negotiable model* is used in industries in which investments, first and foremost, are aimed at reducing current costs, for instance in the energy sector. Often, the savings received from the reduction in current costs exceed the actual investment costs.
- *The leasing model* is one of the forms of partnership between local government and private business; additionally it is most suitable for the construction of public buildings.

### 3.3 Government Agencies

Under the Government of the Republic of Kazakhstan in 2008 a specialized organization for PPP issues was established – the joint-stock company “Kazakhstan Public-Private Partnership Center” (PPP Center) with 100% state participation, the sole shareholder of which was the Government of the Republic of Kazakhstan represented by the Ministry of Economy and Budget Planning of the Republic of Kazakhstan. The main focus of the PPP Center is the economic examination of investment projects with state participation (concession projects, budget investment projects, budget investments with government participation in the authorized capital of legal entities). The

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<sup>1</sup> Law of the Republic of Kazakhstan “On Public-Private Partnership” (art. 7).

<sup>2</sup> Law of the Republic of Kazakhstan “On Concessions” (with changes and additions to 29.09.2014).

PPP Center is also working on improving the legislative framework and strategic development of the PPP system in Kazakhstan.

To expand the use of PPPs in the regions, as well as for closer interaction with government agencies, international and public organizations, and potential investors, regional PPP centers are being created in a number of regions. Thus, the first regional PPP center was established in 2010 in the Karaganda region, followed later by the East Kazakhstan, Pavlodar, South Kazakhstan, Mangystau, and Almaty regions. Corresponding structures have been created in the cities of Astana and Almaty.

The “Kazakhstan Public-Private Partnership Center” JSC signed Memorandums of Understanding and Cooperation with local executive bodies, commercial organizations, and foreign specialized organizations on public-private partnership issues. The center actively cooperates with international organizations such as the World Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, and the European Center for Public-Private Partnerships at the United Nations.<sup>3</sup>

For the implementation and management of concession projects of the “Kazakhstan Public-Private Partnership Center” JSC, an appropriate organizational mechanism was developed, consisting of interconnected decision-making stages. When planning a PPP project, authorized persons, if necessary, create a project team, attracting specialists from subordinate organizations; independent experts; design, engineering, and other companies; interested state bodies; and business entities and consultants. The project team performs the following functions:

- considers proposals and initiatives on PPP project implementation mechanisms; selects, evaluates, and prioritizes them; and determines the implementation method, type of tender, issues related to the allocation of land, connection to utility networks, and other key parameters of the PPP project;
- studies the results of marketing and other necessary studies on the planned PPP project;
- studies all necessary calculations, including preliminary ones, of the PPP project.

Financial and other organizations interested in financing the PPP project have the right to participate in the development and discussion of the concept of the PPP project, the tender documentation, and the draft PPP agreement, including making proposals on the financing scheme for the PPP project, ensuring the fulfillment of obligations on borrowed funds.

### **3.4 Implementation Stages and Current State**

The “Kazakhstan Public-Private Partnership Center” JSC conducted an examination of concession projects in such areas as construction and operation of roads; construction and operation of road infrastructure facilities; construction and operation of health facilities; construction and operation of preschool organizations (kindergartens), etc. According to the data of the “Kazakhstan Public-Private Partnership Center” JSC, as of June 1, 2020, 786 PPP agreements were concluded worth 1.8 trillion tenge, of which 10 are agreements at the republican level, 776 agreements at the local level.<sup>4</sup> Investments amounting to 910 billion tenge have been attracted. PPP is most actively developing in the field of education, where 437 agreements were concluded worth

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<sup>3</sup> Kazakhstan Center for Public-Private Partnerships. Internet resource: <http://kzppp.kz>.

<sup>4</sup> Mataev, T.M. Development of public-private partnership in Kazakhstan: Status, trends and prospects. 2020.

115 billion tenge. More than half of PPP projects in the field of education are concluded with pre-school organizations. So, 240 PPP agreements have been concluded worth 70 billion tenge. Within the framework of these projects, new construction, reconstruction of buildings for preschool institutions were carried out, work was carried out on their restoration, modernization, and operation (Mataev 2020).

Thus, PPP projects in the field of education account for more than half (55%) of the total number of PPP contracts in Kazakhstan. In second and third place are the healthcare and utilities sectors, respectively. At the same time, the largest projects have been implemented in the field of transport and infrastructure. For example, the main reasons for implementing only 24 PPP projects in the field of transport and infrastructure indicate that projects are capital-intensive in this area. The largest PPP projects in the transport and energy sectors of Kazakhstan at the republican level are the following: construction and operation of the “Shar-Ust-Kamenogorsk” railway line; construction and operation of the passenger terminal at Aktau International Airport; construction and operation of the interregional power transmission line “North Kazakhstan – Aktobe region.” The remaining projects were completed and implemented in the regions. They are carried out in various fields and have a social orientation – health care, education, physical education and sports, housing and communal services, and culture. In terms of railway PPPs, there have been three major projects implemented, including the Shar-Oskemen railroad in the East Kazakhstan region, a segment of railroad between Yeralievo and Kuryk near the Caspian Sea in the west, and a railway between Khorgos and Zhetygen in the East, the impact of which we consider in our empirical study.

### **3.5 Challenges and Opportunities**

In evaluating and reviewing PPP projects, some problems and limitations are found in the implementation of public-private partnership mechanisms caused by a conflict between private and public interests within the framework of public-private partnerships, such as:

- the difficulty of accurately assessing the benefits to the state from public-private partnership agreements;
- an increase in costs due to the complexity of the tenders and the approval of public-private partnership agreements in comparison with the established procedures for public procurement;
- the complicated procedure for selecting and approving a private partner and evaluating the effectiveness of PPP projects;
- complexities in forecasting the risks associated with PPP projects;
- the possibility of increasing fees from consumers after the cancellation of explicit or implicit subsidies;
- the need for a thorough study of projects, as not all projects are suitable for PPPs.

Therefore, the main factors hindering the further development of PPPs in Kazakhstan are the high institutional and commercial risks, as well as legislative and operational restrictions that prevent private investors from obtaining an acceptable return on their investments. Despite the aforementioned problems and challenges for PPPs, this is a sufficiently effective mechanism requiring the involvement of both the state in the form



of an authorized body and private business for implementation of a joint project on the basis of mutual benefit in order to achieve economically significant results.

Currently, the main method for assessing the implementation of a PPP project and its impact on various economic indicators is an expert analytical method. One of the drawbacks of this expert approach to evaluating investment projects is its subjectivity depending on the opinions of experts. In this regard, for a more objective approach, a quantitative approach to the assessment of PPP projects is preferable. In this case, in the second part of this study we consider measuring the impact of an infrastructure project at the regional and subregional levels in Kazakhstan using econometric assessment methods: namely, we will calculate the impact of project implementation using the difference-in-difference (DiD) approach, which was described in the scientific works of scientists N. Yoshino and U. Abidhajaev in assessing the implementation of infrastructure projects in other countries. In order to expand the possibilities of implementing a PPP project in Kazakhstan, it is recommended to take into account the impact of the project on the regional and subregional levels. In the next part of this study, we conduct an empirical analysis on the example of the implementation of the infrastructure project in Kazakhstan.

## **4. METHODOLOGY, DATA, AND RESULTS**

### **4.1 “Khorgos–Zhetygen” Railway**

In the present research, in order to investigate the impact of investment in infrastructure in Kazakhstan we consider the project of the construction of the “Khorgos-Zhetygen” railway, which is located in the Almaty region, which is in the eastern region of Kazakhstan on the border with the PRC. ICBC “Khorgos” is one of the largest projects undertaken on initiatives by the leaders of Kazakhstan and the PRC. It aims to develop cross-border trade, and economic, scientific, technical, and cultural cooperation between Kazakhstan and the PRC, as well as to increase the transit potential of both countries.

The construction of the new “Khorgos–Zhetygen” railway line is of strategic importance, since its launch has opened a second railway crossing between Kazakhstan and the PRC. ICBC “Khorgos” consists of two parts: The Kazakhstani part is located in the Panfilov subregion of the Almaty region, and the Chinese part is located in the Ili-Kazakh Autonomous Prefecture of the Xinjiang Uyghur Autonomous Region. The Almaty region (oblast) is located in the extreme southeast of Kazakhstan and borders in the east with the PRC. Through the territory of the region passes the Kazakhstan part of the Great Silk Road. In this regard, we analyze this region using the “difference-in-difference” approach in the study.

As part of the ICBC “Khorgos,” several infrastructure projects were implemented, including the construction of the “Khorgos–Zhetygen” railway, which allowed the distance from the PRC to the southern regions of Kazakhstan and central Asian countries to be reduced by 550 km. During the implementation of this project, the main 293 km-long railway was built. The construction of 28 bridges and two overpasses on the Khorgos-Zhetygen section, and office and technical buildings at 14 new dividing points was also completed. During the implementation of this project in Kazakhstan, a railway station building and an administrative building at the Altynkol border station and engineering networks with their facilities were also built. Also, many infrastructure facilities were constructed, such as houses for railway workers and government employees, along with facilities such as a school, a kindergarten, and a clinic, among others. After the launch of the railway more than 2,000 jobs were created. Given the favorable political

environment, the mild investment climate, and the strategic location of the project area, we can say that the construction of the “Khorgos–Zhetygen” railway was a breakthrough project in the infrastructure sector of the economy, one that accelerated the development of the entire complex of customs, transport, tourism, and other infrastructure development in the area and the transit potential of the country as a whole in the international logistics business system.

## 4.2 Data

### 4.2.1 Subregional Model

Kazakhstan consists of 14 regions (oblast) and the two largest cities are Almaty and the capital Nur-Sultan (Astana). Further, according to the administrative-territorial division of the Republic of Kazakhstan, the regions are divided into subregions (rayon). In this study, we consider the impact of implementing an infrastructure project both at the regional level and at the subregional level. Consideration of the impact of the project at the subregional level allows a more accurate assessment of the impact of the project on the development of the subregions in which the project was implemented. Therefore, firstly we consider the impact of the project at the local level or at the level of subregions. In this case, we build a subregional model, that is, a model at the level of subregions or rayon level. Thus, conducting research at the subregional level makes the subject of the research more accurate and allows us to assess the impact of the investment project on the economic indicators at the local level.

In constructing the econometric model we use the “difference-in-difference” (DiD) approach to measure the impact of the infrastructure project under consideration in Kazakhstan. The DiD approach will help us to measure the difference between an “actual” result and an alternative outcome. To do this, we will divide the data into control and treated groups based on geography and time. As the treated group, in the DiD method we consider the subregions or rayon of the Almaty region through which the railway was constructed. The construction of the Kazakhstani section of the “Khorgos-Zhetygen” railway passes through the Panfilovskiy, Uygurskiy, and Enbekshi-Kazakhskiy subregions of the Almaty region. In this regard, we selected these subregions as the treated group under consideration in the subregional model using DiD approach. Thus, we consider the impact of railway construction on the economic performance of the Panfilovskiy, Uygurskiy, and Enbekshi-Kazakhskiy subregions of the Almaty region at the subregional level.

When choosing a control group at the regional level, we consider various regions of Kazakhstan. However, the regions that specialize in oil production and where investments are mainly made in the oil sector were not included, hence these are mainly western regions of Kazakhstan. In the control group at the subregional level we included one subregion in each of the selected regions of Kazakhstan. When choosing control subregions, we were guided by the relative similarity of the economic structure of these subregions with the subregions under consideration in the treated group. Also, for comparison with the treated area according to the DiD approach, we selected in the control group those subregions that are not related to the scenario of investing in the construction of railways at the relevant time. Table 2 presents the subregions of different regions of Kazakhstan included in the treated and the control group regarding the location of the “Khorgos–Zhetygen” railway.

**Table 2: Treated and Control Group in Subregional Model with DiD Method**

Type of Group	Subregions (rayons)	Regions (oblasts) of Kazakhstan	Number
Treated group	Panfilovskiy rayon	Almatinskaya oblast	1
	Uygurskiy rayon		2
	Enbekshi-Kazakhskiy rayon		3
Control group	Akzharskiy rayon	Severo-Kazakhstanskaya oblast	4
	Zhanakalinskiy rayon	Zapadno-Kazakhstanskaya oblast	5
	Katon-Karagaiskiy rayon	Vostochno-Kazakhstanskaya oblast	6
	Aktogaiskiy rayon	Pavlodarskaya oblast	7
	Shetskiy rayon	Karagandinskaya oblast	8
	Amangeldinskiy rayon	Kostanaiskaya oblast	9
	Sarysuyskiy rayon	Zhambylskaya oblast	10
	Sandyktauskiy rayon	Akmolinskaya oblast	11

Source: Author's own using data from Committee of Statistics of RK.

In the DiD approach the results should reflect the difference between pre-intervention and post-intervention data. By observing the changes in both groups over time, the DID coefficient can be calculated, which will serve as a measure of impact. We differentiate among three time periods, since our desire is to see the impact on the various operating phases of the project, and we distinguish between short-term and medium-term effects, which are presented below.

**Table 3: Pre-Intervention and Post-Intervention Periods**

Period	Pre-construction	Operation Phase 1	Operation Phase 2
Years	2000–2008	2009–2012	2013–2017

Source: Author's calculations.

For the econometric assessment of the implementation of the infrastructure project at the subregional level, we have compiled a panel data set for all encompassing subregions included in the treated and the control groups of the model. The main source of statistical data is the National Statistics Agency of the Republic of Kazakhstan. We hypothesize that investment in transport infrastructure would yield a spillover effect on improving the economic development of treated subregions. In particular, we consider the impact of the project on economic indicators in relevant industries of the real economy, such as construction, agriculture, and industry, in the subregions under consideration. Summary statistics of the dependent and independent variables of the subregional model are presented in Table 4. Bearing in mind that by constructing the econometric model, all nominal data in current prices were converted to constant prices at the base year of 2000 using the deflation method, the following table present data in constant prices.

**Table 4: Summary Statistics of Dependent and Independent Variables by Subregion**  
(in constant price)

	Obs.	Mean	St. Dev.	Min.	Max.
All subregions (11)					
Construction production volume, mln. tenge	198	1,435	3,641	3	24,524
Agricultural gross output, mln. tenge	198	3,933	3,983	887	21,799
Industrial production volume, mln. tenge	198	2,194	2,664	30	11,719
Investment in fixed capital, mln. tenge	198	3,322	7,173	3	50,357
Employed population, thousand people	198	29	31	7	158
Average monthly nominal wage, tenge	198	17,738	6,709	5,693	34,213
Treated subregions (3)					
Construction production volume, mln. tenge	54	4,341	5,966	31	24,524
Agricultural gross output, mln. tenge	54	7,770	5,899	1,804	21,799
Industrial production volume, mln. tenge	54	4,392	3,584	759	11,719
Investment in fixed capital, mln. tenge	54	9,570	11,283	9	50,357
Employed population, thousand people	54	65	39	21	158
Average monthly nominal wage, tenge	54	19,095	7,664	5,960	29,879
Control subregions (8)					
Construction production volume, mln. tenge	144	346	827	3	5,920
Agricultural gross output, mln. tenge	144	2,494	1,148	887	5,485
Industrial production volume, mln. tenge	144	1,370	1,583	30	7,745
Investment in fixed capital, mln. tenge	144	978	1,848	3	10,574
Employed population, thousand people	144	15	6	7	29
Average monthly nominal wage, tenge	144	17,230	6,267	5,693	34,213

Source: Author's calculations using data from Committee of Statistics of RK.

This table contains descriptive statistics of dependent and independent variables by subregion used in the subregional econometric model.

#### 4.2.2 Regional Model

In order to assess the impact of the project on macroeconomic indicators, such as regional GDP and tax revenues, we build a regional econometric model. According to the System of National Accounts, it is known that such macroeconomic indicators as GDP are the aggregate indicator of economic activity, which is measured across the entire country as a whole or by region, but not measured by subregion. We would also like to evaluate the impact of the implementation of the infrastructure project on tax revenues, the data on which were available only at the regional level by regions. Thus, in order to assess the impact of the project on the above macroeconomic indicators, we have created a regional econometric model at the regional level.

When constructing the regional econometric model, we also use the difference-in-difference method, in which the treated and control group at the regional level are distinguished. As the treated group at the regional level, we choose the Almaty region, since it is through this region that the constructed section of the "Khorgos–Zhetygen" railway passes. As the control group at the regional level, we selected the regions of Kazakhstan corresponding to the previously selected control subregions in the subregional model. That is, we included in the control group other regions of Kazakhstan, with the exception of the western regions, which mainly specialize in the oil and gas sectors and where investments mainly go to the oil sector. Table 5 presents the regions

of Kazakhstan included in the treated and the control groups at the regional level relative to the location of the “Khorgos–Zhetygen” railway.

**Table 5: Treated and Control Group in the Regional Model with the DiD Method**

Type of Group in DID Method	Regions (oblasts) of Kazakhstan	Number
Treated group	Almatinskaya oblast	1
Control group	Severo-Kazakhstanskaya oblast	2
	Zapadno-Kazakhstanskaya oblast	3
	Vostochno-Kazakhstanskaya oblast	4
	Pavlodarskaya oblast	5
	Karagandinskaya oblast	6
	Kostanaiskaya oblast	7
	Zhambulskaya oblast	8
	Akmolinskaya oblast	9

Source: Author’s own using data from the Committee of Statistics of RK.

**Table 6: Summary Statistics of Dependent and Independent Variables by Region (in constant price)**

	Obs.	Mean	St. dev.	Min.	Max.
All regions (9)					
Gross domestic product by region, mln. tenge	162	255,140	135,019	57,783	595,613
Tax revenues by region, mln. tenge	162	27,598	11,100	8,455	65,550
Gross domestic product per capita, thous. tenge	162	259	121	59	606
Investment in fixed capital, mln. tenge	162	98,247	80,507	2,338	379,882
Employed population, thousand people	162	518	177	272	1,013
Average monthly nominal wage, tenge	162	30,244	9,161	14,374	41,442
Treated region (1)					
Gross domestic product by region, mln. tenge	18	269,329	92,358	124,564	415,423
Tax revenues by region, mln. tenge	18	40,759	16,578	14,010	65,550
Gross domestic product per capita, thous. tenge	18	150	38	80	208
Investment in fixed capital, mln. tenge	18	142,675	90,780	9,986	258,574
Employed population, thousand people	18	828	132	574	1,013
Average monthly nominal wage, tenge	18	30,244	9,397	14,374	41,442
Control regions (8)					
Gross domestic product by region, mln. tenge	144	253,367	139,579	57,783	595,613
Tax revenues by region, mln. tenge	144	25,953	9,029	8,455	47,563
Gross domestic product per capita, thous. tenge	144	273	121	59	606
Investment in fixed capital, mln. tenge	144	92,693	77,705	2,338	379,882
Employed population, thousand people	144	479	140	272	726
Average monthly nominal wage, tenge	144	30,244	9,164	14,374	41,442

Source: Author’s calculations using data from Committee of Statistics of RK.

In order to build the regional econometric model, we also used independent variables at the regional level. Thus, in the regional model we selected the regional GDP and tax revenues by region as dependent variables. As independent variables we chose the same control group of independent variables that was considered earlier, only at the regional level, because the variables at the regional level describe the dependent variables at the regional level better and obtain more accurate statistical estimates in the

equations. The main source of statistical data is the National Statistics Agency of the Republic of Kazakhstan. Table 6 presents the summary statistics for dependent and independent variables by region included in the regional model. Bearing in mind that by constructing the regional econometric model, all nominal data in current prices were converted to constant prices at the base year of 2000 using the deflation method, the following table presents data in constant prices. The presented summary statistics describe the statistical characteristics of different types of groups by region.

This table contains descriptive statistics of dependent and independent variables by region used in the regional econometric model.

### 4.3 Difference-in-Difference (DID) Approach

#### 4.3.1 Subregional Econometric Model

The difference-in-difference (DiD) approach enables us to see the effect of the particular infrastructure project by computing the difference over time (before and after the intervention) and across different regions. The DiD approach will help us to measure the difference between an “actual” result and an alternative outcome. For this purpose, we will divide the data into treatment and control groups based on geography and time. The results should reflect the difference between pre-intervention and post-intervention data. By observing the changes in both groups over time, the DiD coefficient can be calculated, which will serve as a measure of impact.

We assume that the launch of the railway will have an impact on improving economic efficiency in the respective subregions of the treated group. Our objective is to estimate the impact of infrastructure investment from construction of the railway connection on key economic indicators of treated subregions. In order to study the impact of the implementation of this project on the real economy by subregion, we consider three economic indicators: the real volume of output for each of the sectors, namely construction, agriculture, and industry. When calculating the econometric model, we converted all variables in nominal volume in tenge in the current price into the real volume in constant price using deflation.

According to the difference-in-difference method, in order to test the various impacts on economic performance over time, we divide it into three periods. We denote these as follows: the pre-railway period is 2000–2008, the first phase of operation is 2009–2012, and the second phase of operation is 2013–2017. The difference-in-difference coefficient is estimated for each of these time periods. Hereby, we specify assessment equation related to the affected subregional group. The difference-in-difference coefficients represent deviations from those subregions that are not included in the affected groups. Then we evaluate the equation separately for each of the three subregional indicators of the relevant sectors of the real economy, namely construction, agriculture, and industry in the subregions under consideration, for a total of three regressions. Our estimating equation in the subregional model is as follows:

$$Y_{it} = a_i + X'_{it} * \beta + \delta_1 * D_{tr} * D_{9-12} + \delta_2 * D_{tr} * D_{13-17}, \quad (1)$$

where  $Y_{it}$  is the real volume of production of relevant economic sectors of the real economy, namely construction, agriculture, and industry, by subregion.

**Dependent variables:**

- IND is the real volume of industrial production by subregion, total in constant price (million tenge);
- AGR is the real gross agricultural output by subregion, constant price (million tenge);
- CNS is the real volume of construction production by subregion, constant price (million tenge).

**Independent variables:** (included in  $X'$  a vector of control variables)

- INV is the real volume of investment in fixed capital by subregion, constant price (million tenge);
- AWG is the real average monthly wage by subregion, constant price (tenge);
- EMP is the employed population by subregion (thousand people);
- GDPC is the real gross domestic product per capita by region, constant price (thousand tenge).

**Binary variables in DiD model:**

- $D_{tr}$  is the binary variable indicating whether or not the observation belongs to the treated subregions;
- $D_{9-12}$  and  $D_{13-17}$  are binary variables indicating whether or not the observation belongs to the respective time periods for years 2009–2012 or 2013–2017;
- $D_{tr} * D_{9-12}$  and  $D_{tr} * D_{13-17}$  are difference-in-difference binary variables, indicating whether or not the observation belongs to the respective time periods and treated subregions.

As economic structure in our model we considered the dependent variables describing the volume of production of main sectors of the real economy, such as industry, agriculture, and construction, by a subregion under consideration. A number of different factors might affect the level of economic activity in the sector. Based on the estimated effect and the availability of subregional economic data, we have selected control economic variables that could influence the economic outcomes in the subregions. In particular, as independent variables we selected the GDP per capita by region and investment in fixed capital, employed population, and average monthly nominal wage by subregion. For differentiating regional effect and year effect, we entered into the model the binary variables indicating whether the observation belongs to the respective years or type of region.

**4.3.2 Regional Econometric Model**

At the regional level, we examine the impact of the project implementation on the regional GDP of the region under study. Moreover, the economic impact of investments in infrastructure can be caused by an increase in tax revenues in the region concerned. The difference-in-difference approach (Yoshino and Abidhadjaev 2017; Yoshino and Pontines 2015) can be used to compute the effect of spillovers on tax revenues in places where infrastructure investment occurred compared to ones where no infrastructure investment took place. Therefore, this study uses dependent variables such as GDP and tax revenues to estimate the spillover effects of infrastructure investments. In accordance with the DID approach, we separate the data into the control group and the treated group based on a geographic principle and time,

making a distinction between the pre-intervention or baseline data and the post-intervention data.

We specify an assessment equation related to the affected regional group. In particular, we estimate the equation separately for each of the two macroeconomic indicators, namely regional GDP and tax income by region, in total for two regressions. As well as in the subregional model, when calculating the regional econometric model, we converted all the variables in nominal volume in tenge in the current prices into the real volume in the constant prices using deflation. According to the difference-in-difference approach, in order to test various impacts on economic performance over time, we choose time periods in the same way as in the subregional model. In particular, we denote the pre-railway period as 2000–2008, while the construction period is 2009–2012, and the post-construction period is 2013–2017. The difference-in-difference coefficients are estimated for each of these time periods. Our estimating equation in the regional model is as follows:

$$Y_{it} = \alpha_i + X'_{it} * \beta + \delta_1 * D_{tr} * D_{9-12} + \delta_2 * D_{tr} * D_{13-17}, \quad (2)$$

where  $Y_{it}$  is the dependent variable, describing regional GDP or tax revenues by region.

**Dependent variables:**

- GDP is the real gross domestic product by region, constant price, million tenge;
- TAXREG is the real tax income by region, constant price, million tenge.

**Independent variables:** (included in  $X'$  a vector of control variables)

- INVREG is the real volume of investments in fixed capital by region, constant price, million tenge;
- EMPREG is the employed population by region, thousand people;
- GDPREGC is the real GDP per capita by region, constant price, thousand tenge;
- AWGREG is the real average monthly wage by region, constant price, tenge.

**Binary variables in DiD model:**

- $D_{tr}$  is the binary variable indicating whether or not the observation belongs to the treated region;
- $D_{9-12}$  and  $D_{13-17}$  are binary variables indicating whether or not the observation belongs to the respective time periods for the years 2009–2012 or 2013–2017;
- $D_{tr} * D_{9-12}$  and  $D_{tr} * D_{13-17}$  are difference-in-difference binary variables, indicating whether or not the observation belongs to the respective time periods and the treated region.

Based on the estimated effect and the availability of regional economic data, we have selected control economic variables that could influence the economic outcomes in regions. In particular, as independent variables we selected the GDP per capita by region and investment in fixed capital, employed population, and average monthly nominal wage by region. For differentiating between regional effect and year effect we entered into the model the binary variables indicating whether the observation belongs to the respective years or type of region.



## 4.4 Empirical Results

### 4.4.1 Subregional Estimation Results

The report on the results of the regression is organized in accordance with the effects on the dependent variables in the subregional model. The results for the subregions under study are shown in Table 7. From these results, the main conclusions were drawn on the impact on the real economy of the treated group and the time period at the subregional level.

**Table 7: Evaluation of Impact on Treated Subregions in Subregional Model with DiD Method**

Independent Variables	Dependent variables		
	Construction (million tenge)	Agriculture (million tenge)	Industry (million tenge)
	CNS	AGR	IND
Vector of control variables $X_t$ at subregional level:			
Employed population by subregion (thousand people)	50.013***	94.083***	22.448**
Average monthly nominal wage by subregion (tenge)	0.092***	0.044***	0.076***
Investment in fixed capital by subregion (lag 1) (million tenge)	0.062*	0.008	0.036**
Gross domestic product per capita by region (thousand tenge)	1.405	3.029**	0.726
$D_{it}^* D_{9-12}$	4,661.113***	846.941***	584.185*
$D_{it}^* D_{13-17}$	1,753.031**	547.366*	917.354**
Constant term	-2,597.275***	-364.087	383.636
Total panel observations	187	187	187
Adj $R^2$	0.66	0.82	0.92

Significance levels: significant at 10% \*  $p < 0.10$ ; significant at 5% \*\*  $p < 0.05$ ; significant at 1% \*\*\*  $p < 0.01$ .

Notes:  $D_{it}^* D_i$  is an interactive binary variable that takes on a value of one if an observation is drawn from a treated subregion in the given time period, and zero otherwise.

Source: Author's calculations using data from Committee of Statistics of RK.

As can be seen from the results of the subregional models, obtained adjusted coefficients of determination (adjusted R-squared) are high, such as 0.66, 0.82, and 0.92, which indicates that the models are well suited for the data and model abilities to predict well most variations in the response data or to explain the results of the regression. In addition, the regression results show that the selected independent variables are statistically significant, since their p-values have significance levels of 0.01, 0.05, and 0.1 in almost all regression equations. Generally, the results of the regression model show a good explanatory power of selected independent variables for predicting dependent variables, such as production in the construction, agriculture, and industrial sectors of the real economy.

The evaluation coefficients in this model are different in various branches of the real economy. As can be seen from the table, the most significant independent variable, which has a positive effect on the increase of the production volume in all sectors of the economy, is population employment by subregion (significantly at 1%). According to regression analysis, the regression coefficients provide information about the quantity by which the dependent variable is expected to increase when the independent variable is increased by one, while at the same time holding all the other independent variables as constant. In quantitative terms, this coefficient shows that, if the population employment in the subregion increases by an average of 1,000 people, the expected volume of construction works will increase by about 50 million tenge annually, or by 3.5% of mean

construction volume, respectively gross agricultural output by 94 million tenge, or by 2.4% of mean agriculture production, and industrial production by 22 million tenge, or by 1% of mean industry, provided that all other independent variables are constant. Thus, the employment of the population had the most significant impact on the increase in the volume of construction work, which emphasizes the economic and social significance of the construction of the railway in generating employment in the treated subregion.

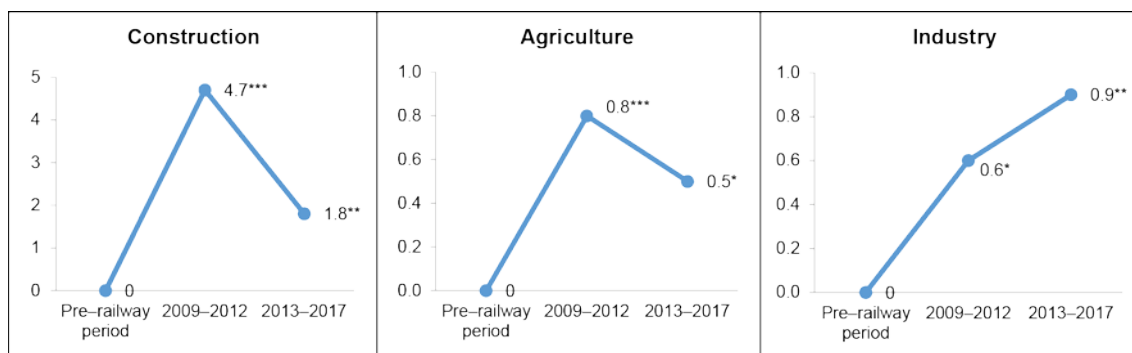
Also, one of the important explanatory variables in this regression is the average monthly wage, whose p-value is significant at the 1% level for all sectors of the real economy, such as construction, agriculture, and industry. The coefficient for this independent variable indicates that for every additional 1,000 tenge of average monthly wage, the expected volume of production in construction works will increase by about 92 million tenge annually, or by 6.4% of mean construction production, respectively gross agricultural output by 44 million tenge, or by 1.1% of mean agriculture production, and industrial production by 76 million tenge, or by 3.5% of mean industry, provided that all other independent variables are constant. Thus, the construction sector also had the most economically significant impact at the subregional level. Other explanatory variables, such as investments in fixed capital and GDP per capita, also have a positive effect. In particular, investments in fixed capital have the most significant impact on industry (significant at 5%), followed by construction (10%). The explanatory variable GDP per capita is more significant in the agriculture sector, since agriculture employs a lot of people living in rural areas (significant at 5%).

Further, we consider the coefficients of binary variables, which belong to categorical variables. As can be seen from the output of equations, the estimates of the coefficients of binary variables have positive signs in all equations; that means that, all things being equal, the treated subregions received a greater economic impact on the increasing production volumes in the respective sectors of the real economy than in the control group at the subregional level. The p-values for binary variables in equations have values in the range from 0.01 to 0.05 to 0.1, which indicates that all binary variables included in regression are statistically significant at levels of 1%, 5%, and 10%. In general, positive and statistically significant values of the coefficients of binary variables show a more positive significant impact of the project on the sectors of the real economy in the treated subregions than in the control subregions during the project implementation period.

As can be seen from the DiD coefficients, the treated subregions demonstrated an increase in the volume of construction work of 4.7 billion tenge during construction of the railway, which is more than three times higher than the industry average, and after the construction it increased by 1.8 billion tenge, or 122% of mean construction production, compared to the counterfactual scenario based on the performance of the nonaffected group. According to time periods, the project under consideration had a more positive significant impact on the construction industry in the period of constructing the railway in 2009–2012 (significance at 1%), and after the completion it had a less statistically significant effect (at 5%). In addition, the project under consideration had a positive and significant impact on the development of agricultural production in treated subregions in the short term (at 1%) and in the medium term (at 10%). As can be seen from the DiD coefficients, the treated subregions demonstrated an increase in agriculture production of 0.8 billion tenge annually, or of 22% of mean agriculture output, and then of 0.5 billion tenge, or 14% of mean agriculture production, compared to the control group at the subregional level. Furthermore, the project also had a positive impact on the development of industrial production in the treated group in both periods and was statistically significant at 10% and 5%, respectively. The DiD coefficients estimate the positive impact on industrial

production in the treated group with an increase of 0.6 billion tenge annually, or of 26.6% of mean industrial production, in the short term, and of 0.9 billion tenge, or 42% of mean industry, in the medium term, as compared to the control group at the subregional level. As coefficients of binary variables show, the construction of the railway has a greater statistical and economic impact on the industrial sector after putting it into operation in the treated subregions. In general, as can be seen from the coefficients of the DiD model, the project under consideration had a greater economic impact on the increase in production in all sectors of the real economy in the treated subregions than in the control subregions. Figure 7 provides a graphic illustration of the estimations of impact on economic performance in the treated subregion.

**Figure 7: The Impact of the Project on Sectors of the Real Economy in the Treated Subregion**



Source: Author’s calculations using data from Committee of Statistics of RK.

In general, the results of an empirical analysis based on the methodology of the DiD model showed that the implementation of the infrastructure project under consideration had a more positive impact on the main sectors of the real economy, such as construction, agriculture, and industry, in the treated group than in the control group at the subregional level.

#### 4.4.2 Regional Estimation Results

The report on the results of the regression is organized according to the effects on the dependent variables in the regional model. The results for the region under study are shown in Table 8. From these results, the main conclusions were drawn on the impact on the macroeconomic indicators of the treated group in the different time periods.

As can be seen from the results of the regional model, the obtained adjusted coefficients of determination (adjusted R-squared) are high, which indicates that the models are well suited for the data and able to predict most of the variations in the response data in the regression. Furthermore, the regression output presented in the table shows that all independent variables, such as investment in fixed capital, GDP per capita, employment and average monthly wages by regions, are statistically significant (almost all at levels of 1–5%) and have a positive effect on dependent variables. There is evidence that the explanatory variables included in the vector of control variables  $X'$  contribute significant information in the prediction of considered dependent variables such as GDP and tax revenues by region.

**Table 8: Evaluation of Impact on Treated Region in Regional Model with DiD Method**

Independent Variables	Dependent Variables	
	Gross Domestic Product by Region (million tenge)	Tax Income by Region (million tenge)
	Regional GDP	TAX
Vector of control variables $X_t$ at regional level:		
Investment in fixed capital by region (lag 1) (million tenge)	0.15***	0.04***
Gross domestic product per capita by region (thousand tenge)	696.52***	24.90***
Employed population by region (thousand people)	124.34**	20.30**
Average monthly nominal wage by region (tenge)	0.0003	0.66***
$D_{tr}^* D_{9-12}$	12,574.58	6,604.74***
$D_{tr}^* D_{13-17}$	45,871.27**	11,551.51***
Constant term	-12,932.06	-52.70
Total panel observations	153	153
Adj R <sup>2</sup>	0.98	0.95

Significance levels: significant at 10% \*  $p < 0.10$ ; significant at 5% \*\*  $p < 0.05$ ; significant at 1% \*\*\*  $p < 0.01$ .

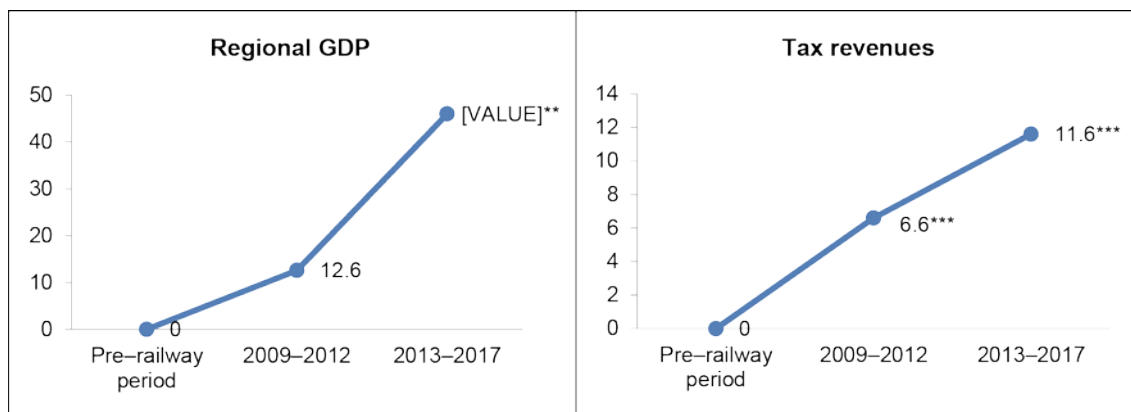
Notes:  $D_{tr}^* D_t$  is an interactive binary variable that takes on a value of one if an observation is drawn from a treated region in the given time period, and zero otherwise.

Source: Author's calculations using data from Committee of Statistics of RK.

In the regional model, the obtained DiD coefficients of binary variables have a positive sign in both equations, which means that the treated region had a more positive impact on increasing GDP and tax revenues than the control group at the regional level. According to the time periods in the DiD model, the project under consideration shows a more positive and statistically significant impact on macroeconomic indicators after the construction of the railway line. In particular, tax revenues in the treated region are statistically significant (by 1%) in both periods and increase after construction was completed. As can be seen from the DiD coefficients, the treated region showed an increase in tax revenues of 6.6 billion tenge annually, or 24% of mean tax revenues, during construction in 2009–2012, and of 11.6 billion tenge, or 42% of mean tax income, after construction in 2013–2017, compared to the counterfactual scenario based on indicators of the nonaffected group. Our results indicate that the difference in tax revenues rose after construction was completed. The estimated increase in tax revenues in the treated region indicates that the influence of the railway has increased since its construction and in recent years has achieved a greater effect.

In addition, the results of the assessment show that in the region along the railway line there was a growth in regional GDP in all periods where the estimates are statistically significant for the post-construction period in 2013–2017 (at 5%). As can be seen from the DiD coefficients, the treated region showed an increase in regional GDP of 46 billion tenge annually, or 18% of mean regional GDP, in 2013–2017 due to the construction of the “Khorghos–Zhetygen” railway. And as shown by the coefficients of the DiD model, the project under consideration had a positive impact on the regional GDP of the region under study during the construction period, as well as after the construction was completed. However, the project had a greater impact on the macroeconomic indicators in the treated region in the medium term than in the short-term. Figure 8 provides a graphic illustration of the estimations of the impact on regional GDP and tax revenues in the treated region.

**Figure 8: Impact of “Khorgos–Zhetygen” Railway on Regional GDP and Tax Revenues in Treated Region**



Source: Author's calculations using data from Committee of Statistics of RK.

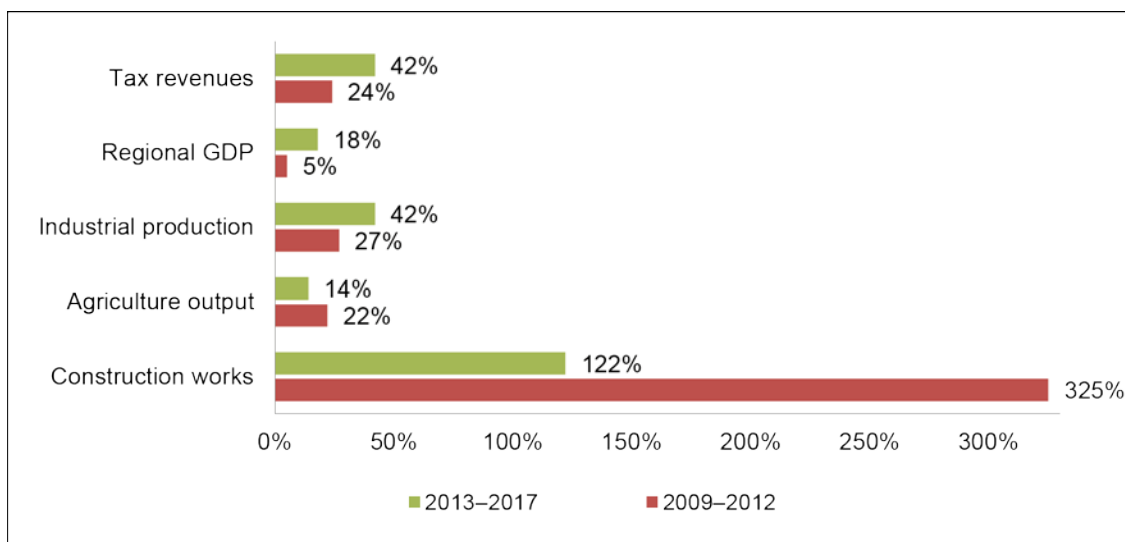
Figure 9 summarizes the impact of the project on economic performance at the regional and subregional levels. The DiD coefficients obtained from the subregional and the regional models are presented in percentage terms in this figure. As mentioned above in this study, the DiD approach makes it possible to see the effect of the infrastructure project by computing the difference over time and across different regions. In particular, the DiD coefficient measures the difference between an actual result and an alternative outcome, or between control and treated groups. Also, in this figure the difference between economic effects over time are illustrated during the railway construction in 2009–2012 and in the post-construction period 2013–2017.

As can be seen in this figure, the construction of the “Khorgos–Zhetygen” railway had the greatest economic effect directly on the increase in the volume of construction work, by more than three times the industry average, during the construction period. After the construction of the railway, the economic impact on the construction production in the treated subregions was also higher by 122% of mean construction volume, compared to the control subregions.

The infrastructure project also had a positive statistically significant impact on the other sectors of the real economy, such as agriculture and industrial production, at the subregional level. In particular, the increase in industrial production in the subregions under study was higher by 27% of mean industrial production during the construction period than in the control subregions. After completion of the construction of the railway, as a result of the spillover effect, there was a stronger increase in industrial production in the subregions concerned, by 42% of mean industry, than in the counterfactual scenario based on indicators of the nonaffected group. Thus, the project had a stronger economic effect on the increase in industrial production after the completion of the railway construction.

The project also had a positive and statistically significant effect on agricultural development in the subregions under study. As can be seen from the DiD coefficients, the treated subregions demonstrated an increase in agriculture production of 22% of mean agriculture output during the construction period, and of 14% of mean agriculture production after the construction period, compared to the control group at the subregional level. In general, as the DiD coefficients obtained from the subregional model showed, the implementation of the infrastructure project had a more significant impact on increasing the construction works and agriculture production during the construction period and increasing industrial production after the railway construction.

**Figure 9: The Impact of the Project on Economic Indicators in the Treated Group according to the Time Period**  
(in % of Mean Respective Macroeconomic Indicators)



Source: Author’s calculations.

Also, as the DiD coefficients obtained from the regional model show, the project implementation had a positive and statistically significant effect on macroeconomic indicators in the affected region. In particular, there was an increase in GDP in the treated region of 18% of mean regional GDP in 2013–2017 due to the construction of the “Khorgos–Zhetygen” railway. As can be seen from the coefficients of the DiD model, the project under consideration had a positive impact on the regional GDP of the treated region in all periods, but in the post-construction period it had a more statistically significant and economically growing effect. The implementation of the infrastructure project also had a positive statistically significant impact on the increase in tax revenues in the region under study. According to the DiD coefficients in the regional model, tax revenues in the treated region increased by 24% of mean tax revenues during the construction period, and after its completion, as a result of the spillover effect, there was a greater increase of 42% of mean tax incomes, compared to the counterfactual scenario based on indicators of the unaffected group. In general, the results of the regional and subregional models using the DiD approach showed that the construction of the railway had a greater economic impact on the treated subregions in the short term. In the medium term, the project had a greater impact on the increase in macroeconomic indicators in the region concerned. Generally, all the DiD coefficients obtained on the basis of the regional and subregional models are positive and statistically significant, which shows the more positive impact of the project on the economic indicators in the treated group than in the control group.

In general, this study shows that the increase in macroeconomic indicators is significant in the case of the “Khorgos–Zhetygen” railway. In particular, the data obtained indicate that the construction of the railway increased tax revenues during the construction and operation phases. Furthermore, the study showed a statistically significant and economically growing impact on tax revenue after its completion. Moreover, the implementation of the infrastructure project under consideration was associated with a positive and statistically significant effect on the regional GDP of the treated region. In general, the results confirm the assumption of an increase in economic activity during the construction of the railway and higher growth rates in the

affected regions afterward. This study shows that the spillover effects from the development of such an infrastructure project are highly significant for the local economy and can stimulate business activity in the region and generate employment.

## 5. DISCUSSION AND CONCLUSIONS

Summarizing the above, this paper presents a macroeconomic empirical study that examines the impact of the constructed “Korgos–Zhetygen” railway on the economic performance of the treated group through which the railway directly passes. For the evaluation, we implemented the econometric methods with a “difference-in-difference” (DiD) approach to study the impact of the constructed railway on the economic performance of the treated group compared to the control group of unaffected regions. To provide a more accurate assessment of this infrastructure project, we considered the impact of the railway construction at two levels: at the subregional (rayon) level and the regional (oblast) level of the Republic of Kazakhstan.

The main source of statistical data for this research was the data of the national statistical agency of the Republic of Kazakhstan. It should be noted that there were some limitations in the availability of statistical data at the subregional level. For example, with regard to subregional data, mainly data on real sectors of the economy have been published. However, data on tax revenues by subregion were not available. Also, we took into account that, according to the system of national accounts, macroeconomic indicators such as GDP are aggregate indicators of economic activity, which is measured across the entire country as a whole or by region, but is not measured by subregion. Given these data limitations, we divided our study of measuring the impact of the infrastructure project on economic performances separately into subregional and regional levels. Considering the impact of the project at the subregional level allows a more accurate assessment of the impact of the project on the development of the subregions in which the project was implemented. Thus, conducting research at the subregional level makes the subject of the research more accurate and allows us to assess the impact of the investment project on the economic performance of the subregions at the local level.

Thus, firstly, we considered the impact of the project at the local level or at the level of subregions. In this case, we built the subregional econometric model using the DiD approach. As the treated group at the subregional level, we considered three subregions of the Almaty region through which the “Korgos–Zhetygen” railway passes. In particular, we considered the impact of the project on economic performance in various sectors of the real economy, such as construction, industry, and agriculture, in the subregions under consideration. We tested for this using the difference-in-difference approach, which assesses the impact of the railway construction project by computing the difference over time (before and after the intervention) and across different regions. To assess the impact of the realization of the project over time, we distinguished between the construction period and the stages of operation. In particular, we distinguished between effects for the short term (2009–2012) and the medium term (2013–2017). The results of an empirical analysis and the evaluation of DiD coefficients obtained from the subregional model showed that the implementation of the infrastructure project under consideration had a more statistically significant and positive impact on the economic activity in the main sectors of the real economy, such as construction, agriculture, and industry, in the treated group than in the control group at the subregional level. As the results of the subregional model showed, the construction of the “Korgos–Zhetygen” railway had the greatest economic effect directly on the increase in the volume of construction

work by more than three times than the industry average, during the construction period. After the construction of the railway, the economic impact on the construction industry in the subregions under study was also higher by 122% of mean construction production compared to the counterfactual scenario based on the performance of the non-affected group. In the industrial production, the construction of the “Khorgos–Zhetygen” railway had a stronger economic effect on the increase in industrial volume after the completion of the railway construction. In particular, the increase in industrial production in the treated subregions was higher than in the control subregions by 27% of mean industrial volume during the construction period. After completion of the railway construction, as a result of the spillover effect, there was a stronger increase in industrial production in the treated subregions of 42% of mean industrial output than in the control subregions. Thus, the project had a stronger economic effect on the increase in industrial production after the completion of the railway construction. As can be seen from the DiD coefficients, the subregions under study demonstrated an increase in agriculture production of 22% of mean agriculture output during the construction period and of 14% of mean agriculture production after the construction period compared to the control group at the subregional level. In general, the results of the subregional model showed that the construction of the “Khorgos–Zhetygen” railway had the greatest impact on the increase in construction work and agriculture production in the treated subregions in the short term, and as a result of the spillover effect it influenced the increase in industrial production in the medium term at the subregional level.

In order to assess the impact of the infrastructure project on macroeconomic indicators, such as the regional GDP and tax revenues by region, we created the regional econometric model. As the treated group at the regional level, we chose the Almaty region, since it is through this region that the constructed “Khorgos–Zhetygen” railway passes. As the results of the regional model showed, the increase in tax revenues in the treated region indicates that the influence of the railway has increased since its construction and in recent years has achieved a greater effect. In particular, tax revenues in the region under study increased by 24% of mean tax revenues during the construction period. After completion of the railway construction, as a result of the spillover effect, there was a larger increase in tax revenues in the treated region of 42% of mean tax incomes than in the counterfactual scenario of the control group.

Moreover, the implementation of the infrastructure project under consideration is associated with a positive and statistically significant effect on the GDP of the treated region. In particular, there was an increase in the regional GDP of the treated region of 18% of mean regional GDP after railway construction compared to the control regions. According to the DiD coefficients obtained from the regional model, the project under consideration had a positive impact on the regional GDP of the region under study in all periods, but it had a more statistically significant and economically growing effect in the post-construction period. Thus, this study shows that the project has a greater impact on the macroeconomic indicators in the treated region in the medium term than in the short term. In general, the results confirm the assumption of an increase in economic activity in treated subregions during the construction of the railway and higher growth of macroeconomic variables in the affected regions in the future. This study showed that the spillover effects from the development of such an infrastructure project are significantly important both for the macroeconomy and for the local economy of the region.



## 6. POLICY IMPLICATIONS

As we know, Kazakhstan is the ninth-largest country in the world and is located in the center of the Eurasian continent at the crossroads of transport routes connecting east and west, and north and south. The favorable geographical location of Kazakhstan offers opportunities for the development of transport infrastructure as a transit area for international transport logistics. At the same time, the development of railway infrastructure plays an important role in the economic development of the country as a whole. The major priority for the railway infrastructure is the development of the transit potential, which can be achieved through the construction of new railway lines. In this regard, we recommend in the future attracting investment in transport infrastructure for the construction or reconstruction of other railways in other regions of Kazakhstan, which may affect the increase in economic activity in the country, as well as the income of foreign investors. The development of railway infrastructure plays a significant role in connecting the country with other countries and has a multiplicative spillover effect on the society and a country's economy. Specifically, the attraction of investment in the development of railway transport infrastructure in Kazakhstan will lead to the following economic benefits:

- New roads will significantly increase the transit potential of Kazakhstan for the development of international transport logistics.
- Construction of new railways will improve the accessibility and connectivity of rail transport communications, both domestically and with other countries.
- New directions of transport corridors will facilitate the development and expansion of economic relations between Kazakhstan and the Eurasian continent.
- Large volumes of road freight will be shifted to more reliable, cheaper, and safer railway transport.
- The operation of new railway lines will provide a new impulse to the development of treated subregions, as shown in this study.

The main incentives for financing infrastructure in Kazakhstan are the reduction of transport costs related to production in the following ways: reducing travel time; association of macro-regions into a single integrated transport system; improving labor migration; creating comfortable conditions for the movement of people; reducing operating costs during transportation of goods, etc. In general, the impact of financing infrastructure projects on related industries will be manifested in increasing the volume of freight and passenger transportation and development of the transit potential of Kazakhstan, which will contribute to economic growth, and increase the competitiveness of the domestic economy and international integration into the foreign markets. Over time, it can be expected that the provision of new infrastructure in the form of a railway connection will generate spillover effects affecting local businesses, household incomes, government tax revenues, and the overall economic performance of related regions.

Summarizing the study above, it should be noted that Kazakhstan has had successful experience in implementing different public-private partnership projects. However, there are still a number of problems for which we recommend the following measures to improve the PPP policy in Kazakhstan:

- In recent years, Kazakhstan has implemented a large number of PPP programs funded by many international institutions, such as the WB, ADB, ERDB, and the EU. With this large experience, the governmental authorities of Kazakhstan can develop a roadmap of the most attractive infrastructure sectors and branches of the economy to attract investments in the country on the basis of PPP mechanisms.
- It is also recommended to continue studying the best international experience of PPP programs in other countries in order to adapt these procedures and implement successful PPP processes in Kazakhstan.
- In this regard, it is recommended to adopt the current law on PPPs in Kazakhstan to international standards, which will help to attract more foreign investors.
- It is recommended that a clear legal environment should be established, based on international practice, to improve the legislative framework for the implementation of public-private partnership projects.

Global experience has shown that the successful implementation of PPP infrastructure projects should be based on a mutually beneficial and effective partnership between the state and business. The use of PPP mechanisms provides a number of incentives for both the state and business. The private sector receives new investment opportunities, which means new sources of income and opportunities to participate in major projects. On the other hand, for the government of Kazakhstan, the financing of infrastructure projects is aimed at facilitating the development of the macro region as a whole and stimulating the export of Kazakhstani goods to foreign markets. The use of PPP mechanisms in Kazakhstan not only provides an opportunity to increase the resource supply of infrastructure projects while reducing budget expenditures, but also makes it possible to provide better services.

Our study showed that the investments in transport infrastructure would yield a spillover effect by improving the economic development of the treated region and increasing the economic efficiency in the respective subregions. In the future, this will contribute to increasing the transport potential of Kazakhstan and its transformation into a major trade, logistics, and transit center in central Asia, as well as a transport bridge between Europe and Asia.

## REFERENCES

- Cruz, C.O., and Marques, R.C. 2011. Revisiting the Portuguese experience with public–private partnerships. *African Journal of Business Management*, 5(11), 4023–4032.
- Delmon, J. 2010. Public-Private Partnership in Infrastructure: Practical Guide for Government Agencies. *Astana: Publishing House of JSC “Kazakhstan Center for Public-Private Partnership”*.
- Encinas, J. 2013. The UK PPP Program: Lessons from PFI History and the New PF2 Model. Paper presented at the *8th International PPP Forum “Growth Strategy and PPP” in Japan*, Infrastructure UK, 17 October.
- Government of the Republic of Kazakhstan. 2008. Decree No. 693 “On the Establishment of a Specialized Organization on Concession Issues” of 17 July 2008. Available at: <http://www.zakon.kz>.
- . 2011. “Program for the Development of Public-Private Partnership in the Republic of Kazakhstan for 2011–2015” of June 29, 2011, No. 731. Available at: <http://www.zakon.kz>.
- . 2015. Action Plan for the Implementation of the State Program for Infrastructure Development “Nurly Jol” for 2015–2019. Available at: <http://www.zakon.kz>.
- Kumar, L., Jindal, A., Velaga, N.R. 2018. Financial risk assessment and modelling of PPP-based Indian highway infrastructure projects. *Transport Policy*, 62: 2–11.
- Law of the Republic of Kazakhstan “On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan Concerning the Introduction of New Types of Public–Private Partnership and Expansion of Their Application” of 4 July 2013. Available at: <http://www.zakon.kz>.
- Law of the Republic of Kazakhstan “On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Improving Budget Legislation” of 3 December 2013. Available at: <http://www.zakon.kz>.
- Law of the Republic of Kazakhstan “On Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on Public Administration” of 2 July 2014. Available at: <http://www.zakon.kz>.
- Law of the Republic of Kazakhstan “On Public-Private Partnership” of 31 October 2015. Available at: <http://www.zakon.kz>.
- Law of the Republic of Kazakhstan of July 7, 2006 No. 167–III “On Concessions” (amended and supplemented as of 4 July 2013). Available at: <http://www.zakon.kz>.
- Mataev, T.M. 2011. Prospects for the development of public-private partnership forms in the Republic of Kazakhstan. *Journal of Russian Entrepreneurship*, 12(12), 187–192.
- . 2020. Development of public-private partnership in Kazakhstan: Status, trends and prospects. <https://www.gov.kz/memleket/entities/economy/press/news/details/o-razvitii-gchp-v-kazahstane-sostoyanie-tendencii-i-perspektivy?lang=ru>.
- Site of National Committee of Statistics of the Republic of Kazakhstan. [www.stat.gov.kz](http://www.stat.gov.kz).

Statistics of the National Bank of the Republic of Kazakhstan. [www.nationalbank.kz](http://www.nationalbank.kz).

The State Program of Industrial and Innovative Development of the Republic of Kazakhstan for 2015–2019. 2014. Astana: Office of the President of the Republic of Kazakhstan. Available at: <http://www.zakon.kz>.

Toksanova, A.N., Abdymanapov, S.A., et al. 2016. Development of Public-Private Partnership in the Republic of Kazakhstan. *IEJME — Mathematics education*, vol. 11, no. 5, 1113-1126.

Yoshino, N. and Abidhadjaev, U. 2016. Impact of infrastructure on tax revenue: Case study of high-speed train in Japan. *Journal of Infrastructure, Policy and Development* (2017) 1 (2), 129-148.

———. 2017. An impact evaluation of investment in infrastructure: The case of a railway connection in Uzbekistan. *Journal of Asian Economics* 49 (2017) 1–11.

Yoshino, N. and Pontines, V., 2015. The “Highway Effect” on Public Finance: Case of the STAR Highway in the Philippines. *ADBI Working Paper Series*, No. 549. October 2015.