

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics



Master's Thesis

**Impact of FDI on Unemployment rate: the
case of Kazakhstan**

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Declaration

I declare that I have worked on my master's thesis titled " Impact of FDI on Unemployment rate: the case of Kazakhstan" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 25.03.2025

DIPLOMA THESIS ASSIGNMENT

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Economics and Management

Thesis title

Impact of FDI on Unemployment rate: the case of Kazakhstan

Objectives of thesis

The Objectives of the thesis is to evaluate the relationship between unemployment and FDI inflows, then to analyse the significance of FDI inflows on economic performance of the country. The thesis also aims to examine the current trend of FDI attraction in Kazakhstan and compare the results with the existing findings of other countries.

Methodology

The thesis will contain 2 main parts: theoretical and practical parts.

The theoretical part will focus on theoretical background of unemployment, FDI and their significance in economic situation, as well as the literature review of findings regarding the mechanism of FDI's impact on unemployment and economic condition of the country. The existing findings of other countries will be taken into consideration to create expectation regarding further analysis. The theoretical part will also consider trend in FDI inflows and changes in unemployment rate in Kazakhstan for last 15-20 years, considering the specific characteristic of each region.

The practical part will be focused on empirical model. The statistical data on regional level for last 20-25 years of Kazakhstan will be collected and used for empirical analysis. The empirical analysis will be done in the form of a Two-stage least squares model to analyse the significance of the relationship between FDI inflows and the unemployment rate of Kazakhstan with consideration of the possible endogenous impact of trade openness on FDI. The results of empirical model will be discussed with the previous findings of other countries and provide some insights for policy implications.

The proposed extent of the thesis

35-50 pages

Keywords

FDI, Unemployment, Two-stage least squares analysis, Kazakhstan.

Recommended information sources

- Grahovac, D., & Softić, S. (2017). Impact of the FDI on unemployment rate in countries of West Balkan. *Review of Innovation and Competitiveness*, 3, 65-82.
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Abstract

Foreign Direct Investment (FDI) is recognized as a key driver of economic growth, significantly impacting labor market conditions. This thesis examines the relationship between FDI and unemployment in Kazakhstan by constructing an empirical analysis based on economic theory. By reviewing the literature and research on FDI, unemployment theories, and macroeconomic factors dynamics, the thesis analyzes how foreign investment influences the labor market, especially the unemployment rate.

The analysis is based on a time-series dataset, which includes the period from 2001 to 2023; the main empirical tools for analysis are Ordinary Least Squares and Two-Stage Least Squares models. The OLS model serves as the initial estimation of relationships, while the TSLS model aims to deal with potential endogeneity problems in FDI to get reliable and effective estimates of relationships.

The empirical findings demonstrate a empirically relevant negative relationship between FDI and unemployment and highlight that increased foreign investment inflow is connected with lower unemployment rates in Kazakhstan. The roles of other macroeconomic variables, such as GDP growth, inflation, education, and public debt on unemployment are also tested. These results highlight the importance of encouraging an investment-friendly environment to get more efficient labor market conditions and provide conditions for economic stability.

The study concludes that FDI inflow attraction policies can play a crucial role in diminishing unemployment and stimulating sustainable economic growth in Kazakhstan.

Keywords: Foreign Direct Investment, Unemployment, OLS Model, TSLS Model, Kazakhstan.

Abstrakt

Přímé zahraniční investice (Foreign Direct Investment – FDI) jsou považovány za jeden z klíčových aspektů ekonomického růstu, jenž významně ovlivňuje podmínky na trhu práce. Tato práce zkoumá vztah mezi FDI a nezaměstnaností v Kazachstánu pomocí empirické analýzy založené na ekonomické teorii. Přezkoumáním odborné literatury a studií na téma FDI, teorií nezaměstnanosti a makroekonomických faktorů tato práce analyzuje, jak zahraniční investice ovlivňují pracovní trh, zejména míru nezaměstnanosti, v průběhu času.

S využitím časové řady od roku 2001 do roku 2023 tato práce konstruuje modely metodou nejmenších čtverců (OLS) a dvoustupňovou metodou nejmenších čtverců (TSLS). Metoda OLS slouží k odhalení vztahů jako takových, zatímco metoda TSLS se pokouší prozkoumat potenciální endogenitu FDI za účelem zajištění co nejspolehlivějších a efektivnějších odhadů.

Empirické výsledky této práce prokazují statisticky významný negativní vztah mezi FDI a nezaměstnaností v Kazachstánu a zdůrazňují, že zvýšený příliv zahraničních investic se pojí s nižší mírou nezaměstnanosti. Rovněž je prozkoumána role dalších makroekonomických faktorů, jako jsou růst HDP, inflace, vzdělání a veřejný dluh, ve vztahu k nezaměstnanosti. Zjištění dané práce poukazují na významnost podpory investičně příznivého prostředí pro lepší podmínky na trhu práce a zajištění ekonomické stability.

Tato práce dochází k závěru, že politika zaměřená na přilákání FDI může hrát klíčovou roli při snižování nezaměstnanosti a stimulaci udržitelného hospodářského růstu v Kazachstánu.

Klíčová slova: Přímé zahraniční investice, Nezaměstnanost, Metoda nejmenších čtverců, Metoda dvoustupňových nejmenších čtverců, Kazachstán.

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1. Introduction

Foreign Direct Investment is considered one of the key drivers of economic development. Its significance is specifically considered in emerging market due to the possibility to stimulate growth, technology development, and competitiveness in different sectors. On the other hand, unemployment is still one of the most significant problems in many economies, influencing the living standards of the population, stability in the country and overall economic conditions. In Kazakhstan, the economic transition from a centrally planned economy to a market-oriented one more than 30 years ago created both opportunities and challenges for the country. FDI has brought a sufficient amount of new technologies and skills, but its relationship with labor market conditions, especially unemployment, is not fully clear and is expected to be complex.

This thesis is aimed to study the interconnection between FDI and unemployment in Kazakhstan. By analyzing collected data with annual measurements for more than 20 years, the thesis aims to understand how changes in foreign investment flows influence the situation in the labor market. The thesis is going to be focused on the connection between FDI and unemployment rate fluctuations, considering other macroeconomic factors such as GDP growth, education level, inflation rate, and public debt rates. The complex relationship of different factors in real life requires consideration of different factors and different relationships between them due to uncertainty in their direct impact on each other.

The significance of this research is that it could provide information for policymakers about the opportunities of FDI as a tool for job creation and economic development. The study aims to provide insights into the ways through which FDI can impact the labor market, help create strategies for sustainable growth, create different employment opportunities and rise the welfare of the population in Kazakhstan.

The thesis consists of two main parts. The theoretical section starts with a theoretical base of unemployment and FDI, their types and specificity, a literature review of existing research on the role of FDI in economic development and a review of labor market conditions. The analysis covers information about the mechanisms through which FDI can create jobs, transfer technology and skills and also considers current research in Kazakhstan relating to the creation of employment and new economic opportunities and through the attraction of FDI.

The empirical section is based on econometric analysis of the relationship between FDI and unemployment in the chosen country. Two empirical models are used: Ordinary Least Squares and Two-Stage Least Squares models. The best-fit model used for the final results' interpretations.

2. Objectives and Methodology

2.1. Objectives

Foreign Direct Investment is a crucial driver of economic performance; therefore, its influence on labor market conditions and unemployment, should be given attention by society and policymakers. The main objective of this thesis is to analyze the relationship between FDI and unemployment in Kazakhstan, with a special focus on the interconnection of foreign investment inflow with some macroeconomic factors concerning employment conditions in the country.

The thesis aims to estimate the impact of FDI on the unemployment rate and analyze whether the rise in FDI inflows is connected with better employment conditions in Kazakhstan. The deeper investigation can give insights into how FDI influences the job creation through capital availability and the transfer of technologies and skills. Moreover, the influence of some macroeconomic variables on employment conditions will be tested. Including macroeconomic variables, such as GDP per capita growth, education level, inflation, and public debt, will provide an opportunity to get a complex review of the determinants of the labor market.

The gained empirical findings can lay a foundation for policy recommendations to develop Kazakhstan's labor market conditions. Therefore, the thesis aims to be an example of a reference for policy implications related to effective job creation and economic stability.

The thesis tries to enlarge the existing research on the relationship between FDI and unemployment in Kazakhstan, which does not have sufficient up-to-date analysis, considering the specificity of the region.

2.2. Methodology

The methodology of this thesis is a combination of theoretical and empirical methods to study the relationship between Foreign Direct Investment and unemployment in Kazakhstan. The theoretical part of the thesis is based on a review of the literature related to FDI, unemployment, and economic performance. This literature review is the theoretical basis for understanding how FDI may influence labor market conditions. This review includes research on the relationship between investment and economic growth, job creation with foreign direct investment help, and the factors influencing the unemployment rate. Additionally, the thesis reviews current policies and publications of Kazakhstan's government.

Empirical analysis is based on annual data from 2001 to 2023 from official statistical reports by organizations such as the World Bank and the Bureau of National Statistics of Kazakhstan. The chosen time period results cover the available data for the chosen variables, such as Unemployment Rate, FDI inflow, GDP per capita growth, the proportion of the population with tertiary education, inflation rate, and public debt.

Before the econometric model, a data analysis is conducted to understand the quality and suitability of the dataset. Descriptive statistics and correlation matrices are applied to check for possible issues and understand the data's specific characteristics. The empirical analysis is done with two econometric models: the Ordinary Least Squares (OLS) Model and the Instrumental Variable—Two-Stage Least Squares (IV-TSLS) Model.

The OLS model is used as a baseline to estimate the linear relationship between unemployment and FDI, considering all independent variables as exogenous. Due to the potential endogeneity problem of FDI, the TSLS model is estimated to get more reliable and efficient estimates. In this case, FDI is instrumented with chosen instruments such as Lag_FDI, Trade openness, and Political stability. Generally, the forecasted instrument values of FDI substitute actual FDI values, and then the relationship between FDI and unemployment is estimated. The TSLS method requires several diagnostic tests, such as tests for instrument relevance and endogeneity.

The thesis's main focus is to integrate economic background ideas from the literature review with empirical results from econometric models. The final analysis draws policy

implications by comparing the findings from Kazakhstan with existing research in other countries.

3. Theoretical aspects of Foreign Direct Investment and Unemployment

3.1. Definitions of FDI

Foreign Direct Investment (FDI) is essential to modern economic development and is significantly linked with globalization trends. The general mechanism of Foreign Direct Investment is connected with one country's investor establishing ownership over business in another country. The increasing role of FDI dramatically impacts the economic interdependence of the countries; it creates not only the transfer of capital but also the transfer of technology, culture and management mechanisms. According to Dunning (1993), FDI is an opportunity to reach new markets, access resources, and rise efficiency, creating the foundation for reaching a comparative advantage in one's field. For example, FDI eliminates several trade barriers and gives access to a deeper understanding of the inner market, which cannot be reached through usual export relationships. Moreover, compared with the mentioned trade relationships, FDI emphasizes ownership and control in the enterprise, which is greater than the usual purchase of stock and bonds. The standard equity ownership rule is connected with 10% and more purchases of foreign entities to be considered as FDI.

This feature points to some rules defining the investment as FDI and differentiation of ordinary portfolio purchase from FDI with ownership and control. International organizations such as the OECD and IMF provide standardized definitions. According to the OECD, the main distinguishing features of FDI are its strong long-term interest and managerial influence. IMF (1993) also emphasizes the control and interest point by highlighting the 10% equity ownership threshold in the case of FDI.

3.2. Key Features of FDI

Long-term investment. Compared to previously mentioned stock and bond purchases as portfolio investments, FDI considers long-term and permanent entrance into the host

country's market, which also considers significant capital inflow and focus on economic development (Ferreira & Laux, 2009).

Ownership control. The capital inflow is aligned with involvement in the company's business activity and managerial decisions. Significant equity ownership allows the investor to adjust the operations according to the parent company's objectives and impact the company's business strategies.

Cross-border flow. FDI differs from other types of investment, including the buying of sufficient equity (more than 10%), and is a flow of capital from a foreign country to a host country. Capital includes not only financial capital but also non-financial capital in the form of technology, skills, knowledge, and expertise.

Economic development. The inflow of financial and non-financial capital positively impacts the host country's economic development. FDI creates new job opportunities and promotes growth in technologies and infrastructure through the spillover effect (Khachoo & Sharma, 2016).

Uncertainty. The inflow of capital into different countries includes several risks related to the host country's political stability, economic conditions and cultural integration. Consideration of fixed assets and their relative illiquidity makes withdrawing the investment difficult, while its close integration with local infrastructure and human capital makes it more sensible to external shocks (Gozgor & Erzurumlu, 2010).

3.3. Types of FDI

FDI is a significant source of growth opportunities for different spheres of the economy and can be used differently based on the specificity of the enterprises. Nevertheless, there are defined main types of FDI. Firstly, cross-country investment can be divided into Greenfield investments or Mergers and Acquisitions (M&A).

3.3.1. Greenfield Investments

Greenfield investment is a type of foreign direct investment in which the company establishes an entirely new enterprise in a foreign country while maintaining complete control over its processes. In this form of investment, complete control of the new company also includes constructing working facilities and infrastructure and building human capital.

This type of investment is more long-term oriented, typical for multinational enterprises that aim to expand to international markets (Harms & Meon, 2018).

Building from scratch provides an opportunity to meet the requirements of the entering market and demand standards. Therefore, it rises the alignment of the business instruments with the company strategies. The initial clear view of the business process allows the parent company to avoid unnecessary costs and rise operational efficiency while keeping complete control of operations and fostering long-term growth (Alon, 2020). The host country receives additional benefits in job creation and transfer of valuable things such as infrastructure, technology and even skills for local employees (Osei, 2019). The fundamental entrance of the parent company into a foreign market is an opportunity to build a brand in a new country. However, it also requires high costs and a long period of time to reach the planned production level.

Some challenges accompany the benefits of greenfield investment. Building a company from scratch requires high initial financial and timing costs (Muller, 2006). Organization of business activity in a new country, especially in the case of developing countries, investors can face regulatory challenges, scarcity in infrastructure and human capital, as well as problems due to market uncertainty.

Greenfield investments are common in the automobile sector. With increasing production volumes, automobile companies try to rise their own capacity by accessing new markets. 2006 Hyundai Motor Company established a new manufacturing plant in Nošovice, Czech Republic. This greenfield project contributed to the local economy and created thousands of jobs (CzechInvest, 2006). In 2015, Toyota Motor Corporation announced a similar greenfield investment in Guanajuato, Mexico. This project aimed to produce the Corolla sedan and rise its influence in the North American market (Toyota, 2015). These examples illustrate that the automobile sector is a leading example of greenfield investments and the significant impact of greenfield investments on local economies.

3.3.2. Mergers and Acquisitions (M&A)

Mergers and Acquisitions (M&A) are another type of foreign direct investment where a company attempts to enter a foreign market by acquiring a working business or merging with an existing enterprise in the local market. A merger happens when the companies combine their businesses into one new entity. On the contrary, the acquisition occurs when

one company takes over another, gaining its assets and business-related operations. In the case of FDI, the foreign company acquires it. Compared to greenfield investments, M&A type of FDI allows the foreign company to keep pre-existing infrastructure and use the market position and knowledge obtained by the acquired or merged company (Jude, 2018). Pre-existing infrastructure includes the customer base and the network of suppliers and distributors. These conditions make the company's entry strategy easier and quicker.

Despite the cost-saving advantage, M&A foreign direct investments may include some drawbacks in integrating into different cultural spheres, conflicting with the existing acquired company's management and adaptation of the parent company's values into new cultural and managerial background. According to Danakol et al. (2016), despite the high rate of globalization and developing countries' willingness to attract more FDI inflow, some countries' strict regulatory rules on foreign ownership create barriers to M&A scope. Still, M&A is a popular choice in foreign investment of big companies in quick entrance to the new markets with some significant impact on the home country, such as capital inflow, new technologies, new jobs creation and higher competition in the influenced industry with following positive impact on economic conditions (Calderon et al., 2002)

Mergers and Acquisitions are widespread in the technology sector. For example, to integrate its professional network into its own services, access its insight data, and expand its influence in the business solutions market, Microsoft acquired LinkedIn in 2016.

3.4. Trends of global FDI Inflows and Outflows

Nowadays, FDI is considered to be the core source of economic growth, industrial progress, and technology boost in all involved countries. Globalization is also significantly fostered by FDI. The transfer of financial and non-financial capital under the conditions of FDI positively influences the growth of multinational enterprises and makes them even more significant in international markets (Erdal & Gocer, 2015). The transfer of technologies and skills diminishes the difference between developed and developing economies while increasing the potential efficiency of host countries' economies and the global economy (Khachoo & Sharma, 2016). Non-financial capital, which includes cultural values that should be aligned with developed countries, aims to make the host countries more competitive, competent, and up to international standards.

Emerging economies in Asia, Africa, and Latin America remain the main destinations of FDI inflows due to their favorable factors. With their efficient tax system, fewer barriers, and government subsidies, such investment-friendly economies make them FDI-favorable environments. According to Assamah & Yuan (2024), the political stability and economic growth over the past few decades made Ghana more attractive for FDI. Ghana was among the top 10 destinations in the Middle East and Africa. The market size in the growing economies is an essential driver of FDI inflow to build a large customer base. Moreover, globalization, new technologies, and local resources make this FDI destination more attractive.

Globalization created the foundation for more liberal trade relationships between countries, smoothing the movement of labor, capital, and goods (Asiedu & Lien, 2004). As a result, global value chains with divided processes across borders have become a significant part of the global economy, increasing demand for cross-border investment activity in FDI form.

According to the results of Digital transformation potential for SMEs in 2023, technological progress in the form of digitalization increased the efficiency of multinational companies by eliminating the impact of physical distance. Digital tools boosted productivity and declined the barriers to entering emerging markets, while the availability of new technologies rised interest in technology-based sectors.

On the global level, greenfield investments used to be a strategy of expansion and market entry, primarily considering developing countries. The current demonstrates that this pattern has shifted towards developed countries due to the increasing significance of innovation and technology-driven industries. As one of the trends over the past few decades, there is an increase in cross-border M&A, which is driven by globalization with its integration of markets, more freedom in international financial activities in the form of regulatory reforms and technology advances such as digitalization that makes it easier for acquiring companies. Jude (2018) states that M&A creates a significant part of FDI flows worldwide. The growth is detected not only in developed countries experiencing M&A activity but also in emerging economies of Asia, Africa and Latin America.

Another change in the FDI sphere is economic nationalism, which has significantly grown in response to the COVID-19 pandemic in 2020. Generally, the COVID-19 pandemic has significantly impacted the FDI rates due to lockdowns, policy restrictions, and disruptions

in supply chains. According to a World Bank report (2020), protectionism of national companies negatively influenced cross-border M&A and general foreign ownership. However, the impact of the pandemic varied for different sectors, with highly negative changes in tourism and hospitality and sufficient FDI growth in the healthcare and digitalization sectors.

The modern trend in FDI is aligned with a shift of FDI concentration from developed Western countries toward new regions with emerging regions. Developed countries like the US and the European Union play essential roles in the FDI sphere. Their influence can be especially seen in innovation-based and financial sectors, despite the fact that there is an overall trend of FDI inflow decline. Currently, Asia is the primary source of FDI inflows and outflows; rapid economic growth accompanied by favorable government policies in East Asian countries attracted investors' attention, especially in the technology and manufacturing sectors. Moreover, they are not only receiving enough FDI inflow, but economic development also creates an opportunity to invest in foreign enterprises, making them a significant source of FDI for other countries. According to Dong & Chen (2023), China was one of the leading players in outbound FDI worldwide over the past two decades. After the 2008 financial crisis, FDI outflows of China started to grow rapidly, with an average 30% growth rate. By 2019, China's total FDI outflow reached \$136.91 billion, the second result globally, making it a significant investor influencing the global economy.

While Asian countries are taking the role of investors, Africa is becoming one of the primary recipients of FDI. The increasing population and numerous natural resources make it a promising economy with a sufficient customer base and capital availability (Narula & Dunning, 2000).

The shift in FDI flows can be seen not only in regions but also in economic sectors. International Monetary Fund's report (2023) demonstrates that the COVID-19 pandemic and globalization highlighted the significance of digitalization; the growing trend in the global population demonstrated the vitality of renewable resources and sustainability topics. Technological advances have positively influenced economic growth and increase the importance of digitalization and investment in innovative digital products. Prioritization of sustainability and green investment boosted the significance of investment in renewable energy sources, especially in developing countries.

3.5. Types of unemployment

The unemployment rate is an essential macroeconomic factor that reflects the issue of the economy to fully use the available workforce. There are several different reasons and conditions for unemployment; therefore, it is significant to differentiate between its types. A deeper understanding of causes and reasons is essential for policymakers to deal with and analyze the impact of any other factor changes on the unemployment rate.

3.5.1. Frictional unemployment.

This type of unemployment is the time lag between two consecutive jobs or entering the workforce after graduation. The dynamic economic and competitive labor market considers the existence of frictional unemployment due to the availability of better job opportunities. However, frictional unemployment can be lowered by better accessibility of information about job opportunities, technological advances that raise the awareness of new job offers and adjusted policies that make job transition smoother.

3.5.2. Structural unemployment

Structural unemployment is a type of unemployment that describes the economy's and its labor force's ability to adapt to industry changes. It happens due to a mismatch between the labor market requirements and available workforce skills. The fast path of technological changes and innovations leads to quick changes in industries, which makes the existing skills of workers irrelevant and requires their better adaptation to new demands. This type of unemployment needs a strategic solution due to its long-term characteristics with financial investment in education and training, as well as policy adaptation from the government side.

3.5.3. Seasonal unemployment

Seasonal unemployment is related to specific sectors of the economy, where seasonal factors influence the demand for labor. Seasonal unemployment is expected and well-predictable due to the specificity of the industry. Tourism and agriculture can be an example of these sectors. However, policymakers try to minimize the impact of seasonal factors on the unemployment rate, especially in regions that are heavily dependent on these industries.

3.5.4. Cyclical unemployment

Cyclical unemployment is strongly linked to business cycles and fluctuations in the economy. The demand for goods and services significantly influences the employment rate, therefore the recession period leads to a rise in cyclical unemployment, the same happens with the expansion period and related decline in the level of cyclical unemployment. It is important to monitor cyclical unemployment to know the response of the economy to applied policies.

3.6. Theories of unemployment

Unemployment is a complex and significant factor in the economic situation in the region; there have been plenty of attempts to analyze it through a theoretical framework. The main aim of the analysis is to understand the causes of the problem and adapt the policies to deal with unemployment. Classical theory explains the root of unemployment as a result of market inefficiencies. Adam Smith believed that the labor market is functioning as a self-regulating market and that wages automatically adjust to changes in labor supply and labor demand. According to his ideas in *The Wealth of Nations* (1776), structural unemployment can exist due to changes in demand for goods and services, as well as due to technological progress, but wages keep being flexible and expected to diminish by higher labor supply in the case of its too high level. The rigidity of wages was further researched by David Ricardo and John Stuart Mill. They supported price flexibility in the labor market and believed in its self-regulatory ability. Therefore, they suggested *the Principles of Political Economy and Taxation* (1817), which puts a minimal wage above the price equilibrium because government interventions, policies, and welfare programs tend to disturb the self-regulatory function of the labor market and create unemployment.

David Ricardo, in *Principles of Political Economy and Taxation* (1817), discussed the impact of technological progress and investment into machinery. According to his work, technologies can create unemployment due to some adjusting periods for workers and lead to technological unemployment. However, in the long term, these investments and improvements are expected to create new jobs. He also described the comparative advantage idea, suggesting that specialization in industries and international trade positively influences the economy, as well as employment rates. John Stuart Mill's *Principles of Political Economy* (1848) expanded the previous ideas. He supported the idea of market self-

regulation and that equilibrium in the labor market exists in the case of flexible wages. However, he clarified that real-world wages are sticky, negatively influencing the employment rate and creating unemployment. Mill expanded the idea of technological unemployment by saying that technological advances lead to structural unemployment, while business cycles and their expansion and recession periods influence the employment rate and create cyclical unemployment. Compared to Ricardo's ideas, Mill supported limited government intervention in the case of economic downturns and educational programs to minimize the negative impact of technological unemployment so that people could more efficiently and smoothly transition to new industries.

The ideas of classical economists were challenged by John Maynard Keynes in his *The General Theory of Employment, Interest, and Money* (1936), where he addressed the issue of unemployment to insufficient aggregated demand. He links cyclical unemployment to fluctuations in economic activity and states that a decline in aggregated demand leads to layoffs and, consequently, to rising unemployment. Keynes also introduced the idea of involuntary unemployment, when people are ready to work for a current market wage. However, weak demand does not allow them to find employment. The Keynesian economist supports government intervention to deal with insufficient aggregated demand and supports the ideas of monetary and fiscal policies, especially during economic recession.

Another economist – Karl Marx and his *Das Kapital* (1867) analyzed the unemployment problem as a critique of capitalism. According to his views, unemployment is a result of capitalist economies that use it to control wages and manipulate the labor market. He referred to the group of unemployed people as the “reserve army of labor,” which is used to suppress possible wage growth. Therefore, he described unemployment as a necessary condition of a capitalistic economy to keep control of the labor market, and his suggested policies are aimed at redistributing wealth and supporting labor rights.

The modern approaches try to combine several theories' perspectives. According to efficiency wage theory, employers try to pay above the equilibrium wage to rise efficiency by reducing turnover, increasing motivation, and increasing productivity (Galí, 1999). Another hysteresis theory looks into the unemployment problem from different time horizons. If classical theories do not distinguish the long-term effects of unemployment, this theory suggests that a long-term high unemployment rate leads to a loss of people's skills

and efficiency in working, which can lead to lower productivity of the whole economy in the long run. Another insider-outsider theory highlights the impact of the long-term existence of persistent unemployment. According to this theory, different treatments between employed and unemployed people make the problem more severe and make unemployment persistent.

The main reason for distinguishing the unemployment theories is to determine each theory's policy implications. The classical economist supports the flexibility of the labor market, while the Keynesian economist suggests government interventions.

3.7. Factors affecting the unemployment rate

3.7.1. Economic growth

The unemployment rate is a significant factor demonstrating the situation of an economy. It is expected that the growth of the economy has an influential impact on the employment rate in the region. Positive economic growth leads to greater aggregate demand, an rise in labor demand, and, respectively, lower unemployment. The negative correlation between economic growth and unemployment was proven and presented by Arthur Okun with his *Okun's law* in 1962. According to Okun (1962), a 1% decline in actual production is connected with a 0.5% rise in unemployment in the United States economy. A similar situation with an economic downturn results in a worse situation in the region's employment levels. This connection highlights the importance of economic stability in controlling unemployment and keeping it at a stable and low rate.

3.7.2. Technological advancements

Technological changes and innovations drive economic growth and development, as well as changes in modern life. Innovations in different industries lead to job displacement but generally positively impact job creation and better employment conditions. It is known that low-skilled employees are negatively influenced by the replacement of human work by machinery and artificial intelligence. However, technological advancements create new industries and jobs. According to Hotte et al. (2022), research on technologies' impact on employment demonstrated that despite some displacement of some jobs, the overall impact is the generation of new employment opportunities. The smoothness of the transition of the

working population to new industries due to technological advances needs support in adaptability and retraining.

3.7.3. Policies and regulations

The policies in minimum wage regulation, employment protection, and labor market laws influence the unemployment rate from different perspectives. Strict labor regulations and fines make hiring and firing employees more expensive and create incentives for employers to minimize hiring more than needed. As a result, this avoidance leads to rised structural unemployment. On the other hand, labor regulations and protective policies create more job opportunities, better employment conditions, and lower unemployment rates. For example, Giotis (2024) gave an overview of labor market institutions, including minimum wage and employment protection. They concluded that empirical studies provide contradictory results, and their impact on employment depends on the specificity of the institutions as well as the significance of changes in the policy – changes in the minimum wage.

3.7.4. Demographic trends

Demographic trends, such as population growth, aging of the population, and waves of immigration, have a significant impact on labor quality, as well as on employment of the population. The sharp rise in the young working population without an aligned rise in job places worsens the unemployment problem, negatively influencing the general economy. The US Bureau of Labor Statistics presented that between 2023 and 2033, the growth of the working population is expected to be 0.6%, while the rise in the active labor market is expected to be 0.4% (Dubina, 2024). The disparity between these changes can bring the problem of a worsening unemployment situation. A similar situation can be seen in the case of an influx of foreign working population without production rise, changing the wage and employment structure in the labor market. On the other hand, the aging population leads to labor shortages and lower competition, which can leave more free employment opportunities for younger workers but negatively impact the economy's productivity. The influx of foreign workers can balance the negative impact of the aging local population and avoid severe labor shortages (Cauimi & Peri, 2024).

3.7.5. Globalization

Globalization and raised international trade volumes are expected to boost economic growth and improve living standards. From the employment side, the inflow of foreign direct investment, expanded market, and match of employment conditions with worldwide standards create more job places. However, in the case of some industries that cannot compete with international giants, globalization can hurt the labor market of those economies and raise the unemployment rate. European Parliament states that raised competition can lead to massive company closures and job losses, especially in low-skilled labor industries (European Parliament, 2019).

3.7.6. Education

The level of education in the country is a factor that forms the match between job seekers and job requirements. Poor investment in education and training sharpens the gap between industry requirements and the current level of workforce skills, increasing the structural unemployment rate. Education provides more opportunities to reach better wage outcomes during re-employment but also makes finding a job quicker (Zimmer, 2016). Therefore, investment in education and reskilling programs is essential for keeping the labor market of modern industries in balance and the labor supply in the standard of developing job markets. Hasan et al. (2024) studied the significance of upskilling and reskilling in keeping the labor force adaptable and flexible to technological changes. The impact of a supportive corporate structure for reskilling is confirmed to positively impact the employee's capabilities and raise the effectiveness of organizations.

3.7.7. Inflation

Monetary policies and resulting interest and inflation rates can influence the employment conditions in the market. Unexpectedly high inflation rate diminishes the purchasing power of population and demotivate businesses from investment, which also diminishes the job opportunities. The study by Zhou (2021) empirically proved the significance of link between unemployment rate and Fed interest rate, demonstrating the ability of unemployment rate to reflect downturn in the economy. On the other hand, an expected low inflation rate boosts the economy, stimulates business growth and provides more job opportunities, which positively impacts the labor market. According to Angelov (2023), high inflation is expected

to negatively impact the employment in the short run, but stable and low inflation rate is sufficient for keeping economic growth and new job opportunities creation.

3.7.8. Natural disasters

As well as unexpected inflation rates, unexpected situations such as natural disasters or pandemics can significantly hurt labor market conditions. The unfavorable economic conditions directly affect the labor market by creating massive job losses on one side and decreasing demand for labor due to lower production levels on the other side. During the period of the COVID-19 pandemic, the effort of virus limitation led to massive layoffs due to restrictions and declined demand. These crises require governments to take action to minimize the severe impact on employment levels by providing special social programs. For example, insurance benefits and stimulus payments in the US during the COVID-19 pandemic helped to keep the purchasing power of consumers and support households (Khattar et al., 2022).

3.8. FDI and employment generation

FDI is an essential tool in the new job opportunities creation and eventual economic growth. The impact of FDI can be seen from different angles, that consequently leads to positive changes in the labor market and employment.

3.8.1. Direct job creation

The inflow of investment with the aim of creating a new company, branch, subsidiary, or factory will require local employees to meet the demand for new production. Especially in the case of greenfield investment, the demand for employees in production, construction, and even administration significantly influences the demand for local employees. In the example of Ghana, greenfield investment has an empirically relevant positive impact on employment generation (Assamah & Yuan, 2024).

3.8.2. Spillover effects

As mentioned before, an increase in FDI leads to raised production, better economic conditions, and higher purchasing power among the population, which positively influences employment in general. FDI creates demand for labor not only in its subsidiaries and companies but also in related industries. As in the example of Ghana, employment generation comes not only from direct investment but also indirect employment generation

through supply chain connections and supporting services (Assamah & Yuan, 2024). The company cannot operate entirely independently. Therefore, cooperating industries, such as logistics, suppliers, and other service companies, also benefit from raised demand and provide more employment opportunities for local employees.

3.8.3. Human capital

FDI considers not only the inflow of capital but also knowledge and skills. Foreign companies bring new technologies, experts, educational programs, and advanced management techniques to the country, which improves the skills of local employees and makes advanced technologies more reachable for them. The rise of expertise and skills of one part of employees eventually leads to a rise in the level of human capital in general. The empirical research of Southeast Asian countries demonstrated that the inflow of FDI raised the incentive of the local workforce for training and skill gaining (Ibarra-Olivo, 2024).

4. Existing research on FDI and unemployment rate

4.1. Existing research on FDI and unemployment rate in other countries

The study by Abdulai (2022), examined the relationship between Foreign Direct Investment and unemployment in Ghana, covering the period between 1990 and 2020. Based on the ARDL technique, the findings demonstrated a long-term relationship between FDI, unemployment, GDP, exports and gross capital formation. The positive influence of FDI in reducing unemployment is detected in the short and the long run, highlighting the higher benefit rate for the male part of the population. The study also confirmed the negative relationship between unemployment and GDP; moreover, GDP plays a role as a mediator between the impact of FDI and the changes in unemployment, suggesting a complex relationship between unemployment, FDI and GDP.

Jenkins (2006) and his research regarding Vietnam discovered the positive impact of FDI on the country's employment through the increase of capital inflows and expansion in the industries with corresponding job places increase. The positive impact of FDI is also associated with the offering of higher wages, targeting the influence of specified regions with relatively high unemployment rates. He also identified the indirect positive effect of FDI on employment through multiplier effect.

According to Hakim et al. (2023), the analysis of the impact of FDI on host countries' economies demonstrated a positive but weak impact on employment. They also identified that the difference in the findings in different countries can be related to the difference in measurement and data collection for FDI inflows and employment conditions. The study highlights the importance of the Merge & Acquisition type of FDI that tends to positively influence employment in some sectors such as mining, agriculture and construction. There is also a different impact of FDI on developed and developing countries, where FDI tends to positively influence only developing and emerging countries, which highlights the importance of FDI for developing economies.

There is also a controversial view on the impact of FDI on the profit of investors, which is usually multinational corporations. The study by Nguen et al. (2020), based on the theory suggests that the inflow of capital is accompanied by the transfer of technologies and knowledge, which increases competitiveness and efficiency. They specifically highlight the transfer of managerial practices, which leads to better quality of working conditions in the influenced industry. On the other hand, their study shows that in the real world, multinational corporations are aiming to extract profit without adequate reinfesting in the host country's local industries and worsening the situation of income inequality. The problem of income inequality arises from the tendency to employ only low-skilled employees in the host country and keep the high-skilled workforce in their original country.

The study by Nguen et al. (2024) considers the impact of FDI on the Asia-Pacific region, which shows that relatively low labor cost attracts foreign investment and tends to create more job opportunities in the region. Moreover, they also found the reduced positive impact of FDI on employment due to a lower level of workforce skill quality, which concludes the need for policy initiatives in increasing the human capital quality to exaggerate the positive impact of FDI on host countries' economies. A similar study by Atilaw Woldetensaye et al. (2022) on East African countries demonstrated similar results of positive impact of FDI with the dependence of the impact scale on the efficiency of local monetary and fiscal policies.

4.2. Existing research on FDI and unemployment rate in Kazakhstan

Kazakhstan is rich in oil and gas resources, which played a significant role in attracting foreign direct investment. In the period between 1994 and 2002, FDI inflows showed an increasing pattern with a peak in 2008 (appr. \$14.3 billion). The vast reserves of natural

resources of an emerging economy, especially oil and gas, attracted the attention of investors and made Kazakhstan more integrated into the global market. Moreover, government reforms improved economic freedom scores, and the existing well-functioning financial sector and infrastructure made the country comparably advantageous to its neighbours. These factors led to strong economic growth; the average annual real GDP was about 10.3 percent from 2000 to 2005, which made early debt repayment to international institutions possible (Teal et al., 2011).

Foreign Direct Investment has played an essential role in developing Kazakhstan's oil production. In the period between 2000 and 2004, oil production's growth was about 15%, while oil exports almost doubled. Approximately 59.8% of the FDI received during this period was directed to the oil and natural gas sectors. Unfortunately, heavy dependence on oil revenues makes Kazakhstan dependent on fluctuations in global oil prices.

According to Waikar et. Al (2011), there is a different impact of FDI inflows on different sectors of the economy. They indicated that FDI can negatively influence the GDP of the agricultural (forestry, hunting, and fishing), construction, trade, and services sectors. On the other hand, positive effects of FDI are detected in the industrial sector, including mining, manufacturing, utilities, transportation, and communication sectors. These findings state that the heterogeneous impact of FDI and its effects vary across different sectors.

Kazakhstan, like other countries with limited domestic investment capital, needs foreign direct investment significantly. FDI's advantage compared to domestic investment is the inclusion of the necessary capital with helpful externalities, such as advanced technologies, knowledge, and managerial skills. Domestic investors, due to their weaker economic situation and high dependence on external factors, cannot provide these spillover effects for economic development. Therefore, FDI plays a significant role in forming national economic growth without additional costs for the host country.

Rakhmatullayeva et al. (2015) and their research indicated that FDI in Kazakhstan demonstrated a positive cumulative social effect, with beneficial results for socio-economic development and the quality of life in Kazakhstani regions.

The research included an analysis of the social effects of FDI. A detailed factors analysis demonstrated a positive impact on consumption, employment, and health, while its impact on education and the environment was negative. The authors recommend increasing foreign

investors' social responsibility to deal with employment issues, encourage economic growth, and strengthen Kazakhstan's competitive advantages.

In the following research by Rakhmatullayeva et al. (2020), the FDI inflow pattern declined in the CIS region. However, Kazakhstan has the opposite result, with an FDI rise of 35%. The reason behind the rise is project initiatives in 2020, such as a rubber and plastic products factory sponsored by China and an airport terminal project with a \$244 million investment from the Netherlands and Russia. Due to the pandemic situation and its impact on the economy, Kazakhstan tried to support the economy through affordable loans, agricultural subsidies, tax incentives, low-interest financing, and specific financial support. For example, starting from 2021, the government aims to cover about 20% of construction and equipment expenses for investment projects. Another governmental initiative is a simplification of procurement procedures for investors. The result of the initiatives was an improved investment climate in the post-pandemic economy, which resulted in a rise in Kazakhstan's FDI inflows.

The study by Kemmes et al. (2021) examined how economic integration, based on the creation of the Eurasian Economic Union, impacts FDI inflows into Kazakhstan and other members, factors such as infrastructure, government regimes, the financial crisis, and the sanctions imposed on Russia were also considered. The results were that regional integration did not significantly affect the country's attractiveness for FDI. Instead, the FDI inflows are more dependent on the specific features of the country and its attractiveness as a country, not like a member of the union.

Ashurov et al. (2020) provided the analysis, which included Kazakhstan as a part of Central Asia. The research concluded that the attraction of FDI inflows depends on institutions, their quality and their functioning. Therefore, the result highlights the need for strengthened institutions through an effective tax system, a regulated labor market, trade openness, and the economy's transparency. Moreover, they found out that consistent GDP growth works as an attraction for FDI, while FDI provides a sufficient amount of investment for sustainable growth.

5. Empirical analysis

5.1. Dataset

The chosen dataset with annual data on the unemployment rate, FDI, and other macroeconomic factors includes the period between 2001 and 2023, constructing a time series of 23 years. The dataset covers annual measurements of variables to eliminate the possible factor of seasonal fluctuations. Moreover, the coverage level is chosen as national. The reason for the selection at the national level is to mitigate the possibility of regional disparity influencing or impacting other non-included regional factors. The implication of national-level data makes the empirical results less reliable due to its inability to capture the influence of avoided regional disparity, while annual data does not capture the impact of short-term changes. The dataset is collected from several sources, such as the Bureau of National Statistics of Kazakhstan and the World Bank, which are considered reliable sources.

The chosen time frame is also impacted by the availability of the data for the chosen country – Kazakhstan. The latest available year with finalized measurements for all chosen variables is 2023, while the earliest year with consistent statistics from reliable sources is 2001. The attempt to include more years is connected with the aim to include all important economic changes, crises, and globalization's impacts on the tested variables. The earliest statistics are incomplete for some variables, especially for FDI inflows and political stability indices, which makes 2001 the most suitable starting year.

The chosen dataset is presented in the form of a time series, which makes it suitable for measuring the Ordinary Least Squares and the Two-Stage Least Squares model.

5.2. Variables explanation

The model includes one dependent variable:

- **Unemployment** – it is a percentage of unemployed out of the total labor force. This variable measures the proportion of the population (not all but the working population) who are unemployed but actively searching for job opportunities. The working population is considered as a share of people aged 16-64. This measurement is considered as the primary indicator of the country's labor market conditions, as

well as economic productivity. Usually, a high unemployment rate is linked to economic problems, stagnation of economic development, and worsening production levels.

The model also includes seven independent variables, which will be later defined as endogenous independent variables, exogenous independent variables and instrumental variables:

- **FDI** – Foreign Direct Investment inflows as a percentage of total GDP. This variable measures the net inflow of investment from foreign entities or individuals into the companies or businesses in the host country. FDI is expected to have a positive impact on employment through the creation of direct job opportunities due to production and business expansion or through the creation of indirect job opportunities due to raised demand for accompanying services and supply chain connections. The impact can also be negative due to the displacement of existing jobs due to advanced technologies and automation of manual work.
- **GDP** – Annual GDP growth rate. It is expressed as a rate of economic growth compared to the previous year. The economy's growth is expected to positively influence the labor market by creating new job places and higher wage rates. On the other hand, the negative rates of economic development can be connected with a rise in the unemployment rate and worsened labor market conditions.
- **Education** – the proportion of the population with tertiary education out of all population. A higher proportion of the population with higher education is expected to positively influence the human capital level. The level of human capital influences employment and diminishes the mismatch between job requirements and employees' skills, which declines the structural unemployment rate. Therefore, the education level measures the adaptability of the population to the changing demands of the labor market.
- **Inflation** – The inflation rate is indicated in the form of the Consumer Price Index. The CPI is a percentage change in the price of a household's basket of goods and services. The population's purchasing power heavily depends on fluctuations in the inflation rate, which, in the end, affects the economy's production and influences the country's attractiveness to foreign investments. The excessive inflation rate can be

expected to raise instability and uncertainty and diminish the creation of new job opportunities creation.

- **Public debt** is calculated as the percentage of public debt stocks out of total GNI. This measurement reflects the government's fiscal position. The significantly high public debt can negatively influence employment by reducing the government's resources to spend on job creating programs and also by making the country less favorable for foreign investors.
- **Political stability** – calculated index reflecting the political stability of the country. This measurement shows how effective the government is in managing the situation and the security atmosphere in the country. It is an essential factor for analyzing the investment climate and environment, the higher rate of political stability works as an attraction for FDI.
- **Trade openness** – expressed as sum of import and export out of total GDP. This index demonstrates how integrated and closely connected the county's economy with global market, its openness to internation cooperation, therefore, higher openness rises the attractiveness of the country for FDI inflows.

5.3. Hypotheses

The aim of the practical part of this thesis is to study the relationship between unemployment, FDI and economic growth for the chosen 23 years, covering the period between 2001 and 2023. Based on the previously mentioned empirical research and theoretical base, these are the formulated hypotheses to be tested:

- FDI, economic growth and unemployment:
 - Higher rate of FDI inflow is expected to be positively interconnected with GDP growth for the period of the chosen 23 years. This hypothesis is based on the assumption that inflow of investments boosts production by enhancing the development, creating capital opportunities and encouraging technological advancement.
 - Higher rate of unemployment is expected to be negatively correlated with economic growth for the period of the chosen 23 years. This hypothesis is based

on the assumption that stagnation of economy negatively impacts the creation of job opportunities and leads to job losses.

- Higher rate of FDI inflow is expected to be negatively correlated with unemployment rate for the period of the chosen 23 years. This hypothesis is based on the assumption that inflow of investment into the economy positively influences the job creation in different industries and declines the unemployment rate.
- A higher rate of unemployment is expected to be negatively correlated with GDP growth for the period of the chosen 23 years. This hypothesis is based on the assumption that less job opportunities shrink the purchasing power of consumers, leading to lower demand for goods and services and consequently to lower production.

Unemployment, economic growth and other independent variables:

- A higher inflation rate is expected to be negatively correlated with economic growth for the period of the chosen 23 years. This hypothesis is based on the assumption that unexpectedly high inflation creates uncertainty, reduces purchasing power and therefore declines the incentive to invest and consume.
- Higher inflation rate is expected to be positively correlated with economic growth for the period of the chosen 23 years. Due to lower spending among the population and lower production volumes, the demand for labor drops.
- Higher rate of population with tertiary education is expected to be negatively correlated with unemployment rate for the period of the chosen 23 years. Better education and consequently better quality of human capital boosts the production that creates new job opportunities, moreover, make the reskilling and adaptation to new labor market requirements more efficient.
- Higher rate of public debt is expected to positively correlate with unemployment rate for the period of the chosen 23 years. This hypothesis is based on the fact that rise in debt puts burden on the budget, reduces the available resources for investing in employment initiatives and lead to job losses in public sector.

FDI, trade openness and political stability:

- A higher rate of trade openness (the ratio of trade in total GDP) is expected to be positively correlated with inflow of FDI for the period of the chosen 23 years. This

hypothesis is based on the expectation that trade openness demonstrates the interest of the country in global trade, international cooperation and attracts foreign investment.

- A higher index of political stability is expected to be positively correlated with the inflow of FDI for the period of the chosen 23 years. This is based on the assumption that better stability measurement signals well-established institutions, higher rates of certainty regarding financial returns and attracts new foreign investors.

5.4. Study importance

Understanding the relationship between important macroeconomic factors such as unemployment, economic growth, and FDI is essential for planning governmental programs and policy implications. Identifying the variables that significantly influence unemployment can help policymakers develop strategies that will deal with the factors severing the unemployment problem, boosting employment, and providing stable economic growth.

The estimates of relationships can provide guidelines in efficient resource allocation for labor market development. For Kazakhstan, the efficient resource allocation can strengthen the economy, attract new investment sources and diminish the dependence on mining industries.

Investment and policy initiatives in the labor market can be an essential tool for boosting the working population's productivity, working conditions, household income, and, consequently, the standards of living. Moreover, understanding the importance of political stability and the country's integration in global trade is important. Understanding and using it correctly can be used by the government to raise the quality of institutions and support international initiatives. The study of the mentioned factors importance is crucial for directing Kazakhstan toward sustainable growth and international competitiveness in the global arena.

5.5. Descriptive statistics

This chapter is aimed at summarizing the descriptive statistics of the chosen dataset. The summary includes all chosen variables and analyses the dispersion, possible issues of extreme and missing values. The chosen measurements are mean, median, minimum and maximum values, standard deviation, coefficient of variation, skewness, excess kurtosis,

percentile ranges and missing observations. The preview of these parameters helps to diagnose the dataset for possible problems that can lead to a statistically insignificant estimated model and give the general idea of the variables' values. All variables, except Political stability, are presented in the form of percentages, while Political stability is indexed in the range between -1 and +1. All variables do not have missing observations, which allows further estimation without the need for treatment of missing values by omitting or imputation of values.

Table 1. Descriptive statistics summary

	Mean	Median	Minimum	Maximum
Unempl	-6.2652	-5.3000	-10.400	-4.7000
GDP	5.6870	4.8000	-2.5000	13.500
FDI	6.6457	5.0400	0.20000	13.010
Trade	74.970	73.120	53.050	97.760
educ	53.920	53.140	43.060	66.980
inflation	8.5843	7.4000	5.2000	17.140
debt	86.513	84.800	62.600	120.00
stability	0.055231	0.024350	-0.46835	0.77682
	Std. Dev.	C.V.	Skewness	Ex. kurtosis
Unempl	1.7296	0.27606	-0.96508	-0.37182
GDP	3.7866	0.66584	0.013019	-0.39485
FDI	4.2870	0.64508	0.28570	-1.4200
Trade	15.190	0.20262	0.26395	-1.4739
educ	5.7590	0.10681	0.57738	-0.14120
inflation	3.4155	0.39788	1.3564	0.52505
debt	14.195	0.16408	0.49143	-0.36138
stability	0.36053	6.5277	0.42721	-0.78737
	5% perc.	95% perc.	IQ range	Missing obs.
Unempl	-10.180	-4.7200	2.9000	0
GDP	-1.7800	12.940	6.0000	0
FDI	0.56600	12.952	8.5700	0
Trade	53.806	97.490	28.630	0
educ	44.122	66.398	7.6600	0
inflation	5.2260	16.718	2.2800	0
debt	64.160	117.33	19.394	0
stability	-0.45637	0.75105	0.61383	0

Source: based on dataset by using Gretl software

- Unemployment

The mean demonstrates the average value of the variable and gives the idea of their average value during the chosen 23 years. The average value of unemployment is shown as 6.26%, so considering the recent period of 23 years, the unemployment rate was relatively low and not significantly higher than the world's natural rate of unemployment. The median is 5.3%, which is an even lower rate and very close to the world's natural rate of unemployment in

2022, which was 5.4%. The closeness of the mean and median suggests that the fluctuation of the unemployment rate during the chosen period was around its average value and demonstrates the absence of critical outliers in the dataset. The absence of outliers is also supported by the measurement of minimal and maximum values. The fluctuation of the rate is between the range of 4.7 and 10.4. The result suggests a relatively stable employment situation in Kazakhstan due to the relatively narrow range. Standard deviation and Coefficient of Variation are also aimed at measuring the spread of values and variability of the data. Their results suggest that the unemployment rate data is stable to its mean and that the deviation from its mean is moderate, also demonstrating the absence of significant outliers. Skewness shows the asymmetry in the distribution, and for the case of Unemployment, the variable is more concentrated in the left tail. The lower values are the majority of the values in the dataset. The distribution is also checked by measuring kurtosis (from 0 to 3); this variable shows fewer deviations than normal dispersion.

- GDP growth

The mean of GDP growth during the chosen 23 years is 5.68%, which means that, on average, Kazakhstan had moderate economic growth. The median is 4.8%, and as in the case of the unemployment rate, it is close to the mean, suggesting that there is also no presence of outliers and that the growth rates during the chosen period were relatively similar.

The minimum (-2.5%) and maximum (13.5%) values show that there were periods of decline in the growth that led to negative indices and also years of significant growth. This suggests that compared to the unemployment rate, there was some variability in the changes in economic production.

The standard deviation of 3.78 and a coefficient of variation of 0.66584 demonstrate that GDP growth showed some deviation from the mean, but considering the fact that the economy is developing in the transition period, these values are not extreme. The standard deviation demonstrates no significant volatility in the data due to negative and positive shifts in the economic situation. The skewness measure of 0.013 is very close to normal distribution; the distribution of GDP growth is almost symmetrical, while the excess kurtosis is -0.39, which means that there are fewer extreme outliers. It can be concluded that Kazakhstan's GDP growth was balanced, and no extreme outliers were detected.

- FDI

The mean value of FDI is 6.6457%, and foreign capital inflows construct a sufficient share of Kazakhstan's GDP. The median of 5.0400% is slightly below the mean. The minimum (0.2%) and maximum (13%) demonstrate the variability of FDI flows; this variation highlights the impact of different global market changes and economic reforms on Kazakhstan's attractiveness for FDI inflow. Moreover, the standard deviation of 4.28 and a coefficient of variation of 0.64 also highlight a high degree of fluctuation in FDI inflows during 23 years. This volatility is usual for a developing country, where the investment decisions of foreigners can be influenced by external factors, geopolitical situations, and changes in global markets.

The skewness of 0.28 indicates that the distribution is more or less balanced; the excess kurtosis of -1.42 demonstrates fewer extreme outliers, suggesting that most FDI values are concentrated around its mean with some years of extremely high or low investment rates.

These statistics demonstrate FDI as a variable with relatively high variability. This variability can be related to changing investment climate in Kazakhstan.

- Education

The mean value of the tertiary education rate is 53.92%; in other words, almost 54% of the population has tertiary education. The median of 53.14% is very close to the mean, demonstrating that the distribution of education rates is symmetric with confirmation of very little skewness (0.58). The minimum value is 43%, and the maximum is almost 67%. This narrow range is confirmed by the standard deviation (5.75) and the coefficient of variation (0.1). Therefore, we can conclude that the education variable has very low variability. The excess kurtosis shows a typical to normal distribution spread of values. The tertiary education level was stable during the chosen 23 years, which assumes stability in the level of human capital, too.

- Inflation

The mean inflation rate is shown as 8.58%; in other words, inflation during 23 years was about 8.58%. The median value is 7.4000%, which is lower than the mean, but the difference is not critical. The minimum inflation rate is 5.2%, while the maximum is 17.14%. This range shows that there were periods of relatively low inflation; some years showed

significantly high rates of inflation. The standard deviation of 3.41 shows that there is sufficient variability in the inflation data, and the coefficient of variation of 0.39 demonstrates sufficient dispersion around the mean, too. The skewness indicates a positive asymmetry in the distribution; the excess kurtosis demonstrates that the distribution of the inflation variable has heavier tails of data than a normal distribution, implying that years with extreme inflation rates happen more often than in the case of data with normal distribution. The inflation rate in Kazakhstan used to be around 8.58%, but there has been a tendency for years to have higher inflation, which might happen due to periods of economic instability.

- Debt

The mean public debt is 86.5%; on average, Kazakhstan's public debt is sufficient for its GDP over the chosen period. The median of 84.6% is close to the mean, so the distribution of values is relatively symmetric. The minimum recorded value is 62.6%, while the maximum is 120%, which concludes that there is a considerable range of debt values over 23 years. The standard deviation 14.2 indicates that the debt values tend to vary significantly from the mean. However, a relatively low coefficient of variation (0.164) suggests that there is a relatively stable situation of debt.

The skewness of 0.49 points to slightly positive asymmetry, so there are some years with higher-than-average rates of debt, but with excess kurtosis, there are fewer extreme values than expected for the case of normal distribution. Kazakhstan's public debt demonstrates a relatively stable range but with a variation trend.

- Political stability

The mean political stability value is 0.055, meaning that the political situation in Kazakhstan shows a positive level of stability. The median of 0.024 is lower than the mean; a significant part of the years shows below the average stability level. The minimum value is -0.47, and the maximum is 0.78, showing that the range of stability varied significantly for 23 years due to significant fluctuations in the political environment. The standard deviation is low, while the high coefficient of variation suggests significant variability in political stability. The skewness (0.42) indicates not extremely significant positive asymmetry in the distribution, while the excess kurtosis (-0.79) shows that the distribution is flatter than a normal distribution. This summary suggests that while the average political stability in the

dataset is modestly positive, there is significant relative variability and moderate asymmetry in the data.

5.6. Correlation matrix

Table 2. Correlation matrix

	Unempl	GDP	FDI	Trade	Educ	Infl	Debt	Stab	Lag_FDI
Unempl	1.00	-0.72	-0.63	-0.91	0.30	0.14	-0.08	-0.60	-0.63
GDP	-0.72	1.00	0.25	0.75	-0.18	-0.18	-0.21	0.26	0.42
FDI	-0.63	0.25	1.00	0.64	-0.49	0.24	0.47	0.62	0.48
Trade	-0.91	0.75	0.64	1.00	-0.26	0.07	0.03	0.59	0.60
Educ	0.30	-0.18	-0.49	-0.26	1.00	-0.13	0.00	-0.47	-0.54
Inflation	0.14	-0.18	0.24	0.07	-0.13	1.00	0.13	0.08	-0.10
Debt	-0.08	-0.21	0.47	0.03	0.00	0.13	1.00	0.52	0.20
Stability	-0.60	0.26	0.62	0.59	-0.47	0.08	0.52	1.00	0.71
Lag_FDI	-0.63	0.42	0.48	0.60	-0.54	-0.10	0.20	0.71	1.00

Source: based on dataset by using Gretl software

The correlation matrix is one of the methods used to do a statistical overview of the relationship between all chosen variables. This analysis shows that the interconnections of variables, including dependent and independent ones, allow one to get first-sight information about the tested relationships. It is also important for multicollinearity checks. Multicollinearity happens when two or more variables in the econometric model are correlated more than allowed (the allowed range is between -0.8 and 0.8). In the case of a high correlation of dependent variables, they change in the same manner. Therefore, the estimated relationship is not reliable.

Findings:

- The mainly focused variables, **Unemployment** and **GDP growth**, show a strong and sufficient relationship (-0.72), which corresponds with economic theory and Okun's law about negative relationships. The sufficient relationship between the dependent and independent variables is a favorable outcome; it might be a prediction that the econometric model will estimate a statistically strong relationship as well.

- Moderate negative relationship between *FDI* and *Unemployment* (-0.63). These results support the assumption about the positive impact of FDI inflow on the employment and labor market situation.
- The correlation between *FDI* and *GDP growth* is positive but weak (0.25). This result is favorable in the model case because both of them are treated as independent variables, so the problem of multicollinearity is not present. Despite weak correlation, the direction of the relationship is in line with expectation that FDI inflow positively influence the economic development.
- Strong relationship between *Unemployment* and *Trade openness* (-0.91). A higher rate of trade activity is connected with better employment, the strong correlation with dependent variable (unemployment) demonstrates the importance of trade openness in the model.
- *FDI* is strongly positively correlated with *Political stability* variable (0.62), supporting the assumption of stability factor for foreign investment attraction.
- *Education* and unemployment rates are positively correlated (0.3). This result is not in line with economic theory regarding the positive impact of human capital on employment, however, the estimated relationship is weak and results cannot be fully reliable.
- There is no strong relationship between dependent variables (not higher than 0.8 and not lower than -0.8). The result of correlation matrix analysis is that the dataset is not affected by multicollinearity problems.
- The dataset can be used in the original form without modification.

5.7. OLS methodology

The Ordinary Least Squares model is used as one of the econometrics models in this thesis to measure the base-line relationship between the unemployment rate and chosen independent variables, where FDI is treated as an exogenous independent variable. This model was chosen for econometric analysis due to its simplicity in calculation and efficiency in measuring the linear relationship between the factors. Based on the primary assumptions of the OLS model and its standards, the target of the OLS model is to estimate a more

accurate approximation equation with minimum variability between the actual values and predicted values of the model.

Main Assumptions of OLS model:

- **Linearity.** The first and the most sufficient assumption implies that the relationship between the chosen dependent variable and all independent or, in other words, independent variables is linear. In the situation of this study, the relationship between *Unemployment* variable and independent variables, including *FDI*, is assumed to have a straight-line relationship. The straight-line relationship assumes that one-unit shift in any independent variable is expected to be connected with a fixed estimated change in the chosen dependent variable. In the case of a non-straight-line relationship, estimated coefficients cannot be efficiently explained as in the situation of a linear relationship, moreover, the estimated model is not considered as efficient model due to the absence of a constant variation effect.
- **Independence of Residuals (Non-Autocorrelation).** The presence of autocorrelation is explained by the correlation of error terms between each other. The correlation of error terms or autocorrelation is usually problematic for the time-series dataset considering a wide range of periods. Therefore, for effective estimation of the model and unbiasedness of the results, all error terms must be uncorrelated and independent. The presence of autocorrelation can give information about possible problems of omitted variables that create a correlation or incorrect model selection. In any situation, the issue of autocorrelation leads to misrepresentation model estimates.
- **Normality of error terms.** Another assumption related to errors is the normality of error terms, meaning that the residuals must be normally distributed. In the case of other than normal distributions such as skewness or kurtosis, the OLS model estimates effectiveness declines and might influence the correctness of hypothesis test results.
- **Homoscedasticity.** Homoscedasticity considers the variance of the residuals and requires them to be fixed for all coefficients, considering all independent variables. If heteroscedasticity is present, it affects the standard errors estimates that are significant for hypothesis test rejection/accepting as well as measuring the

confidence intervals. Econometrics tests are able to check data for the presence of heteroscedasticity.

- **Absence of Multicollinearity.** Multicollinearity happens in the case of significant correlation (usually more than 0.8 in absolute terms) between two or several independent variables. This problem leads to no isolated effects of each variable, which means that changes in one highly correlated variable can lead to changes in another independent variable, even considering the ceteris paribus condition. In this case, the estimated effects of independent variables on dependent variables are not efficient due to the external impact of correlation. The presence of multicollinearity is tested in the Correlation matrix chapter.

Model Specification

The general form of the OLS model applied in this thesis looks the following:

$$\text{Unempl}_t = \beta_0 + \beta_1 * \text{FDI}_t + \beta_2 * \text{GDP}_t + \beta_3 * \text{Educ}_t + \beta_4 * \text{Inflation}_t + \beta_5 * \text{Debt}_t + e_t$$

Where:

- **Unempl_t** is the unemployment rate in year t.
- **FDI_t** is the foreign direct investment as a percentage of GDP in year t.
- **GDP_t** is the GDP growth rate.
- **Educ_t** demonstrates the rate of population with tertiary education.
- **Inflation_t** is the inflation rate.
- **Debt_t** represents public debt as a percentage of GDP.
- **β₀** is the intercept.
- **e_t** is the error term.

Needed econometric tests:

- **Autocorrelation Tests:** Durbin-Watson test to check the independence of the residuals.
- **Normality Tests:** Use plot visualization to evaluate the normality of residuals.

- **Homoscedasticity Tests:** Breusch-Pagan test will be used to confirm constant variance.
- **Multicollinearity Assessment:** Calculation of correlation matrices to identify possible problems of correlation, in the case of multicollinearity presence, the problematic variables can be transformed through 1st difference or logarithmic form.

5.8. TSLS methodology

There is a possibility of an endogeneity problem of FDI in the relationship with the chosen dependent variable – *unemployment rate*, which requires conducting the Instrumental Variable—Two-Stage Least Squares model estimation. The previously studied research suggested the possible influence of endogeneity in the case of FDI and economic performance relationship, therefore, the Two-stage least squares method is useful to be considered. The endogeneity problem can arise when independent variables are correlated with the error term due to reverse causality or omitted variable's influence. This case of FDI endogeneity can be connected with its complexity and dependence on external factors that are not considered in the initial OLS method.

Previous studies on the relationship between foreign investments and macroeconomic variables, which include the unemployment rate, demonstrated that the endogeneity problem can be presented and lead to insufficient model and relationship estimates. To deal with it, TSLS method is used by the assumption that there are valid instruments or, in other words, variables that are correlated with the endogenous variable FDI but have no influence on the unemployment rate itself, only through the impact on FDI.

For this study, *lagged FDI, political stability, and trade openness* are chosen as instrumental variables. The choice of instruments is based on the theoretical framework of FDI, which considers these factors as significant in the changing the volumes of FDI inflow but also no relevance in the measuring unemployment rate. These conditions make them proper instruments for this model estimation.

The Two-stage least squares model consists of two stages:

First step: In the first step, the equation is an estimation of endogenous variables, which is FDI, regression on the instrumental variables and all other exogenous independent variables.

The first-stage equation:

$$FDI_t = \gamma_0 + \gamma_1 \cdot \text{Lag FDI}_t + \gamma_2 \cdot \text{Stability}_t + \gamma_3 \cdot \text{Trade}_t + \gamma_4 \cdot \text{GDP}_t + \gamma_5 \cdot \text{Educ}_t + \gamma_6 \cdot \text{Inflation}_t + \gamma_7 \cdot \text{Debt}_t + e_t$$

The chosen instruments (*lagged FDI, political stability, and trade openness*) and other exogenous variables from the initial OLS model are used to estimate FDI. This stage solves the endogeneity problem by measuring the FDI values through using instruments and exogenous independent variables.

Second step: In the second step, the estimated values of FDI from the first step are used in the similar to the initial OLS equation to estimate the relationship with unemployment. The second-stage equation:

$$\text{Unempl}_t = \beta_0 + \beta_1 \cdot \hat{FDI}_t + \beta_2 \cdot \text{GDP}_t + \beta_3 \cdot \text{Educ}_t + \beta_4 \cdot \text{Inflation}_t + \beta_5 \cdot \text{Debt}_t + e_t$$

The results of this equation model give coefficients, which is a final interpretation of the impacts of FDI and other factors on unemployment.

The main key assumptions of the Two-stage least squares model:

- **Instruments correctness.** The instrumental variables have to be correlated with the endogenous independent variable (FDI). The correctness of the instruments is checked by the F-tests.
- **Exogeneous instruments:** The instruments as well as independent variables should not be correlated with the error term. The confirmation of this assumption proves that these factors influence unemployment rate only through FDI.
- **Model Identification:** The case when the number of instruments is equal, or more than endogenous variables called an identified model. In this study, there are three instruments and one endogenous variable, which makes the model over-identified, which is acceptable, and the model can be estimated further.

- **OLS Assumptions:** All other standard assumptions of OLS are applicable for the Two-stage least squares models.

OLS Regression (to compare):

$$\text{Unempl}_t = \beta_0 + \beta_1 * \text{FDI}_t + \beta_2 * \text{GDP}_t + \beta_3 * \text{Educ}_t + \beta_4 * \text{Inflation}_t + \beta_5 * \text{Debt}_t + e_t$$

TOLS First step:

$$\text{FDI}_t = \gamma_0 + \gamma_1 \cdot \text{Lag FDI}_t + \gamma_2 \cdot \text{Stability}_t + \gamma_3 \cdot \text{Trade}_t + \gamma_4 \cdot \text{GDP}_t + \gamma_5 \cdot \text{Educ}_t + \gamma_6 \cdot \text{Inflation}_t + \gamma_7 \cdot \text{Debt}_t + e_t$$

Second step:

$$\text{Unempl}_t = \beta_0 + \beta_1 \cdot \hat{\text{FDI}}_t + \beta_2 \cdot \text{GDP}_t + \beta_3 \cdot \text{Educ}_t + \beta_4 \cdot \text{Inflation}_t + \beta_5 \cdot \text{Debt}_t + e_t$$

5.9. OLS results

This chapter is focused on analyzing the estimation of the Ordinary Least Squares model, which is aimed to test the impact of chosen macroeconomic factors on the unemployment rate in Kazakhstan. In the case of the OLS model, compared to the TOLS model that is considered in the next chapter, the main assumption is that all independent variables are exogenous, and the endogeneity problem is not present. The main aim is just to assess the relationship between unemployment and independent variables, which are Foreign Direct Investment (FDI), GDP per capita growth, education (rate of population with tertiary education), inflation, and public debt.

The general form of the OLS as it is stated in the methodology:

$$\text{Unempl}_t = \beta_0 + \beta_1 * \text{FDI}_t + \beta_2 * \text{GDP}_t + \beta_3 * \text{Educ}_t + \beta_4 * \text{Inflation}_t + \beta_5 * \text{Debt}_t + e_t$$

Here, *t* is responsible for a year of the chosen period – between 2001 and 2023.

The OLS model results, computed using the dataset for chosen period and using R studio, are presented in Table 3.

Table 3. OLS results

Variable	Estimate	Std. Error	t-value	p-value	Significance
Intercept	-10.068	5.378	-1.872	0.0796	Significant at 10% level
FDI	-0.279	0.152	-1.837	0.0849	Significant at 10% level
GDP	-0.317	0.248	-1.276	0.2202	Not significant
Education	-0.039	0.117	-0.332	0.7439	Not significant
Inflation	0.78	0.369	2.113	0.0507	Significant at 5% level
Debt	0.028	0.025	1.109	0.284	Not significant

Source: Agency for strategic planning and reforms of the Republic of Kazakhstan

Multiple R-Squared: 0.6458

Adjusted R-Squared: 0.5351

F-test p-value: 0.000655

The F-test is aimed to test the general empirical relevance of the model; its p-value is 0.000655, which is lower than the 1% confidence threshold; it proves that at least one independent variable is empirically relevant in the relationship with the unemployment rate. The R-squared is 0.6458, which means that approximately 65% of the variability in the dependent variable (unemployment) is explained by the variability of the independent variable. The adjusted R-squared is lower but still significant – 0.5351.

Intercept variable:

The intercept's coefficient is -10.06833. Its p-value is 0.0796, which makes it empirically relevant only at the 10% confidence threshold. The intercept does not have a direct and clear economic interpretation in this case, it only shows the expected value of the unemployment rate when all other independent variables are zero, which is very unlikely in the real world.

FDI variable:

The coefficient of the FDI variable is -0.27943; its p-value is 0.0849. This variable, the same as the intercept, is empirically relevant only at the 10% confidence threshold. The minus sign of the coefficient suggests a negative relationship between FDI and the unemployment rate, which is in line with previously studied economic theory. This generally shows that an increase in FDI inflow is connected with a decline in the unemployment rate, matching the theory and previous research that foreign investments create jobs and, therefore, positively impact economic growth.

GDP variable:

The coefficient of the GDP growth variable is -0.31694; its p-value is 0.2202. The p-value is higher than all acceptable confidence thresholds, which makes the variable statistically insignificant. The negative sign of the estimated coefficient is in line with the expected negative relationship between GDP growth and unemployment, but this model and chosen dataset do not provide an evidence base to confirm the economic theory of the relationship. This might be related to an incorrectly chosen parameter for measuring economic growth or the influence of other factors that are not included.

Education variable:

The coefficient is -0.03889, its p-value is 0.7439. The p-value is relatively high, making the changes in the rate of tertiary education among the population a statistically insignificant parameter towards the unemployment rate. The theoretical background expects a positive influence of improved education levels on human capital and, followingly, on employment level, but the insignificance of this variable might be due to an indirect effect that cannot be captured through the tertiary education level or due to the delayed impact of education on employment in the current period.

Inflation variable:

The inflation coefficient is 0.7798, and its p-value is 0.0507, which makes the variable empirically relevant at the 5% confidence threshold. The captured positive relationship means that higher inflation rates are related to an rise in unemployment. This result can be connected to economic theory, which suggests that inflation reduces the purchasing power

of the population, declines the demand for products and services, and, followingly, declines the demand for labor.

Debt variable:

The public debt variable's coefficient is 0.02801, and its p-value is 0.2840. This suggests that this variable has a positive but statistically insignificant relationship with unemployment. While the positive influence of debt on unemployment can be related to strict fiscal policy, which leads to a negative effect on employment, the insignificance shows that there might be omitted factors that influence unemployment together with debt or that fiscal policy arising due to debt will influence only next periods of employment not current one.

The results of the OLS model show that only FDI and inflation from all chosen independent variables show statistical significance regarding unemployment, while GDP, education, and debt do not demonstrate empirically relevant relationships. The negative sign of the FDI coefficient proves the hypothesis that risen foreign investment can decline unemployment, while the positive coefficient for inflation shows that the inflation rate can negatively influence the employment situation. Generally, the model partially explains the changes in the unemployment rate, but due to the significance only at the 10% level and the insignificance of several independent variables, it suggests consideration of the endogeneity problem.

5.10. TSLS model results

The previous research on the relationship between FDI inflows and labor market situation, especially those focusing on emerging economies, has highlighted the possible presence of endogeneity issues. The endogeneity problem can happen due to reverse causality when changes in unemployment influence FDI flows or from omitted variables that affect FDI and unemployment at the same time. The moderate statistical significance of FDI in the previously explained OLS model creates an idea that endogeneity might be a significant problem, making the estimated relationship between FDI and unemployment insufficient.

To deal with this issue, the Instrumental Variable—Two-Stage Least Squares model is chosen to be tested. This method creates an opportunity to get consistent estimates by using instrumental variables. These variables should be correlated with FDI but uncorrelated with

the error term in the equation of the dependent variable. The chosen instrument variables are **lagged FDI, political stability, and trade openness**. The selection of these factors is justified: lagged FDI demonstrates changes in investment flows in previous periods, while political stability and trade openness influence the country's attractiveness for the inflow of foreign investment but without direct impact on the situation on the labor market.

In the first step, FDI, which is considered as endogenous independent variable in the original equation, serves as dependent variable and the instrumental variables aimed to estimate its values together with all exogenous independent variable from original equation. This stage calculates the forecasted values of FDI, which will be called ***FDI_hat*** in the following section.

In the second step, the forecasted values of FDI, which were obtained from first step, replace the original actual values of FDI and used in the original regression model. This replacement is aimed at addressing the endogeneity issue. The second equation estimates the effect of FDI on unemployment, together with other macroeconomic factors, which are presented in the form of other exogenous independent variables. In the case of replacement, FDI is considered to be exogenous because it was estimated by instrumental variables.

According to the instrumental variables method, dealing with endogeneity is highly needed in case of reverse causality or omitted variables issues. If FDI variable in this study is endogenous, then the Two-stage least squares model should be estimate differently than OLS coefficients, and this difference between the two methods can prove the presence of an endogeneity problem. In the proved case, the usage of the Two-stage least squares model estimates are more efficient and correct.

Interpretation of the model's results needs a check of equations' identification. This means checking that the number of instrumental variables is at least equal to the number of endogenous independent variables in the original equation. Identification can have three results: just-identified, over-identified, or under-identified equation. The most problematic result is the under-identified case, which leads to an indefinite number of solutions and, therefore, unconcreted estimates.

The identification calculation:

$$k^{**} \geq g^* - 1$$

Where:

k** - the total number of independent variables in the whole model minus the number of predetermined variables in the chosen equation.

g* - the number of endogenous variables in the chosen equation.

The following illustrates the evaluation process for each equation in our Two-Stage Least Squares model:

First Equation: the total number of independent variables is 7 and the predetermined variables in the equation are 6, $k^{**} = 7 - 6 = 1$.

The endogenous variable in this equation is FDI, $g^* = 1$.

$k^{**}(1) \geq g^*(1) - 1$, the first equation is over-identified.

Second Equation: the total number of independent variables is 7 and the predetermined variables in the equation are 5, $k^{**} = 7 - 5 = 2$.

The endogenous variables in Unemployment and FDI, $g^* = 2$.

$k^{**}(2) \geq g^*(2) - 1$, the second equation is also over-identified.

Therefore, both equations and the overall model is over-identified. More instruments used than necessary number, which allows estimate model with chosen instruments.

First equation results interpretation

The first step of the Two-Stage Least Squares estimation is aimed to get the forecasted values of the endogenous variable, which is Foreign Direct Investment (FDI). It is done by regressing FDI on the chosen instrumental variables and other exogenous independent variables. The chosen instruments are *Lag_FDI, Trade openness, and Political stability*. Other exogenous independent variables: *GDP growth, education, inflation, and public debt*. This stage is crucial to isolate the exogenous variation in FDI that can be a reason for the endogeneity problem.

The result of the first-stage estimation using R Studio software in Table 4.

Table 4. TSLS results (1st stage)

Variable	Estimate	Std. Error	t-value	p-value	Significance
Intercept	-3.13446	7.32082	-1.872	0.675051	<i>Not significant</i>
Lag_FDI	-0.18962	0.18182	-1.043	0.314672	<i>Not significant</i>
Trade openness	0.30647	0.06602	4.642	0.000381 ***	<i>Significant at 1% level</i>
Political stability	-3.80306	2.55911	-1.486	0.159426	<i>Not significant</i>
GDP	-0.48985	0.23526	-2.082	0.056155	<i>Significant at 10% level</i>
Education	-0.42551	0.11582	-3.674	0.002503 **	<i>Significant at 1% level</i>
Inflation	-0.06136	0.15147	-0.405	0.691519	<i>Not significant</i>
Debt	0.16726	0.04564	3.664	0.002551 **	<i>Significant at 1% level</i>

Source: Agency for strategic planning and reforms of the Republic of Kazakhstan

The model is empirically relevant, which can be seen from the result of F-test with p-value of 0.0001946 (significant at 1% confidence threshold). The R-squared is 0.8288, therefore approximately 83% of the variability in FDI is explained by the instruments and other independent variables, the Adjusted R-squared is 0.7432.

Intercept variable:

Its coefficient is -3.13446 but it is not empirically relevant due to the extremely high p-value (0.675051). There is no economic theory meaning for the intercept to be interpreted.

Lag_FDI variable:

Its coefficient is -0.18962 and p-value is 0.314672, which makes the estimated impact of Lag_FDI statistically insignificant. This result suggests that previous values of FDI do not work as a predictor of current FDI. It might be related to the dependence of FDI on external factors rather than trend in its inflow in general.

Trade openness variable:

Its coefficient is 0.30647 and it is highly empirically relevant (p-value = 0.000381). This positive relationship demonstrates that higher trade openness is connected with rise in FDI inflows, showing that higher integration of the country in global trade makes it favorable for foreign investment.

Political stability variable:

The coefficient for stability is -3.80306, with statistical due to high p-value (0.159426). The estimated effect is not in line with economic theory that suggests a positive relationship between political stability and FDI inflows, however this mismatch is not crucial due to insignificance of the variable in the estimated model.

GDP growth variable:

Its coefficient is -0.48985, and it is empirically relevant only at a 10% confidence threshold (p-value= 0.056155). This negative relationship might be based on the influence of the prosperity of domestic production in the attraction of foreign investment. The sufficiently growing economies with powerful domestic producers are usually considered as potential competitors in the eyes of foreign investors, therefore they might prefer to invest in emerging markets with unstable economic growth.

Education variable:

The coefficient for the education variable is -0.42551 and it is significant at the 1% confidence threshold (p-value = 0.002503). The negative relationship in this case might be related to the previous assumption of powerful domestic production, which suggests that a population with high education levels is a sign of a skilled domestic workforce. A high rate of educated people and a well-functioning economy encourage domestic production and saving, which can substitute foreign investment.

Inflation variable:

The inflation variable is negative and not empirically relevant (coefficient is -0.06136, p-value is 0.691519). This suggests that even if inflation is expected to negatively influence the attractiveness of the country for foreign investment, its impact is insufficient.

Debt variable:

The variable of public debt demonstrates a positive (0.16726) and empirically relevant coefficient at 1% confidence threshold (p-value is 0.002551). This estimation can be based on the previously assumption of forwarding of foreign investment towards complicated emerging economies, due to more opportunities for capital investment during the period of tight fiscal policies.

The first-step regression confirms that Trade openness, which was chosen as an instrumental variable, plays a significant role in the relationship to FDI inflow. The high R-squared indicates the effectiveness of chosen independent variables in constructing the FDI. The forecasted values of FDI, which were calculated in the first step, will be used in the second step of the Two-stage least squares model to estimate the impact of FDI on unemployment. Other instrument, such as Lag_FDI and Stability, needs detailed analysis in their competitiveness in measuring the FDI inflows in Kazakhstan.

Second equation results interpretation

Table 5. TSLS model results (2nd stage)

Variable	Estimate	Std. Error	t-value	p-value	Significance
Intercept	-2.97563	2.67984	-1.11	0.28325	<i>Not significant</i>
FDI	-0.31349	0.08904	-3.521	0.00284 **	<i>Significant at 1% level</i>
GDP	-0.20081	0.06803	-2.952	0.00937 **	<i>Significant at 1% level</i>
Education	-0.04982	0.0469	-1.062	0.30392	<i>Not significant</i>
Inflation	0.09276	0.06043	1.535	0.14436	<i>Significant at 5% level</i>
Debt	0.02157	0.01938	1.113	0.28212	<i>Not significant</i>

Source: Agency for strategic planning and reforms of the Republic of Kazakhstan

Residual standard error: 0.8908 on 16 degrees of freedom

Multiple R-Squared: 0.7351, **Adjusted R-Squared:** 0.6524

F-test's p-value: 0.0001956

The second step has a purpose to quantify the correlation between the dependent variable, which, as in the OLS model, is the unemployment rate, and all chosen independent variables, with the point that the FDI factor is endogenous. The primary alteration from the OLS model is that the Two-stage least squares model estimates FDI values in the first step and puts them instead of the actual values. This process is aimed at eliminating the endogeneity bias and making the FDI's estimated effect more reliable.

As shown in Table 5, the general statistical relevance of the model is relatively high because the p-value of the F-test, which estimates the general empirical relevance of the model, is 0.0001956. A very low p-value suggests that minimum one independent variable is empirically relevant in measuring the model. The R-squared is 0.7351, which means that approximately 74% of the variation in the unemployment rate variable is explained by the model's independent variables, and the Adjusted R-squared is 0. These results are very close to the results of the OLS model, suggesting that there are no sufficient changes in the model's general empirical relevance.

Intercept variable:

Its coefficient is -2.97563, but it is not empirically relevant. As it was highlighted before, the case of all independent variable being isolated is impossible in the real world, therefore there is no need of intercept measurement interpretation.

FDI variable:

The variable, which is viewed as endogenous in the Two-stage least squares model, shows a coefficient of -0.31349, and its p-value demonstrates that this variable is empirically relevant at a 1% confidence threshold. The result means a one percent unit rise in endogenous factors, but estimated through instrumental variables, FDI is linked to a 0.31 percent unit decline in the unemployment rate. The raised level of confidence threshold serves as proof that elimination of endogeneity bias is needed, and the Two-stage least squares model is able to capture a more efficient effect of FDI on the unemployment rate.

The obtained negative correlation between factors is in line with the theoretical background of the correlation.

GDP growth variable:

GDP growth variable's parameter is -0.20081, similar to FDI being empirically relevant at 1% confidence threshold. It means that A 1 percent unit rise in GDP growth is linked to a 0.20 percent unit decline in the unemployment rate variable. This result is in line with the economic assumptions of economic output's influence on labor market conditions, especially the employment rate.

Education variable:

The coefficient of the population with higher education is -0.04982, the negative impact of education on unemployment rate, through better skills and expertise in the country, is expected and in line with research review. Despite the expected effect, the coefficient is statistically insignificant. It can be connected with the absence of a direct effect of education on employment conditions in the same period due to its slightly delayed effect on macroeconomic factors, or the impact of the proportion of schooled people influencing unemployment through other not included factors.

Inflation variable:

The obtained coefficient is 0.09276, it is significant at a 5% level. A positive and empirically relevant coefficient means that higher inflation is linked to a growth in the unemployment rate. This finding can match the assumption that an rise in the inflation rate is linked to an rise in production cost and a decline in the population's purchasing power, which leads to worse labor market conditions and a decline in employment.

Debt variable:

Its coefficient is 0.02157 and it does not show statistical significance. Despite the expected positive impact of public debt on unemployment rate, due to complexity of public debt's influence on macroeconomic factors or its delayed impact on labor market through fiscal policies, the actual influence cannot be captured by this model.

The results of the second-stage, Two-stage least squares model highlight the importance of FDI treatment as an endogenous independent variable. The first step corrects the possible

biases of FDI that can give more reliable results in the final equation. The final estimated negative and empirically relevant FDI coefficient proves the relationship between foreign investments and the unemployment rate. Moreover, the negative effect of GDP growth and the positive effect of inflation also highlights that macroeconomic factors are crucial in measuring the changes in unemployment rate. The results show the importance of dealing with endogeneity in the chosen dataset to get accurate results that can be used in policy regulations regarding employment, FDI attraction and other macroeconomic factors.

5.11. Two models evaluation

The main difference between the OLS and TSLS models is related to the treatment of FDI, which is considered an endogenous independent variable in the TSLS model. In the initial OLS model, FDI was statistically insignificant, highlighting the possibility of endogeneity issues. However, after treatment, endogeneity of FDI through the instrumental variables estimation in the TSLS model, the coefficient for FDI becomes empirically relevant at the 1% level. The estimated negative and significant result suggests that foreign direct investment plays an essential role in the labor market conditions.

The other independent variables, which are considered exogenous variables in both models (GDP growth, education, inflation, and debt), show relatively fixed relationships with the unemployment rate. For example, GDP growth keeps showing a negative and significant, while inflation shows a positive and significant effect on unemployment in all regression models. The educ and debt variables remain statistically insignificant.

Generally, the TSLS estimates confirm that when the endogeneity issue of FDI is taken into account, foreign direct investment shows a significant influence on reducing the unemployment rate. This finding highlights the role of FDI in job creation and improving labor market conditions, which can be used as a foundation for future policy implications.

5.12. Endogeneity and Instrumental Variables Testing

To verify the validity of the instruments and the presence of endogeneity in the model several test should be applied: the Weak Instruments test and the Wu-Hausman test (Table 6).

Table 6. Wu-Hausman and Weak instruments tests results

	df1	df2	statistic	p-value
Weak instruments	3	14	2.748	0.08213
Wu-Hausman	1	15	12.708	0.00282**

Source: calculations in R studio

5.12.1. Weak Instruments Test

The Weak Instruments test is aimed at testing that instruments used to estimate the endogenous variable are correlated with FDI. The p-value of the Weak Instrument test is **0.08213**. This p-value is slightly above the 5% confidence threshold, which means that instrument weakness is present and a p-value below 0.05 would prove the relevance of chosen instruments relevance. However, this result suggests that while the instruments are not extremely strong, they can still be acceptable at a 10% confidence threshold. As it was seen, not all instrumental variables demonstrated statistical significance in the first-stage equation, which can be a reason for weak results and can suggest a revision of the instruments list to get better results.

5.12.1 Wu-Hausman Test

The Wu-Hausman test is used to assess the presence of endogeneity bias issue. The idea behind the test is to compare the results from the OLS and TSLS models. The null hypothesis is that all independent variables are exogenous, and that the OLS model is enough to be regressed. The obtained p-value is **0.00282**, meaning the output is empirically relevant at very precise scale. The null hypothesis is rejected, and the endogeneity of the FDI variable is confirmed. Therefore, the TSLS model is confirmed to have a more reliable findings due to endogeneity.

5.13. Drawbacks and improvements

The main drawback of the model is the relatively small dataset. The dataset covers the period from 2001 to 2023. About 20 years may not fully include long-term economic changes in the economy, while non-included factors implemented in similar studies on other economies are unavailable for Kazakhstan.

GDP growth is chosen as the main indicator of economic output. Despite its popularity, it does not capture all economic effectiveness, including income distribution or living standards. Other measurements for covering the economic output of different dimensions can be used.

The chosen instruments are justified by economic theory, there are still some doubts about their statistical significance in the model. One possible improvement would be to expand the list of the instruments by additional variables, such as measures of corruption or the legal system. A rise of the instrument list might improve the independent power of the model.

FDI is the only endogenous independent variable in the model. However, other variables, like education, can be endogenous as well. The inclusion of multiple endogenous variables and their instrumental variables can expand the understanding of the relationship between variables and raise the independent power of the model as well.

6. Conclusion

This thesis aimed to test the relationship between foreign direct investment (FDI) and unemployment in Kazakhstan based on the increasing role of FDI in emerging economies. Kazakhstan is one of the countries going through an economic transition; therefore, understanding how FDI influences the labor market is important for creating practical policy implications for job creation and sustainable economic growth.

The practical part used two econometric models: the Ordinary Least Squares model and the Instrumental Variable—Two-Stage Least Squares model. The OLS model first understood the relationship between FDI and unemployment; all independent variables were viewed as exogenous. It was indicated that FDI showed a possible endogeneity bias issue; its coefficient was only significant at a 10% confidence threshold, which made its interpretation insufficient.

To deal with possible endogeneity issues, TSLS model was measuring, instrumenting FDI with Lag FDI values from the T-1 period, Trade openness, and Political Stability. The findings from the TSLS method showed an empirically relevant and negative coefficient for FDI. As a result, the model estimated that a one percent unit rise in FDI of the TSLS model is linked to a 0.31349 percent unit decline in the unemployment rate. This result was in line with the hypothesis that FDI significantly reduces unemployment in Kazakhstan.

Other macroeconomic variables, which were included in the equations, such as GDP growth and inflation, also showed significant effects on the unemployment rate. The negative coefficient of GDP growth demonstrates interconnection, better economic development, and better labor market conditions, while the positive coefficient of inflation demonstrates that risen price levels may lead to worse employment conditions due to the lower purchasing power of the population and lower investment rates. On the other hand, education and public debt did not show significant impacts on unemployment due to possibly complex structures or the absence of the factors that need to capture their full impact.

The Wu-Hausman test confirmed the FDI endogeneity bias issue, confirming better independent power by the second model. The result of endogeneity test and comparison between the two models confirms the importance of eliminating endogeneity in the FDI-unemployment interconnection.

The findings provide the following policy recommendations for Kazakhstan: FDI can be used as a tool for job creation. For efficient usage of this tool, the government's objectives should be targeted toward improving the investment climate. This can be done through the introduction of more efficient regulation and the improvement of political stability.

To enhance the benefits of FDI for the national economy, domestic industries should fit the modern standards and have well-functioning infrastructure; therefore, government should consider developing domestic industries and their labor conditions.

In conclusion, this thesis serves as a proof about a significant relationship between FDI and unemployment, based on the case of Kazakhstan. FDI can be used as an essential tool in dealing with unemployment problems and related policy implications can serve as a baseline of sustainable economic growth strategies. The obtained result shows the need for efforts to attract foreign investment as part of a strategy for economic development. The research can be developed further by adding more variables or broader time periods to get more specific results and more sophisticated policy implications.

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