

Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Statistics



Bachelor Thesis

Statistical Analysis of Unemployment in Ukraine

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BACHELOR THESIS ASSIGNMENT

Viktor Zub

Business Administration

Thesis title

Statistical Analysis of Unemployment in Ukraine

Objectives of thesis

The objective of the bachelor thesis is to provide the current directions of state socio-economic policy in Ukraine by investigating the level of unemployment through the analysis of its dynamics and structure, considering gender, age, and causes of unemployment.

Methodology

The theoretical part of the bachelor thesis will be based on selected literature and other scientific sources.

In the practical part, the bachelor thesis will employ official data on employment and registered unemployment posted on the website of the government agency ukrstat.gov.ua, and data from the International Labor Organization and the World Bank (IBRD IDA). These databases also contain information on the unemployment rate according to age, gender, educational level, type of activity, and place of residence. For describing the development of unemployment, methods of time series analysis will be elaborated on, as well as regression and correlation analysis methods.

The proposed extent of the thesis

30-40 pages

Keywords

causes of unemployment, dynamics, sex and age structure of unemployment, unemployment, registered unemployment rate

Recommended information sources

FIELD, A P. *Discovering statistics using IBM SPSS statistics*. Thousand Oaks: SAGE Publications, 2013. ISBN 978-1-4462-4917-8.

CHERVONA, S. *Unemployment in Ukraine: an Analysis of the Dynamics, Gender, Age Structure and Causes of Unemployment*. Kyiv: National Academy of Statistics, Accounting and Audit, 2019. DOI 10.31767/nasoa.3-2020.02

PIGOU, A. C. *The Theory of Unemployment*. London: FRANK CASS AND COMPANY LIMITED, 1968. ISBN 0714612421

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Declaration

I declare that I have worked on my bachelor thesis titled "Statistical Analysis of Unemployment in Ukraine" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break any copyrights.

In Prague on 15.03.2023

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Own processing based on data from the Ukrainian Statistical Office

Abstract

This bachelor's thesis offers a thorough overview of the unemployment problem in Ukraine. It aims to show the causes of unemployment, to analyse unemployment through the prism of gender and age, to identify the main predictors of unemployment.

In the practical part are presented the results of the unemployment analysis. The main analysis was done using the multiple regression model. The unemployment rate was a dependent variable, while gross domestic profit, change in the workforce, inflation rate, interest rate, foreign direct investment and minimum wage were chosen as independent variables. The analysis was based on data from the Ukrainian statistical office about the period from 2000 to 2021. The purpose of a regression model is to figure out which factors have a statistically significant effect on the unemployment rate. As a result, it was found that the main predictors of the unemployment rate in Ukraine during the period from 2000 to 2021 were foreign direct investments and interest rate.

Keywords: Labour market, unemployment, Ukraine, types of unemployment, predictors, regression analysis, demographic structure.

Statistická analýza nezaměstnanosti na Ukrajině

Abstrakt

Tato bakalářská práce nabízí důkladný přehled problému nezaměstnanosti na Ukrajině. Jejím cílem je ukázat příčiny nezaměstnanosti, analyzovat nezaměstnanost prizmatem pohlaví a věku, identifikovat hlavní prediktory nezaměstnanosti.

V praktické části jsou prezentovány výsledky analýzy nezaměstnanosti. Hlavní analýza byla provedena pomocí modelu vícenásobné regrese. Závislou proměnnou byla míra nezaměstnanosti, jako nezávislé proměnné byly zvoleny hrubý domácí zisk, změna počtu pracovních sil, míra inflace, úroková míra, přímé zahraniční investice a minimální mzda. Analýza vycházela z údajů ukrajinského statistického úřadu o období 2000-2021. Cílem regresního modelu je zjistit, které faktory mají statisticky významný vliv na míru nezaměstnanosti. Výsledkem bylo zjištění, že hlavními prediktory míry nezaměstnanosti na Ukrajině v období 2000 až 2021 jsou přímé zahraniční investice a úroková míra.

Klíčová slova: Trh práce, nezaměstnanost, Ukrajina, typy nezaměstnanosti, prediktory, regresní analýza, demografická struktura.

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List of Abbreviations

FDI.....Foreign Direct Investment

GDP.....Gross Domestic Product

1 Introduction

Unemployment is one of the most pressing issues faced by nations worldwide, and Ukraine is no exception. The high unemployment rate in Ukraine has been a recurring problem that has severe repercussions for the economy and society at large, affecting people at the individual, family, and community levels. The complex nature of this issue requires a comprehensive understanding of its underlying causes to develop successful policies and initiatives that can address the problem effectively.

The consequences of unemployment extend far beyond the individual level and can have a significant impact on society and the economy. Unemployment can lead to poverty, crime, and poor mental and physical health, contributing to a range of social and economic problems. The long-term effects of unemployment can also have a significant effect on the country's overall productivity, leading to a cycle of economic decline and social instability.

It is important to address the problem and identify practical solutions to lessen the effects of unemployment given its serious repercussions. This necessitates a multifaceted strategy that takes unemployment's underlying causes into account and develops focused strategies to deal with them. With the appropriate policies in place, Ukraine may progress toward a more sustainable future with lower unemployment rates and opportunities for individuals to positively impact the economy and society.

1.1 Objectives

The purpose of the paper is to provide a comprehensive analysis of the phenomenon of unemployment in Ukraine. The paper will use a number of analytical methods and tools, including demographic development analysis and regression analysis.

One of the goals of the thesis is to analyze the different types of unemployment that exist in Ukraine, as well as their causes and consequences for the country. The thesis examines the characteristics of each type of unemployment, its prevalence in the Ukrainian labor market, and its impact on the economy and society.

The second objective of the thesis is to analyze the demographic structure of the country and its impact on unemployment. The paper will examine the differences in unemployment rates between different demographic groups, such as men and women, young people, and adults.

The third objective of the paper is to identify predictors of unemployment in Ukraine. The paper will use regression analysis to identify the economic, political, and social factors that influence the unemployment rate in the country. By identifying the predictors of unemployment, to provide recommendations for the development of effective policies and programs to mitigate its effects.

1.2 Methodology

Scientific literature, academic publications, and internet libraries were used to conduct the thesis analysis. The Ukrainian Statistical office and the World Bank were used as a source of data collection for regression analysis and building the graphs.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon \quad (1)$$

Where Y is the expected or predicted value of the dependent variable, X_1 to X_p are p unique independent or predictor variables, b_0 is the value of Y when all of the independent variables (X_1 to X_p) are equal to zero, is the error term, a random variable, and b_1 to b_p are the estimated regression coefficients. Every regression coefficient shows how Y changes when the relevant independent variable changes by one unit. In the case of multiple regression, all other independent variables are held constant, and b_1 represents the change in Y in relation to a one unit change in X_1 . The regression coefficients 0, 1, ..., p must be approximated because they are unknown. (Field 2018)

Predictions may be made, using the following equation (2).

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_pX_p \quad (2)$$

The parameters are estimated using the OLS method, which is based on the following formula (3).

$$\sum_{i=1}^n (y_i - a - b_x x_{1i} - b_x x_{2i})^2 \dots \min \quad (3)$$

The F-test was utilized to assess the statistical significance of calculated parameters. Setting a null hypothesis, an alternative hypothesis, and selecting a significance threshold of 1%, 5%, or 10%. The null hypothesis for the F-test was usually $H_0: \beta_0 = \beta_1 = \dots = \beta_i = 0$. The alternative hypothesis was H_1 : At least one $\beta \neq 0$. A P-value less than alpha 0.05 showed statistical significance, whereas a P-value more than alpha 0.05 indicated the variable was statistically insignificant.

The t-test was used to assess the statistical significance of the parameters. The hypotheses for the t-test were $H_0: \beta_i = 0$ and $H_1: \beta_i \neq 0$. After its needed to evaluate the statistical significance of the variables. If the P-value of less than alfa 0.05 indicated statistical significance, otherwise is not significant.

To determine the model which is not contained non-significant parameters was used stepwise method of OLS. It's an approach for selecting a subset of predictor variables to include in a model. The algorithm starts with a model that includes all predictor variables and sequentially removes the least significant variable, one at a time, until the desired number of predictors is reached. At each step, the variable with the lowest statistical significance is removed from the model if its exclusion does not significantly reduce the model fit.

To determine if the model is suitable for using check the assumptions of the model:

1. Homoscedasticity:

Homogeneity of variance is achieved when the distribution of scores for your criterion is consistent across each predictor level. If met, the parameter estimations will be optimal.

White's test of heteroscedasticity involves fitting an auxiliary regression model using the squared residuals (4) of the original regression model and testing the null hypothesis of constant variance using a Chi-Square distribution. This test was processed using Gretl. According this test if the p-value is greater than the significance level, do not reject the null hypothesis (all slope coefficients = 0) and conclude that there is no evidence of heteroscedasticity, otherwise the model is homoscedastic. (Wooldridge J., 2009)

$$\begin{aligned} \text{Residual} &= \text{Observed value} - \text{Predicted value} \\ e &= y - \hat{y} \end{aligned} \quad (4)$$

2. Normality:

In order to obtain the best parameter estimation, the residuals should be normally distributed around zero if the model is a good fit for the data. A normal distribution of residuals indicates that the errors are randomly distributed, and the model is correctly capturing the relationships between the variables. To verify if residuals are normally distributed were used histogram created by IBM SPSS and Jarque-Bera test from Gretl.

Jarque-Bera test (5) is the test of normality, based on the skewness and kurtosis of the dataset, which are measures of the shape of the distribution.

$$JB = \frac{n}{6} \left(S^2 + \frac{1}{4} (K - 3)^2 \right) \quad (5)$$

- JB is the Jarque-Bera test statistic
- n is the number of observations in the dataset
- S is the skewness of the dataset
- K is the kurtosis of the dataset

Under the null hypothesis the dataset is normally distributed, it means the p-value should be larger than the significance level. (Wooldridge J., 2009)

3. Autocorrelation:

Autocorrelation means that different points in time are related to each other.. The Breusch-Godfrey test provides a way to assess whether autocorrelation is present in the residuals of a regression model. This test was processed using Gretl. According this test if the p-value is greater than the significance level, do not reject the null hypothesis and conclude that no autocorrelation is present in the model. (Wooldridge J., 2009)

3 Literature review

3.1 Definition

An unemployed person is considered to be a person who at the same time does not work, but wants to work. (Pigou, 1933)

This definition is not exactly correct because it covers the whole population. It is appropriate to distinguish between the unemployed and the unemplyed. For example, a six-year-old child without employment cannot be categorized as unemployed. Similarly, 60-year-old pensioners are not unemployed. Prisoners are also not unemployed. A more accurate definition of unemployment would be that a person is considered unemployed only if he or she is able to work and willing but cannot find a job. In real life, it means that an adult over the age of 16 must be considered unemployed, that a civilian should not reside in specialized institutions such as prisons, and most importantly, actively seeking employment. (Cowen, et al., 2015)

Unemployment is a phenomenon in the economy that occurs in a country when the number of jobs offered is less than the number of the working population.

To measure unemployment, use the following formula to determine the percentage of the unemployed in the population (6).

$$Unemployment\ rate = \frac{Number\ of\ unemployed}{Labor\ force} * 100 \quad (6)$$

Two indicators are used to study unemployment in Ukraine:

- The unemployment level according to the ILO methodology (the ratio of the number of unemployed people of a certain age to the labor force of the specified age)
- The level of registered unemployment (the ratio of the number of unemployed people registered with the State Employment Service to the average annual number of the population of working age)

It is the unemployment rate according to the ILO methodology that is used to measure the unemployment rate in Ukraine according to international practises.

At the same time, the level of registered unemployment serves more as an indicator of the effectiveness of the State Employment Service. After all, the indicator "registered

unemployment" includes precisely those Ukrainians who applied to the State Employment Service. (Ministry of Economy of Ukraine, 2020)

There are a lot of factors that can influence the Unemployment rate. The author would like to consider the main economic parameters that can have a significant impact on the unemployment rate in the economy of the country.

GDP: Higher GDP levels tend to lead to more job opportunities, while lower GDP levels, on the other hand, can lead to job losses.

Changes in the labor force: Demographic changes, such as an increase in the number of people entering the labor market, can create more competition for jobs.

Interest rates: Higher interest rates can lead to a reduction in investment and hiring.

Foreign direct investment (FDI): FDI can create jobs both directly through new investment and hiring, and indirectly through supply chains and other linkages.

Minimum wage: Increases in the minimum wage can affect the cost of labor for companies, potentially leading to a reduction in the workforce or hours worked. (Layard, Nickell, Jackman 1994)

However, the specific relationship between each factor and the unemployment rate may vary depending on economic conditions and other contextual factors.

3.2 Types

Unemployment is usually divided into types by occurrence:

- Frictional
- Structural
- Cyclical
- Seasonal
- Technological
- Voluntary
- Objective

3.2.1 Fractional unemployment

Unemployment is distinguished by the causes of its occurrence. We'll start with Frictional. This is an intermediate type of unemployment. It arises in the period between when a person left his previous place of work and is looking for a new one. The reason for

this type of unemployment will be forced dismissal at the direction of the company's administration or voluntary dismissal due to employee dissatisfaction with working conditions. (Cowen, et al., 2015)

"Frictional unemployment is short-term unemployment caused by the ordinary difficulties of matching employee to employer." (Cowen, et al., 2015)

In some way or another, this period is determined by the time it takes to find a good job. It takes time to prepare or supplement your resume, find vacancies that suit you, wait for all the answers, and, after analysing everything, make a smart choice. Also, considering your vacancy takes time. Employers need to decide whether your skills and qualifications are relevant to them. If you are looking for a job but don't work at the same time, you will be unemployed. (Hall, et al., 2013)

In the case of voluntary resignation, the period to find a new job can last less than a week. Often people prepare and search for vacancies even before they leave their former job. Furthermore, it cannot be denied that the Internet plays a significant role in the search for jobs. There are hundreds of resources where vacancies are posted for various jobs today. These services will facilitate the search for decent work for people, and the search for qualified personnel for employers.

This type of unemployment is natural and does not have great consequences for the economy and specifically for the unemployed. Usually, people count on such troubles in their lives and have enough money saved to fully survive this difficult period. Frictional unemployment even has good features: a person has the opportunity not to accept the first better free job, but to find a better-paid job. There, the employee will feel better and be more productive. Firms have well-motivated and productive employees and society gets more goods and services. (Hall, et al., 2013)

Frictional unemployment can occur if there is some connection between layoffs from one company and hiring people in another, or when people move from one occupation to another or change the region of work. Frictional unemployment cannot be eradicated in the realities of a market economy, and it follows that full employment is also impossible. (Pavlenkov, 2004)

As we know, frictional unemployment is characterized by its short-term nature. It usually represents a period of 4-5 weeks. At the end of the 1980s in the USA, with a general unemployment rate of 5.5-6.5% (about 7 million people), about half did not work for less than 5 weeks. In Ukraine, frictional unemployment is not important in shaping the general

scale of unemployment. According to the methodology of the ILO, about 2.6 unemployed people had a break of less than a month. Usually, a high level of frictional unemployment is not the cause of population poverty and does not cause the need to change the usual way of life. This type of unemployment makes it possible to see changes in the demand and supply of labour, so it is a sign of the dynamism of the labour market. (Drok, 2016)

So, the reason for the emergence of frictional unemployment is a person's dissatisfaction with his job, his pay, or the team in which he works and the search for a job that can satisfy a number of these desires. (Popov, 2006)

3.2.2 Structural unemployment

There are two theories for defining structural unemployment. According to the first theory, structural unemployment is constant, while according to the second theory, SU is considered a variable. So we can say that there is an equilibrium between inflation and unemployment in the long run. In the short run, cyclical changes can have positive and negative effects on unemployment, and inflation rates adjust to returning SU to equilibrium. Therefore, structural unemployment is relatively constant and is adjusted only to support the proper functioning of the economy. It is usually called "long-term unemployment" or "permanent unemployment". (Cowen, et al., 2015)

The concept of structural unemployment as the balance of inflation and unemployment is useful for understanding macroeconomic theory, but the second understanding is more acceptable. It is based on change. According to the second theory, structural unemployment arises under the influence of structural disparities in the labor market as a result of a mismatch between the demand for labor and the supply of labor by profession, qualification, geography, etc. (Cowen, et al., 2015)

If a person spends a long time without work and his chances of finding a job are small, then such a person can be called structurally unemployed. This is because changes in the structure of the economy have led to the fact that the skills of such people are outdated or irrelevant to the jobs on offer. This group of workers includes people with no work experience and low skills (Maitah, 2017).

Lack of work may not always indicate structural unemployment. Due to the lack of vacancies by qualification or occupation, structurally unemployed can usually find low-paid work for a period of time, just to meet their basic needs. This is, for example, the work of a

waiter, cleaner, or any other job that requires few skills and is always available on the labor market. (Cowen, et al., 2015)

3.2.3 Cyclical unemployment

Cyclical unemployment is caused by changes in demand within a certain business cycle. This can be explained by layoffs, reduced working hours, or other responses to a temporary downturn in business (Aysun, et al., 2014)

Cyclical unemployment occurs during economic downturns. Then the shortage of demand for goods and services causes the absence of vacant jobs. For example, some companies, realizing that there is no demand for their products, will try to reduce their staff. This company will try to lay off old employees or not hire new ones to avoid spending extra money. Thus, it will be more difficult for job seekers to find employment. If the demand strengthens or grows, then this will lead to the opposite situation. (Aysun, et al., 2014)

Also, an improper assessment of the demand for its products by the company can lead to cyclical unemployment. This then leads to too many goods being produced. This oversupply and unsold goods affect the economy and lead to layoffs. People lose their income and have to reduce their spending, thus reducing the demand for goods and services. (Holman, 2011)

It can be said that the increase in cyclical unemployment indicates that the economy is operating below its potential. As cyclical unemployment increases, competition for jobs increases. This may lead to companies offering lower wages. (Holman, 2011)

3.2.4 Seasonal unemployment

Seasonal unemployment arises as a result of seasonal fluctuations in the production of various industries. Usually, such a phenomenon can be observed at a certain time of the year. The victims of such unemployment are workers in industries such as agriculture, construction, fishing, and recreational services. Seasonal unemployment complicates the interpretation of unemployment data. You can usually see how seasonal factors affect the unemployment rate in certain months, even though economic conditions remain the same. (Hall, et al., 2013)

The list of seasonal jobs and industries was approved by the Post-New Cabinet of Ministers of Ukraine dated March 28, 1997, under No. 278. These enterprises massively hire

additional staff when the amount of work increases under the influence of seasonal factors. During the period of a sharp decrease in the workload, there is a mass layoff. (Popov, 2006)

3.2.5 Technological unemployment

Enterprises always try to implement new technologies in production, which reduce the need for labour, whenever possible. For this reason, a significant number of employees become useless and lose their free work. (Campa, 2019)

An instance of an occupation that became obsolete due to advancements in technology is that of the lantern bearer. These people would embark on their duties each evening at dusk, armed with long poles and charged with the task of illuminating the city's streetlamps. However, this profession became extinct in the latter half of the 19th century, owing to the advent of gas lamps, which could be activated and deactivated remotely without external assistance.

Technological transformation constitutes one of the paramount challenges of the current century. Undoubtedly, this exerts a significant impact on the labour force market. Technological change can happen slowly, so it can remain imperceptible to an inattentive observer. (Arntz, et al., 2016)

Technological unemployment can be defined as “unemployment due to our ability to find ways to save the use of work to be greater than the ability to find new uses for work” (Keynes, 2009)

History tells us that technological change has not caused unemployment in the long run. In the short term, these changes brought about disruptions in the labour market, which were caused by the adaptation of workers to new conditions. (Autor, 2015).

In the past, technological changes caused a reduction in the labor force in certain sectors of the economy, and an increase in others, balancing the labor market. Thus, technological changes contribute to technological progress and increase the number and quality of jobs. (Autor, 2015)

3.2.6 Voluntary unemployment

The Cambridge dictionary interprets voluntary unemployment as a concept when "a person does not want to work in a low-paid job or decides not to work because of the satisfactory level of public assistance provided to him if he does not work" (Cambridge University Press, 2023).

Voluntary unemployment can be caused by reasons such as high tax rates, insufficient awareness of vacant jobs, socioeconomic factors, market structure, government interventions, and technological progress. People may not want to work voluntarily due to the income effect, delays in adapting to the qualifications required by the market, unrealistic expectations, short-term preferences, or reasons arising from human temperament. In this case, it is possible to define voluntary unemployment as a state of refusal to work as a result of not looking for a job or acting reluctantly in the job search. (Davar, 2016)

3.2.7 Objective unemployment

Objective unemployment occurs due to influence factors from outside, it doesn't depend on specific a person. The reason for this kind of unemployment can be wars, pandemics, or natural disasters. As we know, the world has faced a pandemic of the covid 19 virus in recent years. This has caused many companies to close and, as a result, people to be laid off. I believe this is a good example of understanding objective unemployment.

The publication "Ukrainian Pravda" reports that due to Russia's invasion of Ukraine, the unemployment rate in the country has jumped sharply. Despite the efforts of enterprises to retain employees, the unemployment rate has dropped to a record 35% (National Bank of Ukraine, 2022)

3.2.8 Consequences of unemployment

The rise in unemployment has consequences. Among the negative social consequences of unemployment, the most significant can be identified.

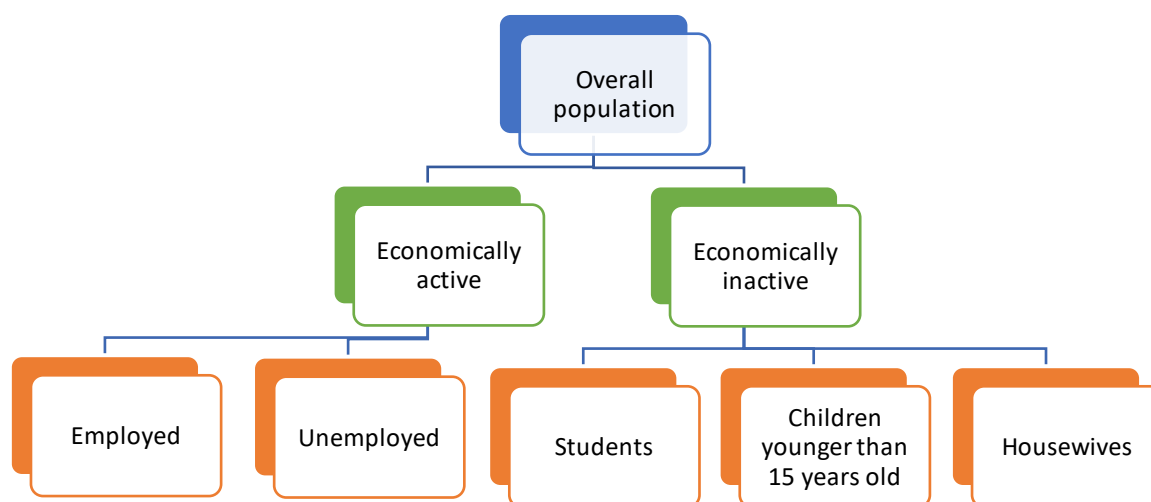
1. Unemployed workforce means underutilisation of the economic potential of society, direct economic losses.
2. With long-term unemployment, the employee loses qualifications, and obtaining new qualifications and adapting to new conditions are often painful for him.
3. Unemployment leads to a direct drop in the previously achieved standard of living. Unemployment benefits are always less than wages and are temporary. The growth of unemployment reduces purchasing and investment demand, reduces the amount of savings of the population.
4. The fact of unemployment inflicts psychological injury on a person
5. Due to unemployment, the number of crimes is increasing.
6. Unemployment causes an increase in the number of suicides. (Poluyaktova, 2016)

3.3 Ukraine

3.3.1 Population

The Ukrainian population can be divided into two categories. The first category is economically active citizens. They include employed and unemployed. The second category is economically inactive. It includes students, housewives, and children under 15 years old.

Figure 1 The economical population of Ukraine

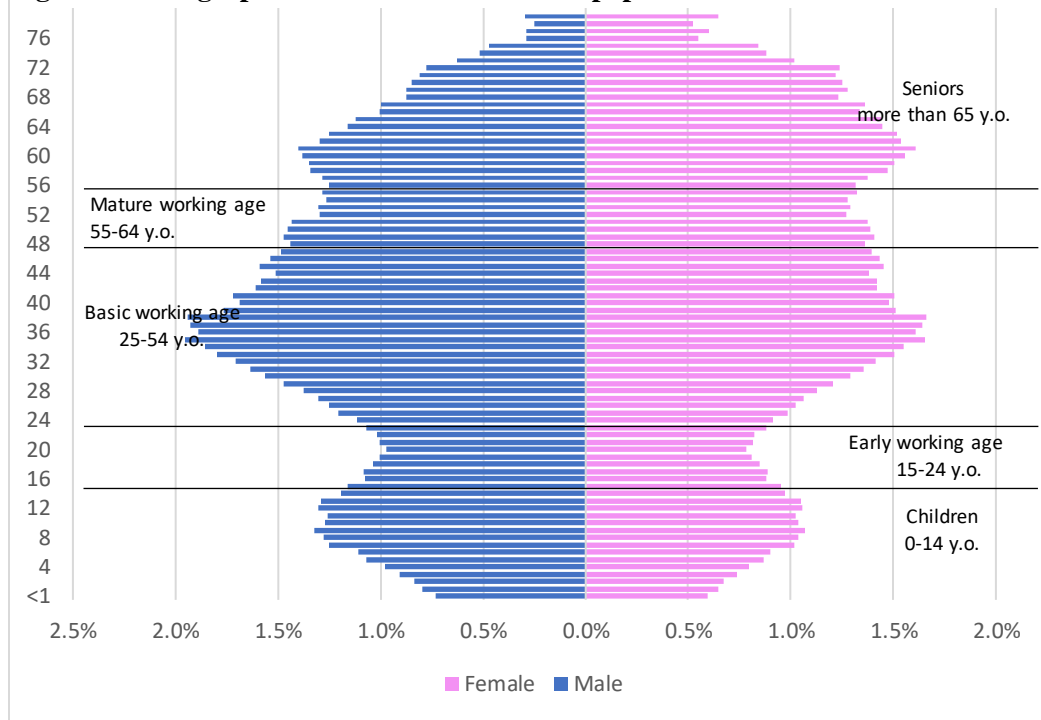


Source: The Statistical Office of Ivano-Frankivsk

According to the labor force concept, the economically active population is the population of both sexes aged 15-70 years, which during a certain period ensures the supply of labor for the production of goods and services. The economically active population includes persons who were engaged in economic activity or were looking for work and are ready to start it. (Statistical office of Ivano-Frankivsk, 2012)

Economically inactive population (outside the labor force) - persons who cannot be classified as "employed" or "unemployed". This population category includes unemployed persons who belong to the following social groups: pensioners; full-time students (pupils); persons performing household (family) duties; persons of working age who have despaired of finding work; persons who believe that there is no suitable job and do not know where and how to find it; other persons who did not need employment, as well as those whose activities are not economic (performing unpaid or voluntary work, etc.). (Statistical office of Ivano-Frankivsk, 2012)

Figure 2 Demographic structure of Ukrainian population



Source: Own processing based on the data from The Ukrainian Statistical Office

As of January 1, 2022, there are 4,099,7698 people in Ukraine, according to Ukrainian Statistic Office. The ratio of women to men is 1.15. The main working population is 18 million.

3.3.2 Political domain

Since 1991, Ukraine has existed as an independent nation. Over the course of this period, there have been five successive Presidents and correspondingly, shifts in the primary trajectory of the country's progression. It is deemed advisable to undertake a succinct examination of each President's tenure in regards to their leadership and administrative endeavors Presidents of Ukraine

Leonid Kravchuk served as the first president of Ukraine following its independence from 1991 to 1994. His tenure is remembered for the economic crisis and hyperinflation that ensued, as the liberalization of prices in 1992 resulted in a 100-fold increase in the price of gas and a 300-fold increase in the price of oil. Despite this, Kravchuk also played a significant role in Ukraine's European integration by signing a major Agreement on Cooperation and Partnership with the European Union. (Goljuk, et al., 2017)

Subsequently, Leonid Kuchma held the presidency from 1994 to 2005. During his tenure, the largest industrial enterprises in Ukraine were privatized, resulting in the

emergence of a "national elite." However, the privatization process was widely perceived as unjust, opaque, corrupt, and serving the interests of criminal clan structures and individuals close to power. (Padalka, 2011)

Kuchma also signed the "Budapest Memorandum" which established Ukraine's non-nuclear status, renounced its nuclear weapons in exchange for guarantees of sovereignty from the United States, Great Britain, and Russia. Furthermore, Kuchma officially instilled Ukraine's desire for membership in the European Union and NATO. (Chervonenko, 2019)

The "Orange Revolution" of 2004-2005 was a result of the social tension that had accumulated during Kuchma's rule. As a result, Viktor Yushchenko became president, known for his humanitarian policies. However, Yushchenko's pro-Western policies led to conflicts with Russia, manifesting in two major gas crises. (Chervonenko, 2019)

Viktor Yanukovich became the next president (2010-2014). He was distinguished by his active pro-Russian policy. The main geopolitical decision was the refusal to conclude the Association Agreement between Ukraine and the European Union, which was being prepared since 1998. It was to be signed at the Vilnius Summit on November 28, 2013. The Central Committee's decision led to the "Revolution of Dignity", which forced Yanukovich to flee to Russia. (Mieliekiestsev , 2021)

In 2014, Russia annexed Crimea and started a conflict in the east of Ukraine, which continues in the future.

Petro Poroshenko (2014-2019) is the first president elected after the start of the armed conflict. During his presidency, during 2014-2015, there was a rapid devaluation of the hryvnia several times, as well as a decline in the economy. Petro Poroshenko signed the Association Agreement with the EU, and during his presidency, Ukraine fulfilled the requirements for obtaining a visa-free regime and it began to operate.

On his initiative, Ukraine terminated the Agreement on Friendship and Cooperation with Russia. He also initiated enshrining in the Constitution of Ukraine the course for joining NATO and the EU.

Volodymyr Zelensky became the next president and remains so to this day. He won the 2019 elections. His board:

Integration with the EU and NATO remains unchanged, a number of European integration laws have been adopted, and cooperation with NATO is deepening. At the same

time, the Ukrainian "course to the West" took a backseat, and the COVID-19 pandemic did not accelerate integration processes. (Bazhenova, 2020)

The global crisis phenomena of the pandemic significantly strengthened the negative trends of the Ukrainian economy. The Government of Denys Shmyhal, appointed by Volodymyr Zelensky, failed to significantly mitigate the negative consequences of the strict quarantine for the Ukrainian economy. At the same time, there is liberalization and deregulation of certain areas with the financing of infrastructure solutions and digitalization. (Bazhenova, 2020)

Demonopolization of the economy, as well as reforms in the fiscal sphere, strengthened control over finances and deepened the internal contradictions of regulatory mechanisms, and created an even greater tax burden on the private sector. The economic prerequisites for increasing the social level of the population of Ukraine have not been met. (Bazhenova, 2020)

3.3.3 Covid-19 in Ukraine

The Covid-19 pandemic has posed a formidable challenge to humanity, and Ukraine has not been immune to its detrimental effects. The initial case of the disease in the country was recorded in the Cherkasy region on March 3rd, 2020, and since then, a system of periodic strict lockdowns has been implemented, but the level of control over its compliance remained at a low level. (Puschulina, 2021)

To mitigate the consequences of the virus, the Ukrainian government has implemented several measures. Firstly, it has sought to create conditions that foster an increase in employment among the population. This has been achieved through the introduction of legislative changes that pertain to the registration process for employment services and the receipt of unemployment benefits, such as the simplification of the application process and the enhancement of minimum unemployment benefit amounts. (Government portal, 2020)

Additionally, assistance to the unemployed is provided from the first day of acquiring the status, even to those who were dismissed during the quarantine period of their own accord. (Ministry of Economy of Ukraine, 2020)

Secondly, the government has tried to regulate the employment market by expanding programs to compensate for interest costs on private-sector loans and introducing a partial unemployment programme, which has been used by 240 subjects and has so far saved

380,000 workers' jobs. As of 3 September 2020, 2.3 billion hryvnias have been paid under this program. (Official web-representation of the President of Ukraine, 2020)
(Verkhovna Rada of Ukraine, 2021)

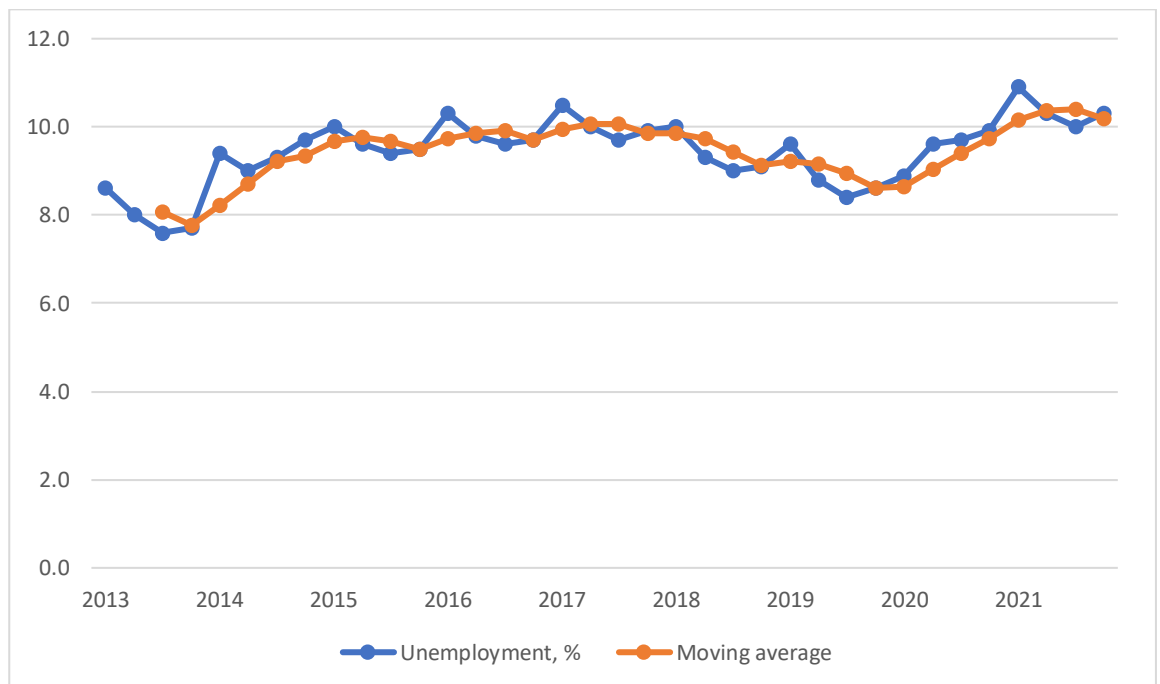
4 Practical Part

4.1 Seasonality

In order to properly understand the trends and tendencies behind the unemployment phenomenon in Ukraine, it is downright essential to firstly estimate the trend using the time series reflecting the development of this macroeconomic indicator in Ukraine from 2013 until 2021.

Then, after creating the dataset, it is essential to take a look at the graphical representation of the development of the following macroeconomic index. The next figure represents the development of unemployment in time per quarters.

Figure 3 Unemployment rate and Moving average of unemployment index



Source: Own processing based on data from The Ukrainian Statistical Office

Clearly, as it can be easily noticed when looking at the figure above, the development of the following index resembles a periodical tendency, which helps suggesting that there is a particular seasonality pattern.

As it became evident from the theoretical part, when modeling the development of unemployment in time, the situation when the development of the index has a certain periodicity, which is a direct consequence of the fact that unemployment is divided into

various categories and the seasonal unemployment is one of the main reasons behind such a pattern.

Yet, the author now focuses on quantifying the seasonality by calculating the seasonality factor that will indicate the situation of whether the unemployment percentage for individual quarters is above or below the average. For the calculation of the following index, the author uses SPSS Statistics application. The author considers a multiplicative time series given the pattern of the development. The output containing seasonality factors is presented in the following table.

Table 1 Seasonal factor per quarter

Seasonal Factors	
Series Name: Unemployment, %	
Period	Seasonal Factor (%)
1	105.0
2	99.4
3	97.1
4	98.5

Source: Own processing based on data from The Ukrainian Statistical Office

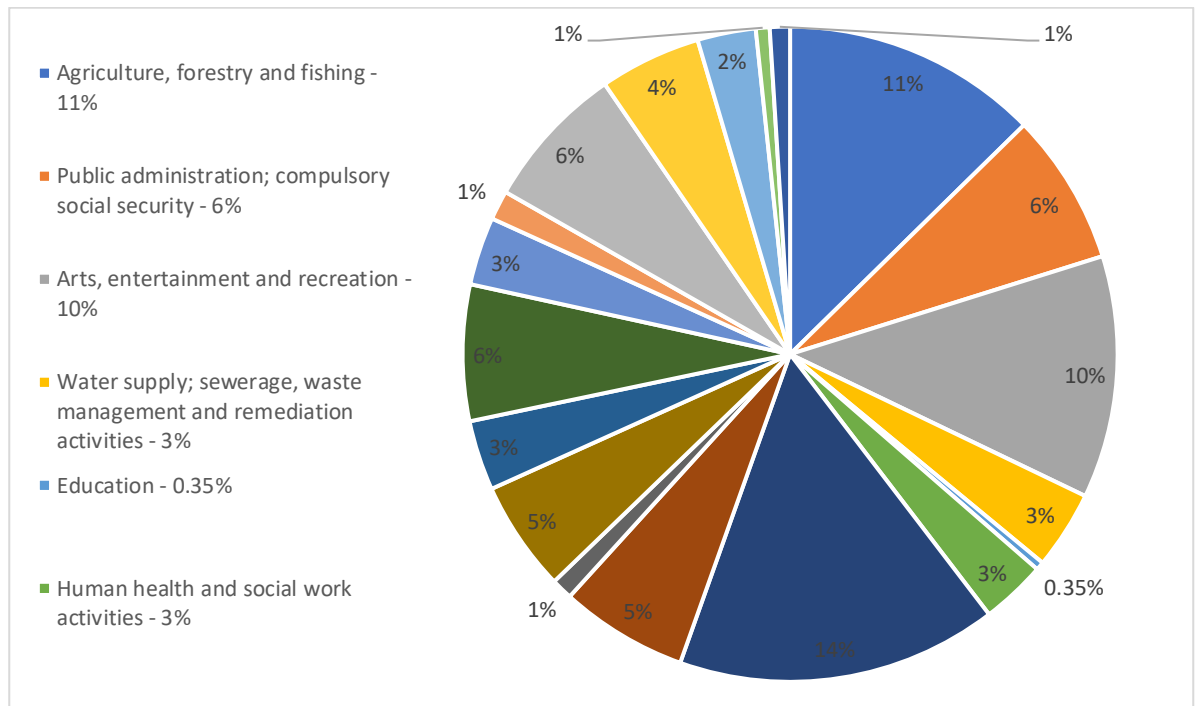
Hence, the author is able to conclude the following:

- *Unemployment in Ukraine in the first quarter of the year is 5% higher on average.*
- *Unemployment in Ukraine in the second quarter of the year is 0.6% lower on average.*
- *Unemployment in Ukraine in the third quarter of the year is 2.9% lower on average.*
- *Unemployment in Ukraine in the fourth quarter of the year is 1.5% lower on average.*

Hence, the country experiences more problems related to unemployment during the first quarter of the year – in January, February and March. Ukraine is an agricultural country, that's why its not surprised that unemployment is higher during the non-harvested period. According to the Ukrainian Statistical office the largest part of the GDP in Ukraine belongs

to Agricultural sector. It made more than 10% of the Ukrainian Gross Domestic Production in 2021.

Figure 4 Ukrainian GDP



Source: Own processing based on data from The Ukrainian Statistical Office

4.2 Demographical analysis

4.2.1 Gender

It's essential to take a look at the way how the development of the index differs between men and women. The author uses the information available on the website of the Ukrainian statistical office in order to create the dataset presented on the next table. The data are considered as a percentage by the system of the ILO.

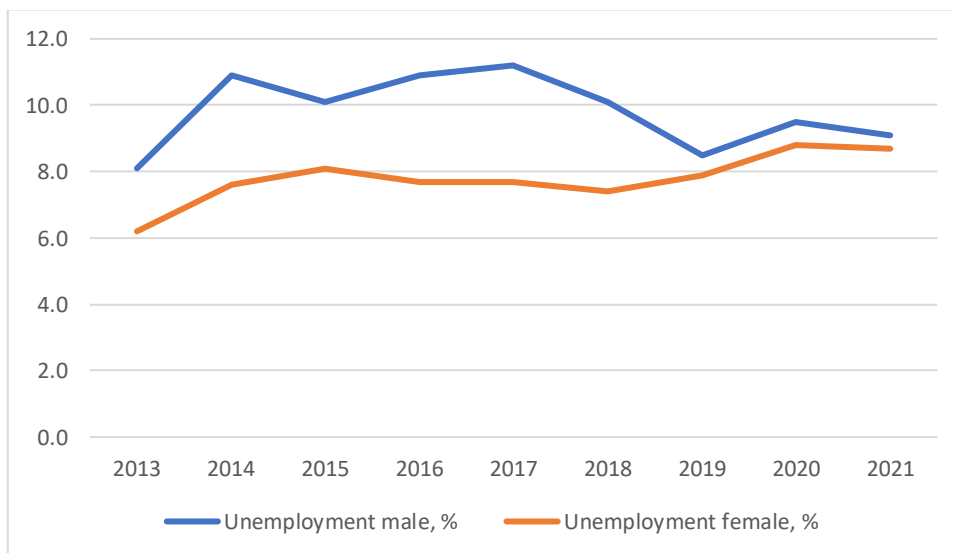
Table 2 Unemployment by gender

Year	Unemployment male, %	Unemployment female, %
2013	8.1	6.2
2014	10.9	7.6
2015	10.1	8.1
2016	10.9	7.7
2017	11.2	7.7
2018	10.1	7.4
2019	8.5	7.9
2020	9.5	8.8
2021	9.1	8.7

Source: Own processing based on data from The Ukrainian Statistical Office

The author chooses the time period of 9 years due to the fact that the country does not offer any statistics for the earlier period. As it becomes evident, the unemployment among men is higher than among women, which is a relatively expected result. The visual representation of the development of two indicators is available in the table below.

Table 3 Development of unemployment by gender



Source: Own processing based on data from The Ukrainian Statistical Office

The reason may be that men may be more likely to work in industries that are more sensitive to economic cycles or that are undergoing structural changes. In addition, men are more likely to work part-time, temporarily, or not be officially employed at all, in order to

avoid paying taxes. It should be noted that dishonest employers often insist on informal employment.

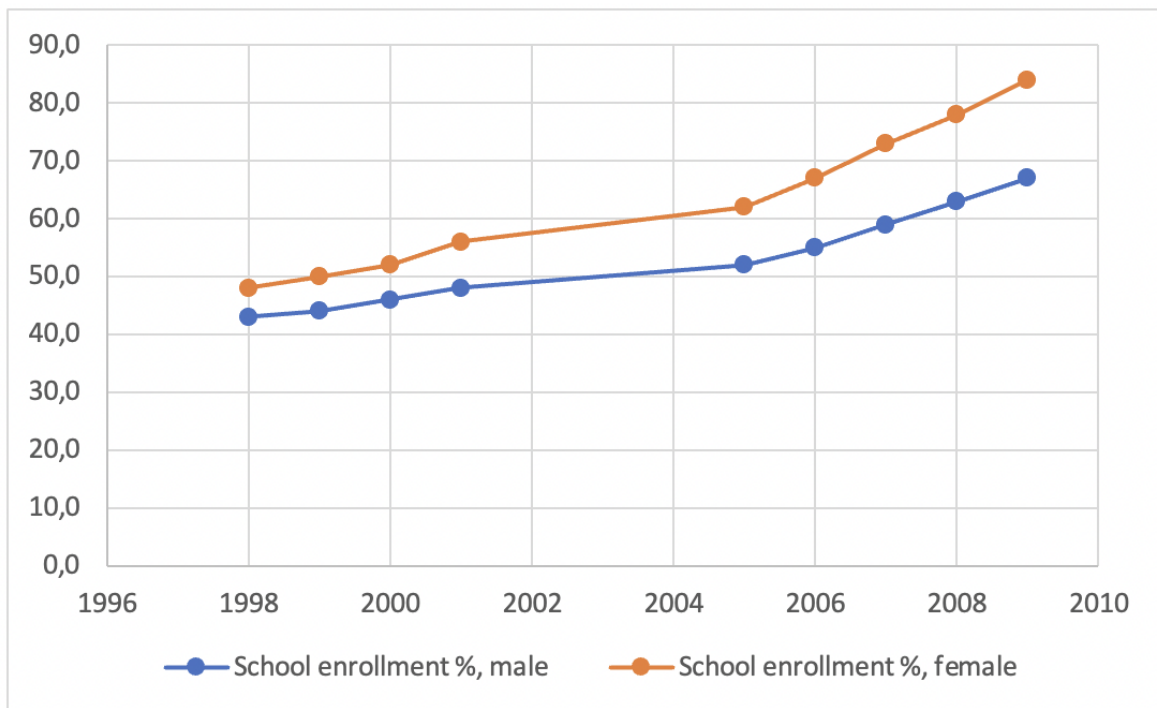
However, when reflecting on the reasons for this diversity, it is important to look at another important statistical indicator - the percentage of school enrollment among men and women. Education, as is obvious, is one of the key factors affecting the structural type of unemployment. Obviously, the lack of primary education is one of the most important factors that limits the ability of some people to find a job, especially in a highly competitive economy with high employer requirements. The graph (Figure 6) shows the dynamics of the percentage of school enrollment among men and women.

Table 4 School enrollment database

Year	School enrollment %, male	School enrollment %, female
1998	43.0	48.0
1999	44.0	50.0
2000	46.0	52.0
2001	48.0	56.0
2005	52.0	62.0
2006	55.0	67.0
2007	59.0	73.0
2008	63.0	78.0
2009	67.0	84.0

Source: Own processing based on data from The Ukrainian Statistical Office

Figure 5 School enrollment between men and women



Source: Own processing based on data from The Ukrainian Statistical Office

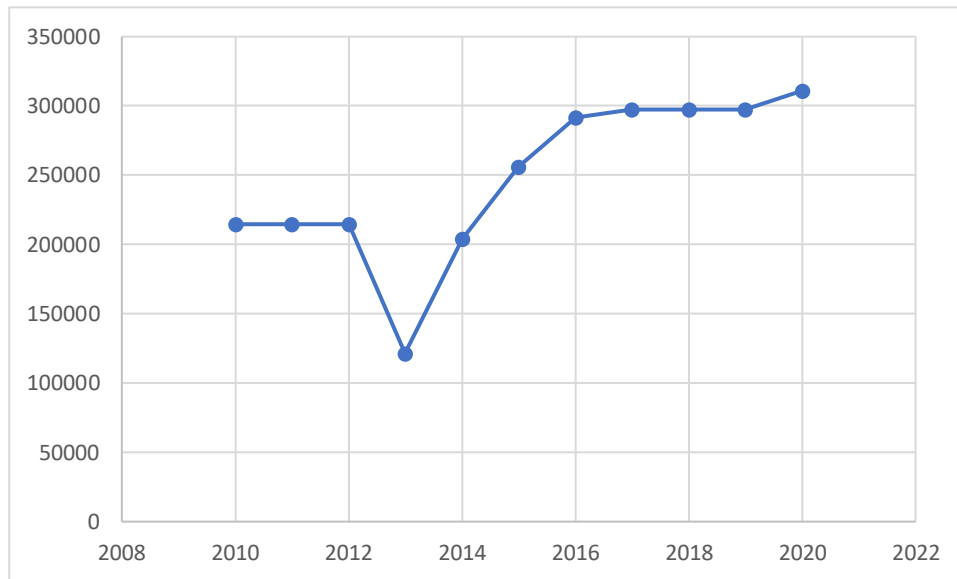
As it can be seen (Figure 6), the percentage of girls entering primary school is higher than the percentage of boys. Given the fact that the author chose the period up to 2010, this explains the fundamental difference in unemployment rates in the 2010s between men and women - people who were just starting school in 1998-2006 graduated in the mid-2010s and began actively looking for work. From 2006 to 2009, it is clear that the situation with school enrollment began to improve, so the slight improvement in the unemployment rate in the late 2010s is partly due to this phenomenon.

On the other hand, it is not a secret that a huge amount of men go abroad in search of work. In the absence of a unified system to control this movement, these people will be considered as unemployed.

Since 2018, the Cabinet of Ministers has adopted several bills to improve the labor market. Thus, on December 27, 2019, the Cabinet of Ministers approved the draft law "On Labor". The purpose of these changes was to balance the labor force in the market, bring wages out of the shadows, and accelerate economic growth. This resulted in a decrease in the gap between the male and female unemployment rates. (Ministry of Economic Development and Trade of Ukraine, 2019)

It is also easy to observe that, in 2014, the unemployment rate of both men and women increased considerably. At this time, Russia annexed Crimea and began a conflict in eastern Ukraine. Many people have moved to these regions, which has increased unemployment. Subsequently, many men decided to join the army. The author has created a graph (Figure 7) showing the growth of the army and the reduction of unemployment as a result.

Figure 6 Ukrainian army's personnel



Source: Own processing based on data from The Ukrainian Statistical Office

4.2.2 Age

In addition to education, it is also essential to take a look at other statistics related to the unemployment and demographics at the same time – percentage of youth unemployed. The following figure contains the dataset used for the analysis.

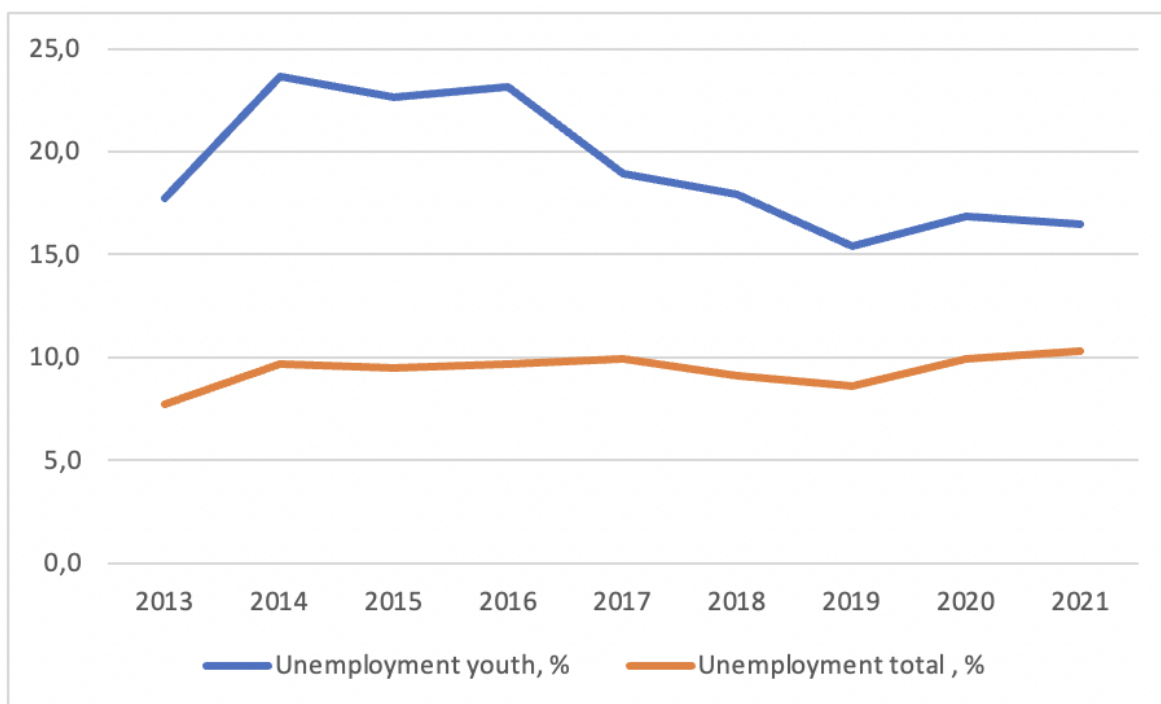
Table 5 Unemployment among youth

Year	Unemployment youth, %	Unemployment total , %
2013	17.7	7.7
2014	23.7	9.7
2015	22.6	9.5
2016	23.1	9.7
2017	18.9	9.9
2018	17.9	9.1
2019	15.4	8.6
2020	16.9	9.9
2021	16.5	10.3

Source: Own processing based on data from The Ukrainian Statistical Office

Clearly, it becomes pretty evident that the number of unemployed youths exceeds the average unemployment rate in Ukraine, which is a sign that people in the age between 15 and 24 are more vulnerable to this problem than adults. The gap between two indicators is even more visible on the following chart.

Figure 7 Difference between two unemployment indicators



Source: Own processing based on data from The Ukrainian Statistical Office

Yet, the current tendency brings a slight optimism as the percentage of youth unemployed slowly approaches the country's average, so it is quite likely that the gap will be eliminated even more in the nearest future.

4.3 Regression Analysis

4.3.1 Initial model

Finally, the very last part of the practical part is related to the regression analysis, with the help of which the author will be able to identify the most important factors influencing the unemployment in Ukraine. For this purpose, the author assumes an econometric model:

$$Y = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_6 X_{6t} \text{ where}$$

- Y, unemployment in Ukraine expressed in percentage points.
- X₁, minimum monthly wage in Ukraine expressed in UAH.
- X₂, inflation rate in Ukraine expressed in percentage points.
- X₃, FDI net inflow in Ukraine expressed in billion US dollars.
- X₄, interest rate in Ukraine expressed in percentage points.
- X₅, change in workforce in Ukraine expressed in millions of people.
- X₆, GDP in Ukraine expressed in billion US dollars.

Before proceeding to the OLS method and estimating parameters for the linear regression equation, it is essential to check if there is a problem of multicollinearity encountered in the following dataset.

Multicollinearity is a strong linear relationship between independent variables. The author sets the level of 0.8 as a milestone for identifying the presence of the problem. Violating the assumption of the absence of multicollinearity leads to the fact that parameters are not the best. In order to understand if there is a problem of multicollinearity in the model, the author uses a correlation matrix, whose output is available below.

Table 6 Correlation matrix

Correlations							
		Minimal Wage, UAH	Inflation rate, %	FDI, net inflow billions	Interest rate, %	Change in Workforce, mill of people	GDP, billion US dollars
Minimal Wage, UAH	Pearson Correlation	1	-.157	-.174	.017	-.405	.505*
	Sig. (2-tailed)		.486	.440	.940	.061	.016
	N	22	22	22	22	22	22
Inflation rate, %	Pearson Correlation	-.157	1	-.122	.775**	.177	-.232
	Sig. (2-tailed)	.486		.588	<.001	.431	.300
	N	22	22	22	22	22	22
FDI, net inflow billions	Pearson Correlation	-.174	-.122	1	-.294	.469*	.529*
	Sig. (2-tailed)	.440	.588		.184	.028	.011
	N	22	22	22	22	22	22
Interest rate, %	Pearson Correlation	.017	.775**	-.294	1	.093	-.354
	Sig. (2-tailed)	.940	<.001	.184		.680	.106
	N	22	22	22	22	22	22
Change in Workforce, mill of people	Pearson Correlation	-.405	.177	.469*	.093	1	.050
	Sig. (2-tailed)	.061	.431	.028	.680		.825
	N	22	22	22	22	22	22
GDP, billion US dollars	Pearson Correlation	.505*	-.232	.529*	-.354	.050	1
	Sig. (2-tailed)	.016	.300	.011	.106	.825	
	N	22	22	22	22	22	22

Source: Own processing based on data from The Ukrainian Statistical Office

Clearly, there is no case of multicollinearity in the given model based on the fact that all Pearson correlation coefficients are less than 0.8. Hence, the author does not need to transform the initial dataset and he is finally able to estimate parameters of the model using the OLS method.

Now author added t variable and dummy variable to the model in order to determine whether the changes were made by political situations in Ukraine after the beginning of Zelenski's presidency:

- X₇, Presidency of Zelenski
- X₈, Time variable

Table 7 OLS output

		Coefficients^a				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	9.503	.839		11.330	<.001
	Minimal wage, UAH	.000	.000	.444	1.185	.257
	Inflation rate, %	-.035	.025	-.255	-1.387	.189
	FDI, net inflow billions	-.292	.072	-.666	-4.038	.001
	Interest rate, %	.129	.059	.449	2.200	.047
	Change in workforce, mil. of people	.414	1.766	.032	.234	.818
	GDP, billion US dollar	-.002	.006	-.077	-.341	.738
	Presidency of Zelensky	-.268	.978	-.064	-.274	.789
	Time variable	-.063	.066	-.281	-.951	.359

a. Dependent Variable: Unemployment, %

Source: Own processing based on data from The Ukrainian Statistical Office

Table 8 ANOVA table

		ANOVA^a				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	38.527	8	4.816	10.145	<.001 ^b
	Residual	6.171	13	.475		
	Total	44.699	21			

a. Dependent Variable: Unemployment, %

b. Predictors: (Constant), Time variable, FDI, net inflow billions, Inflation rate, %, Change in workforce, mil. of people, Presidency of Zelensky, Interest rate, %, GDP, billion US dollar, Minimal wage, UAH

Source: Own processing based on data from The Ukrainian Statistical Office

Yet, now it is essential to conduct a series of statistical tests to find out, if the model itself is significant, and if individual predictors of unemployment in Ukraine are also significant. For this purpose, the author uses F-test to test the significance of the whole model, while taking the significance value from Table 9. The testing process is shown in the table below.

Table 9 F-test

Ho: $\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$ (The model is not significant)
Ha: At least one $\beta \neq 0$ (The model is significant)
$\alpha = 0.05$
P = 0.001
$0.001 < 0.05 \Rightarrow$ Ho is rejected and Ha is assumed \Rightarrow The model is significant

Source: Own processing based on data from The Ukrainian Statistical Office

After conducting the F-test, it is essential to proceed to T-test for individual predictors to check which ones of them are not significant. The result of T-test is shown in the table below.

Table 10 T-test

	Variable	p - value	Description
X ₁	Minimal wage, UAH	0.257056	is not significant
X ₂	Inflation rate, %	0.188812	is not significant
X ₃	FDI, net inflow billions	0.001409	is significant
X ₄	Interest rate, %	0.04654	is significant
X ₅	Change in workforce, mil. of people	0.818324	is not significant
X ₆	GDP, billion US dollar	0.738261	is not significant
X ₇	Presidency of Zelensky	0.788551	is not significant
X ₈	Time variable	0.359131	is not significant

Source: Own processing based on data from The Ukrainian Statistical Office

Given the fact that just 2 variables out of 7 are significant, the author will recreate the original model by excluding predictors which do not contribute significantly to the unemployment rate in Ukraine.

4.3.2 Improved model

For the improvement of the model, the author used Stepwise method which gives the three possible variants of the model:

Model 1: Only includes FDI as predictor.

Model 2: Includes FDI and Interest rate as predictors.

Model 3: Includes FDI, Interest rate, and Inflation rate as predictors.

Table 11 Improved model's summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.853 ^a	.728	.714	.7796
2	.887 ^b	.787	.764	.7085
3	.914 ^c	.836	.808	.6391

a. Predictors: (Constant), FDI, net inflow billions

b. Predictors: (Constant), FDI, net inflow billions , Interest rate, %

c. Predictors: (Constant), FDI, net inflow billions , Interest rate, %, Inflation rate, %

Source: Own processing based on data from The Ukrainian Statistical Office

Table 12 Improved model's ANOVA

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	32.544	1	32.544	53.552	<.001 ^b
	Residual	12.154	20	.608		
	Total	44.699	21			
2	Regression	35.160	2	17.580	35.019	<.001 ^c
	Residual	9.538	19	.502		
	Total	44.699	21			
3	Regression	37.346	3	12.449	30.476	<.001 ^d
	Residual	7.353	18	.408		
	Total	44.699	21			

a. Dependent Variable: Unemployment, %

b. Predictors: (Constant), FDI, net inflow billions

c. Predictors: (Constant), FDI, net inflow billions , Interest rate, %

d. Predictors: (Constant), FDI, net inflow billions , Interest rate, %, Inflation rate, %

Source: Own processing based on data from The Ukrainian Statistical Office

The three models show a significant relationship between independent and dependent variables with p values below 0.001 in each case. The R-square values of the models show that the third model with all three independent variables (FDI, interest rates and inflation

rates) has the highest R-square value of 0.836, which indicates that it explains the largest proportion of the variance in the dependent variable. ANOVA results also show that the third model has the lowest residual sum of squares and the highest F value, indicating that it is the best model of the three. The third model, which contains all three independent variables, is therefore the best model to explain the relationship between independent and dependent variables.

Table 13 Improved model

		Coefficients^a				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	10.378	.270		38.465	<.001
	FDI, net inflow bilions	-.374	.051	-.853	-7.318	<.001
2	(Constant)	9.417	.487		19.327	<.001
	FDI, net inflow bilions	-.341	.049	-.779	-7.028	<.001
	Interest rate, %	.073	.032	.253	2.283	.034
3	(Constant)	8.998	.475		18.927	<.001
	FDI, net inflow bilions	-.324	.044	-.738	-7.273	<.001
	Interest rate, %	.156	.046	.541	3.389	.003
	Inflation rate, %	-.048	.021	-.356	-2.313	.033

a. Dependent Variable: Unemployment, %

Source: Own processing based on data from The Ukrainian Statistical Office

According to this regression model, it's easy to notice that inflation rate has a positive impact on the level of the unemployment, which is unusual. However, it is important to note that regression model does not always imply causation, and there may be other factors at play that are not accounted for in the model. So, there have been cases in the past where inflation has been positively correlated with unemployment. This is because high inflation can lead to higher production costs, which can lead to lower economic growth and job losses. (Depersio G., 2020)

In addition, the relationship between interest rates and inflation can be complex. As a rule, central banks raise interest rates when they want to fight inflation., which can lead to the positive strong correlation between these variables.

So based on that, the author decided to choose the second model, which includes only FDI and Interest rate as predictors. The correct model has a look:

$$Y = 9.417 - 0.341X_{1t} + 0.73X_{2t}$$

In addition to this, the new relationship is estimated:

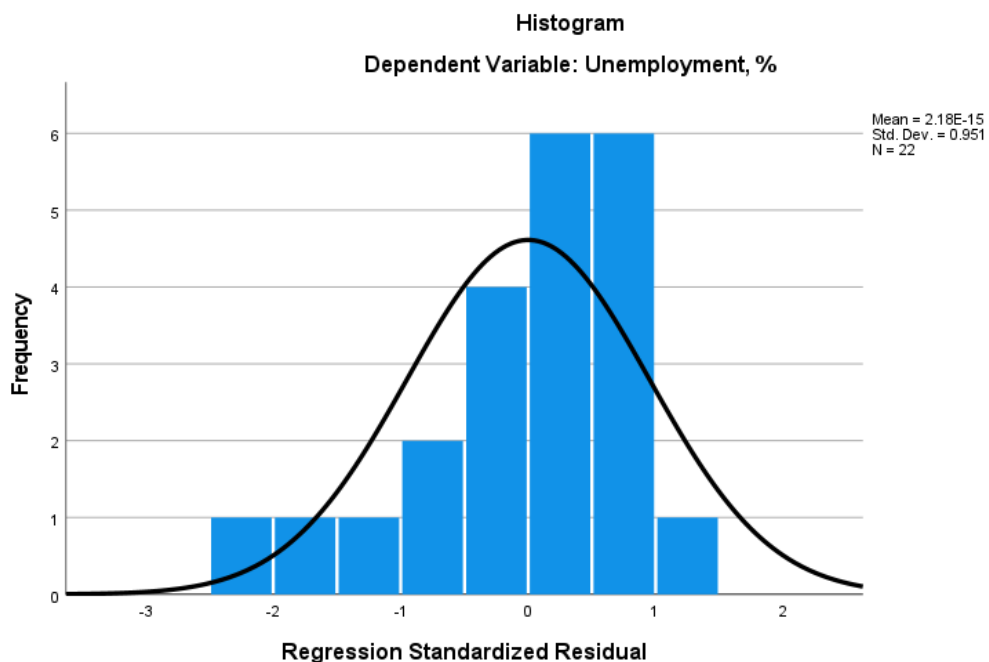
- When the FDI net inflow increases by 1 billion US dollars, the unemployment rate decreases by 0.341 percent.
- When the interest rate increases by 1 percent, the unemployment rate increases by 0.73 percent.

4.3.3 Verification

Once the model with only significant predictors has been determined, it is crucial to confirm its accuracy. For this purpose, the author uses plots from the same application – SPSS Statistics accompanied by test procedures performed in Gretl, another application for statistics purposes.

First, the author checks if residuals are distributed according to the normal distribution. In order to verify the model's compliance with the principle, the author checks the histogram of residuals and then performs Jarque-Bera test.

Figure 8 Distribution of the residuals



Source: Own processing based on data from The Ukrainian Statistical Office

When looking at the distribution of residuals of the model, it is not certain if residuals are normally distributed. To ultimately come to a particular conclusion, the author goes for the normality test.

Picture 1 Normality test

```
Test for normality of Residuals:  
  
Doornik-Hansen test = 3.49311, with p-value 0.174374  
  
Shapiro-Wilk W = 0.936046, with p-value 0.163924  
  
Lilliefors test = 0.137193, with p-value ~ = 0.34  
  
Jarque-Bera test = 2.29039, with p-value 0.318163
```

Source: Own processing based on data from The Ukrainian Statistical Office

The Jarque-Bera test gives the P value of 0.31, which is evidently greater than 0.05 (the significance level set for this research), the author concludes that residuals are, in fact, normally distributed.

Then, it is essential to check another assumption – absence of autocorrelation. Autocorrelation is a situation when residuals periodically return the same values. For this purpose, the author uses Breusch-Godfrey test, whose output is shown below.

Picture 2 Autocorrelation test

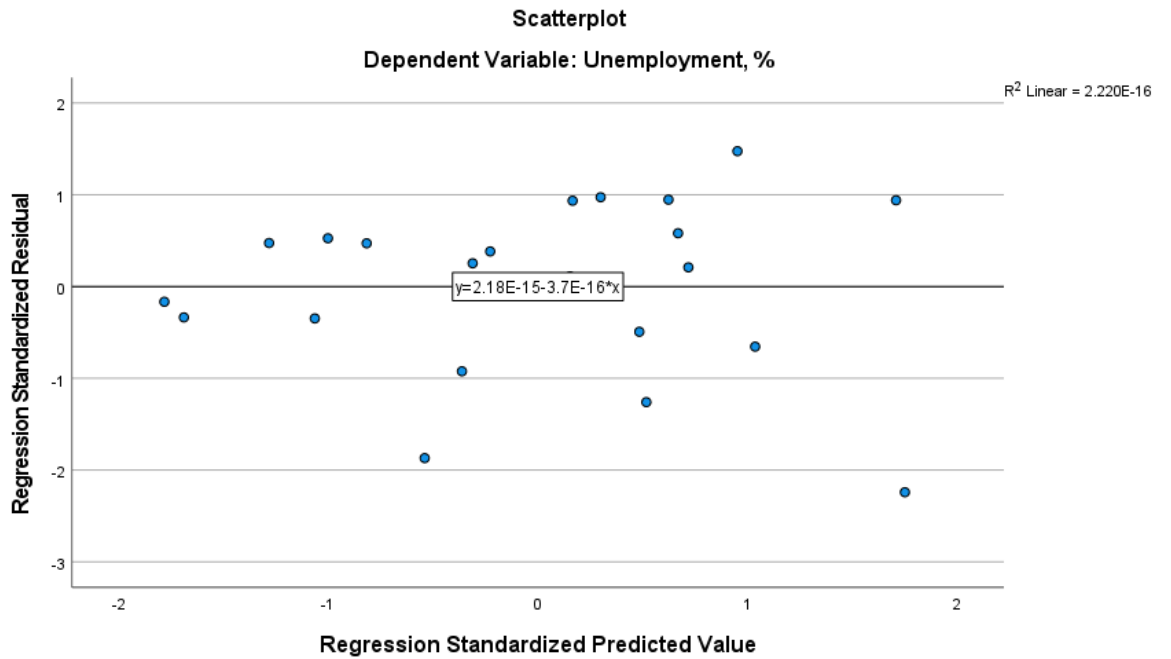
```
Null hypothesis: no autocorrelation  
Test statistic: LMF = 1.85702  
with p-value = P(F(1, 18) > 1.85702) = 0.189777
```

Source: Own processing based on data from The Ukrainian Statistical Office

Significance of 0.18 is greater than 0.05, so the author suggests that the model currently has no problem of autocorrelation of the first order.

Finally, the author checks if residuals are independent, i.e., homoscedastic. The plot below shows how observed values are getting dispersed with increasing values of the predicted values, which indicates that perhaps the problem of heteroscedasticity is present. Of course, it's needed to be argued by White's test.

Figure 9 Residuals plot



Source: Own processing based on data from The Ukrainian Statistical Office

Picture 3 Heteroscedasticity

```
White's test for heteroskedasticity -  
Null hypothesis: heteroskedasticity not present  
Test statistic: LM = 9.68816  
with p-value = P(Chi-square(5) > 9.68816) = 0.0845689
```

Source: Own processing based on data from The Ukrainian Statistical Office

0.08 is greater than 0.05, so the author is able to conclude that residuals are not heteroscedastic, which is a good sign for the model.

All in all, the model created by the author shows a solid quality and an absolute compliance with the fundamentals of econometrics. Following the regression analysis, the author concludes that there are just factors that influence the development of unemployment rate in Ukraine the most and these are: FDI net inflow and interest rate. In the following chapter, the author will summarize his findings.

5 Results and Discussion

The interpretation of seasonality suggests that there is a strong periodical tendency in the development of the unemployment index, with the first quarter of the year having the highest unemployment rate. This can be attributed to the non-harvested period as Ukraine is an agricultural country. The agricultural sector is a significant contributor to the Ukrainian economy. The majority of the population is involved in agriculture, and this leads to a higher unemployment rate during the non-harvested period.

A detailed analysis of the unemployment rate between the years 2013 and 2021 reveals some interesting insights into the differences in unemployment levels between men and women. The data suggests that the higher percentage of girls entering primary school, compared to boys, in the period leading up to 2010 may have contributed to this disparity. As graduates from this period began actively looking for work from 2017 onwards, the unemployment rate improved significantly. However, the analysis also showed that individuals between the ages of 15 and 24 are more vulnerable to unemployment than adults. It is important to note that this group may require additional support and resources to help them find employment and establish a career path.

The regression analysis the unemployment phenomenon in Ukraine from 2000 to 2021. The author assumes an econometric model to identify the most important factors influencing unemployment, which includes minimum monthly wage, inflation rate, FDI net inflow, interest rate, change in workforce, and GDP as predictors. The author estimates parameters of the model using the OLS method and checks the significance of the whole model using F-test, which indicates that the model is significant. To check the significance of individual predictors, the author uses T-test and finds that only FDI net inflow and the interest rate are significant.

For improvement, the author creates a model using the Stepwise method, which gives three possible models. Firstly, author chose the model, which includes FDI net inflow, inflation rate, and interest rate. The R-squared value of the model was 0.836, indicating that it explains the large proportion of the variance in the dependent variable among these three models.

Nevertheless, because of high correlation between interest rate and inflation rate, the author decided to use the second model that includes only FDI net inflows and the interest rate.

The author checked the model's compliance with the assumptions of normality, absence of autocorrelation, and homoscedasticity using Jarque-Bera test, Breusch-Godfrey test, and White's test. The author concludes that the model created shows a solid quality and an absolute compliance with the fundamentals of econometrics.

$$Y = 9.417 - 0.341X_{1t} + 0.73X_{2t}$$

The FDI influences unemployment in Ukraine positively, while the interest rate has a negative impact on unemployment. It can be useful in designing effective programs and policies to reduce unemployment in Ukraine.

6 Conclusion

In conclusion, this paper has provided a comprehensive analysis of the phenomenon of unemployment in Ukraine, utilizing various analytical methods and tools, including demographic development analysis and regression analysis. The paper has achieved its three main objectives of analyzing the different types of unemployment, examining the demographic structure of the country and its impact on unemployment, and identifying predictors of unemployment in Ukraine.

The analysis has revealed that there are various types of unemployment in Ukraine, which have unique characteristics and impacts on the economy and society.

Furthermore, regression analysis has identified several economic factors that influence the unemployment rate in Ukraine. Thus, the unemployment rate in Ukraine is most affected by FDI, interest rate and inflation rate. Based on this, recommendations for reducing the unemployment rate are proposed:

Attract more foreign direct investment: Given that FDI net inflow has a negative relationship with unemployment rate, increasing FDI in the country can help decrease unemployment. The government can create policies and incentives to attract foreign investors to invest in different sectors of the economy, such as infrastructure, manufacturing, and technology. The results suggest that policy interventions aimed at improving these factors could effectively mitigate the negative impacts of unemployment in the country.

Reduce the interest rate: The interest rate has a positive impact on the unemployment rate, which means that reducing the interest rate can help decrease unemployment. The government should cooperate with the central bank to create policies that will lead to a reduction of interest rates.

Overall, this paper has provided valuable insights into the complex issue of unemployment in Ukraine, highlighting the need for evidence-based policies and programs to address the diverse challenges faced by the country's labor.

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