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Macroeconomic Determinants of Unemployment in Kazakhstan: An ARDL Approach

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ABSTRACT

Despite the fact that in Kazakhstan unemployment rate has remained stable over the past few years, the gap between social classes and other indicators point to a much higher actual unemployment rate in Kazakhstan and existing hidden unemployment. It is expected that by 2030, there will be high demographic pressure on the labor market that led to increased unemployment. To effectively manage the employment and unemployment, it is necessary to identify the influencing factors. The aim of this article is to define and evaluate the macroeconomic determinants of unemployment in Kazakhstan. To achieve the research, an autoregressive distributed lag model of the effect of the oil price, foreign direct investment, gross capital formation, inflation, GDP per person employed, broad money, gross national expenditure and general government expenditure on unemployment rate was used. Information base of the study was a secondary data of World Data Bank Indicators (WDI) and Macrotrends.com from 1993 to 2022. According to the findings, in short-run and long-run perspectives oil price and general government spending have positive effect on unemployment. Gross capital formation and Inflation have negative effect on unemployment rate. Foreign direct investments don't have impact on the unemployment rate. Moreover, unemployment rate itself depends on its previous year's indicator. In order to develop the country's economy and to reduce unemployment, the state should intensify the development of infrastructure and domestic production, and structure of government spending should be reconsidered and carefully monitored.

INTRODUCTION

The modern labor market is a sophisticated system that connects people to jobs and influences crucial variables like economic growth and productivity and public policy. One of the key indicators in labor market is an unemployment. This indicator has been the focus of discussion and research work for many years by scientists around the world. Furthermore, unemployment is a metric that significantly influences the socioeconomic standing of people, families, and communities.

Ngubane et al. (2023) found that unemployment raises poverty over time in both linear and nonlinear models when they looked at the relationship between unemployment, economic growth, and poverty in South Africa. According to Kacar and Yildirim (2020), unemployment is a significant factor in the prevalence of poverty and can also fuel criminal activity within society. They further state that long-term unemployment has serious social repercussions, such as health issues, isolation, and higher crime rates, exacerbating the existing socio-economic challenges faced by the country. Losing a job has a significant impact on the economy in addition to an individual's income and employment prospects (Davis et al., 2011). In order to support workers during a downturn in the economy, the government must provide targeted assistance as well as reemployment services. Zhang and Banerjee (2021) found that unemployment limits each person's ability to contribute to the growth and development of the nation. Those who are unemployed may lose the skills necessary to enter the labor market or may find it difficult to acquire these skills, which can result in long-term socioeconomic losses. Niken et al. (2023) examined the relationship between economic growth, inflation, and unemployment, and concluded that both variables had a negative effect on the country's output growth over the long and short terms. When unemployment is consistent over the short term, output has a positive, temporary effect on inflation. However, in the long run, the rise of both indicators does not impede economic growth. In this situation, the authors recommend allocating a portion of government revenue to the real sector in order to boost employment and productivity.

Unemployment in Kazakhstan rose from 1993 to 1999, it began to fall during the second European debt crisis and the first wave of COVID-19 pandemics. According to Bureau of national statistics of Agency for strategic planning and reforms of the Republic of Kazakhstan, in 2023 the unemployment rate was 4.7% (BNS RK, 2023). Despite the fact that it has remained stable over the past few years, the gap between social classes and other indicators point to a much higher actual unemployment rate in Kazakhstan. Having studied the socio-economic factors of the country, Mukhamediyev et.al (2023) came to conclusion that hidden unemployment, decline in real income of the population can cause unrestraints in some areas of Kazakhstan. It is expected that by 2030, in Kazakhstan there will be high demographic pressure on the labor market that led to increased unemployment. To effectively manage the employment and unemployment, it is necessary to substantiate the importance of this process by identifying the influencing factors (Sekerbayeva et al., 2024).

This study aims to define and evaluate the macroeconomic determinants of unemployment in Kazakhstan. The structure of the article is as follows: section-1 describes the theoretical basis of the study and the research hypotheses; section-2 describes the methodology and data that were used; section-3 consists of empirical findings and discussions, and conclusion.

1. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

1.1 Theoretical Background

The development of the economy was greatly influenced by Keynes' book «The General Theory of Employment, Interest, and Money» (1936). The concept states that the decrease in total consumer demand leads to a decrease in the production of goods and services. Reduced production leads to the impoverishment of small producers, the dismissal of wage earners by large enterprises and large-scale unemployment. Unemployment brings down income, that is, buyers. This, in turn, spurs a further decline in consumer demand for goods and services. The economy is unable to adapt to falling demand due to the rigidity of prices and wages. Employees refuse to cut wages, and companies may not always be able to afford it in the right amount, and it is not profitable for companies to lower prices even if demand falls. This can hinder competition, costs, so they can only wait. As a result, due to the uncertainty of market housefolds start tighten the purse strings, manufacturers can not sell products at the same prices and reduce production, lay off employees. The economy is trapped in a chronic depression by a vicious circle. In such case the doctrine of «laissez-faire» does not work, so the state should support the demand and help the economy find balance: increase budget spending, reduce taxes, increase the money supply. He argued that to

provide employment for the labour force and production equipment, governments should use fiscal policy wisely. Using government revenues and expenditures correctly, it can positively increase the economy.

Studies indicate that public spending negatively affects unemployment, and unemployment naturally has an impact on household spending. Holden and Sparrman (2018) noted that government expenditures have the potential to boost the economy and reduce joblessness. Additionally, Ahsan et al. (1992) discovered a short-term positive correlation but a long-term negative relationship between public spending and the unemployment rate. Saraireh (2020) tested the relationship between unemployment and public spending in Jordan and came to the conclusion that funding for infrastructure, healthcare, and education should be prioritized in order to lower long-term unemployment. Additionally, if the government provides equal opportunity for the private sector to launch a business, unemployment will be decreased. Kolsrud et.al (2018) demonstrated that during a period of unemployment, consumption spending decreases by 33%. It implies that households are unable, in some way, insure themselvesagainst job loss. Ganong and Noel (2019) demonstrated that spending and job search are highly sensitive to the amount of unemployment insurance benefits using de-identified bank account data. The job search increases and then decreases when benefits are used up. Penrose and La Cava (2021) argued that the average worker underestimates the likelihood of losing his job and that, in the event that he does, the length of his unemployment benefits may be greater than anticipated. This raises ethical and financial questions about why unemployment is dangerous.

According to Friedman (1968), technology advancements, monetary policy adjustments, the development of human resources, and macroeconomic shifts in the economy all have an impact on unemployment. Gatti et al. (2009), Wang (2021) and others studied relationship between money supply and unemployment. For example, Bassey (2017) showed that in the long-run, money supply has significant pass-through effect on unemployment rate, and emphasizes the importance of properly accounting for short-term symmetries (asymmetries) to shed light on potentially significative policy differences between positive and negative shocks. Del Negro et al (2015) argued that an increase in the money supply would lead to a slowdown in money circulation and real income would rise, which in turn would motivate aggregate demand, allowing the economy to reach full employment. While monetarists such as Humphrey (1974), Brunner et al (1980), Friedman and Schwartz (2008) showed that inflation increases proportionally with the growth of the money supply, so governments must control the price level. Phillips (1958) showed inverse relationship between unemployment rate and inflation in short-term period in UK. According to the concept, the unemployment rate is inversely proportional to the inflation rate. This means that the state, when implementing policies aimed at reducing unemployment, will inevitably face an increase in inflation, and vice versa. Subsequently, Samuelson and Solow (1960) reported same correlation of aforementioned indicators in USA. Unluckily, the stagflation of the 1970s disproved this concept. Ait Lahcen et al. (2022) used a standard monetary model with two shocks and demonstrated that trend inflation has effects on unemployment, output and welfare. Also, the long-run positive correlation between expected inflation and unemployment in the US was validated by Berentsen et al.'s (2011) research work by combining labor and goods market frictions. Khraief et al. (2015) conducted an empirical analysis, which revealed that the cross-sectional and structural break assumptions rule out the existence of unemployment hysteresis hypothesis in the selected countries. Consequently, governments do not require costly macroeconomic stabilization policies.

Mussard and Philippe (2006) connects the unemployment rate through gross domestic product (GDP) with the effectiveness of the employer's use of his resources by examining the dependence of the unemployment rate in period t on the level of GDP and inflation in period t-1. According to them, employers can gauge how efficiently they use their resources and how quickly they adopt new technologies by measuring the unemployment rate using the GDP. Anderson (2024) concluded that labor market policies should be based on evidence that takes into account the various needs and circumstances of workers and firms in different sectors and regions after studying labor market flexibility and unemployment in the United States.

Examining how trade openness, GDP, foreign direct investment (FDI), and oil prices affect Saudi Arabia's unemployment rate, Alfalih (2024) discovered that the unemployment rate is influenced by each of these indicators. Trade liberalization can lower unemployment and attract foreign direct investment,

allowing foreign businesses to hire unemployed people by creating new job opportunities. Okada and Samreth (2014) and Pegkas (2015) support the theory indicating that FDI positively affects economic growth. Gohou and Soumaré (2012) discovered a strong and positive correlation between FDI inflows and the decline of poverty in Africa. Effective and efficient government management plays a critical role in the impact of foreign direct investment on the host nation. Triatmanto and Bawono (2023) discovered evidence of a significant relationship between human capital, corruption, and unemployment. But, by upholding human rights, thwarting corruption, and enhancing human potential, good governance lessens the detrimental effects of foreign direct investment on human development, according to research by Nam and Ryu (2023).

Additionally, the unemployment rate is statistically significant and negatively impacted by the oil price variable; however, in order to arrive at this conclusion, the minimum benchmark price must first be reached. Agboola et.al (2024) suggests that in order to better enable domestic firms to withstand oil shocks, the working quality of institutions should be improved. A clear negative correlation between energy prices and overall output and employment measures was demonstrated by Hamilton (1983), indicating that rising oil prices may have a negative impact on macroeconomic efficiency. There is a correlation between changes in oil prices and unemployment, as demonstrated by various econometric tests involving different variables. Mellquist and Femermo (2007) found that this relationship holds true in Sweden.

Therefore, according to the available literature analysis, the main macroeconomic factors influencing the unemployment are the public spending, inflation, GDP, FDI, and oil price. So, oil price, foreign direct investment, gross capital formation, inflation, GDP per person employed, broad money, gross national expenditure and general government expenditure were taken as factors influencing on unemployment rate.

1.2 Hypothesis Development

As a country transitioned from an administrative-command system to a market economy, the government of Kazakhstan is involved in regulating market relations. In this case oil and gas industry of Kazakhstan has an important role in the development of the country, provides a significant portion of tax revenues to the country's budget and forms about a quarter of GDP.The nation is vulnerable to fluctuations in global oil prices. It should be noted that the mining received the greatest volume of investments, including FDI. In this regard, it is important to define and evaluate the impact of government spending, money supply, fluctuation of oil price and volume of FDI on the unemployment rate in Kazakhstan.

The following hypotheses were proposed:
*H1: Government spending (*GNE) *has negative effect on unemployment rate.*
H2: Inflation has negative effect on unemployment rate.
H3: FDI have negative effect on unemployment rate.
H4: Oil price has negative effect on unemployment rate.

The considered hypotheses were studied in developed countries, with market economies and during a certain period. This study considers how these concepts correspond to Kazakhstan and the period under review.

2. METHODOLOGY

2.1 Data

The current study examines the impact of key macroeconomic factors on the unemployment rate in the Republic of Kazakhstan. The study uses data for the period from 1993 to 2022, which was obtained by World Data Bank Indicators (WDI), and Macrotrends.com. The identified macroeconomic variables in this study are: unemployment (UNEMP) (dependent), foreign direct investment (FDI), oil price (POIL), inflation (INF), gross capital formation (GCF), GDP per person employed (GDPPE), broad money (BM), gross national expenditure (GNE) and general government expenditure (GGE), (Table 1).

Table 1. Model Variables and Sources

Variable	Definition	Source
UNEMP	Share of the labor force that is without work but available for and seeking employment (%)	World Development Indicators (WDI)
POIL	West Texas Intermediate (WTI or NYMEX) crude oil prices per barrel	Macrotrends.net
FDI	Direct investment equity flows in the reporting economy, the sum of equity capital, reinvestment of earnings, and other capital (current U.S. dollars)	WDI
GCF	Outlays on additions to the fixed assets of the economy (land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings) plus net changes in the level of inventories.	WDI
INF	Annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.	WDI
GDPPE	Gross domestic product divided by total employment in the economy. Purchasing power parity (PPP) GDP is GDP converted to 2017 constant international dollars using PPP rates.	WDI
BM	Sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveler's checks; and other securities such as certificates of deposit and commercial paper	WDI
GNE (% of GDP)	Sum of household final consumption expenditure, general government final consumption expenditure, and gross capital formation.	WDI
GGE (% of GDP)	All government current expenditures for purchases of goods and services (including compensation of employees).	WDI

Source: compiled by authors

2.2 Method

The relationship between the unemployment rate and explanatory factors in the Republic of Kazakhstan in the period 1993–2022 is considered. In this case, the unemployment rate is determined by the following equation:

$UNEMP_t = f(FDI_t, POIL_t, INFt, GCF_t, GPPE_t, BM_t, GNE_t, GGE_t)$, (1)

where all of their definitions and measurements are given in the Table 1 above.

Before studying long-term relationships between series, it is important to determine whether they are stationary. There are many unit root tests available to determine if a series is stationary and if there are regression problems. This study used Augmented Dickey-Fuller (ADF) unit root tests to examine levels or differences of variables considered to be stationary. Some variables can be used at level I(0), while other variables are static at first difference I(1). Moreover, further cointegration methods are sensitive to the sample periods. For the purpose of this study, the ARDL methodology is used, in order to determine the suitability of the ARDL model for the study, the order of integration of variables is considered, and a maximum of one lag is selected by a special test.

The nonlinear NARDL model and linear ARDL models were evaluated using logarithms and first difference, respectively, and the long-term and short-term analysis of the relationship between variables was conducted. There were 3 main models created.

As model 1, the linear model specification was converted to the log-linear specification. The log-linear specification, that is, the parameters of the rank model show flexibility, gives more accurate and efficient results than the simple linear functional form:

A) In the non-linear autoregressive distributed lag model NARDL procedure is the determining the co-integration existence between the sampled variables. The bounds test examines long-run relationships, where the NARDL framework of the model 1 is expressed in Equation 2:

$$\Delta LogUNEMP_t = b_0 + b_1 \cdot Log\Delta UNEMP_{t-1} + b_2 \cdot \Delta logPOIL_t + b_3 \cdot \Delta logPOIL_{t-1} + b_4 \cdot \Delta logFDI_t + b_5 \cdot \Delta logFDI_{t-1} + b_6 \cdot \Delta logGCF_t + b_7 \cdot \Delta logGCF_{t-1} + b_8 \cdot \Delta logINF_t + b_9 \cdot \Delta logINF_{t-1} + b_{10} \cdot \Delta logGDPPE_t + b_{11} \cdot \Delta logGDPPE_{t-1} + b_{12} \cdot \Delta logBM_t + b_{13} \cdot \Delta logBM_{t-1} + b_{14} \cdot \Delta logGNE_t + b_{15} \cdot \Delta logGNE + b_{16} \cdot \Delta logGGE_t + b_{17} \cdot \Delta logGGE_t, \quad (2)$$

where, operator Δ represents the differencing operation, and Log signifies the natural logarithm of the variables.

B) The NARDL model uses a semi-log-linear specification, i.e. in the form of an exponential model estimated as the following Equation 3:

$$\Delta LogUNEMP_t = b_0 + b_1 \cdot \Delta UNEMP_{t-1} + b_2 \cdot \Delta POIL_t + b_3 \cdot \Delta POIL_{t-1} + b_4 \cdot \Delta FDI_t + b_5 \cdot \Delta FDI_{t-1} + b_6 \cdot \Delta GCF_t + b_7 \cdot \Delta GCF_{t-1} + b_8 \cdot \Delta INF_t + b_9 \cdot \Delta INF_{t-1} + b_{10} \cdot \Delta lGDPPE_t + b_{11} \cdot \Delta GDPPE_{t-1} + b_{12} \cdot \Delta BM_t + b_{13} \cdot \Delta BM_{t-1} + b_{14} \cdot \Delta GNE_t + b_{15} \cdot \Delta GNE + b_{16} \cdot \Delta GGE_t + b_{17} \cdot \Delta GGE_t, \quad (3)$$

C) The ARDL linear model is estimated as Equation 4:

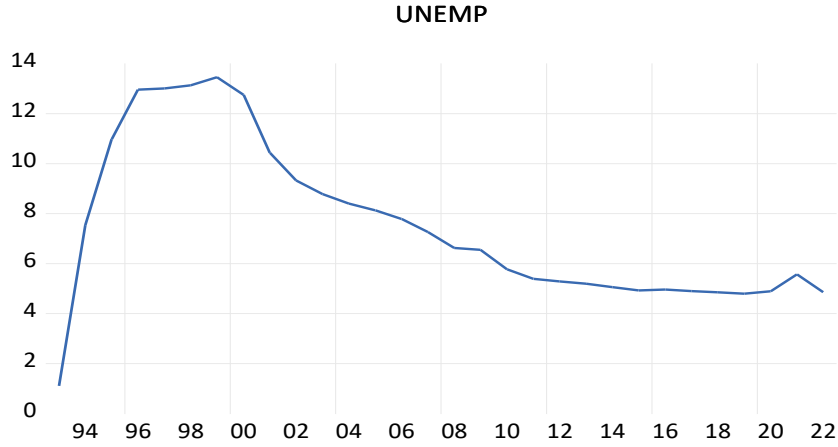
$$\Delta UNEMP_t = b_0 + b_1 \cdot \Delta UNEMP_{t-1} + b_2 \cdot \Delta POIL_t + b_3 \cdot \Delta POIL_{t-1} + b_4 \cdot \Delta FDI_t + b_5 \cdot \Delta FDI_{t-1} + b_6 \cdot \Delta GCF_t + b_7 \cdot \Delta GCF_{t-1} + b_8 \cdot \Delta INF_t + b_9 \cdot \Delta INF_{t-1} + b_{10} \cdot \Delta lGDPPE_t + b_{11} \cdot \Delta GDPPE_{t-1} + b_{12} \cdot \Delta BM_t + b_{13} \cdot \Delta BM_{t-1} + b_{14} \cdot \Delta GNE_t + b_{15} \cdot \Delta GNE + b_{16} \cdot \Delta GGE_t + b_{17} \cdot \Delta GGE_t, \quad (4)$$

To test H1-H4, the results were estimated using the above equations in order to study the effect of the above variables on the unemployment rate in the Republic of Kazakhstan.

3. EMPIRICAL RESULTS AND DISCUSSION

3.1 The dynamic change of all indicators

Analyzing the graph shown in Figure 1 makes clear that the variables of the study are suitable for analysis. The graphs clearly show consistent and consistent time patterns, suggesting that variables' changes are suitable for further study.



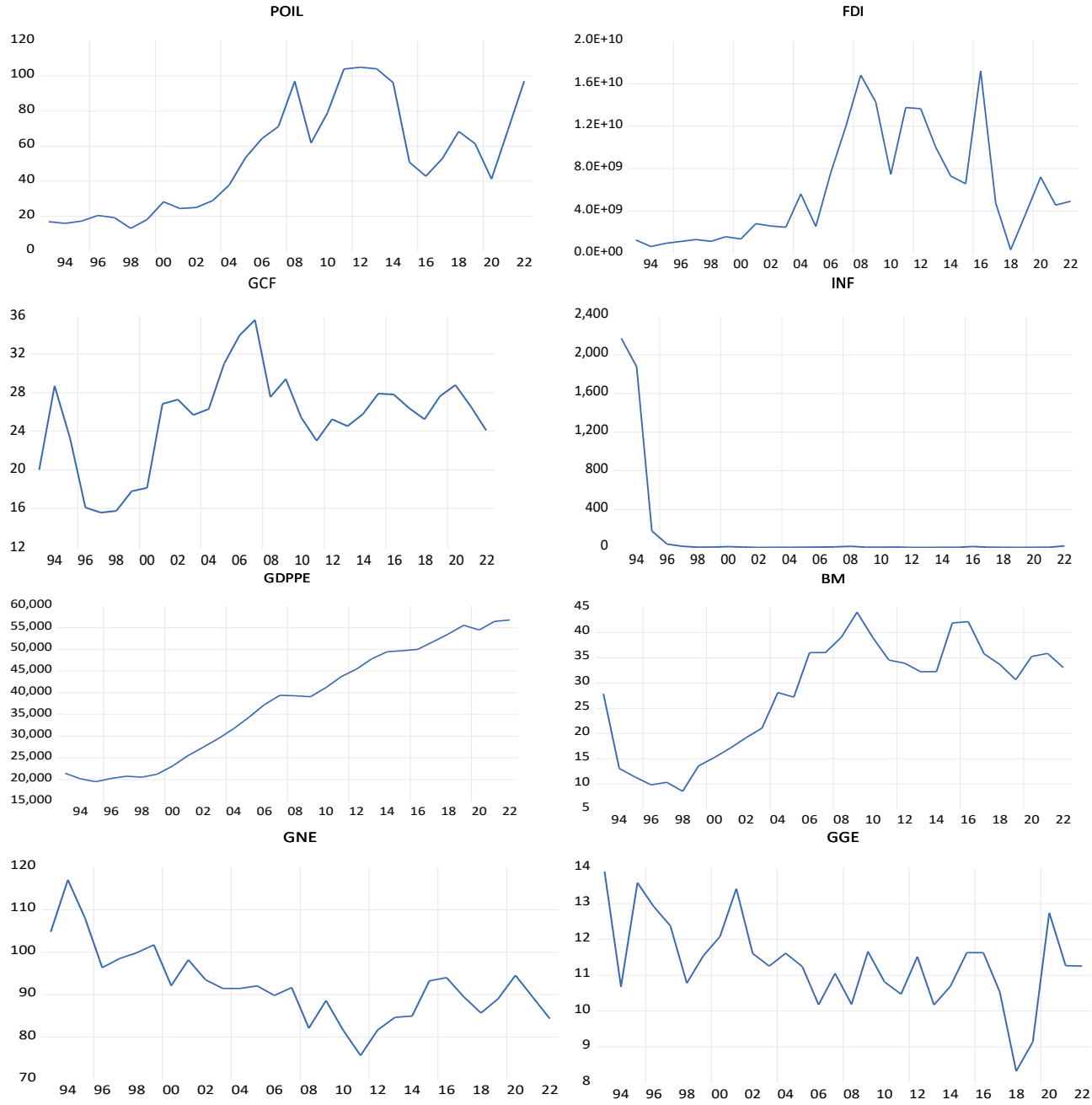


Figure 1. Evolution of all variables for Kazakhstan (1993–2022)
Source: Authors' analysis results

GDP per person employed of Kazakhstan on either side of COVID-19 was a good bit of stable; nevertheless during pandemic crisis it dramatically diminished, and its effect we can see on all graphs. As of 1998, inflation in Kazakhstan has declined from 17.4% to 7.1% from 1997, and in 2009 it fell from 17.4% to 7.3% compared to 1998. Unemployment rose from 1993 to 1999, and it began to fall during the second European debt crisis and the first wave of COVID-19 pandemics.

3.2 Descriptive Statistics

The study used time series variables. In the study, the mean, median, standard deviation, minimum, maximum, asymmetry, and Hark-Behr statistics for each variable used in model, and their respective characteristics are described in Table 2. The study validates the variables by mean, median, asymmetry, and minimum and maximum variables.

Table 2. Values of Descriptive Statistics of the Displayed Series

Variable	*UNEMP*	*POIL*	*FDI*	*GCF*	*INF*	*GDPPE*	*BM*	*GNE*	*GGE*
Mean	7.49	52.81	5.92E+09	25.25	149.87	37545.02	27.93	92.19	11.34
Median	6.59	51.781	4.66E+09	26.05	7.81	39185.53	32.24	91.57	11.26
Maximum	13.46	105.01	1.72E+10	35.53	2169.80	56760.13	44.02	117.04	13.90
Minimum	1.11	13.06	3.53E+08	15.60	5.10	19503.68	8.57	75.67	8.32
Std. Dev.	3.21	30.91	5.13E+09	4.91	511.72	13201.91	10.99	8.58	1.22
Skewness	0.53	0.36	0.87	-0.38	3.49	-0.03	-0.47	0.76	-0.00
Kurtosis	2.41	1.82	2.559353	2.97	13.30	1.54	1.85	3.98	3.37
Jarque-Bera	1.84	2.38	4.055820	0.71	193.39	2.69	2.76	4.05	0.17
Probability	0.40	0.30	0.131610	0.70	0.00	0.26	0.25	0.13	0.92
Sum	224.71	1584.26	1.78E+11	757.41	4496.164	1126351.0	837.88	2765.58	340.28
Sum Sq. Dev.	299.67	27712.17	7.64E+20	700.34	7593792.	5.05E+09	3504.41	2137.20	43.39
Observations	30	30	30	30	30	30	30	30	30

Source: authors' analysis results

Based on descriptive statistics, the median of the sample is 6.59 and the standard deviation is 3.215. The value of the Jarque-Bera statistic is 1.85, the probability of the link being 0.40, which is greater than 0.05, so it can be concluded that the series is evenly distributed. The median oil price is 51.78% and the standard deviation is 30.65. FDI, INF, GDPPE likewise exhibited substantial variation as evidenced by its large standard deviation (7.64E+20; 7593792; 5.05E+09) indicating heterogeneity in economic growth over the period. The Jarque-Bera 2.386 statistic that approaches the probability of 1.22, which means that at a 5% significance level, the zero normal distribution hypothesis is confirmed. In table 2, we see that for GCF, GDPPE, BM, GGE, the time series asymmetry ratio is less than zero, which is to say they have left asymmetry, and for the rest there is a right asymmetry.

3.3 Correlation matrix

Table 3 shows several significant relationships among the variables, including pairwise correlation analysis. It shows the Pearson correlation between each pair of all variables in this study. The correlations of all series variables do not exceed 0.9.

Table 3. Correlation Matrix

Variable	*UNEMP*	*POIL*	*FDI*	*GCF*	*INF*	*GDPPE*	*BM*	*GNE*	*GGE*
UNEMP	1.000								
POIL	-0.586	1.000							
FDI	-0.439	0.666	1.000						
GCF	-0.502	0.375	0.445	1.000					
INF	-0.270	-0.335	-0.273	-0.076	1.000				
GDPPE	-0.733	0.735	0.479	0.475	-0.362	1.000			
BM	-0.805	0.715	0.734	0.641	-0.192	0.817	1.000		
GNE	0.399	-0.851	-0.584	-0.210	0.600	-0.668	-0.654	1.000	
GGE	0.286	-0.546	-0.206	-0.308	0.260	-0.526	-0.383	0.504	1.000
Probability	0.40	0.30	0.131610	0.70	0.00	0.26	0.25	0.13	0.92

Source: authors' analysis results

The unemployment rate (UNEMP) showed a negative correlation with all other variables except GNE, GGE. In particular, UNEMP is highly correlated with BM (r = -0.805) and GDPPE (r = -0.733). A weaker relationship is observed between UNEMP and GGE (0.286). Overall, the correlation analysis provides preliminary evidence of a relationship between macroeconomic indicators. These results indicate that the data are suitable for time series analysis and can be used to study the correlation between independent variables and the unemployment rate in Kazakhstan.

3.4 Unit Root Test

Table 4 presents the results of the unit root test of the extended Dickie Fuller (ADF) for the series at level and first difference, as the optimal lag is the first step in the measurement of the ARDL models. ADF test the non-stationary null hypothesis, which is rejected if ADF is more negative or exceed the absolute critical values of 1%, 5% and 10%. The results show that all variables except UNEMP, INF, GGE are not stationary at the level. However, these variables are stationary in the first difference.

Table 4. ADF Unit Root Tests

Variable	*Intercept*			*Trend and intercept*		
	Level	*First diff.*	*Order of Integration*	*Level*	*First diff.*	*Order of Integration*
UNEMP	-1.6243 (0.4569)	-1.7117*** (0.0001)	I(1)	-5.0998*** (0.0015)	-5.0987 *** (0.0028)	I(0)
POIL	-1.3549 (0.5901)	-4.6075*** (0.0010)	I(1)	-2.0092 (0.5721)	-4.5016*** (0.0067)	I(1)
FDI	-2.4790 (0.1307)	-5.9353*** (0.0000)	I(1)	-2.5509 (0.3035)	-5.9637*** (0.0002)	I(1)
GCF	-2.2763 (0.1859)	-5.6592*** (0.0001)	I(1)	-2.2190 (0.4621)	-5.5271*** (0.0006)	I(1)
INF	-6.0613*** (0.0000)	-4.1591*** (0.0032)	I(0)	-5.18744*** (0.0012)	-4.5603*** (0.0058)	I(0)
GDPPE	0.4387 (0.9812)	-3.7896*** (0.0079)	I(1)	-2.9361 (0.1666)	-3.5711*** (0.0510)	I(1)
BM	-1.1019 (0.7013)	-58079*** (0.0000)	I(1)	-2.3483 (0.3968)	-2.6514*** (0.0004)	I(1)
GNE	-2.1386 (0.2319)	-7.0318*** (0.0010)	I(1)	-2.6737 (0.2537)	-7.2069*** (0.0000)	I(1)
GGE	-4.4818** (0.0014)	-4.5466*** (0.0014)	I(0)	-5.1273*** (0.0014)	-5.6554*** (0.0005)	I(0)

Note: *, **, *** denote statistically significant at the 10%, 5% and 1% levels, respectively, p-value is inside brackets.
Source: authors' analysis results

The unit root results are consistent with the underlying assumptions, which require the use of the ARDL model test to confirm the existence of long-term relationships between Kazakhstan's unemployment rate and the macroeconomic factors proposed in the study.

3.5 Granger Causality Test

To study the causal relationship between the selected variables and the unemployment rate, a Granger test is performed, which tests the null hypothesis that the changes in the dependent variable are not causal (Noncausality). The acceptance criterion is called the P-value. If P is less than 0.05, the null hypothesis is rejected. According to the Table 5, the null hypothesis is not accepted for all variable.

Table 5. Noncausality Tests in the Sense of Granger for the Vector Autoregressive (1) (1993-2021)

Direction of causality	*Chi-sq*	*df*	*Prob.*
UNEMP			
POIL does not Granger cause UNEMP	0.0661	1	0.7971
FDI does not Granger cause UNEMP	0.0824	1	0.7741
GCF does not Granger cause UNEMP	1.8557	1	0.1731
INF does not Granger cause UNEMP	0.9750	1	0.3234
GDPPE does not Granger cause UNEMP	2.7227	1	0.1089
BM does not Granger cause UNEMP	0.8544	1	0.3553
GNE does not Granger cause UNEMP	1.1751	1	0.2784
GGE does not Granger cause UNEMP	0.0016	1	0.9678

Source: authors' analysis results

3.6 Results of Long– and Short- Run Relationship

In the course of the study, using logarithms and the first difference according to the results of the ADF test, the nonlinear NARDL (equation 2 and 3) and linear ARDL (equation 4) models were evaluated, respectively, and in order to conduct a long-term and short-term analysis of the relationship between the variables, the obtained results are presented in the following table.

Cointegration F-test results for all 3 models (Table 6) indicate that the obtained F-statistic exceeds the upper limit of 3.77 and is statistically significant at the significance level of 10% and 5%, respectively. The results show that the selected variables are cointegrated and in the Kazakhstan case, a long-run relationship between the variables is found.

Table 6. Results of Cointegration Test

Model	*F Statistics*	*Critical Bounds*	*Decision*
Model 1	20.95	2.85-3.77	Cointegration
Model 2	11.82	2.85-3.77	Cointegration
Model 3	4.73	2.85-3.77	Cointegration

Note: critical bounds are reported at 1% (***) and 10% (**) level of significance.
Source: authors' analysis results

Given the long-run cointegration of the sample variables, the next step is to estimate the long-run and short-run coefficients. Given the logarithmic estimate of NARDL Model 1 for both the long and short runs, it is possible to estimate the effect of a shock to 1% of the explanatory variables on the dependent variable.

Table 7. Results of NARDL and ARDL Estimation Unemployment (1993-2021)

Model 1- results of NARDL estimation ΔlogUNEMP		*Model 2- results of NARDL estimation ΔlogUNEMP*		*Model 3- results of ARDL estimation ΔUNEMP*	
Variable	*Coefficient*	*Variable*	*Coefficient*	*Variable*	*Coefficient*
Short Run					
ΔlogUNEMP(-1)	-0.8705*** (-7.2064)	ΔLOGUNEMP(-1)	-1.1166*** (-4.6791)	ΔUNEMP(-1)	-1.2412*** (-5.3790)
ΔlogPOIL	0.3002** (1.9371)	ΔPOIL(-1)	-0.0018 (-0.6163)	ΔPOIL(-1)	-0.0374 (-0.8782)
ΔlogFDI	-0.0043 (-0.1289)	ΔFDI	-1.48e-12 (-0.2199)	ΔFDI	-3.71e-11 (-0.3952)
ΔlogGCF	-0.8035*** (-2.2322)	ΔGCF(-1)	-0.0351** (-2.2020)	ΔGCF(-1)	-0.3138 (-1.4873)
ΔlogINF	-0.0631 (-1.0980)	ΔINF	-0.0005 (-1.6638)	ΔINF	-0.0046** (-2.3965)
ΔlogGDPPE	0.3843 (0.3110)	ΔGDPPE	3.29e-05 (0.8555)	ΔGDPPE	0.0003 (0.6277)
ΔlogBM	0.2626 (1.3987)	ΔBM	0.0106 (1.1831)	ΔBM	0.0852 (0.6816)
ΔlogGNE	0.0241* (2.0647)	ΔGNE	0.0046 (0.4337)	ΔGNE(-1)	-0.1052 (-0.6208)
ΔlogGGE	0.2079 (0.7244)	ΔGGE	0.0085 (0.2774)	ΔGGE	0.1359 (0.3164)
Long Run					
ΔlogPOIL	0.3448* (1.9453)	ΔPOIL	-0.0016 (-0.6212)	ΔPOIL	-0.0301 (-0.8950)
ΔlogFDI	-0.0050 (-0.1285)	ΔFDI	-1.32e-12 (-0.2183)	ΔFDI	-2.99e-11 (-03887)
ΔlogGCF	-0.9230* (-2.0035)	ΔGCF	-0.0315** (-1.9450)	ΔGCF	-0.2528 (-1.4009)
ΔlogINF	-0.0725 (-1.2229)	ΔINF	-0.0005*** (-2.4115)	ΔINF	-0.0037** (-2.7668)
ΔlogGDPPE	0.4415 (0.3050)	ΔGDPPE	2.95e-05 (0.7932)	ΔGDPPE	0.0003 (0.6033)
ΔlogBM	0.3017	ΔBM	0.0095	ΔBM	0.0686

	(1.3051)		(1.0659)		(0.6454)
ΔlogGNE	2.3251* (1.8262)	ΔGNE	0.0041 (0.4247)	ΔGNE	-0.0848 (-0.6289)
ΔlogGGE	0.2389 (0.7441)	ΔGGE	0.0076 (0.2713)	ΔGGE	0.1095 (0.3089)

Notes: 1) coefficients of constant values are not specified; 2) Student's t-statistics in parentheses; 3) coefficients are statistically significant at ***1%, **5%, *10% level of significance.
Source: authors' analysis results

According to Munasipova et al. (2018), low GDP per capita, low public spending on education, inflation, balance of trade and higher GINI index influence the increase in unemployment in Kazakhstan.

In this study, based on short-term estimates, it can be concluded that POIL and GNE are one of the determining factors among the selected variables that have a positive impact on unemployment. In other words, a 1% increase in POILs increases UNEMP by 0.3% at a 1% significance level, and a 1% increase in GNE increases UNEMP by 0.02% at a 1% significance level. Another interesting result is that the 1% decline in GCF overall reduces unemployment by 0.8%. Both short-term and long-term estimates also show that POIL and GNE have a positive impact on unemployment, with elasticities of 0.34 and 2.33 respectively. This highlights the impact of the growth of Average price of world crude oil and Gross national expenditure on rising unemployment. Gross capital formation is also statistically significant and has a negative elasticity. Thus, hypothesizes H1 and H4 has not been proven.

Model 2 showed that in the short term, the GCF of the previous year could have a negative impact on unemployment. GCF in the long run is also negatively correlated with the unemployment rate. Inflation (INF) has a negative effect on unemployment in the long term according to model 2, and in the short term according to model 3. Thus, hypothesis H2 has been proven.

FDI don't have impact on the unemployment rate in Kazakhstan. At the same time Moreover, the unemployment rate in the t period was confirmed to depend on its value in the t-1 period. This negative effect of the variable lag on unemployment is also confirmed in two other models. Thus, hypothesis H3 has not been proven.

CONCLUSION

This study defined and evaluated the impact of macroeconomic indicators such as oil price, foreign direct investment, gross capital formation, inflation, GDP per person employed, broad money, gross national expenditure and general government expenditure on unemployment rate in Kazakhstan. The results of the study allow to draw the following conclusions:

Firstly, in short-run and long-run perspectives oil price and general government spending have positive effect on unemployment. Gross capital formation and inflation have negative effect on unemployment rate. Foreign direct investments don't have impact on the unemployment rate. Moreover, unemployment rate itself depends on its previous year's indicator.

Secondly, in order to develop the country's economy and to reduce unemployment, the state should intensify the development of infrastructure and domestic production. Findings imply that structure of government spending should be reconsidered and carefully monitored. According to foreign experience, an increase in government spending reduces unemployment. So, the targeting of government spending and its effectiveness is very important here.

Thirdly, the economy should also be free from or least dependent on energy shocks. In terms of policy making, efforts should be directed toward the development of domestic production. This is due to the fact that the weak domestic production has made the country's economy dependent on fluctuating indicators such as world oil prices.

Lastly, the negative impact of both short-term and long-term CCP and inflation on the unemployment rate is in some sense natural. The effective use of gross capital formation for the production of capital goods and good fiscal policy aimed at reducing inflation can reduce the unemployment rate.

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