The Impact of population growth on unemployment rates in Blida Province: An analytical and econometric study for the period 2000-2022

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Abstract

This study aims to measure the impact of population growth on unemployment rates in Blidaprovince using the Autoregressive Distributed Lag (ARDL) model, relying on annual data from 2000 to 2002. The econometric study results indicate that the effect of population growth on unemployment rates was positive in the long run, while in the short run, although positive, the effect was not statistically significant. Among the findings is the presence of cointegration, and the error correction coefficient was statistically significant and negative, indicating that short-term unemployment rate errors are corrected within approximately 28 months, implying that the adjustment speed towards equilibrium in the long run takes about two years and four months. Diagnostic tests results showed that the model is devoid of the following problems : autocorrelation of errors, heteroscedasticity of errors, non-normality of errors. Additionally, the model is unstable, indicating inconsistency between the parameters of the long run and short run, rendering it unfit for prediction.

Keywords: Population Growth, Unemployment, Blida, ARDL

Jel Classification Codes: B23, J64, J11

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1. INTRODUCTION

Unemployment represents one of the most significant problems facing economies of countries at various levels. Its severity increases particularly in developing and poor countries. Algeria is among the countries that have suffered and continue to suffer from this phenomenon, despite the various strategies adopted by successive governments to combat it. According to the International Labour Organization, an unemployed is a person without a job, meaning they do not have employment in exchange for wages. Additionally, they are currently available for work while actively seeking employment at the same time (Byrne & Strobl, 2001, pp. 4-7).

The search for determinants of unemployment has received considerable attention from researchers and economic theorists. Identifying the key variables that influence this phenomenon can assist decision-makers in making short-term decisions and formulating long-term strategies to curb the expansion of this phenomenon, which has economic, social, and even political and security implications that sometimes threaten the stability of countries.

Among the most significant variables directly related to unemployment is population growth, which is subject to varying interpretations in studies. Some argue that population growth expands the labor force, thereby contributing to economic growth. Additionally, population growth can encourage competition and stimulate development and technological innovation (Wong & Fumitaka, 2005, pp. 314-330). Furthermore, statistics indicate that low population growth can lead to economic and social problems in high-income countries (Peterson, 2017, pp. 1-15). Moreover, countries that have experienced economic growth often exhibit an increase in population growth rates, as seen in the cases of China and India. On the other hand, economist Malthus in 1978 adopted a pessimistic view suggesting that population growth increases geometrically while production growth progresses arithmetically. Undoubtedly, this would lead the economy into the problem of unemployment due to the gap between population and production. The increase in population growth would have a negative impact in the short term, leading to higher costs of living, and in the long term, it would result in increased unemployment, especially in low-income countries. Additionally, population growth would be accompanied by increased utilization of available resources and a reduction in potential long-term growth. This idea has been embraced by a group of economists (Peterson, 2017, p. 1).

In this article, we shed light on the nature of the relationship between population growth and unemployment in Blidaprovince by posing the following main question :

What is the impact of population growth on unemployment in Blida province during the period (2000-2022)?

Study Hypothesis: To answer the posed question, we will rely on the following hypothesis:

There is a statistically positive relationship between population growth and unemployment rates in Blida province.

The Importance of the Study: This study holds significant importance as it deals with province statistical data, unlike previous studies that addressed this topic based on macroeconomic data. It addresses a local problem concerning the nature of the relationship between population growth and unemployment. Additionally, it will enable local authorities to review their long-term strategies and prepare developmental plans aimed at absorbing the

unemployed workforce in Blidaprovince, especially since it is considered one of the industrial regions.

Study Objectives: Through this study, we aim to shed light on the labor market in Blidaprovince and address its key indicators. Additionally, we seek to measure the impact of population growth on unemployment in Blida province.

Previous Studies: Previous studies that addressed this topic at the national level relied on statistical data at the macroeconomic level. Among the studies that intersected with our topic, we mention the following:

Researchers Samari and Ben El-Habib (2022, pp. 16-33) conducted a study titled "The Impact of Population Growth and Economic Growth on Unemployment Rates in Algeria: An econometric Study during the Period 1991-2020". The researchers utilized the methodology of the autoregressive distributed lag (ARDL) model and concluded that there is a negative relationship between population growth and unemployment in Algeria in both the short and long terms. Additionally, they found that economic growth is inversely related to the unemployment rate in both the short and long terms.

The researcher's study (Boudia, 2022, pp. 411-430) titled "Population Growth and Unemployment in Algeria 1990-2017," employed simple linear regression. The researcher found an inverse relationship between population growth and unemployment rates in Algeria, with a linear correlation coefficient of -0.159. Additionally, the fertility rate does not affect the unemployment rate in Algeria, while the life expectancy at birth has an inverse effect on the unemployment rate, with a linear correlation coefficient of -0.741.

The study by researchers Yahia and Kerbali (2020, pp. 139-152) titled "Demographic Growth and the Challenge of Unemployment in Algeria: Prospects for 2040" concluded that demographic growth in Algeria is not a major cause of unemployment. Instead, the primary reason is the structure of the national economy, which is built on imports and relies on the hydrocarbon sector. To address the requirements of demographic growth, there is a need to change and diversify the economic structure to absorb unemployment rates.

As for international studies, we find:

The study by researchers Babatunde & Awopetu (2020, pp. 98-106) titled "Population Growth and Unemployment in Nigeria" employed the method of Error Correction Mechanism (ECM) on yearly data spanning from 1991 to 2016. The results of this study revealed a negative relationship between population growth and unemployment rates. To combat unemployment, the researchers recommend the Nigerian government to create job opportunities, especially in the agricultural and industrial sectors.

The study by researchers Sadikova, Faisal, & Resatoglu (2017, pp. 706-711) titled "Influence of energy use, foreign direct investment, and population growth on unemployment for the Russian Federation" employed the method of Error Correction Model (ECM). The study found a statistically positive impact of both population growth and energy consumption on unemployment. Additionally, it indicated a bidirectional causality between unemployment and foreign direct investment on one hand and population and energy consumption on the other hand.

The study by researchers Biagi & Lucifora (2005, pp. 1-27), titled "Demographic and Education Effects on Unemployment in Europe: Economic Factors and Labour Market

Institutions," aims to assess the impact of demographic growth and education on unemployment rates in a sample of European countries during the period from 1980 to 2000. Among the key findings of this study is that demographic growth has an inverse effect on unemployment rates. Moreover, the structural changes in the age composition of the population in these European countries have an impact on unemployment rates, a factor often neglected in studies. Generally, the older, more educated demographic group experiences lower unemployment rates, whereas young, uneducated individuals face unemployment issues.

Studies conducted at the national level have varied in determining the nature of the relationship between population growth and unemployment. Some assert the presence of a positive relationship, while others argue for an inverse relationship. However, studies conducted at the level of Western countries affirm a positive relationship between these two variables. What distinguishes previous studies is their use of macroeconomic data, unlike our current study, where we will utilize local data specific to Blidaprovince, modeling it to determine the nature of the relationship between population growth and unemployment and comparing it with results applied at the national level.

We have divided this study into four parts. The first part will provide a descriptive and statistical analysis of labor market indicators and demographic growth in Blida province. Following that, we will present the methodology used in the study. The third part will present the results obtained and discuss them. Finally, in the fourth part, we will provide a summary containing the most significant findings, answer the research questions, and offer some recommendations.

2. Labor Market Indicators and Demographic Growth in Blida Province

Blidaprovince is one of the agricultural food poles in Algeria, hosting several major companies in this field, such as SIM Group, Semoulerie Amour, SOSEMIE, Couscous MAMA, specializing in pasta and flour production. In the dairy sector, there are companies like Okids, Trefl, Président, and Optima. Additionally, in the soft drinks and juice sector, notable companies include Hamoud Boualem, Orangina, and Vita Ju. In 2017, Blidaprovince recorded 20,036 small and medium-sized enterprises employing more than 60,969 individuals. The industrial fabric of the province consists of 5,141 production units, employing over 42,893 people, with approximately 40,810 in the private sector (FERDJ, 2020, pp. 376-377).

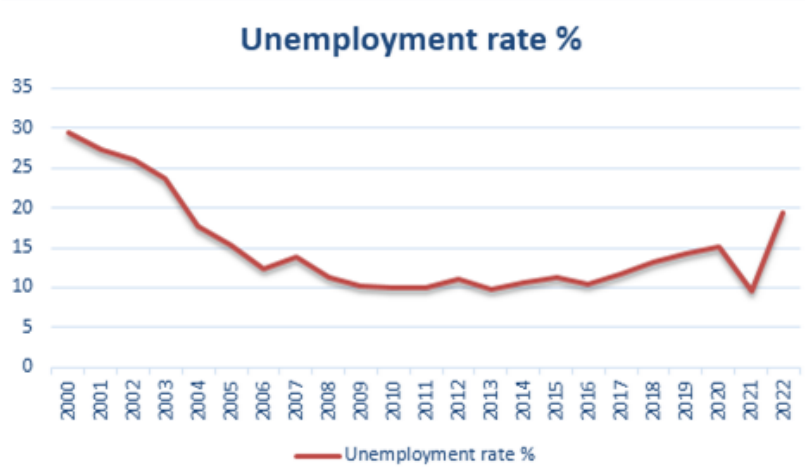
In this section, we will present the key indicators of the labor market in Blida province and its development path, along with an overview of the most important demographic indicators in this province.

2.1 Labor market indicators in Blida province (2000-2022)

One of the key indicators related to the labor market is the unemployment rate, which witnessed a significant decrease with the beginning of the third millennium. This period was characterized by the launch of financial expansion programs, coinciding with improved oil prices. This improvement allowed the province to create various mechanisms to absorb the unemployed workforce. Although most of the job positions created were temporary and predominantly in the public sector, the National Employment Agency was established by

Executive Decree No. 06/77 dated Muharram 17, 1427 corresponding to February 18, 2006. The National Employment Agency was established by Executive Decree No. 06/77 dated 17 Muharram 1427 corresponding to February 18, 2006. This agency acts as an intermediary between job offers and demand, as well as assists in organizing and understanding the labor market and its development. It is considered the effective tool of the province in performing its tasks as an intermediary in the labor market. Furthermore, it implements the province's employment policy as part of the action plan to promote employment and combat unemployment (National Agency for the Support and Development of Entrepreneurship, 2023). The following figure provides a detailed illustration of the development of unemployment rates in Blida province during the period (2000-2022).

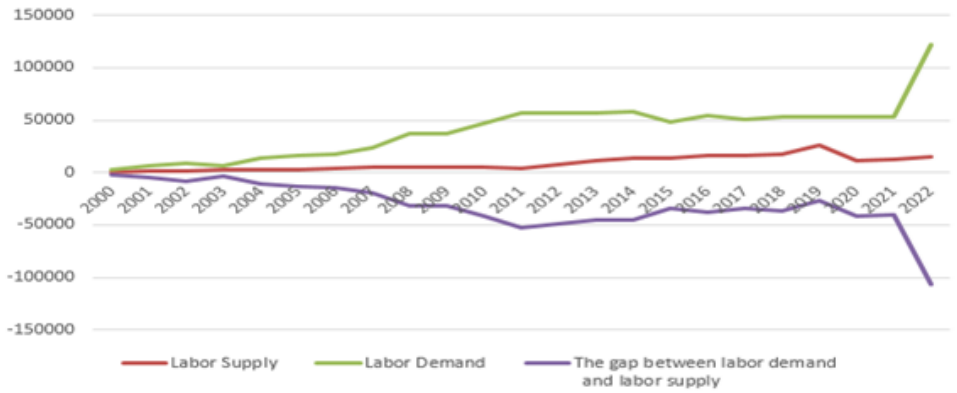
Fig1. Development of unemployment rates in Blida Province during the period (2000-2022)



Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

What we notice from this figure is a noticeable increase in unemployment rates for the year 2022, reaching a percentage of 19.29%. This increase can primarily be attributed to the measures taken by the government, particularly the implementation of unemployment benefits. These benefits serve as a program to support and motivate first-time job seekers, providing them with assistance during their search period. Job seekers must meet specific conditions outlined in Executive Decree No. 22-70 dated 9 Rajab 1443 corresponding to February 10, 2022. These measures have resulted in a significant increase in the number of registered job seekers within the National Employment Agency, with the number reaching 122,464 in 2022 compared to 53,607 in 2021, representing an annual increase rate of 128.44%. The following figure illustrates the registered job offers and demands in Blida province, along with the estimated gap between them during the period (2000-2022).

Fig2. Development of job applications and offers in Blida Province during the period (2000-2022)



Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

Through figure number (02), we notice that the gap between labor demand and supply began to expand significantly starting from the year 2006. This is when the employment agency was established, which began receiving job applications and offers. What we observe is that job offers from institutions remained stable in their developmental trajectory during the period (2000-2011), while job applications from unemployed individuals experienced an increase in their levels (2007-2011). This period was characterized by a rise in the number of university graduates due to the increase in success rates in the baccalaureate exams. The success rates in the baccalaureate exams rose from 32.29% in the year 2000 to 62.45% in the year 2011. This situation has led to a significant increase in the number of job seekers looking for employment opportunities. What we also observe is that the job market in Blida province is inflexible[*], and this observation can be generalized to the national job market as well. Job applications registered are witnessing a growing pace compared to job offers provided by institutions.

The distribution of job offers provided by institutions for the year 2022 according to the legal sector and their type (permanent and temporary) can be presented in the following table:

[*]The flexible labor market is one capable of achieving a good balance that enables reducing structural unemployment rates.

Table 1. Distribution of job offers by legal sector during the year 2022 in Blida Province

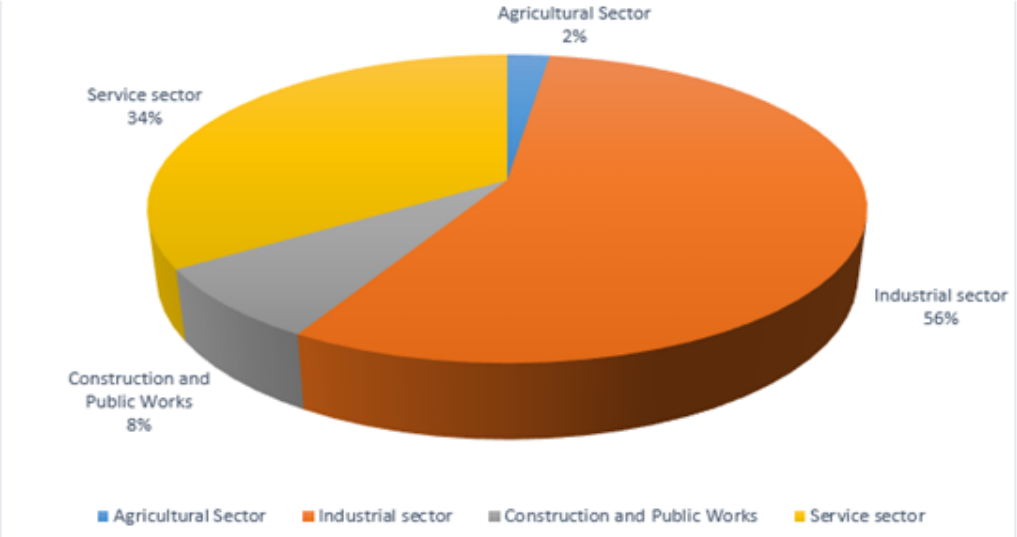
Sector / type	Public	Foreign National	Foreign Private	Total
Permanent	842	278	27	**1147**
Temporary	30	12610	1636	**14276**
Total	872	12888	1663	**15423**

Source: Directorate of Employment in Blida Province

Through this table, we notice that temporary job offers took the lion's share at 92.56%, while permanent job offers accounted for only 7.44% of the total job offers. What we observe is that the national private sector contributes 88.33% of the total temporary job offers, followed by the foreign private sector at 11.45%, and then the public sector at 0.22%. As for permanent job positions, the main source is the public sector with 842 job positions, followed by the national private sector with 278 positions.

The distribution of job offers by economic sector for the year 2022 can be presented in the following figure:

Fig 2. Distribution of job offers by economic sector for the year 2022

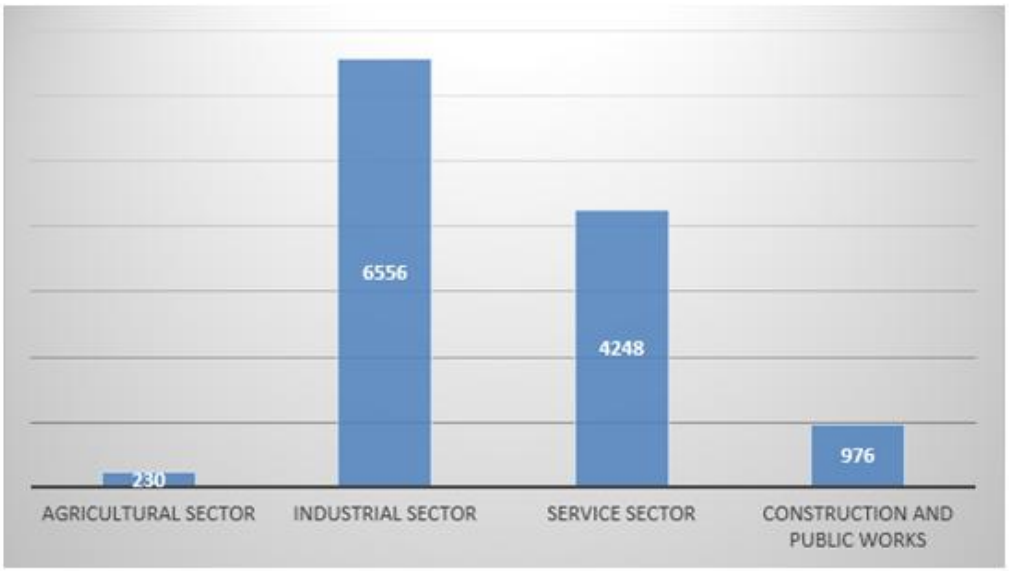


Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

We notice that the industrial sector took the largest share among other sectors, due to the presence of industrial zones in the province. Then we find the trade and services sector at 34%, followed by construction and public works at 8%, and finally the agricultural sector with a very low percentage of 2%. It's worth noting that employment in the agricultural sector can be considered part of the informal workforce, as most positions are filled through informal channels, and it is also considered seasonal employment.

As for the distribution of job positions achieved during the year 2022 according to sectors, the following figure details it:

Figure 3. Distribution of job positions achieved during the year 2022 according to sectors in Blida province

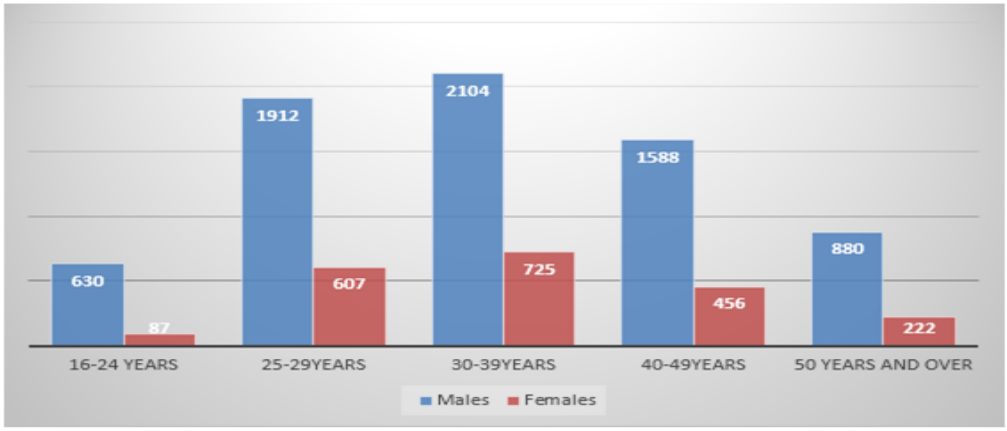


Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

The distribution of job positions achieved during the year 2022 corresponds with job offers, where we notice that the number of job positions achieved in the industrial sector reached 6556 out of 12010 job positions, that is, a rate of 54.58%, followed by the services sector with 4,248, then the construction and public works sector with 976 job positions, and finally the agricultural sector with 230 job positions.

The distribution of job positions achieved according to age and gender during the year 2022 can be presented in the following figure :

Fig 4. Distribution of job positions achieved during the year 2022 according to age and gender in Blida Province.



Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

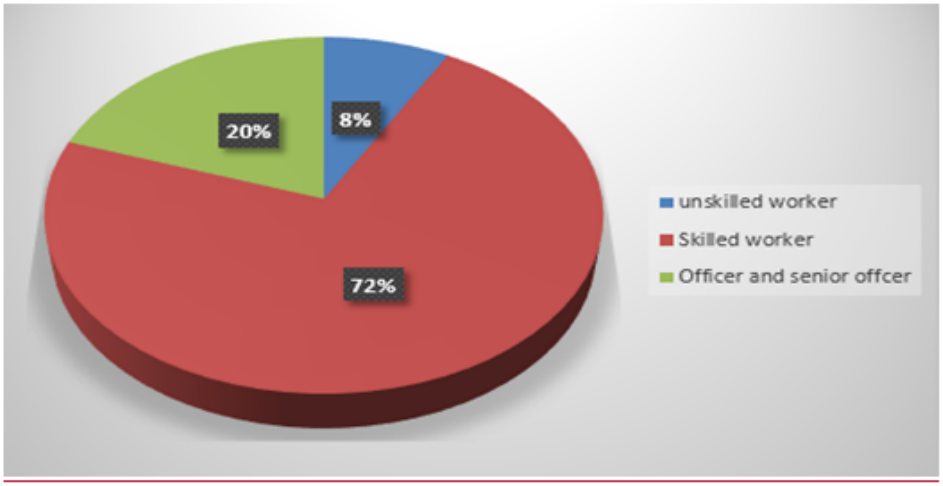
Through this figure, it becomes clear that the age group benefiting the most from job positions in Blida province is the one between 30 and 39 years old, with a total of 2829 job

positions. Following closely is the age group between 25 and 29 years old, with a total of 2519 job positions. Then, the age group between 40 and 49 years old with a total of 2044 job positions. Other age groups, specifically those over 50 years old and the age group between 16 and 24 years old, are less likely to obtain job positions.

These statistics clearly confirm that the age group most vulnerable to unemployment is between 25 and 39 years old, according to official statistics at the level of Blidaprovince.

This category includes university graduates, graduates of vocational training centers, as well as unskilled labor. If we examine the structure of job seekers in Blidaprovince according to educational level during the year 2022, the following figure illustrates this in detail.

Fig 5. Distribution of job applications by qualification level in the state of Blida during the year 2022.



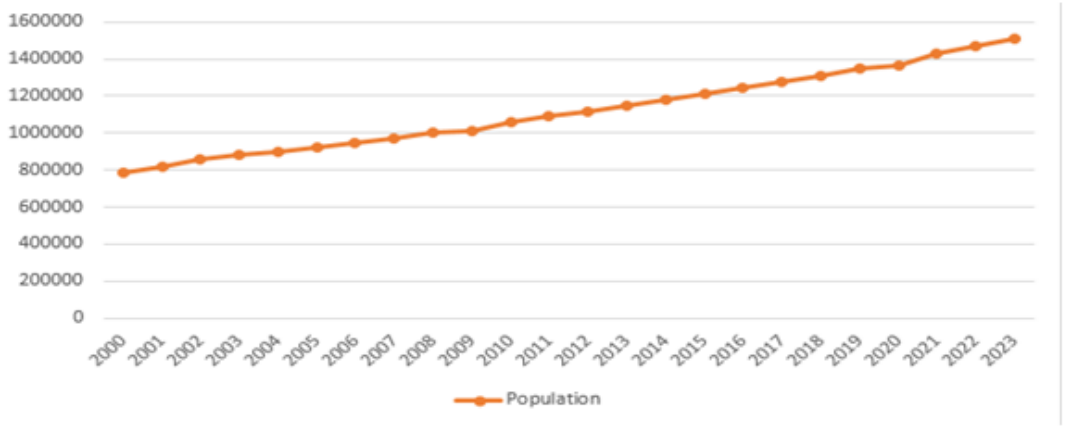
Source: Prepared by researchers based on data from the Employment Directorate in the state of Blida

Figure 4 confirms that the most in-demand category for work is the qualified category, which has undergone vocational training, with this group accounting for 72%. Following this are the category of executives and senior executives, referring to university graduates, constituting 20%. The last category is those without any qualifications, estimated at 8%. These statistics indicate that the majority of job seekers officially registered with the Employment Directorate in Blida province are predominantly either qualified with vocational training or have undergone university education. The percentage of females is 51.94%, while the percentage of males is 48.06%.

.2.2Population growth in Blida province (2000-2022)

Population growth in Blidaprovince exhibited an upward trend during the period (2000-2022), where it increased from 784,284 inhabitants in the year 2000 to 1,469,248 inhabitants in the year 2022, as illustrated in the following figure:

Fig 6. Population development in Blida Province during the period (2000-2022)

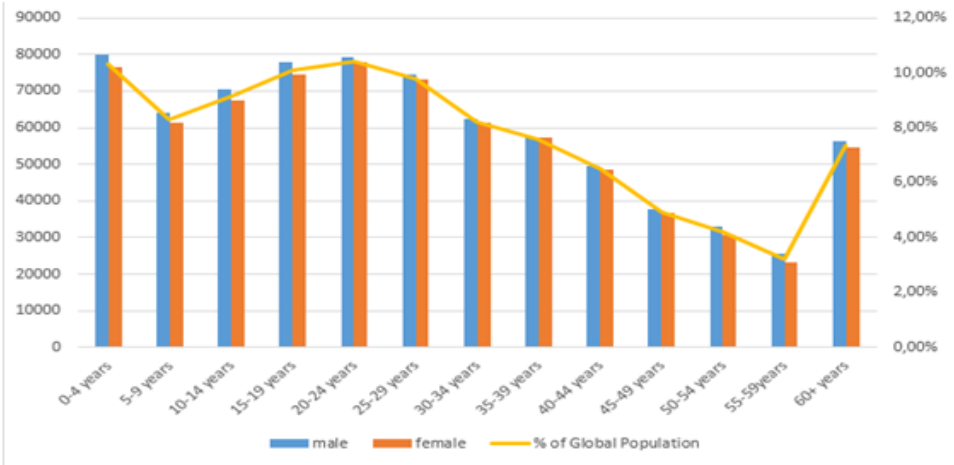


Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

When we examine the annual population growth rate at the level of Blida province, we notice fluctuations and variations during this period. We find that it experienced an increase during the years 2000 and 2001, reaching 4.58% and 4.84% respectively. Subsequently, we record a significant decrease in 2003, where it reached 2.37%, stabilizing during the period (2004-2007) at the same level. Then it sharply declined in 2009, reaching 0.70%, the lowest value recorded during this period. What is noticeable in the population growth rates is that they experience sharp changes in some years and then stabilize during the subsequent period. Generally, the population growth rates in Blida province range from 2.50% to 2.80% annually.

The population structure at the level of Blidaprovince according to age and gender during the year 2023 can be presented in the following figure:

Fig 7. Distribution of the population of Blida Province by age and gender for the year 2023



Source: Prepared by researchers based on data from the Employment Directorate in Blida Province

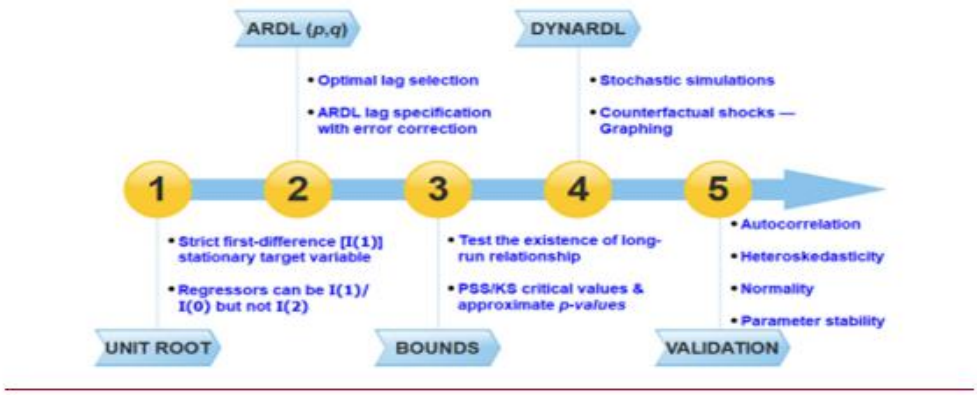
From this figure, it is evident that the age group ranging from 20 to 24 years old has the highest proportion of the total population of the province of Blida, reaching 10.40%. This is closely followed by the age group of 15 to 19 years old and the age group of 25 to 29 years old. We also observe that as age increases, the proportions decrease, except for the age group of 60 years and above, where the proportion reached 7.34%. Notably, we shouldn't overlook the youngest age group, from 0 to 4 years old, with a proportion of 10.34%.

Therefore, it can be said that the population in Blidaprovince is young, which is a dominant feature of Algerian society, as the average age in Algeria reached 29.4 years during the year 2019, according to the latest statistics published by the National Bureau of Statistics, and the median age reached 27.7 years (Office National des Statistiques, 2019, p. 29).

3.METHODS AND MATERIALS:

The Autoregressive Distributed Lag (ARDL) approach proposed by (Pesaran, Shin, and Smith ; 2001, pp. 289-326) represents one of the models that allows for estimating the relationship between variables in both the short and long run within a single equation. It is an extremely flexible method used in time series analysis regardless of their order of integration. This methodology relies on stability tests as a first step to determine the degree of integration of the series. This is followed by the second step, which involves determining the lag order and estimating the ARDL model. The third step is testing for cointegration, while the fourth step involves estimating the short-run relationship followed by the long-run relationship. Finally, diagnostic tests are conducted. These stages can be summarized in the following figure:

Fig 8. Phases of implementing the ARDL model



Source : (Sarkodie & Owusu, 2020, p. 3)

4. RESULTS AND DISCUSSION :

We collected annual data spanning from 2000 to 2022 based on statistics published by the Directorate of Programming and Budget of Blida province. It's worth noting that we attempted to obtain data prior to this period but were unable to do so. The model consists of two variables : the dependent variable, which is the unemployment rate $UNRAT_t$ and the independent variable, which is the population growth rate $POPG_t$.The results of stationarity

tests for the studied series gave the following results :

Table2. Results of Stationarity Tests

		UNIT ROOT TEST TABLE (PP)	
	At Level		
		UNRAT	POPG
With Constant	t-Statistic	-2.7146	-7.1462
	Prob.	***0.0875***	***0.0000***
		*	***
With Constant & Trend	t-Statistic	-0.0290	-6.8214
	Prob.	***0.9928***	***0.0001***
		n0	***
Without Constant & Trend	t-Statistic	-1.6915	-1.3299
	Prob.	***0.0853***	***0.1641***
		*	n0
	At First Difference		
		d(UNRAT)	d(POPG)
With Constant	t-Statistic	-4.2453	-10.9780
	Prob.	***0.0037***	***0.0000***
		***	***
With Constant & Trend	t-Statistic	-6.5339	-14.6103
	Prob.	***0.0002***	***0.0000***
		***	***
Without Constant & Trend	t-Statistic	-4.1566	-11.2048
	Prob.	***0.0003***	***0.0000***
		***	***

Source: Prepared by researchers based on the outputs of the EVIEWS 13 program

From Table 2, we observe that the series $UNRAT_t$is not level-stationary, whereas first-differences provide a stationary series, indicating the integration order of this series is 1, I(1). As for the series $POPG_t$, the first and second models show that it is level-stationary, but the third model indicates it is not. However, first-differences confirm the stationarity of this series, meaning it is integrated of order I(1).

We will rely on the Microfit 5.5 software, which was developed by researchers Bahram P and M. Hashem P in 2017. This software allows for estimating the ARDL model and automatically provides critical values for the bounds test through random simulation using 20,000 replications. Unlike EVIEWS software, which cannot provide critical values for samples smaller than 30.

We have set the maximum number of lag orders to 1 since the sample size is small, and the software itself rejects larger values. After applying the Schwarz Bayesian criterion, lag orders of p=1 and q=1 were selected. The estimation results can be summarized in the following table:

Table 3. Results of estimating the ARDL (1, 1) model

Autoregressive Distributed Lag Estimates
ARDL(1,1) selected based on Schwarz Bayesian Criterion

Dependent variable is UNRAT
21 observations used for estimation from 2002 to 2022

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
UNRAT(-1)	.56193	.094005	5.9777[.000]
POPG	.33710	.36986	.91144[.374]
POPG(-1)	1.6752	.37933	4.4162[.000]

R-Squared	.80489	R-Bar-Squared	.78321
S.E. of Regression	2.1286	F-Stat. F(2,18)	37.1271[.000]
Mean of Dependent Variable	13.6381	S.D. of Dependent Variable	4.5716
Residual Sum of Squares	81.5541	Equation Log-likelihood	-44.0435
Akaike Info. Criterion	-47.0435	Schwarz Bayesian Criterion	-48.6103
DW-statistic	2.2095	Durbin's h-statistic	-.53204[.595]

Source: Prepared by researchers based on Microfit5.5 program

The estimation results confirm the existence of a causal relationship between the explanatory variables and the dependent variable. We observe that a one-unit increase in the unemployment rate from the previous year results in a 0.56 increase in the current unemployment rate. This parameter is statistically significant at the 1% level. As for the population growth rate during the same period, it also exhibits a causal relationship, but it is not significant. However, the population growth rate in the previous year has an impact on current unemployment rates. This suggests that the effect is not immediate but requires a year to materialize. A one-unit increase in the population growth rate from the previous year leads to a 1.67 increase in unemployment rates. This indicates a strong and statistically significant effect at the 1% significance level.

The coefficient of determination indicates the high explanatory power of the model, with a value of 80%. This suggests that the independent variables contribute to explaining the dependent variable by 80%.

The results of the Bounds Test can be presented in the following table :

Table 4.PSS bounds test results

Testing for existence of a level relationship among the variables in the ARDL model

F-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
11.0492	3.4431	4.6142	2.5919	3.5255

W-statistic	95% Lower Bound	95% Upper Bound	90% Lower Bound	90% Upper Bound
22.0984	6.8861	9.2284	5.1837	7.0510

If the statistic lies between the bounds, the test is inconclusive. If it is above the upper bound, the null hypothesis of no level effect is rejected. If it is below the lower bound, the null hypothesis of no level effect can't be rejected. The critical value bounds are computed by stochastic simulations using 20000 replications.

Source: Prepared by researchers based on Microfit5.5 program

We notice that the calculated value exceeds the upper bound at the 5% and 10% significance levels, indicating the rejection of the null hypothesis of no cointegration and acceptance of the alternative hypothesis.

In light of the cointegration results, the relationship can be estimated in the long term, as illustrated in the following table:

Table 5. Results of Long-Term Relationship Estimation

```
          Estimated Long Run Coefficients using the ARDL Approach
           ARDL(1,1) selected based on Schwarz Bayesian Criterion
*****************************************************************************
 Dependent variable is UNRAT
 21 observations used for estimation from 2002 to 2022
*****************************************************************************
 Regressor             Coefficient       Standard Error         T-Ratio[Prob]
 POPG                     4.5936            .36623            12.5429[.000]
*****************************************************************************
```

Source: Prepared by researchers based on Microfit5.5 program

From this table, we find that the population growth in Blida province has a significant inverse effect on unemployment rates. A one-unit increase in population growth leads to a 4.59 increase in unemployment rates. This aligns with the data of the Algerian economy, which has so far been unable to absorb the unemployed despite the Algerian authorities' efforts to reduce unemployment rates. It's notable that the population growth coefficient is statistically significant at the 1% level.

As for the short-term estimation results, they can be presented in the following table:

Table 6. Results of estimating the relationship in the short-run error correction model

```
        Error Correction Representation for the Selected ARDL Model
           ARDL(1,1) selected based on Schwarz Bayesian Criterion
*****************************************************************************
 Dependent variable is dUNRAT
 21 observations used for estimation from 2002 to 2022
*****************************************************************************
 Regressor               Coefficient       Standard Error         T-Ratio[Prob]
 dPOPG                      .33710            .36986             .91144[.373]
 ecm(-1)                   -.43807           .094005           -4.6600[.000]
*****************************************************************************
 List of additional temporary variables created:
 dUNRAT = UNRAT-UNRAT(-1)
 dPOPG = POPG-POPG(-1)
 ecm = UNRAT   -4.5936*POPG
*****************************************************************************
 R-Squared                        .58806   R-Bar-Squared                  .54228
 S.E. of Regression              2.1286    F-Stat.     F(1,19)      25.6953[.000]
 Mean of Dependent Variable      -.38143   S.D. of Dependent Variable      3.1462
 Residual Sum of Squares         81.5541   Equation Log-likelihood       -44.0435
 Akaike Info. Criterion         -47.0435   Schwarz Bayesian Criterion    -48.6103
 DW-statistic                    2.2095
*****************************************************************************
```

Source: Prepared by researchers based on Microfit5.5 program

From this table, we observe that the error correction coefficient is significant at the 1% level, with a value of -0.43. This means that 43% of the short-term errors in unemployment rates are corrected within approximately 28 months, equivalent to two years and four months. As for the population growth coefficient in the short term, it is positive with a value of 0.33, but it is not statistically significant.The final stage is diagnostic tests, which involve examining autocorrelation, heteroscedasticity, and the normality of residuals. These results

will be presented in the following table:

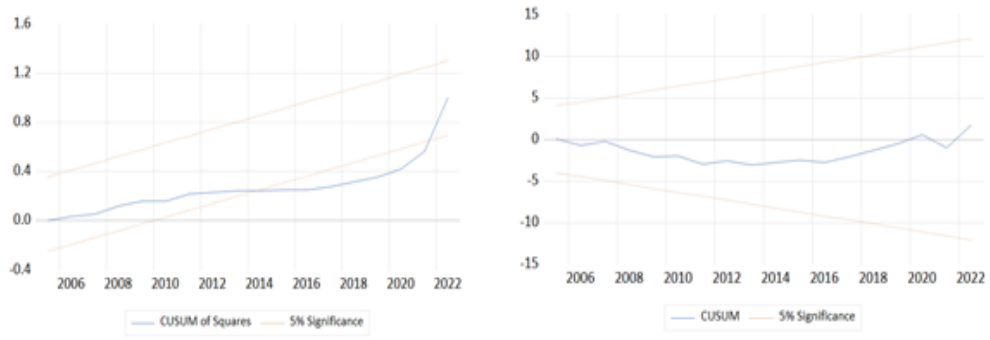
Table 7. Diagnostic tests

```
                          Diagnostic Tests
*************************************************************************
*    Test Statistics  *        LM Version       *          F Version      *
*************************************************************************
*                     *                         *                         *
* A:Serial Correlation*CHSQ(1)  =   2.4855[.115]*F(1,17)      =   2.2822[.149]*
*                     *                         *                         *
* B:Functional Form   *CHSQ(1)  =   .43050[.512]*F(1,17)      =   .35579[.559]*
*                     *                         *                         *
* C:Normality         *CHSQ(2)  =   .58396[.747]*                         *
*                     *                         *                         *
* D:Heteroscedasticity*CHSQ(1)  =  .048651[.825]*F(1,19)      =  .044119[.836]*
*************************************************************************
   A:Lagrange multiplier test of residual serial correlation
   B:Ramsey's RESET test using the square of the fitted values
   C:Based on a test of skewness and kurtosis of residuals
   D:Based on the regression of squared residuals on squared fitted values
```

Source: Prepared by researchers based on Microfit5.5 program

Through this table, we notice that the P-value is greater than the significance level of 1%. This indicates that the model is free from all the previously mentioned econometric problems. The validity of the model for prediction must undergo a test for the stability of the estimated model characteristics. In this regard, we rely on the cumulative sum of residuals and their squares test, the results of which can be summarized in the following figure:

Figure 9. CUSUM and CUSUM of Squares test



Source: Prepared by researchers based on the outputs of the EVIEWS 13 program

5. CONCLUSION

This study aimed to investigate the impact of population growth on unemployment rates in Blida Province during the period 2000-2022. We have reached several practical results:

- Blida Province enjoys several advantages, as it is considered an agricultural food pole, and contains industrial areas and active zones that allow it to reduce unemployment rates.
- Despite the mentioned advantages, the labor market at the national level or at the level of the Blida province is characterized by inflexibility. The number of job seekers and those

registered with employment agencies far exceeds job vacancies. The gap between them was estimated at -107,041 during the year 2022.

- The gap between job applications and job offers has been increasing since 2008, with the peak reached in 2022. This can be attributed to several reasons, most notably the rise in the proportion of university graduates who find themselves involuntarily unemployed. This trend can be traced back to the Algerian government's introduction of the unemployment grant, which encouraged unemployed individuals to register with employment offices.
- Many of the created job positions are temporary in nature, and the structure of job seekers confirms a clear imbalance in the labor market. On one hand, there is a high number of unskilled laborers, while on the other hand, graduates from universities, especially executives and senior executives, suffer from significant unemployment.
- The distribution of job positions created during the year 2022 primarily originated from the industrial sector, followed by the services sector.
- Unemployment in Algeria as a whole, or even in Blida province, is characterized by long-term unemployment, with job seekers facing unemployment for periods exceeding one year.
- Population growth in Blida province has experienced sharp fluctuations in some periods followed by periods of stability. Generally, population growth rates in the province of Blida revolve around an annual rate ranging from 2.50% to 2.80%.
- The econometric study confirmed the existence of a statistically significant positiverelationship between population and unemployment in Blida province. Additionally, the bounds test results indicated cointegration between these two variables.
- In the short run, changes in population growth rates in Blida province have a positive effect on changes in unemployment rates, but this effect is not statistically significant. The error correction coefficient is negative and significant. Short-term errors in unemployment rates are corrected within a period of approximately 28 months, indicating that the speed of adjustment towards equilibrium in the long run takes about two years and four months.
- Diagnostic tests have revealed that the model is free from the following problems: autocorrelation of errors, heterogeneity of errors, and non-normality of errors. Additionally, the model is unstable, indicating a lack of consistency between the parameters of the long run and the short run.

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