Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Master's Thesis

Analysis of Applicability of Okun's Law in Tajikistan

Farrukh Hakimov

CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

DIPLOMA THESIS ASSIGNMENT

Bc. Farrukh Hakimov

Economics and Management

Thesis title

Analysis of applicability of Okun's Law in Tajikistan

Objectives of thesis

The main goal of the following thesis is to test the hypothesis of whether the Okun's law, which is defined as "1% increase in unemployment leads to 2% decrease in the GDP", does really work on the case of a country situated in the Central Asia – Tajikistan.

In addition to that, the author does also answer the following research questions using his analysis:

1) What are the three most important factors influencing the development of GDP in Tajikistan?
2) What is the biggest quantitative effect of macroeconomic variables on the country's GDP?

Methodology

The author divides his work into a theoretical introduction and a practical application. The theoretical section includes the author's analysis of the applicable scientific framework and references to the works of other writers who place emphasis on the same subject. In the application section, the author develops two econometric models, one of which describes how GDP changes in response to shifts in the unemployment rate. The second one will have more moving parts than the first, but it will still foretell changes in GDP and other macroeconomic indicators

The proposed extent of the thesis

60 pages

Keywords

Okun's law, Tajikistan, GDP, unemployment, factors, exchange rate

---

Recommended information sources

Asadov, P. (2007). Foreign Investment and Economic Reform in Tajikistan. Problems of Economic Transition,

Azimov, U., & Avezova, N. (2022). Sustainable small-scale hydropower solutions in Central Asian countries for local and cross-border energy/water supply. Renewable and Sustainable Energy Reviews

Davlatzod, U. (2017). FREE ECONOMIC ZONES: CURRENT STATE AND DEVELOPMENT PERSPECTIVES IN THE REPUBLIC OF TAJIKISTAN. In Революция и современность

Expected date of thesis defence

2022/23 SS – FEM

The Diploma Thesis Supervisor

Wilem Heijman

Supervising department

Department of Economics

Electronic approval: 28. 3. 2023

prof. Ing. Lukáš Čechura, Ph.D.

Head of department

Electronic approval: 29. 3. 2023

doc. Ing. Tomáš Šubrt, Ph.D.

Dean

Prague on 30. 03. 2023

Declaration

I declare that I have worked on my diploma thesis titled " Analysis of Applicability of Okun's Law in Tajikistan" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the diploma thesis, I declare that the thesis does not break any copyrights.

In Prague on 31.03.2023 _____

Acknowledgement

I would like to express my deepest gratitude to my parents for their unwavering support throughout my academic journey. Their encouragement, guidance, and sacrifices have been invaluable in helping me achieve my goals. Also, I would like to express my appreciation to my supervisor Prof. Dr Wilem Heijman for the valuable assistance.

Analysis of Applicability of Okun's Law in Tajikistan

Abstract

The main goal of the following thesis is to test the hypothesis of whether the Okun's law, which is defined as "1% increase in unemployment leads to 2% decrease in the GDP", does really work on the case of a country situated in the Central Asia – Tajikistan.

In addition to that, the author does also answer the following research questions using his analysis: What are the three most important factors influencing the development of GDP in Tajikistan; What is the biggest quantitative effect of macroeconomic variables on the country's GDP?

In his practical part, the author creates two econometric models – the first one defining the development of GDP according to the fluctuations in the unemployment. The second one will include more variables, but will ultimately predict the development of the same macroeconomic variable – GDP.

To conclude, the author is able to say that indeed, following his research, it came out that Okun's law is not applicable to Tajikistan, as the quantitative effect of 1% change in the unemployment rate in the county has a positive effect on the economic growth and this effect is equal to 2%.

Keywords: Okun's law, Tajikistan, GDP, unemployment, factors, exchange rate

Analýza použitelnosti Okunova práva v Tádžikistánu

Abstrakt

Hlavním cílem následující práce je otestovat hypotézu, zda okunův zákon, který je definován jako "1% nárůst nezaměstnanosti vede k 2% poklesu HDP", skutečně funguje na případu země ležící ve střední Asii – Tádžikistánu.

Kromě toho autor pomocí své analýzy také odpovídá na následující výzkumné otázky: Jaké jsou tři nejdůležitější faktory ovlivňující vývoj HDP v Tádžikistánu; jaký je největší kvantitativní vliv makroekonomických proměnných na HDP země?

Ve své praktické části autor vytváří dva ekonometrické modely-první definuje vývoj HDP podle výkyvů nezaměstnanosti. Druhá bude obsahovat více proměnných, ale nakonec bude předpovídat vývoj stejné makroekonomické proměnné – HDP.

Závěrem lze říci, že autor je schopen říci, že po jeho výzkumu vyšlo najevo, že okunův zákon se na Tádžikistán nevztahuje, protože kvantitativní účinek 1% změny míry nezaměstnanosti v kraji má pozitivní vliv na hospodářský růst a tento účinek se rovná 2%.

Klíčová slova: Okunův zákon, Tádžikistán, HDP, nezaměstnanost, faktory, měnný kurz

Table of contents

List of pictures

List of tables

List of abbreviations

OLS	Ordinary Least Squares Method
GDP	Gross Domestic Product
GNP	Gross National Product
CPI	Consumer Price Index
SME	Small and medium-sized business

1 Introduction

As a Tajik citizen, the author always has interested in the economic development of his own country. Tajikistan, a small landlocked country in Central Asia, faces significant economic challenges, including high levels of poverty and unemployment. Over the years, I have witnessed firsthand the impact of economic fluctuations on the lives of ordinary Tajiks. This motivated the author to pursue a diploma thesis that would contribute to a better understanding of the economic situation in Tajikistan.

The topic of the author's thesis is "Testing the Applicability of Okun's Law for the Case of Tajikistan." Okun's law is a widely accepted empirical relationship between unemployment and gross domestic product (GDP) growth. It states that for every one percentage point increase in GDP, the unemployment rate decreases by a certain percentage point. This law has been tested in many countries and is often used to analyze the performance of an economy.

However, there is limited research on the applicability of Okun's law to the case of Tajikistan. Tajikistan's economy is unique in many ways, with a heavy reliance on remittances and agriculture, which are both vulnerable to external shocks. Therefore, it is important to examine the relationship between unemployment and GDP growth in Tajikistan and test the applicability of Okun's law. Students and economists often come across the notion of Okun's law; yet, one can question whether or not it is still relevant in today's world. Some scholars argue that this is the case, while others point out that with the structural shifts in the economies that occurred in the 1970s, the law itself may be considered something of an outmoded idea (Lee, 2000).

Nevertheless, the author will determine whether or not the economic idea in question is appropriate to the author's home country of Tajikistan, which is a post-Soviet nation with an economy that is considered to be in transition.

In this thesis, the author will also analyze the historical data on GDP growth and unemployment in Tajikistan and test the relationship between the two variables using Okun's law. There will also be examined the factors that affect this relationship, such as the structure of the economy, government policies, and external shocks. The findings of this study will contribute to a better understanding of the economic situation in Tajikistan and inform policymakers about the potential impact of economic policies on unemployment.

Overall, the author's motivation for this thesis is to contribute to the understanding of the economic situation in Tajikistan and provide policymakers with evidence-based recommendations to improve the economic situation in my country.

2 Objectives and Methodology

2.1 Objectives

The main goal of the following thesis is to test the hypothesis of whether the Okun's law, which is defined as "1% increase in unemployment leads to 2% decrease in the GDP", does really work on the case of a country situated in the Central Asia – Tajikistan.

In addition to that, the author does also answer the following research questions using his analysis:

1) What are the three most important factors influencing the development of GDP in Tajikistan?
2) What is the biggest quantitative effect of macroeconomic variables on the country's GDP?

2.2 Methodology

The author splits his work into two equally important parts – the theoretical part and the practical part. In his theoretical part, the author analyses the relevant scientific framework and cites the works of author authors empathizing on the same topic. In his practical part, the author creates two econometric models based on the time series data from 1993 to 2020 obtained from the World Bank and processed in Gretl – the first one defining the development of GDP according to the fluctuations in the unemployment. The second one will include more variables, but will ultimately predict the development of the same macroeconomic variable – GDP but with just those variables that would be classified as significant previously.

Effectively, the author's main methodological approach is empirical or quantitative one, where he relies solely on empirical evidence to support particular claims and assumptions. For this purpose, it is wise to quickly go through all quantitative techniques implemented by the author in his diploma thesis. First, the author relies on an econometric model to draw conclusions which is based on the OLS method disclosed in formula on the next page.

$$OLS = (X^T X)^{-1} X^T Y \quad (1)$$

In addition to the OLS approach, the author also considers elasticities for his analysis, which are calculated as follows:

$$Elasticity = Partial\ Derivation * \frac{x_{it}}{\hat{y}_{it}} \quad (2)$$

In addition to the original estimation, the author also implements techniques of statistical inference, such as t-tests and F tests, which are performed based on test criteria obtained for both tests according to particular formulas indicated below:

$$F = \frac{\partial_1^2}{\partial_2^2} \quad (3)$$

$$t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} \quad (4)$$

3 Literature Review

3.1 Okun's Law

3.1.1 Essence

Okun's law is formulated according to the following formula:

$$\frac{\bar{Y} - Y}{\bar{Y}} = c(u - \bar{u})$$

In this formula: $\bar{Y}$ stands for the potential GDP; Y stands for the actual output, c is factor that related changes in unemployment to changes in output, u is the actual unemployment rate and $\bar{u}$ stands for the natural rate of unemployment.

Okun's law is a generally accepted principle of economics that describes the relationship that exists between changes in the output of the economy and the level of employment, which is directly proportional to these changes. This concept, in its most fundamental expression, states that an increase in the level of economic output must necessarily be followed by an increase in the level of employment, and vice versa (Altig, 1997). It is widely believed that the reliability of this connection is a decisive factor in determining both the ability for economic growth and the health of the economy as a whole. However, the true nature of Okun's Law can be a difficult and mysterious topic, which the author explores in more detail in the following paragraphs.

Okun's law can be disassembled into its component parts, the first of which is the statistical relationship that exists between shifts in production and employment in the economy. It got its name in honor of the economist Arthur Okun, who made the first discovery of the correlation in the 1960s in the United States. According to Okun's law, the proportion of people who have a job will increase by a given amount for every percent increase in total output in the economy. The exact percentage varies not only from country to country, but also from time to time and is determined by the aspect under consideration (Chamberlin, 2011).

On the other hand, the relationship between production and employment is not always easy to understand. Understanding Okun's law can be tricky for a number of reasons, but one of the hardest is the fact that the relationship between two things can change depending on the circumstances (Prachowny, 1993). For example, the link may weaken whenever there is a general economic downturn or industrial automation is widely used. In addition, Okun's rule does not take into account changes in the degree of income inequality in the economy and the types of jobs available in this sector of the labor market (Knotek II, 2007).

Another factor that complicates the structure of Okun's rule is the concept of "output potential". The total output that an economy is capable of producing when all its resources are used to the maximum extent possible is called the potential output of the economy. As a result of the fact that it is not possible in reality to estimate the production potential of an economy with any degree of accuracy, the predictions made by Okun's Law may not be as accurate as they could be.

Okun's Law continues to be a useful tool for policy makers and economists in their efforts to better understand the relationship that exists between output and employment, despite the challenges (Meyer, 2012). Developments in the manufacturing economy, combined with legislation, can be used to predict likely changes in employment levels in the future. This information can be useful for making informed and educated judgments about monetary and fiscal policy, as well as other economic initiatives.

On the other hand, it is important to keep in mind that Okun's rule is just one of the tools that can be used to understand how production and employment are related to each other. When making a choice about the economy, one should not rely on it as the only factor; rather, a number of other aspects, such as inflation, should also be taken into account.

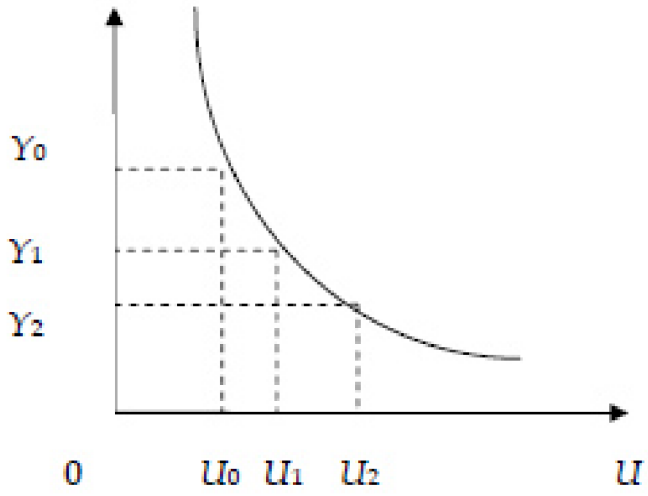
In addition to its wide applicability in the real world, Okun's rule has also received significant attention from the scientific community. Researchers have explored the relationship between production and employment in a variety of contexts, and as a result, a large number of hypotheses and models have been developed to explain the relationship found. For example, a number of scholars have suggested that the meaning of the link

between Okun's Law and globalization may change over time as a result of technological advances (Zanin, 2012).

Because there are so many aspects to consider, the core of Okun's Law can sometimes be a topic that is both overwhelming and difficult to understand. It is important to be aware of the limitations of this concept, as well as the many factors that can potentially influence the relationship between production and employment, despite the fact that this principle is an incredibly useful tool for understanding the relationship between the two. When this is completed, policy makers and economists will be able to make more informed decisions about how to promote long-term economic growth and employment (Jalles, 2020).

According to Okun's rule, also known as the law of the natural rate of unemployment, the difference between actual GDP and potential GDP is two to two and a half percent if the actual unemployment rate is higher than the natural rate by one percent.

Figure 1, Graph of Okun's law



Source: Knotek II, 2007

In a scenario with full employment, the level of production is denoted by *Y0,* while the unemployment rate is denoted by *U0*. Output will decrease in tandem with a decline in employment and an increase in unemployment. As a result, the graph illustrates how the amount of output is becoming less reliant on the unemployment rate (Kim, 2020).

3.1.2 Importance

The importance of an empirical assessment of this kind of dependence is due, first of all, to the fact that it allows one to estimate the output growth rate necessary to reduce the unemployment rate, and, in addition, it can be used to determine the effectiveness of anti-inflationary policy, since the latter depends on the degree of sensitivity of unemployment to unemployment. various changes in the growth rate of output. Regarding the meaning of this law, Okun's Law states that there is an inverse relationship between the percentage change in a country's gross domestic product (GDP) and the percentage change in that country's unemployment rate. It is shown that this law has a significant impact on the world economy (Batavia, 2012). In other words, GDP growth often leads to a decrease in the unemployment rate, and conversely, a decrease in GDP usually leads to an increase in the proportion of the unemployed seeking work (Sobotka, 2011).

1962's "Potential GNP: its measurement and relevance" by A. Okun was one of the earliest in-depth investigations of the problem of the connection between output and unemployment variances on their potential values (potential GDP and natural unemployment rate) (Okun, 1963). This is regarded as one of the most significant studies on the issue. The consistency established by A. Okun's research has been repeatedly proven using the statistical data of other nations. On the basis of investigations conducted by a number of writers for nations with sophisticated economies, it has been observed variations that the link between output and unemployment indicated by A. Okun exists, but not always in the form provided in his work. Okun's hypothesis was predicated on the notion that there is a connection between the two variables, although this connection does not necessarily take the form indicated.

A primary reason for the relevance of Okun's Law is that it may assist policymakers and economists in better comprehending the connection that exists between expanding economic activity and expanding job opportunities. With Okun's Law, policymakers in a nation are able to determine the proper pace of economic growth required to sustain a given level of employment in the country. This gives them the ability to create possibilities with more precision and prepare for the future.

Nevertheless, it is essential to bear in mind that Okun's rule is not a reliable approach for assessing the link between GDP growth and employment growth. This is something that has to be kept in mind at all times. Communication may be influenced by a wide variety of factors, including recent advances in technology, changes in the composition of the labor force, and alterations in economic conditions on a national and international scale.

Okun's law has been shown to be a very helpful tool for both economists and politicians, despite the fact that it suffers from a number of flaws. It is often used in the process of selecting macroeconomic policy, such as the process of establishing interest rates and fiscal policy. In addition to this, it is used in the evaluation of the current status of the economy, as well as the evaluation of future changes in the economic sector, in addition to the evaluation of trends in employment.

One of the primary advantages of Okun's rule is that it provides assistance to policymakers in striking a balance between expanding the economy and increasing the number of available jobs. For instance, policymakers may utilize Okun's rule to determine the appropriate level of government expenditure required to stimulate economic expansion and provide employment opportunities during a period of economic stagnation.

Another important advantage of Okun's rule is that it helps economists better comprehend the long-term impacts of changes in the demographics of the working population. For instance, if there is a shift in the composition of the labor force toward more highly skilled occupations, it may take some time for the unemployment rate to adapt such that it accurately reflects this shift in the labor force. This adjustment will be reflected in the unemployment rate (Harris, 2001). Using Okun's law, economists are able to get a deeper understanding of the connection that exists between shifts in the size of the labor force and variations in the unemployment rate.

There are others who believe that Okun's Law may not be applicable to all nations or economies because of the differences between them. For instance, in certain nations there may be significant levels of structural unemployment that cannot be immediately addressed via changes in policy. This problem cannot be solved overnight. It's possible that low percentages of people participating in the work force are making this issue worse. In a similar

line, it is plausible that some economies are less sensitive than others to changes in the rates of GDP growth.

In spite of the criticism that has been levied against it, Okun's Law continues to be a helpful tool for both politicians and economists. If policymakers had a better understanding of the connection between economic expansion and job creation, they would be able to make more educated decisions about how to expedite economic development, generate more employment opportunities, and boost the general health of the economy. Indeed, when seen from this angle, the immense significance of practically all of Okun's law's characteristics becomes immediately apparent.

It is also essential to point out that Okun's law is a significant notion that provides economists and policymakers with a better understanding of the connection between economic expansion and unemployment rates. Even though it has a number of drawbacks, Okun's law remains the most significant instrument for analyzing the current status of the economy and choosing the path that macroeconomic policy will take. If political leaders can strike the appropriate balance between expanding the economy and adding jobs, they have the chance to build a prosperous and secure economy that will benefit all of the country's residents (Paik, 2019).

3.1.3 Criticism

The author would also like to highlight what is shown in the brief literature review presented in Ball's work, and in principle it is important to note that a number of authors have doubts about the stability of the long-term relationship between the rate of economic growth and changes in the unemployment rate. Thus, the analysis of the literature carried out by these authors of the work allows the author of this work to conclude that the stability of Okun's law in relation to many countries is controversial - for example, its violations were noted during the Great Depression in the USA (Ibragimov, 2017). A. Okun proposed several options for reflecting the relationship between output and unemployment.

The first method is to evaluate the regression equation, presented in the form of first differences (Noor, 2007).

The second method, proposed by A. Okun, is based on the selection and testing of exponential trends in potential output for given variants of its growth rates and initial level. As criteria for choosing a trend, A. Okun used such characteristics as the quality of fit, the absence of a trend in the balances, and the equality of actual output to potential output at a 1% unemployment rate (Silvapulle, 2004).

The third method makes it possible to correlate directly the levels of unemployment and output without going over to the increments of these values. When interpreting the obtained results, author will use the assumption of exponential growth of potential GNP and constant elasticity of the relationship between the ratio of actual output to potential and actual employment to total employment (Knotek, 2007).

But it is important to note that this paper discusses the significance of Okun's law in terms of macroeconomic policy response to changes in unemployment. On the one hand, this law is part of theoretical models in which shifts in aggregate demand led to changes in output and, consequently, employment; according to such models, high unemployment can be reduced by stimulating demand. On the other hand, as the authors of the work under discussion note, opponents of Okun's law emphasize that the violations of the law mentioned above are due to problems in the labor market, in particular, the mismatch of workers with vacancies existing in the labor market. In other words, the problems of rising unemployment should be addressed through labor market policies (for example, through employee training, etc.), and not through demand stimulation (Gyllow, 2021).

It should be emphasized that according to the results of empirical estimates of Okun's law for the countries of the world, Okun's coefficients vary in different countries in different time periods (Zanin, 2012). Such results are due to the situation in the economy in the study period; norms of legislation regulating the labor market; as well as the individual characteristics of the labor market in a particular country, including the system of social protection (for example, the existence of lifetime employment in Japan implies a labor market that is practically inelastic relative to the rate of GDP growth). It should be noted that in some countries the hypothesis of the existence of this law is rejected, and in a number of countries the fulfillment of this hypothesis depends on the circumstances (for example, crisis

phenomena) that take place in the economy during the period under study, as well as on the chosen assessment methodology.

It is very important to evaluate whether it works in different situations and over a certain period of time, just as it is important to do this with any law in economics, science or any other field. As for Okun's law, in some situations it works quite effectively, while in other cases it is powerless, as already noted based on the time of the Great Depression. There are a number of methods for tracking unemployment, and it goes without saying that Okun used the United States as his primary testing ground for the legislation he drafted. The discrepancy between potential output and actual economic growth rates was the subject of Okun's analysis.

Several studies have provided evidence that is more consistent with Okun's law. Kansas City's analysis for the quarter showed that Okun's calculations had several inconsistencies with the results. They were based on the fact that preliminary data showed higher levels of dynamics than usual. After some time, Okun finalized the bill and proposed to include or exclude certain elements depending on the stage of economic growth (Gabrisch, 2006). Empirical evidence shows that the influence of the law exists, even though there are a number of other variables that can influence the relationship between unemployment and economic growth. A study was conducted and its developers and creators came to the conclusion that "Okun's law does not indicate a significant relationship." Despite this, the bank concluded that "Okun's law predicts that a fall in growth tends to match an increase in unemployment." Bernanke argued that statistical noise, in particular, could be an obvious reason for the failure of Okun's law due to the fact that the law was not in force during the financial crisis and this is due to the fact that the legislation did not work (Hooper, 2017).

A significant number of economists have concluded that "Okun's Law works well and seems to allow certain economic forecasts" (Knotek II, 2007). The Kansas City study discussed earlier, as part of its study, came to the following conclusions: "Okun's Law can be a useful benchmark for monetary policy, but only if the natural rate of unemployment is estimated accurately" (Orphanides, 2002).

3.2 Tajikistan

3.2.1 History and Economic domain

It is a landlocked republic in Central Asia that shares its borders with China, Afghanistan, and the Central Asian republics of Uzbekistan and Kyrgyzstan. China is its only neighbor. The country of Tajikistan occupies a pivotal position in the Central Asian area. The population of the nation is around 10 million people, and it is well-known for the huge natural resources it possesses, which include a variety of minerals, water, and arable land (Jullien, 2023). The size of the country's population is another factor that contributes to the country's notoriety. In spite of this, it was challenging for Tajikistan to construct an economy that would develop and be differentiated by a wide variety of goods and services. The nation needed to find solutions to a diverse array of problems, ranging from the unpredictability of its politics to the constraints imposed by its geography. These problems demanded that the nation adjust its strategy and prevail (Smith, 2023).

Agriculture is one of the most important businesses in Tajikistan since it employs virtually the entire population of the nation (close to 50 percent), making it one of the most significant contributors to the Tajik economy (Hofman, 2021). Cotton, wheat, and other fruits, particularly grapes and apricots, are among the nation's most valued agricultural exports (Pirmatov, 2018). Apricots and grapes are particularly lucrative. Apricots and cotton are two other goods that come from agriculture. Due to the fact that the industry as a whole is not even close to being as developed as it could be, it is plagued by poor levels of productivity and restricted access to more modern technology and equipment (Hofman, 2016).

The nation possesses substantial stores of a variety of valuable resources, including silver, gold, iron, lead, antimony, coal, salt, precious stones, oil, and gas. The mining, chemical, metallurgical, and machine-building sectors all benefit from the availability of raw materials from deposits that have been explored. Tajikistan is a big exporter of electricity, and the nation is ranked eighth in the world in terms of its hydropower reserves. The electric power sector is a highly well-developed and promising business, and Tajikistan is a major exporter of energy (Nabiyeva, 2015).

Nonetheless, the light industry continues to be the sector that is both the most significant and the largest. Tajikistan is home to a plethora of businesses that are involved in the processing of agricultural raw materials, such as carpet weaving, textile, and knitting industries. Cotton and silk are two examples of these types of businesses. Because of their reasonable prices and high levels of quality, the manufactured goods are in high demand not only inside the country's borders but also within the country itself.

Dushanbe and Khujand are the two most important cities in Tajikistan when it come to the country's industrial sector. On figure below (Fig. 2) example of new palace of water sports that has been opened in 2020 clearly shows that main cities of Tajikistan are trying to get hand to hand with countries that surrounds it.

Figure 2, Tennis Palace and Water Sports Complex in Dushanbe

Source: Asia-Plus, 2020

Tajikistan is making great strides to expand its tourism industry. Monuments of nature, history, culture, and archeology may be found across the area of the country. These landmarks constantly capture the interest of visitors from other countries. More than four million people traveled to the nation from outside it for tourism purposes in x; this number sets a new record. The annual tally of visitors from other countries continues to rise.

This nation in Central Asia is drawing interest from investors located in other parts of the world due to the rapid growth of its economy. The amount of foreign investment in the economy over the past three years has been around one billion dollars yearly, and official figures indicate that this figure is continuing to go up despite the fact that it has been relatively stable. This situation helps to create a favorable environment for investment on the part of the state, which is due in large part to the factors discussed above. Because of this, the government of Tajikistan has established four free economic zones on its territory.

These zones are known as "FEZ Sughd," "FEZ Dangara," "FEZ Ishkoshim," and "FEZ Panj." Within these zones, numerous tax and customs perks and favors have been established for international companies (Fig 3).

Figure 3, Free Economic zones of Tajikistan

Source: Davlatzod, 2017

The most active investors in the Tajik economy are corporate representatives from Russian and Chinese companies. Thus, China spent around one and a half billion dollars in various sectors of the Tajik economy during the period from 2007 to 2019, whereas Russia invested one billion and four hundred million dollars in the same time period (Bossuyt, 2019).

The areas of communications, construction, financial services, geological research and development of mineral reserves, industry, energy, and tourism are the most appealing markets for investors. Raw cotton and other cotton products, aluminum, and electrical power are the primary commodities that are exported.

Russia, China, Kazakhstan, and Turkey are Tajikistan's primary trading partners with the rest of the world. Almost half of all global commerce is conducted with nations that are members of the Commonwealth of Independent States (CIS). Another prominent business that provides a substantial contribution to the economy of Tajikistan is the mining industry (Pomfret, 2022). This country possesses considerable amounts of precious metals such as gold, silver, and copper. In addition, the country has an abundance of non-metallic minerals such as rock salt and sulfur, which are also important industrial minerals. On the other hand, this industry is plagued by instances of corruption and poor management, both of which stymie its growth and contribute to an overall dearth of investment. Because of these issues, there has been a reduction in investment. Nevertheless, the terrain in many of these regions is steep, and there is a lack of infrastructure; all of these factors combine to make it challenging to harvest and transport these minerals.

Compared to other nations, Tajikistan's industrial sector is notably underdeveloped and relatively modest. In addition to this, it has an inadequate capacity and uses antiquated technology. The majority of the country's industries were established during the time of the Soviet Union; however, there has been no modernization or extension of these industries since that time. This has resulted in low levels of productivity and a restricted range of commodities, with the majority of industries manufacturing fundamental items like textiles, footwear, and food. Because of this, there is now a smaller selection of items available (Kalinovsky, 2018).

In addition, Tajikistan's service industry is undeveloped, with limited access to new technologies and a labor force that does not possess the necessary degree of technical abilities. Despite the fact that the tourist business in the country has a substantial amount of unrealized potential, it has been significantly hindered in recent years as a result of the COVID-19 epidemic and continued security worries in Afghanistan, which is located in close proximity to the country (Omelicheva, 2022).

In order to address these difficulties, the government of Tajikistan has begun a series of economic reforms with the aims of improving the country's business climate and attracting foreign investment (Panwar, 2022). These goals are intended to be achieved via a variety of means. The process of starting a new business will become less complicated as a result of these reforms, as will the payment of taxes and other fees, and access to financial resources will grow. In addition, the upgrading of infrastructure has been declared a key priority by the government, notably the extension of transportation networks and the increase of energy sources (Davies, 2021).

In spite of all of these efforts, Tajikistan's economy continues to struggle with a diverse range of issues. The political instability of the nation makes it difficult for the country to grow its export markets and attract international investment (Ashurov, 2020). This difficulty is compounded by the fact that the nation's geographical constraints and lack of adequate infrastructure make the situation even more difficult. In addition, economic development is still significantly hampered by the pervasive presence of corruption. Because of these challenges, the growth of the private sector is slowed down, and investment from outside the nation is discouraged.

In response to these challenges, the government of Tajikistan has initiated a number of economic reforms in an effort to enhance the environment for doing business in the nation and to entice foreign investment. These objectives have to be accomplished through a variety of approaches that will be discussed in the next chapter as author will touch more of current state and development of Tajikistan. But still some of the government reforms, made the process path of beginning a new businesses and organizations, paying taxes and other fees, and gaining access to financial resources became easier, and the availability of such resources also increases (Mukimova, 2022). In addition, the administration has placed a high focus on the modernization of existing infrastructure, particularly the extension of existing transportation networks and the development of additional energy sources (Tleuken, 2022).

In spite of all of these efforts, the economy of Tajikistan continues to suffer with a wide variety of issues. The country is unable to cultivate its export markets or attract foreign investment as a result of the political instability that exists in the country (Fisher Melton,

2021). This challenge is made much more difficult by the fact that the country's geographical constraints and inadequate infrastructure make the issue considerably more challenging.

In spite of the fact that Tajikistan is a developing country with a low per capita income, economists are optimistic about the country's prospects for further economic growth.

3.2.2 Current development

Tajikistan is a nation that can be found in Central Asia and has a population that is close to 10 million people. To the west, it shares a border with Uzbekistan; to the north, it shares a border with Kyrgyzstan; to the east, it shares a border with China; and to the south, it shares a border with Afghanistan (Fig. 4).

Figure 4, Countries that surround Tajikistan

Source: Zainiddinov, 2023

The country of Tajikistan's transportation infrastructure is one of the primary factors contributing to the country's present level of development. The nation is now making significant investments in modernizing its road network, with a particular emphasis on enhancing the connection between its main cities and the nations that lie to its immediate south and west. This comprises the building of brand-new highways in addition to the refurbishment of older roads and the replacement of aging bridges. These improvements to transportation are anticipated to have a substantial influence on the economy of the nation, making it possible for increasing levels of both commerce and tourism.

The energy industry in Tajikistan is another area that is undergoing growth. The nation is endowed with an abundance of hydropower resources and has the ability to produce up to 12,97 billion kWh of energy per year (World Data, 2023). To make the most of this opportunity, Tajikistan is in the process of building a number of new hydroelectric power plants with the intention of becoming a significant supplier of energy to the nations that are located in its immediate vicinity. In addition, the nation is making investments in renewable energy sources like as solar and wind power in order to lessen its dependency on fossil fuels and increase the degree to which it can operate independently in the energy sector (Aien, 2020).

The agriculture sector of Tajikistan is also one of the primary areas of concentration for the country's overall growth. The vast majority of Tajikistan's population is concentrated in the country's rural regions, where they make their living off of agriculture. In order for the government to be able to assist this sector, investments are being made in irrigation systems, modernization of agricultural equipment, as well as training and support for farmers. In addition, the government of this nation is actively encouraging the growth of agroindustry’s, such as the manufacturing of textiles and the food processing sector, with the dual goals of increasing the value of agricultural goods and generating new employment possibilities (Lukyanets, 2020).

Tajikistan's education system is another area that is undergoing improvement. The government is making investments in enhancing access to education and boosting the quality of its schools; therefore, this is an area of growth for Tajikistan. The government has committed resources to the development of new schools, the professional development of

educators, and the distribution of instructional resources in an effort to meet its objective of providing primary education to all citizens by the year 2025. In addition, Tajikistan is striving to expand access to higher education by creating new universities and forming relationships with institutions located in other countries (Afzal Tajik, 2022).

To sum things up, Tajikistan is a nation that is in the process of experiencing considerable growth in a number of important spheres, such as agriculture, education, and transportation, among others. These new discoveries have the potential to have a big positive impact on both the economy and the standard of living in the nation. But there is still some wide problems that are bad for this region and unemployment is one of them.

3.2.3 Unemployment

The problem of unemployment is a widespread one that affects civilizations all around the globe. It is a complicated issue that offers distinct obstacles for different nations, and Tajikistan is not an exception. Tajikistan has the same challenges as other countries. This nation in Central Asia has a high rate of unemployment, which presents a serious obstacle to the government's efforts to build its economy and maintain its social stability. In the following paragraphs, author also shall investigate the problem of unemployment in Tajikistan, including its origins, impacts, and potential remedies.

To begin, it is very necessary to have an understanding of the complexity of the work situation in Tajikistan. The nation ranks 65 in unemployment in the world in 2022, with an estimate of 7,8 percent (Trading Economy, 2022). While this number may not seem to be very concerning at first glance, it is essential to keep in mind that the country's population is expanding at a pace of 2% per year (Macro Trends, 2022). This indicates that more individuals are joining the labour force each year. In addition to this, it is believed that roughly 200,000 of Tajikistan's young people are now without jobs (Geres, 2022). This trend is especially troubling since young people are the most susceptible to unemployment, and it may have detrimental impacts on their lives that last for their whole lifetimes.

The high percentage of unemployment in Tajikistan may be attributed to a number of different variables. The bad economy of the nation is one of the primary causes behind this. Tajikistan is a landlocked nation with a tiny industrial base and few natural resources.

Tajikistan does not have any coastline. Agriculture plays a significant role in its economy and is responsible for more than sixty percent of the workforce there (Zainiddinov, 2023). Due to the low yield per acre and the fact that this industry is primarily focused on subsistence, it is difficult for farmers to produce an income that is sufficient for their needs. The fact that Tajikistan has a hard environment, which makes it difficult to farm crops, adds insult to injury with regard to this scenario.

The poor level of education that exists across Tajikistan is another element that plays a role in the country's high unemployment rate. Although if the literacy rate in the nation is close to 99%, the quality of education in the country is quite low (Kluczewska, 2022). In today's highly competitive work market, many young people may not possess the skills essential to get employment. In addition, there is a mismatch between the skills that are needed by employers and the abilities that are already held by the workforce. In spite of the high unemployment rate, this mismatch causes a considerable number of job openings to remain unfilled and causes businesses to lose money.

The impacts of unemployment in Tajikistan have a wide range of repercussions and are complicated. The most obvious and immediate consequence is the economic strain that is placed on people and families as a result of it (Khuntia, 2022). Those who are unemployed do not have a source of income, which makes it challenging for them to satisfy their essential requirements. This circumstance has the potential to lead to poverty, which in turn may lead to malnutrition and bad health. In addition, a high unemployment rate adds to social unrest since it makes individuals angry because they are unable to find job and support their families. People feel upset when they are unable to find work (Torrisi, 2023).

The high unemployment rate in Tajikistan has wider-reaching implications for the country's economy. Due to the state of the country's economy, it is difficult to entice foreign investment, which is absolutely necessary for the production of new employment. Moreover, since there is a shortage of competent people, many firms have difficulty expanding and growing, which further hinders the development of new jobs. Because of the high percentage of unemployment, the state is forced to offer financial help to people who are unable to find job, which places a burden on the resources available to the government (Ibbotson, 2020).

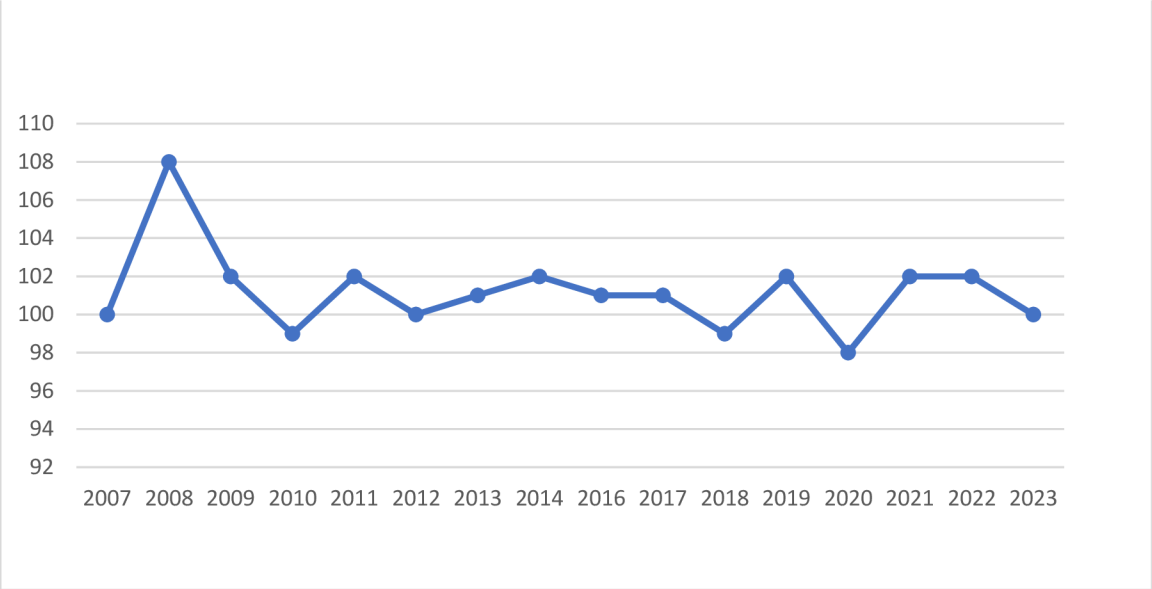
The issue of unemployment in Tajikistan is complicated, and any potential solution will need to take into account a variety of angles and perspectives. One of the most important things that can be done is to diversify the economy by pouring money into emerging markets and making the regulatory climate friendlier to business. This strategy would result in the creation of new employment opportunities and would entice investment from outside. Enhancing the quality of education and training programs would be another way to guarantee that young people have the skills necessary to obtain jobs in today's competitive job market.

Another alternative is to provide assistance to small and medium-sized businesses (SMEs), which serve as the driving force behind economic growth. Small and medium-sized businesses are responsible for the majority of newly created jobs in the majority of nations and may have a considerable influence on the reduction of unemployment. Tax breaks and loans with low interest rates are two examples of the kind of incentives that the government could provide to individuals who want to establish their own enterprises.

3.3 Determinants of GDP

The Gross Domestic Product (GDP) of Tajikistan, a landlocked nation located in Central Asia, has been demonstrating a consistent rate of expansion over the course of the last several years. Although agriculture and cotton production have long been Tajikistan's primary industries, the government has been working to diversify its economy in recent years in an effort to entice global investment and advance environmentally responsible growth. These issues show the expansion of the private sector and discourage investment from entities located outside the nation (Babu, 2022). Author would also like to show the dynamics that were happening in the Tajikistan for the last 15 years and the following chart illustrates the movement of the CPI that can be found with year divided by value when compared to the same time the previous year (percentage).

Figure 5, Tajikistan Consumer Price Index (CPI): Goods from Jan 2007 to Jan 2023



Source: Ceicdata, 2023

The growth of Tajikistan's gross domestic product (GDP) is determined by a complex and diverse set of factors, ranging from macroeconomic policies and structural changes to natural resources. Author also found some of the primary causes that have led to the expansion of Tajikistan's GDP, and the difficulties that the nation confronts in maintaining its economic progress.

The strategic position of Tajikistan within Central Asia is one of the primary factors contributing to the country's growing economy. Landlocked nations in the area, such as Uzbekistan, Kyrgyzstan, and Afghanistan, use Tajikistan as a transit hub to get goods and people in and out of their country as were mentioned before. The nation has been making significant investments in its transportation infrastructure, including as the building of new motorways, trains, and airports, in order to improve its connection with both its immediate neighbors and other nations farther afield. Enhanced connectivity has resulted in higher levels of both commerce and investment, both of which have contributed to the expansion of Tajikistan's GDP.

The development of Tajikistan's natural resources, in particular its hydroelectric capacity, is another important factor in the country's overall GDP growth. With around 527 rivers and an estimated hydroelectric capacity of 527 billion kWh per year, Tajikistan offers

a significant potential for the generation of electricity by hydropower (Azimov, 2022). The nation has been making investments in the growth of its hydropower industry, which includes the building of new hydroelectric power facilities as well as the renovation of those that already exist. The growth of the hydropower industry in Tajikistan has not only increased the country's overall energy supply but also helped produce cash for the country via the sale of electricity to nations in the region.

Nonetheless, Tajikistan is confronted with considerable obstacles in maintaining the expansion of its economy. The country's overwhelming dependency on remittances is one of the most significant issues it faces. Remittances make up more than thirty percent of Tajikistan's gross domestic product, giving the country one of the highest remittance-to-GDP ratios in the world. The majority of remittances come from Tajik migrant workers residing in Russia (Khramova, 2020). These employees, who sometimes face difficult working conditions and restricted job options, send money back to their families in Tajikistan. The COVID-19 epidemic has made this problem even worse, as a result of which many migrant workers have been let off from their positions or have been unable to transfer money back to their homes in their native countries.

To summarize, the expansion of Tajikistan's gross domestic product is influenced by a diverse range of variables, such as the country's strategic position, its natural resources, and its macroeconomic policies. The country has made significant progress in diversifying its economy and attracting foreign investments, but it still faces significant challenges, such as its heavy reliance on remittances and its weak institutional and governance framework. Despite these achievements, the country still faces significant challenges. In order to effectively address these difficulties, it would be necessary to maintain efforts aimed at enhancing the education system in the nation, as well as its institutional and governance structure (Bezborodova, 2022).

4 Practical Part

4.1 Limitations

Data is, without a doubt, the most fundamental condition that influences the overall quality of an econometric model and ensures that a good model will be created, and it is essential to understand this condition when developing a given econometric model and evaluating the relationship between a large number of macroeconomic indicators. It is also essential to understand that this condition ensures a good model will be developed. Unfortunately, when it comes to post-Soviet countries, and especially those that are located in Central Asia, it is more difficult to collect data than in other parts of the world. This is due to the fact that statistical offices in post-Soviet countries do not typically collect data on an annual basis, as is the case with developed countries and other categories of countries. Statistical offices in developed countries and other categories of countries collect data on an annual basis.

The author accomplishes this goal mostly via the use of data that is supplied by international organizations such as the International Labor Office and the World Bank. However, there is still another constraint, and this one is connected to the fact that it was impossible to evaluate the situation in Tajikistan in terms of its macroeconomic indicators during the years 1992–1997, when the nation was in the midst of its Civil War. From this point forward, the author will be basing his considerations on projections provided by international organizations.

4.2 GDP Model for Tajikistan

In spite of the obvious economic instability and the relatively traditional political regime for a country located in Central Asia, Tajikistan is still a macroeconomic subject; therefore, it is possible to estimate a model that will reflect the real growth of the country's GDP. This is the case despite the fact that Tajikistan is located in Central Asia.

However, it is necessary to first offer a list of components that will be included in the GDP model for Tajikistan and provide a justification for the choice of the variables that will be included in the model.

The very first independent variable to be included in the GDP growth model for Tajikistan is unemployment, and the choice of this variable is justified by two reasons – the first is that it is a fundamental factor that will also help the author to test if the Okun's law actually applies to Tajikistan, and the second is that given the uncertainty related to employment and traditionally high unemployment level in the country, it is supposed that this macroeconomic variable will be a significant predictor of GDP growth. The GDP growth model for Tajikistan was developed The author went with the exports variable as the second one in the model. Because the value of this variable will always have an impact on the total GDP, incorporating it in the model appears to make a lot of sense given how evident it is that it is one of the most important factors that determines GDP alongside other components related to the trade with foreigners.

Wheat output in tons is the third variable that will be mentioned by the author, and the unusual nature of the Tajik economy is largely responsible for explaining why this is the case. As the author mentioned earlier, a large percentage of the population in Tajikistan is employed in the agricultural sector, and the nation as a whole went through an economic transformation after the Civil War when the role of the agricultural sector was significantly increased under the leadership of President Emomali Rahmon. Wheat is one of the most essential agricultural commodities; as a result, picking this specific commodity to study is an intriguing experiment that will assist to determine whether or not the importance of the agricultural sector to the national economy is exaggeratedly high.

The fourth variable that the author chose to focus on is the exchange rate, which is expressed in terms of the local currency, the somoni, relative to the dollar. Since the quantity of exports increases whenever a given currency depreciates, the GDP is a good predictor of whether or not a country has a currency that is falling in value relative to the rest of the world and its neighbors. This is because when a country's exports become more affordable to other nations, the amount of exports increases. It is considered that the exchange rate is a key predictor of GDP in view of recent developments regarding the somoni, the local currency of Tajikistan, and its propensity to decline.

Last but not least, remittances have traditionally been a significant contributor to the national economy also due to the fact that the overwhelming majority of population works outside of the country. Therefore, the author estimates the following economic model:

$$f(x) = (X_1, X_2, X_3 X_4, X_5)$$

Based on the economic model, the author eventually proceeds to the estimation of an econometric model containing future parameters of independent regressors. Hence, the model that will be estimated will have the following characteristics:

$$\mathbf{Y_{1t} = ß_0 + ß_1 X_{1t} + ß_2 X_{2t} + ß_3 X_{3t} + ß_4 X_{4t} + ß_5 X_{5t} + \varepsilon_i,}$$ where:

$\mathbf{ß_{1,2,3...n}}$	parameters of individual predictors or regressors of the econometric model.
$\mathbf{ß_0}$	constant term or intercept term.
$\mathbf{X_{1t}}$	Unemployment rate in Tajikistan in percentage terms.
$\mathbf{X_{2t}}$	Exports in Tajikistan in billions of current US.
$\mathbf{X_{3t}}$	Wheat production in Tajikistan in thousand tons per year.
$\mathbf{X_{4t}}$	Exchange rate in Tajikistan in somoni per current USD.
$\mathbf{X_{5t}}$	Remittances in current billions of current USD
ε_i	Error Term or disturbance
$\mathbf{Y_{1t}}$	real GDP growth in Tajikistan in percentage terms.

The model itself is created based on the dataset containing 28 observations (n = 28 and df = 22) reflecting the development of chosen indicators from 1993 to 2020. The reason behind not extending the given dataset lies in the history of the country – Tajikistan became independent in 1991, after the collapse of the Soviet Union and there would be no possibility to find the values of mentioned parameters for Tajik Soviet Republic since the Soviet Union was not publishing any related data and even if they were, the degree of bias would still be debatable. The following table (Table 1) effectively contains the dataset that is used by the author for the econometric estimation of the model discussed earlier. Data was retrieved from The World Bank, which serves as the main source for extracting valuable data reflecting the development of the country's GDP.

Table 1, Dataset used for the estimation

Year	**GDP growth, %**	**Unemployment, %**	**Exports, billion USD**	**Wheat production, tons**	**Exchange rate, somoni per USD**	**Remittences, billion USD**
	y1t	*x1t*	*x2t*	*x3t*	*x4t*	*x5t*
1993	-16.40	6.20	0.47	170.600	0.01	0.33
1994	-21.30	8.80	0.58	149.000	0.02	0.37
1995	-12.42	10.30	0.81	170.000	0.12	0.38
1996	-16.70	13.40	0.80	239.000	0.30	0.39
1997	1.68	13.90	0.81	452.209	0.56	0.42
1998	5.31	16.50	0.65	388.149	0.78	0.49
1999	3.70	15.40	0.72	365.136	1.24	0.63
2000	8.32	15.13	0.75	406.196	2.08	0.67
2001	9.58	14.77	0.74	387.314	2.37	0.68
2002	10.80	14.41	0.77	544.565	2.76	0.79
2003	11.00	14.02	0.99	660.222	3.06	1.46
2004	10.30	13.61	1.22	631.328	2.97	2.52
2005	6.70	13.13	1.25	618.467	3.12	5.64
2006	7.00	12.74	1.65	640.339	3.30	9.76
2007	7.80	12.37	1.71	649.300	3.44	15.14
2008	7.90	11.98	1.76	659.096	3.43	22.78
2009	3.90	11.50	1.22	1088.591	4.14	15.66
2010	6.50	10.89	0.84	1033.144	4.38	20.21
2011	7.40	10.24	1.07	726.880	4.61	27.22
2012	7.50	9.58	1.32	812.588	4.74	32.22
2013	7.40	8.91	0.94	947.350	4.76	36.98
2014	6.70	8.23	0.84	868.368	4.94	33.84
2015	6.02	7.55	0.90	896.362	6.16	22.59
2016	6.90	6.90	1.22	917.081	7.84	18.67
2017	7.10	6.95	1.13	899.653	8.55	22.37
2018	7.60	7.01	1.12	778.986	9.15	21.83
2019	7.40	7.06	1.24	836.884	9.53	23.22
2020	4.40	7.58	1.41	846.000	10.32	21.87

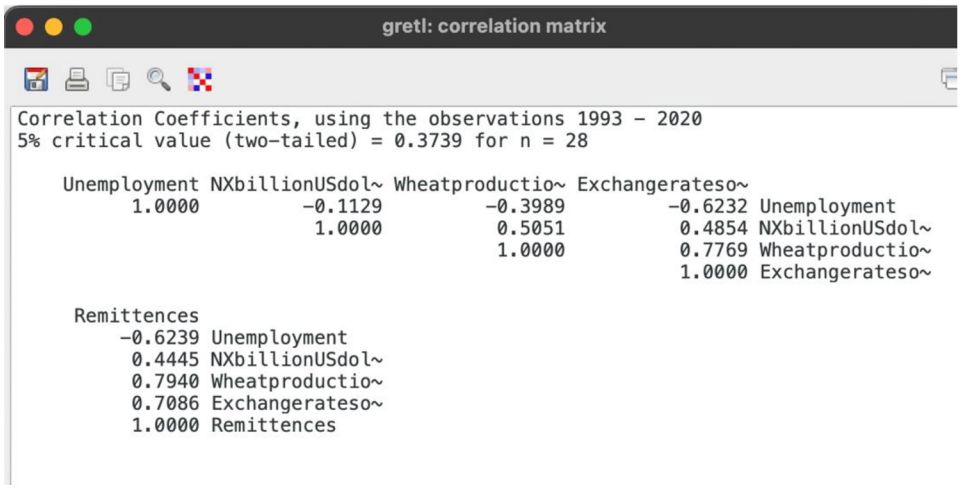
Source: World Bank, 2022

In addition to that, it is sensible to mention the software that will help the author to apply the OLS, i.e., ordinary least squares method to the following dataset. The author will be using Gretl, a piece of widely used statistical software.

Just creating a model and interpreting the results is not sufficient, so the author will also conduct various verifications that will include mathematical verification, statistical verification, econometric verification and economic verification. Finally, the author's idea is to have a model which will be categorized as BLUE – best linear unbiased estimator with consistent parameters. Eventually, following the subsequent creation of such a model, relevant conclusions can be made.

All in all, the very first step that should be taken into the consideration when creating a given econometric model is checking if there is a problem of multicollinearity (high linear dependency between independent parameters) in the given dataset. For this purpose, the author sets the identification level for Pearson correlation coefficient equal to 0.8, so whenever an absolute value of individual correlation coefficient will be greater than 0.8, it will inevitably mean that there is a problem of multicollinearity. The method selected for multicollinearity identification and Pearson correlation coefficient computation is correlation matrix, that will display correlation coefficients of each parameter. The output is presented in Figure X.

Figure 6, Correlation matrix

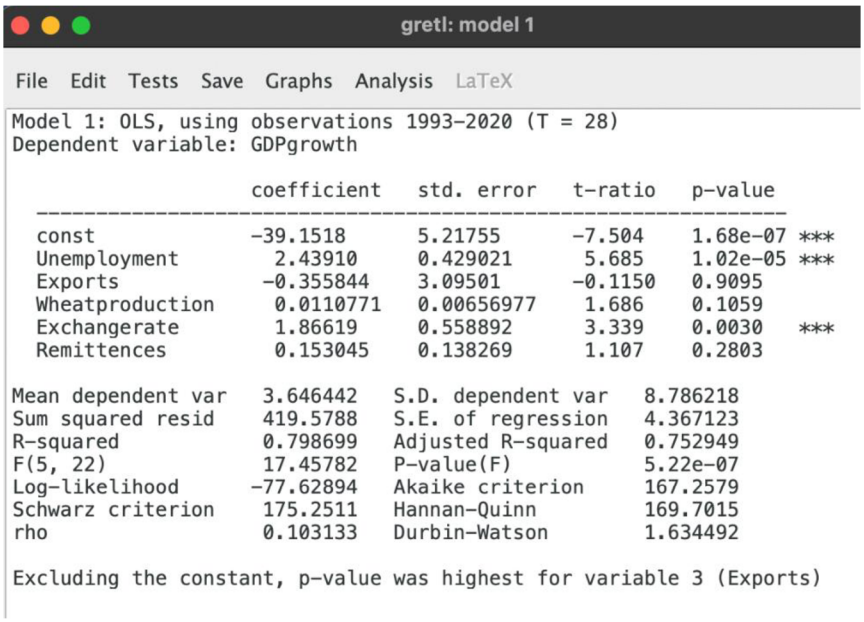


Source: own processing

Fortunately for the author, there is no problem of multicollinearity in the dataset as all correlation coefficients are lower than the boundary selected by the author for the identification of multicollinearity – 0.8 in Pearson correlation coefficient's absolute terms.

Then, the author proceeds to the ordinary least squares method and obtains the following output from Gretl:

Figure 7, OLS output from Gretl



Source: own processing

Hence, the author is able to estimate the following model based on the output:

$$\mathbf{Y_{1t}} = -39.1518 + 2.43\mathbf{X_{1t}} - 0.35\mathbf{X_{2t}} + 0.0115\mathbf{X_{3t}} + 1.86\mathbf{X_{4t}} + 0.15\mathbf{X_{5t}} + \varepsilon_i,$$

Now, in the next chapter, the author will continue to the verification of the estimated model.

4.2.1 Mathematical Verification

The essence of mathematical verification of any econometric model lies in finding out of the mean of the observed dependent variable (GDP growth, in this case) is equal to the

mean of the fitted dependent variable. If this assumption is not satisfied, the model is created with a significant mistake. The following table contains the comparison of fitted values and observed ones alongside the averages per each indicator.

Table 2, Mathematical verification

Average fitted	3.65
Average observed	3.65

Source: own processing

- Mean observed = 3.65
- Mean fitted = 3.65

Two values are identical, so it is possible to conclude that mathematical verification has successfully been passed.

4.2.2 Statistical Verification

Now, it is essential to perform the statistical verification of the following model to understand if the model is good from the statistical point of view.

First, it is vital to interpret the results of the R^2 – the coefficient of determination. R square value of the model is equal to 0.79, but yet, it is more sensible to check the value of the R square adjusted, which is slightly lower and equal to 0.75, meaning that 75% of the variation in the GDP growth is explained by the variation in unemployment, exports, wheat production, exchange rate and remittances. This is a solid result, but it is still an indicator that there might be further variables included into the model that will help to precise the development of the real GDP growth in the chosen country.

Then, it is essential to test the model to find out if it is significant or not. For this purpose, the author will first use F-test to understand if the whole model is significant or not.

For all testing procedures related to the model, the author uses the significance level equal to 0.05 or 5%, which means that there is 5% to reject the null hypothesis when it is true. The testing procedure is presented below:

- H_o: $ß_0 = ß_1 = ß_2 = ß_3 = ß_4 = ß_5 = 0$ (the model is not significant)
- H_a: At least one beta coefficient is not equal to 0 (the model is significant)
- A = 0.05
- F = 17.45
- F critical (obtained from the table) = 2.66
- 26.7 > 2.66 => H_o is rejected. The model is deemed to be significant.

Now, after estimating the whole model's significance, it is vital to check which individual parameters are significant and which are not. Now, instead of using F test for all individual parameters at once, the author will focus on conducting testing procedures for each predictor excluding constant, because it is not so important in the context of this research, but which is evidently significant, according to its extremely low P value.

The author starts from testing the significance of X_1 – unemployment rate.

- H_o: $ß_1 = 0$ (unemployment is not significant)
- H_a: $ß_1 \neq 0$ (unemployment is significant)
- A = 0.05
- T = 5.68
- T critical (df = 22) = 2.07
- 5.68 > 2.07 => H_o is rejected. Unemployment is a significant predictor of the real GDP growth in Tajikistan.

Then, the author proceeds to the second parameter – net exports.

- H_o: $ß_2 = 0$ (exports is not significant)
- H_a: $ß_2 \neq 0$ (exports is significant)
- A = 0.05
- T = -0.11
- T critical (df = 22) = 2.07
- 0.11 < 2.07 => H_o is not rejected. Exports is not a significant predictor of the real GDP growth in Tajikistan.

The third test is related to wheat production in Tajikistan, the third parameter.

- H_o: $ß_3 = 0$ (wheat production is not significant)
- H_a: $ß_3 \neq 0$ (wheat production is significant)
- A = 0.05
- T = 1.6
- T critical (df = 22) = 2.07
- 1.6 < 2.07 => H_o is not rejected. Wheat production is not a significant predictor of GDP growth in Tajikistan.

Forth test is reflecting the important of exchange rate and its contribution to the GDP growth in Tajikistan.

- H_o: $ß_4 = 0$ (exchange rate is not significant)
- H_a: $ß_4 \neq 0$ (exchange rate is significant)
- A = 0.05
- T = 3.33
- T critical (df = 22) = 2.07
- 3.39 > 2.07 => H_o is rejected. Exchange rate is a significant predictor of GDP growth in Tajikistan.

Finally, the final test is related to the amount of remittances and its contribution to the GDP growth in Tajikistan.

- H_o: $ß_5 = 0$ (remittances is not significant)
- H_a: $ß_5 \neq 0$ (remittances is significant)
- A = 0.05
- T = 1.107
- T critical (df = 22) = 2.07
- 1.107 < 2.07 => H_o is rejected. Remittances is not a significant predictor of GDP growth in Tajikistan.

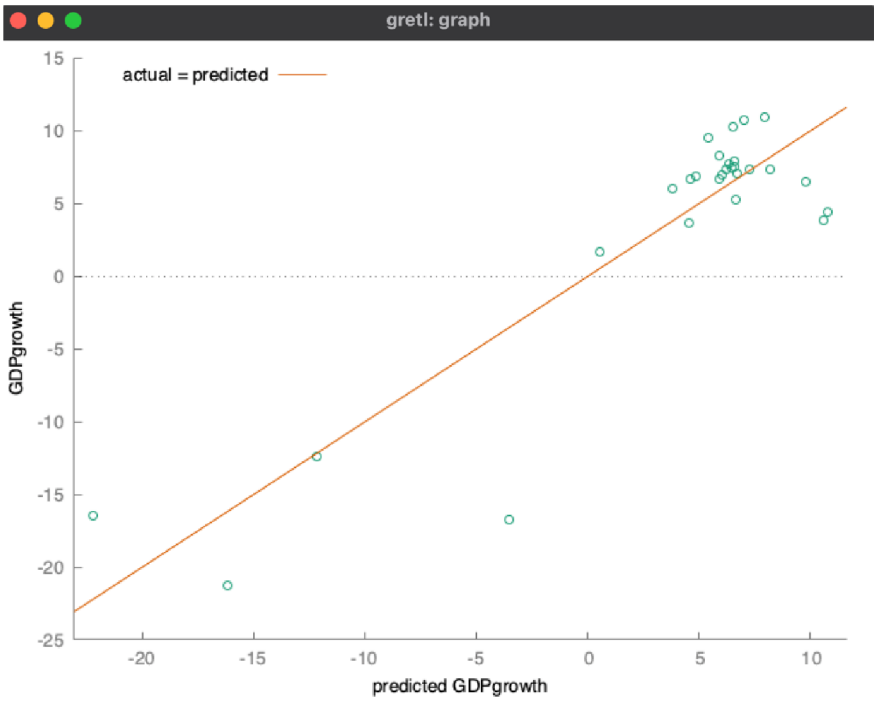
Thus, it is possible to say that just 2 out of 5 predictors were identified as significant – unemployment (X_1) and exchange rate (X_4).

This is a fairly good result, but the model can be recreated, and insignificant variables can be excluded from the model, but it will be done in the next chapter of the analysis. First, it is essential to perform an econometric and economic verification of the model first.

4.2.3 Econometric Verification

In the econometric verification, the author will perform 3 tests – test for autocorrelation, heteroscedasticity and normality of residuals.

Figure 8, Comparison of fitted with observed values



Source: own processing

Test outputs for the econometric verification are presented in the following figure.

Figure 9, Econometric tests

```
White's test for heteroskedasticity -
  Null hypothesis: heteroskedasticity not present
  Test statistic: LM = 18.7999
  with p-value = P(Chi-square(20) > 18.7999) = 0.534862

Test for normality of residual -
  Null hypothesis: error is normally distributed
  Test statistic: Chi-square(2) = 12.5826
  with p-value = 0.00185233

LM test for autocorrelation up to order 1 -
  Null hypothesis: no autocorrelation
  Test statistic: LMF = 0.217377
  with p-value = P(F(1, 21) > 0.217377) = 0.645846
```

Source: own processing

The author uses the same significance level as before, a = 0.05.

First, the author starts from the heteroscedasticity test.

- H_o: heteroscedasticity is not present
- H_a: heteroscedasticity is present
- P = 0.53
- 0.53 > 0.05 => H_o is not rejected (heteroscedasticity is not present).

Then, the author continues with the autocorrelation test of the first order.

- H_o: autocorrelation is not present
- H_a: autocorrelation is present
- P = 0.64
- 0.64 > 0.05 => H_o is not rejected (autocorrelation is not present).

Finally, the author tests if residuals are normally distributed or not.

- H_o: error is normally distributed
- H_a: error is normally distributed
- P = 0.001
- 0.003 < 0.05 => H_o is rejected (error is not normally distributed).

All in all, the tests' outcome is rather satisfying, as the majority of econometric assumptions is satisfied, apart from the one that concerns the normal distribution of residuals. Thus, the model does have just one problem – the lack of normal distribution of the error term, but both of them do not present obstacles to continue this study.

4.2.4 Economic Verification

Now, the author will interpret the quantitative effect of each predictor on the GDP growth in Tajikistan and verify if the direction of the change is logical from the economic point of view.

- *When the unemployment rate in Tajikistan increases by 1 percent, GDP in Tajikistan increased by 2.43 percentage points.*
- *When the exports increase by 1 billion US current, GDP in Tajikistan fall by 0.35 percentage points.*
- *When the wheat production in Tajikistan increases by 1 thousand tons, GDP in Tajikistan increases by 0.01 percentage point.*
- *When the exchange rate in Tajikistan goes up by 1 somoni to 1 US current, GDP in Tajikistan increases by 1.86 percentage points.*
- *When the number of remittances sent to Tajikistan goes up by 1 billion US current, GDP in Tajikistan increases by 0.15 percentage points.*

All has its economic logic apart from the sign of exports and unemployment, as exports is often believed to be a positive determinant of a country's GDP. However, the author believes that since the variable can be omitted from the model, then it is not such a big issue as this economic relationship will be excluded from the model as such. Unemployment will be discussed a bit later in the results.

4.2.5 Elasticity Analysis

Now, the author will focus on the elasticity analysis in 2020 to understand the factor which is the most important one in terms of its effect on the percentual effect on the variable of real GDP growth of Tajikistan.

The following figure presents the table with elasticities calculated per each predictor.

Table 3, Elasticities for 2020

Unemployment	Exports	Wheat production	Exchange rate	Remittances
1.49	-0.04	0.76	1.56	0.27

Source: own processing

Based on estimated elasticities, in 2020:

- The effect of 1% increase in unemployment led to 1.49% increase in the real GDP growth of Tajikistan.
- The effect of 1% increase in exports led to 0.04% decrease in the real GDP growth of Tajikistan.
- The effect of 1% increase in wheat production led to 0.76% increase in the real GDP growth of Tajikistan.
- The effect of 1% increase in the exchange rate of Tajikistan to USD led to 1.56% increase in the real GDP growth of Tajikistan,
- The effect of 1% increase in remittances received by Tajikistan led to 0.27% increase in the real GDP growth of Tajikistan.

The most influential factors in terms of their effect on the real GDP growth of Tajikistan were unemployment and exchange rate with the second being the most influential regressor out of all incorporated into the model.

4.2.6 Model Simulation

In this part, the author focuses on finding the figure for GDP change in Tajikistan for 2022 based on the model created by the author on the time series from 1993 to 2020, given the recent values published by the government and fitted values based on trend functions.

- Unemployment rate = 8.6% (obtained from The World Bank)
- Exports = 0.643 billion US current (obtained from The World Bank)
- Wheat Production = 1058, 571 thousand tons (fitted trend value based on the dataset created)
- Exchange rate = 10.15 somoni per USD current (average for the year 2022)
- Remittances = 0.626 billion US current (taken from the World Bank)

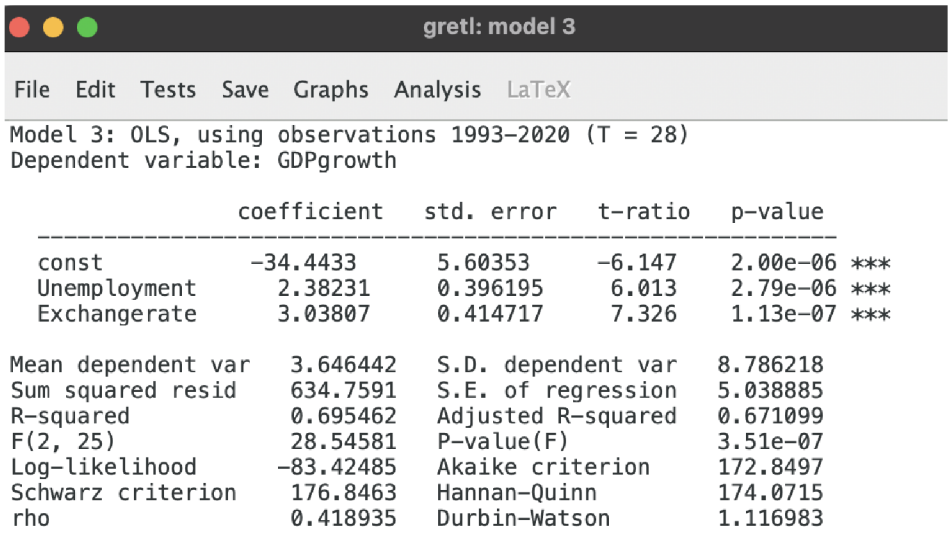
Hence, the projected real GDP change in Tajikistan is equal to 12.35%, according to the model created by the author.

4.3 Okun's Law Test

As the author has specified it in his theoretical part, it is essential to understand that Okun's law is not a universally applicable concept and the degree to which it can be applied depends on country to country.

Yet, from the model estimated by the author in the previous chapter, it became evident that unemployment is, in fact, a significant predictor of GDP in Tajikistan, but the relationship between two indicators in Tajikistan is much different from the one supposed by Okun. However, before ultimately answering the question of whether Okun's law applies to the case of Tajikistan, the model will be recreated with only significant predictors left there (unemployment and exchange rate). The output is presented in Figure 10.

Figure 10, Restructured model



Source: own processing

Indeed, the effect of unemployment on the GDP growth in Tajikistan is almost 2 percentage points (2.38, effectively), so it basically means that 1% increase in the unemployment rate in Tajikistan leads to the 2.38 percentage point ***rise*** in the GDP of the country, which is significantly different from what Okun described in his law, where 1% increase in the unemployment leads to the 2% decrease in the GDP. Henceforth, it is possible to say that the quantitative effect is absolutely precise, but the direction is absolutely opposite in the case of Tajikistan. Further reflections will be provided in the next chapter.

5 Results and Discussion

5.1 Okun's Law Applicability

To begin, it is worthwhile to begin the results and discussion chapter by concluding once more that there is an asymmetric behavior in the Okun's law on the example of Tajikistan – the relation is quantified exactly at 1 percent change in unemployment for each 2% change in the real GDP, but the direction is completely different. This is something that should be done because it is worth beginning the results and discussion chapter with this conclusion. In Tajikistan, a rise of one percentage point in the unemployment rate results in a two percentage point acceleration in GDP growth.

Therefore, the basic hypothesis can no longer be supported. Overall, it is crucial to establish an explanation for this, and Jim Lee came to the conclusion in 2000 that, as a result of the structural shift in economies that occurred in the 1970s, the impact of an increase in unemployment is not as significant in certain regions (Lee, 2000). In addition to this, it is very important to discuss the history of the nation, since Tajikistan is now considered to be an economy in transition. Tajikistan was a member of the Soviet Union for more than seventy years.

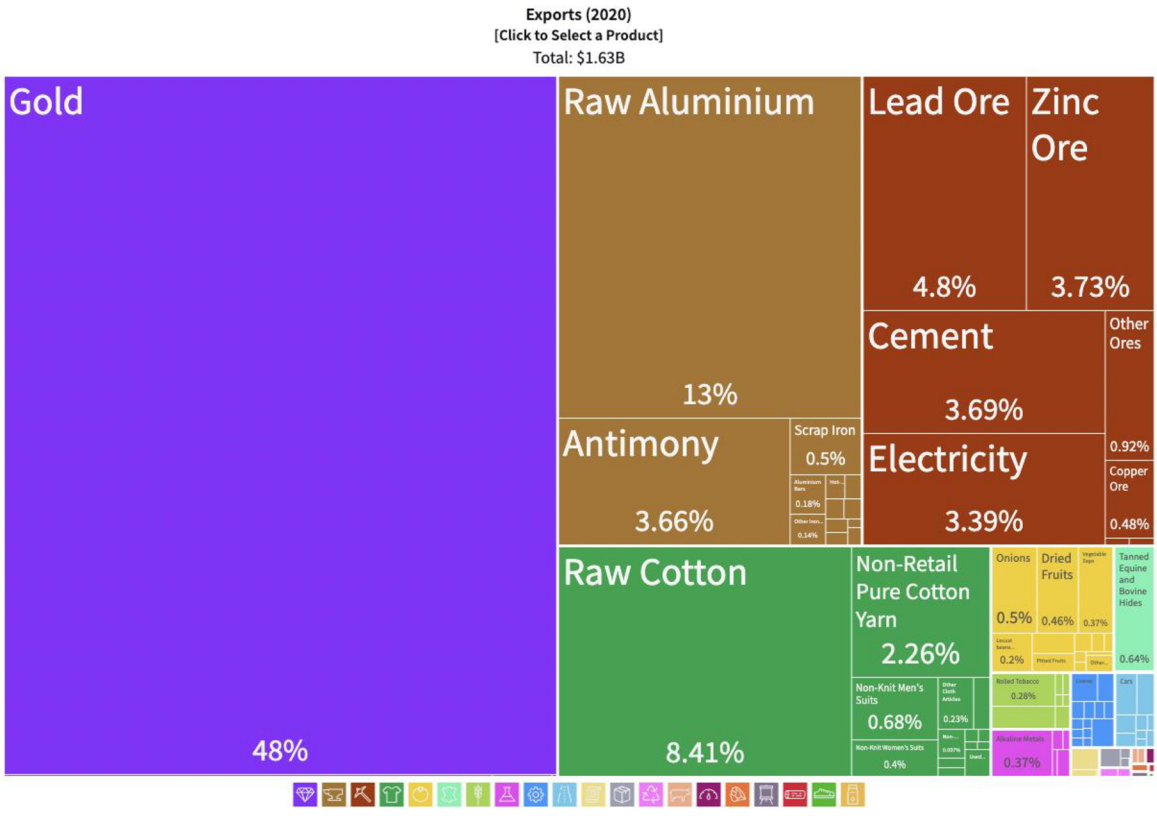
The Western economies, and notably the economy of the United States, which was used as an example by Okun in his research, serve as a useful point of comparison for contrasting these economies' organizational structures and performance. Other authors who have researched the topic of Okun's law in transition economies have noted that countries that are currently experiencing war are the outlying ones, and Okun's law does not really apply to them. On the other hand, there are only a few countries that are considered to be part of transition economies that adhere to Okun's law (Izyumov, 2002). It is abundantly clear that this is the scenario in Tajikistan, given the country's precarious economic status in the 1990s, which was made worse by the continuous civil war that wreaked havoc on the nation for over 5 years.

All in all, Okun's law is not applicable in the case of Tajikistan as of the author's research and empirical evidence collected to support this claim regarding the case of the country and Okun's law.

5.2 Factors influencing GDP in Tajikistan

After conducting his analysis, the author is able to conclude that there are just 2 factors that tremendously affect the economy of Tajikistan – unemployment rate and exchange rate of somoni to US current. Actually, when it comes to them, it becomes clear that the country is focused on exports and the growth in GDP is justified primarily by the change in the depreciating currency (around 1.56% change in the GDP growth whenever the exchange rate increases by 1%), which is quite a substantial effect. However, when looking at the country's export breakdown, shown on the figure above, the justification seems to be quite simple.

Figure 11, Tajikistan exports in 2020



Source: OEC, 2022

The country's exports are almost solely based on three important commodities – gold (48%), raw aluminum (13%) and raw cotton (8.41%) and it is in the country's interest to keep the currency to depreciate since the amount of exports increases

tremendously and as a consequence, the GDP growth is obtained in the country. The author believes that the fact that the GDP growth is negatively correlated in the author's model is a consequence of third factors and generally the fact that the variable is not significant. Once Tajikistan will exist the turmoil, it is expected by the author that the sign will be positive for future econometric models. When comparing the value of exports in 2020 (1.63 billion US) with the value of exports in 2019 (1.23 billion US) and also taking in the consideration the change that occurred in the exchange rate of somoni – increase of almost 1 somoni to the US dollar, it is quite clear that the growth in the GDP is primarily attained by the fact that the country currency is rapidly depreciating over time and goods produced there are more attractive. In addition to that, the observed GDP growth in Tajikistan was approximately 4%, so there is a perfect explanation of the development of the Tajik economy. The other authors come to the same conclusion in this matter, who believed that there is a strong link between the country's depreciating domestic currency and a slowly increasing economic growth (Jha, 2010).

Finally, another piece of evidence that reflects the development of the Tajik economy is the fact that the fitted value by the author for 2022 is equal to 12.35%, which indicates that the economy of Tajikistan is expected to continue growing at a steady pace in the near future. Also, this value goes along with the current prognosis of the Tajik economy for 2022 of 7.4% (Avesta, 2022).

5.3 Recommendations

Tajikistan faces a range of economic challenges, including high levels of poverty, unemployment, and low economic growth. Here are some recommendations to improve the economic situation in Tajikistan:

- Diversify the economy: Tajikistan's economy is heavily reliant on agriculture and remittances, which can be vulnerable to external shocks. The government can encourage diversification by promoting other industries such as manufacturing, tourism, and service sectors.

- Improve infrastructure: Tajikistan's infrastructure is in need of significant improvement, particularly in transport and energy sectors. The government can invest in infrastructure development to create more jobs, boost economic growth, and improve access to basic services.

- Strengthen institutions: Corruption and weak institutions can hinder economic development. The government should improve transparency, accountability, and the rule of law to create an environment that encourages investment, entrepreneurship, and economic growth.

- Increase access to finance: Access to finance is a major constraint for small and medium-sized enterprises (SMEs) in Tajikistan. The government can work with international organizations to provide credit and financial services to SMEs, which can boost their productivity and create more jobs.

- Improve education and skills: Education and skills development are critical for economic growth and job creation. The government can invest in education and vocational training to equip people with the skills they need to succeed in a changing economy.

- Expand regional trade: Tajikistan is strategically located between China and Central Asia, and it can leverage its location to increase trade and investment. The government can work to improve trade relations with neighboring countries and reduce barriers to regional trade.

- Promote sustainable development: Sustainable development can create long-term economic benefits and protect the environment. The government can prioritize renewable energy, water management, and environmental protection to create a more sustainable and resilient economy.

These recommendations can help improve the economic situation in Tajikistan, but they require sustained effort and commitment from the government, civil society, and international partners. The author believes that once the government will focus more on the

economic analysis of the country, they will understand which areas have to be targeted better and what is the best methodology for reaching those objectives.

6 Conclusion

To conclude, the author is able to say that indeed, following his research, it came out that Okun's law is not applicable to Tajikistan, as the quantitative effect of 1% change in the unemployment rate in the county has a positive effect on the real economic growth and this effect is equal to 2%, which goes absolutely against the existing framework developed by Okun in the last century, where 1% change in unemployment causes a 2% drop in the value of the real GDP growth of a given country. Hence, the original hypothesis of the author is rejected with the alternative about insignificance of Okun's law is assumed.

What is more, the author estimated that the most important indicator influencing the GDP growth in the country is exchange rate of somoni to US current and this effect accumulates for 1.86 percentage point change in the real GDP growth caused by just 1 unit depreciation in the exchange rate of somoni to dollars. The second most important factor is actually the unemployment variable itself, which was the main focus of the author in his analysis.

All in all, the author suggests that the empirical econometric model projected by him is of decent quality but can be improved by adding more variables to the original model. Also, tackling the problem with the absence of normality of residuals is a crucial point that will ensure that statistical tests could be conducted under the condition of normality, which is an important assumption for those statistical tests.

The author suggests that if the country wants to improve its financial situation, it is wise to define an additional series of important factors that influence the country's economy and particular sectors, whose role is being restructured in modern Tajikistan. The author suggests that improving access to finances, stimulating sustainable development, decreasing dependency on remittances, expanding regional trade with other developing partners such as Uzbekistan, Pakistan and Kazakhstan, improving infrastructure and finishing the transition from an economy dependent on the agrarian sector are steps that will ultimately bring prosperity to Tajik people and lead to an incredible surge in the country's economic output and as a consequence, it will increase the attractiveness of the country and also bring more

money to locals, who will finally be able to break the viscous circle of poverty and initiate a higher degree of economic activity, where everyone would be given fair opportunities.

7 References

Afzal Tajik, M., Shamatov, D., & Fillipova, L. (2022). Stakeholders' perceptions of the quality of education in rural schools in Kazakhstan. Improving Schools, 25(2), 187-204.

Aien, M., & Mahdavi, O. (2020). On the way of policy making to reduce the reliance of fossil fuels: Case study of Iran. Sustainability, 12(24), 10606.

Altig, D., Fitzgerald, T. J., & Rupert, P. (1997). Okun's law revisited: should we worry about low unemployment?. Economic Commentary, (5/15/1997).

Asadov, P. (2007). Foreign Investment and Economic Reform in Tajikistan. Problems of Economic Transition, 50(6), 32-84.

Ashurov, S., Othman, A. H. A., Rosman, R. B., & Haron, R. B. (2020). The determinants of foreign direct investment in Central Asian region: A case study of Tajikistan, Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan (A quantitative analysis using GMM). Russian Journal of Economics, 6(2), 162-176.

Asia-Plus, website Tajikistan's largest sports complex officially opens in Dushanbe, 2020. https://www.asiaplustj.info/en/news/tajikistan/society/20200721/tajikistans-largest-sports-complex-officially-opens-in-dushanbe

Avesta. (2022, July 13). GDP growth in Tajikistan. Retrieved from Avesta Information Agency: https://avesta.tj/2022/07/14/rost-vvp-tadzhikistana-sostavil-7-4-s-snizheniem-tempa-na-1-3/

Azimov, U., & Avezova, N. (2022). Sustainable small-scale hydropower solutions in Central Asian countries for local and cross-border energy/water supply. Renewable and Sustainable Energy Reviews, 167, 112726.

Babu, S. C., & Akramov, K. (2022). Agrarian reforms and food policy process in Tajikistan. Central Asian Journal of Water Research, 8(1), 27-48.

Batavia, A. R., & Salam, M. A. (2012). Relationship between Unemployment and Gross Domestic Product: Evidence from Pakistan using Okun's Law. JISR management and social sciences & economics, 10(1), 149-157.

Bezborodova, A., & Radjabzade, S. (2022). English in higher education in the Kyrgyz Republic, Tajikistan, and Uzbekistan. World Englishes, 41(1), 72-91.

Blackley, P. R. (1991). The measurement and determination of Okun's Law: Evidence from state economies. Journal of Macroeconomics, 13(4), 641-656.

Blinder, A. S. (1982). Issues in the coordination of monetary and fiscal policy (No. w0982). National Bureau of Economic Research.

Bossuyt, F. (2019). The EU's and China's development assistance towards Central Asia: low versus contested impact. Eurasian Geography and Economics.

Ceic Data, Tajikistan Consumer Price Index (CPI): Goods, 2023. https://www.ceicdata.com/en/tajikistan/consumer-price-index-previous-month100/consumer-price-index-goods

Chamberlin, G. (2011). Okun's Law revisited. Economic & Labour Market Review, 5, 104-132.

Davies, M., & Matthews, N. (2021). Water futures along China's Belt and Road Initiative in Central Asia. International Journal of Water Resources Development, 37(6), 955-975.

Davlatzod, U. (2017). FREE ECONOMIC ZONES: CURRENT STATE AND DEVELOPMENT PERSPECTIVES IN THE REPUBLIC OF TAJIKISTAN. In Революция и современность (pp. 267-271).

Fisher Melton, J. (2023). Democratization from below: Civil society in Tajikistan. Public Administration and Development, 43(1), 38-48.

Gabrisch, H., & Buscher, H. (2006). The relationship between unemployment and output in post-communist countries. Post-communist economies, 18(3), 261-276.

Geres, NEW OPPORTUNITIES FOR UNEMPLOYED YOUTH IN TAJIKISTAN, 2022. https://www.geres.eu/en/news/project-news/new-opportunities_for-unemployed-youth-in-tajikistan/

Gyllow, N., & Vieweg, V. (2021). OKUN'S LAW DURING THE 21ST CENTURY: A Comparison of 8 OECD Countries over a 20-year period.

Harris, R., & Silverstone, B. (2001). Testing for asymmetry in Okun's law: A cross-country comparison. Economics bulletin, 5(2), 1-13.

Hofman, I. (2016). Politics or profits along the "Silk Road": what drives Chinese farms in Tajikistan and helps them thrive?. Eurasian Geography and Economics, 57(3), 457-481.

Hofman, I., & Visser, O. (2021). Towards a geography of window dressing and benign neglect: The state, donors and elites in Tajikistan's trajectories of post-Soviet agrarian change. Land Use Policy, 111, 105461.

Hooper, V. J. (2017). Okun's law revisited within the context of high eurozone unemployment: a note. E-Journal of International and Comparative Labour Studies, 6(2).

Ibbotson, S. (2020). Covid-19: approaches, outlooks, and power dynamics in Central Asia. Asian Affairs, 51(3), 528-541.

Ibragimov, M., & Ibragimov, R. (2017). Unemployment and output dynamics in CIS countries: Okun's law revisited. Applied Economics, 49(34), 3453-3479.

Izyumov, A. V. (2002). The Unemployment–Output Tradeoff in Transition Economies: Does Okun's Law Apply? Economics of Planning, 317-331.

Jalles, J. T., & Ge, J. (2020). Emissions and economic development in commodity exporting countries. Energy Economics, 85, 104572.

Jha, R. D. (2010). Economic vulnerability and poverty in Tajikistan. Economic change and restructuring, 95-112.

Jullien, S., Mirsaidova, M., Hotamova, S., Huseynova, D., Rasulova, G., Yusupova, S., ... & Carai, S. (2023). Unnecessary hospitalisations and polypharmacy practices in Tajikistan: a health system evaluation for strengthening primary healthcare. Archives of Disease in Childhood.

Kalinovsky, A. M. (2018). Laboratory of socialist development: Cold War politics and decolonization in Soviet Tajikistan. Cornell University Press.

Khramova, M., Ryazantsev, S., Rakhmonov, A., & Kasymov, O. (2020). THE IMPACT OF REMITTANCES FROM ABROAD ON SOCIO-ECONOMIC DEVELOPMENT IN TAJIKISTAN. Central Asia & the Caucasus (14046091), (4).

KHUNTIA, M. Massive Inflow of Central Asian Migrants to Russia: Causes and Consequences.

Kim, J., Yoon, J. C., & Jei, S. Y. (2020). An empirical analysis of Okun's laws in ASEAN using time-varying parameter model. Physica A: Statistical Mechanics and its Applications, 540, 123068.

Kluczewska, K., & Hojieva, N. (2022). Socialist in form,"national" in content? Art and ideology in Soviet Tajikistan. Nationalities Papers, 50(2), 372-394.

Knotek II, E. S. (2007). How useful is Okun's law?. Economic Review-Federal Reserve Bank of Kansas City, 92(4), 73.

Lee, J. (2000). The robustness of Okun's law: Evidence from OECD countries. Journal of Macroeconomics, 331-356.

Lukyanets, A., Ryazantsev, S., Moiseeva, E., & Manshin, R. (2020). The economic and social consequences of environmental migration in the central Asian countries. Central Asia and the Caucasus, 21(2), 142-156.

Macro Trends, Tajikistan Population Growth Rate 1950-2023, 2023. https://www.macrotrends.net/countries/TJK/tajikistan/population-growth-rate#:~:text=The%20population%20of%20Tajikistan%20in,a%202.21%25%20increase%20from%202019.

Meyer, B., & Tasci, M. (2012). An unstable Okun's Law, not the best rule of thumb. Economic Commentary, (2012-08).

Mladenov, N. S., & Mladenov, N. S. (2021). New System of International Relations? Which Way Forward into the Rest of the Twenty-First Century?. China's Rise to Power in the Global Order: Grand Strategic Implications, 259-355.

Mukimova, N., Beryozkina, S., Mirzo, A., Sayfudinova, M., & Zicmane, I. (2022). DIGITAL TRANSFORMATION AS A SUSTAINABLE DEVELOPMENT FACTOR IN THE ENERGY SYSTEM OF THE REPUBLIC OF TAJIKISTAN. International Multidisciplinary Scientific GeoConference: SGEM, 22(4.1), 35-42.

Nabiyeva, K. (2015). Renewable energy and energy efficiency in Central Asia: Prospects for German engagement. Michael Succow Foundation: Greifswald, Germany.

Noor, Z. M., Nor, N. M., & Ghani, J. A. (2007). The relationship between output and unemployment in Malaysia: Does Okun's law exist. International Journal of Economics and Management, 1(3), 337-344.

Okun, A. M. (1963). Potential GNP: its measurement and significance. Cowles Foundation for Research in Economics at Yale University.

Omelicheva, M. Y., & Markowitz, L. P. (2022). COVID-19 in Central Asia:(De-) Securitization of a Health Crisis?. Problems of Post-Communism, 69(1), 92-102.

Orphanides, A., & Williams, J. C. (2002). Robust monetary policy rules with unknown natural rates. Brookings Papers on Economic Activity, 2002(2), 63-145.

Paik, Y., Kang, S., & Seamans, R. (2019). Entrepreneurship, innovation, and political competition: How the public sector helps the sharing economy create value. Strategic Management Journal, 40(4), 503-532.

Panwar, V., Nijhar, I., Borodyna, O., Opitz-Stapleton, S., & Nadin, R. (2022). Opportunities and co-benefits of transitioning to a net-zero economy in Kyrgyzstan, Tajikistan and Uzbekistan.

Pirmatov, K., Galova, J., & Horska, E. (2018). Value-Added Agriculture for Central Asian Countries. In Establishing Food Security and Alternatives to International Trade in Emerging Economies (pp. 135-154). IGI Global.

Pomfret, R. (2022). The Central Asian economies since independence. In The Central Asian Economies Since Independence. Princeton University Press.

Prachowny, M. F. (1993). Okun's law: theoretical foundations and revised estimates. The review of Economics and Statistics, 331-336.

Silvapulle, P., Moosa, I. A., & Silvapulle, M. J. (2004). Asymmetry in Okun's law. Canadian Journal of Economics/Revue canadienne d'économique, 37(2), 353-374.

Smith, R. L., & Shashkina, O. (2023). A way forward to integrating cascading risk into local resilience strategies in Central Asia. Progress in Disaster Science, 17, 100273.

Sobotka, T., Skirbekk, V., & Philipov, D. (2011). Economic recession and fertility in the developed world. Population and development review, 37(2), 267-306.

Tajikistan (TJK) exports, imports, and trade partners | OEC. (2022). Retrieved October 14, 2022, from https://oec.world/en/profile/country/tjk?deltaTimeSelector1=deltaTime5&depthSelector1=HS4Depth&tradeScaleSelector1=tradeScale0&yearSelector1=exportGrowthYear24

Tleuken, A., Tokazhanov, G., Jemal, K. M., Shaimakhanov, R., Sovetbek, M., & Karaca, F. (2022). Legislative, Institutional, Industrial and Governmental Involvement in Circular Economy in Central Asia: A Systematic Review. Sustainability, 14(13), 8064.

Torrisi, O. (2023). Young-age exposure to armed conflict and women's experiences of intimate partner violence. Journal of Marriage and Family, 85(1), 7-32.

Trading Economy, Unemployment Rate, 2022. https://tradingeconomics.com/country-list/unemployment-rate

World Data, Energy consumption in Tajikistan, 2023. https://www.worlddata.info/asia/tajikistan/energy-consumption.php

Zainiddinov, H. (2023). Contextual factors associated with women's attitudes toward intimate partner violence in Tajikistan: findings from the 2012 and 2017 demographic and health surveys. Violence against women, 29(2), 112-133.

Zainiddinov, H. (2023). Contextual factors associated with women's attitudes toward intimate partner violence in Tajikistan: findings from the 2012 and 2017 demographic and health surveys. Violence against women, 29(2), 112-133.

Zanin, L., & Marra, G. (2012). Rolling regression versus time-varying coefficient modelling: An empirical investigation of the Okun's Law in some euro area countries. Bulletin of Economic Research, 64(1), 91-108.