

## ECONOMETRIC TESTING OF THE BENOIT HYPOTHESIS IN AZERBAIJAN, KAZAKHSTAN, AND KYRGYZSTAN

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The aim of this study is to examine the effect of defence expenditures on economic growth in Azerbaijan, Kazakhstan, and Kyrgyzstan and to test the validity of the Benoit hypothesis. In this context, the existence of the relationship between defence expenditures and economic growth in the economy of selected Turkic states was investigated by obtaining data on an annual basis for the 2005-2020 periods. The relationship between the variables was examined with the help of Granger Causality Analysis. The results obtained revealed the existence of a positive relationship between the variables for the Azerbaijan economy and the existence of a one-way causality relationship from economic growth to defense expenditures. The fact that economic growth causes an increase in defense expenditures and this relationship is not reversed is since economic growth in Azerbaijan is an effective tool for the objectives of increasing military expenditures. These results: In the context of the Benoit Hypothesis, it is an expected situation for Azerbaijan in developing countries. As a result, the findings confirm the Benoit Hypothesis for the Azerbaijan economy. However, as a result of the analysis for Kazakhstan and Kyrgyzstan, the Benoit hypothesis was not found in these countries.

**Keywords:** Benoit hypothesis, military expenditure, economic growth, Azerbaijan, Kazakhstan, Kyrgyzstan.

## 1. Introduction

According to Clements, Gupta, and Khamidova (2019), advanced economies and top spenders globally have continued to be ambitious in their expenditures since the 1970s. In contrast, social investment geared toward the sustainable development goal is now limiting military spending in emerging nations. A powerful and competitive military force is a method for some of the biggest spenders to perform as anticipated in battle and win concessions without participating in actual warfare. Because the state invests in expensive military forces that are seldom employed, military power bears a significant economic cost (Slantchev, 2012).

Defence economics literature has done a lot of study on the connection between military expenditure and economic growth. Contradictory findings have been found in the research undertaken in the literature, nevertheless, as can be observed. In particular, despite research suggesting a negative association between military spending and growth (Deger, 1986; Deger & Smith, 1983; Huang & Mintz, 1990), others (Biswas & Ram, 1986; Grobar & Mintz, 1990) have found no evidence of such a relationship. (Smith, 1980; Porter, 1989; Ward & Davis, 1992). On the other hand, some research (Benoit, 1973; Sezgin, 1997, 2000) and others (Abu-Qarn and Abu-Bader, 2003; Pradhan, 2010) imply that military investment boosts economic growth for various reasons.

On the basis of data from many nations, the literature has examined the link between military spending and economic development, either in terms of the structure of these spending and financing practices or the impact of military spending on economic growth. The Benoit hypothesis was examined in this research for the nations of Azerbaijan, Kazakhstan, and Kyrgyzstan.

## 2. Literature review

In the early 1970s, debates over the connection between military spending and economic development started. In particular, Benoit (1972, 1973, 1978) was a trail-blazer in the study of the connection between military expenditure and economic development in emerging nations. The study's findings led to the conclusion that raising military expenditure boosts economic growth rates. However, he also made the assumption that emerging nations would cut down on their support for military projects and that doing so would not boost economic growth.

The Benoit hypothesis was examined between 1961 and 2005 in 15 major EU nations, according to research by Nikolaidou (2008). Zsoy (2008) used vector autoregression (VAR) and impact response functions (IRF) models to analyze the relationship between military spending, budget deficits, and income distribution for Türkiye between 1965 and 2003. The study's findings showed a link between budget deficits and military spending that is generally favorable. By using fully modified least squares (FMOLS) and dynamic least squares (DOLS) in Bahrain, Iran, Jordan, Oman, Syria, and Yemen for the years 1988 to 2002, Smyth and Narayan (2009) examined the effect of defense spending on external debt and discovered a positive correlation between the two. Ahmed (2012) used panel data analysis to look at the link between military spending and foreign debt for 25 Sub-Saharan nations during the years 1988–2007 and discovered a favorable correlation between the two.

In a study by Muhanji and Ojah (2014), the dynamic stochastic general equilibrium

model was used to analyze the impact of defense spending on external debt for 10 African countries between 1970 and 2010. The results showed a positive correlation between defense spending and foreign debt. Aye et al. (2014) examined the connection between military expenditure and economic growth in African nations between 1951 and 2010. Using the Johansen and Eagle cointegration method, Mosikari and Matlwa (2014) also discovered that military expenditure had a direct impact on economic growth. The link between India's military expenditure and its economic development was examined in research by Khalid and Mustapha (2014).

In a research published in 2018, Karagöz (2018) used the DOLS, FMOLS, and FE models in Türkiye, Kazakhstan, Kyrgyzstan, and Azerbaijan from 1994 to 2015 to empirically examine the impact of military spending on foreign debt. A time series of Türkiye, Azerbaijan, and Pakistan's per capita GDP and military expenditures for the years 1992–2019 were used in research by Usta (2020) to perform an experimental investigation. (2019) used cointegration and a causality test on panel data to examine the Benoit hypothesis in light of data from three South Asian nations.

The impact of military spending on budget deficits for 22 OECD nations from 2000 to 2017 was examined using the panel data analysis approach in research by Ertekin (2020). The study's findings revealed that spending on the military had a beneficial impact on budget deficits. Susilo et al. (2022) used cross-sectional data for 40 upper-middle-income nations to perform their analysis, which looked at the effects of military spending, political stability, and the size of the labor force on GDP growth.

### 3. Research methodology

#### 3.1. Purpose and data Set

In this study, it is aimed to test the validity of the Benoit hypothesis in developing countries in the economy of selected Turkic states (Azerbaijan, Kazakhstan, and Kyrgyzstan) and to determine whether defense expenditures are an auxiliary factor for economic growth. The data set used in the study consists of annual data for the years 2005-2019 for each country. Logarithmic results of the data are included in the analysis for more robust results.

### 4. Analysis Method

In order to determine the most suitable model to be used in the analysis of the data, it is necessary to examine whether the time series used are stationary. The most common approaches used to test the stationarity of a time series are Dickey and Fuller. It is the DF unit root test developed by (1979-1981). The “Extended Dickey-Fuller (ADF)” test regression equations used in this study are as follows:

$$\Delta Y = \alpha_1 Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta Y = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-1} + \varepsilon_t \quad (2)$$

$$\Delta Y = \alpha_0 + \alpha_1 trend + \alpha_2 Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-1} + \varepsilon_t \quad (3)$$

The  $i = 1, 2, 3, \dots, k$  parameters in the equations indicate the optimal lag length at

which autocorrelation between variables disappears. In the study, the appropriate lag lengths where the autocorrelation problem disappeared were determined by performing LM autocorrelation tests.

The Granger causality test is a test that determines whether there is causality between any two variables, and if there is causality, it determines the direction of causality. The Granger causality test assumes that information on the estimation of variables is found only in the time series data of these variables. The regression equations for the test are formed as follows:

$$\Delta X_t = \alpha_0 + \sum_{i=1}^m \beta_i \Delta X_{t-i} + \sum_{i=1}^n \gamma_i \Delta Y_{t-i} + \varepsilon_t \quad (4)$$

$$\Delta Y_t = \alpha \delta_0 + \sum_{j=1}^p \theta_j \Delta Y_{t-j} + \sum_{j=1}^q \varphi_j \Delta X_{t-j} + \varepsilon_t \quad (5)$$

In the Granger causality test, the series are required to be stationary, but they are not required to be stationary at the same level. In the equations, m, n, p and q indicate the optimal lag lengths. In the study, optimal lag lengths were determined by looking at the Akaike Information Criteria (AIC) and Schwarz Information Criteria (SC) for each added delay. In the model, firstly, the lag number of the dependent variable is determined, and the constrained regression equation is obtained. Then, the lag number of the other variable is determined, the unconstrained regression equation is obtained, and the F statistic is calculated. The model created for the data set used in this study is expressed as follows for all three countries:

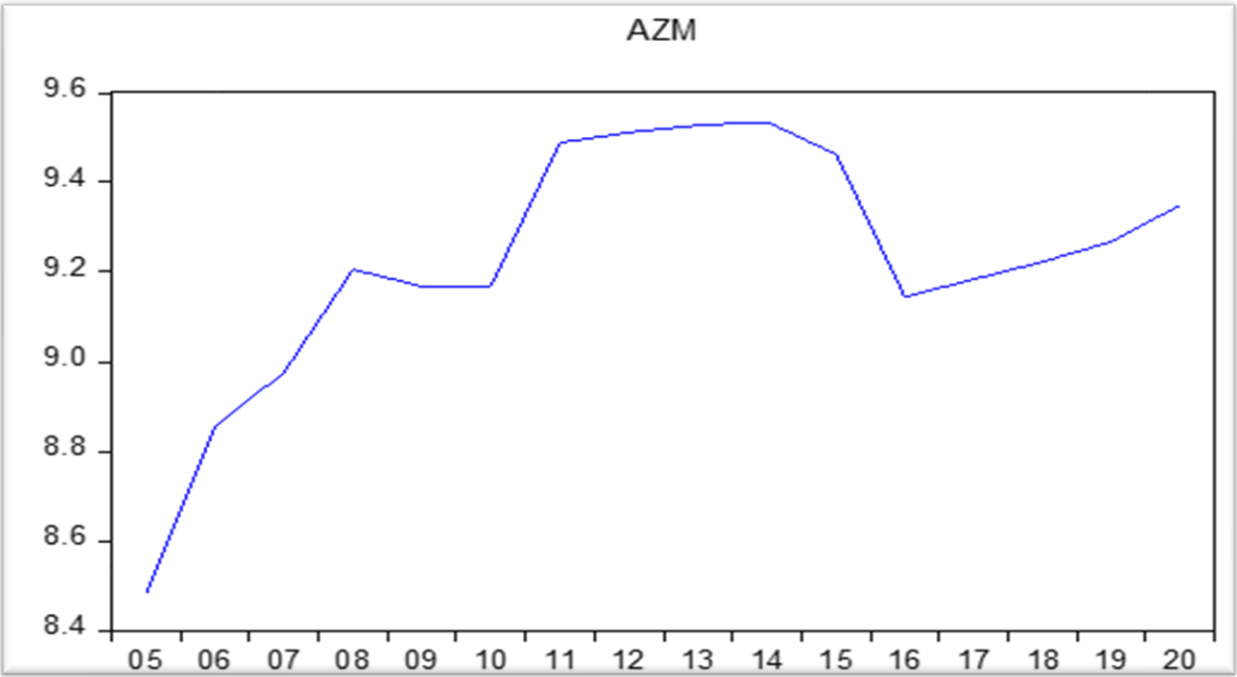
$$GDP_t = \alpha_0 + \alpha_1 MS_t + \varepsilon_t \quad (6)$$

## 5. Analyses and results

Before proceeding to econometric analysis, examining the graphical drawing can give a preliminary idea about the series. When the graphical drawing of the series in Figure 1 is examined, the trends of the series are observed. Since the series are in a constant mean and constant progression state, they create the impression that they are stationary in their level values.

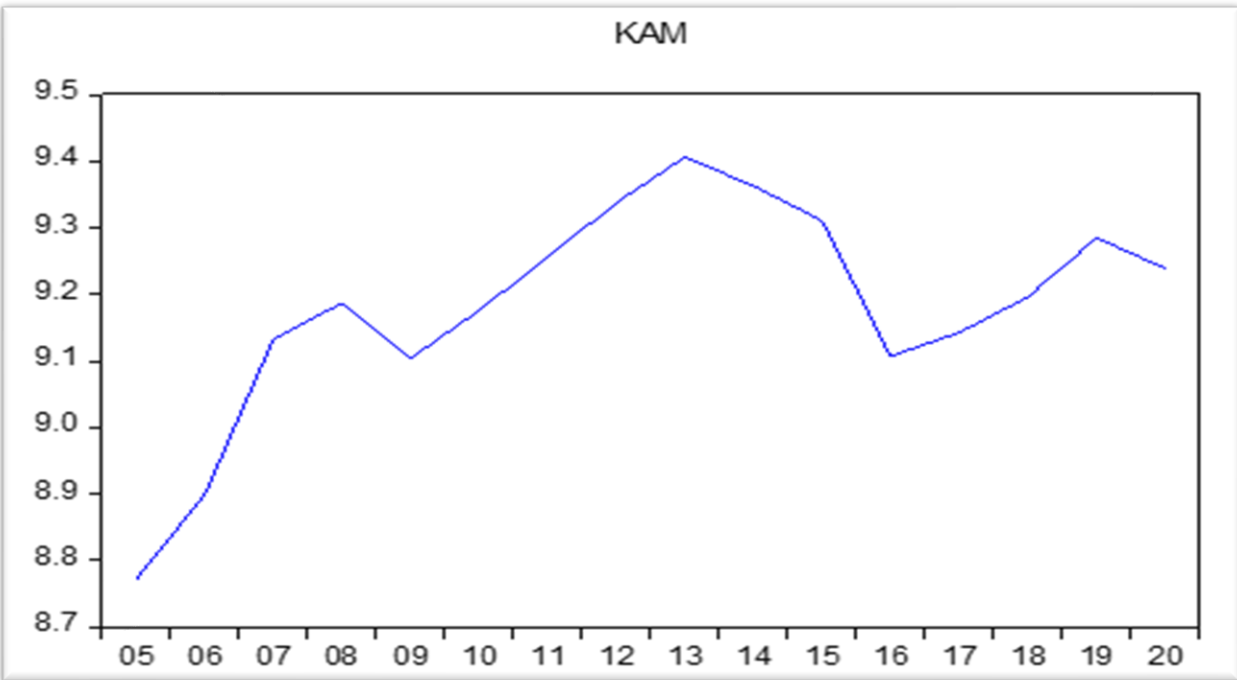
To test the stationarity of the series, ADF unit root tests were used in the study. Results suitable for ADF unit root tests are given in Table 1. To test the stationarity of the series, the calculated critical value and the test statistical value are compared in absolute value. If the test statistical value is higher than the critical value, it is concluded that the series is stationary, and in the opposite case, it is not stationary. In line with the findings in Table 2, it has been observed that these data are stationary from the level value. The data were processed logarithmically to give more accurate results in the stage of either stationarity or general analysis.

**Figure 1.**  
*Distribution of military expenditures in Azerbaijan by years*

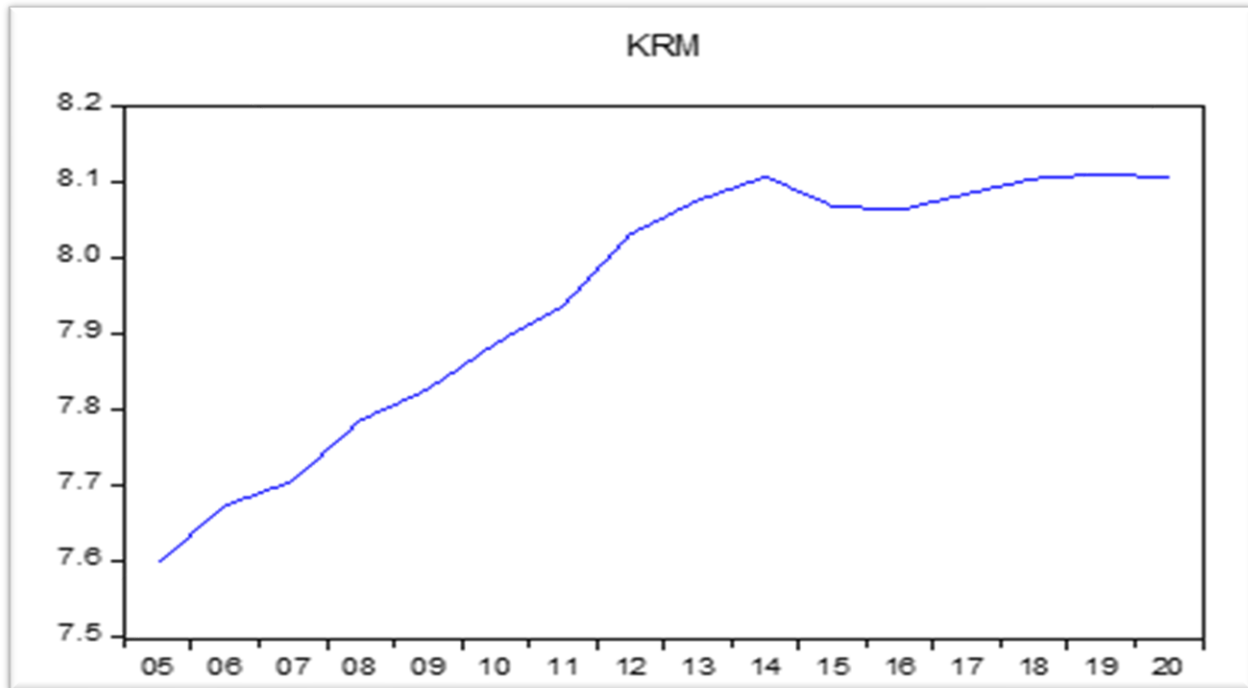


Source: Prepared by the author based on World Bank data

**Figure 2.**  
*Distribution of military expenditures in Kazakhstan by years*



Source: Prepared by the author based on World Bank data

**Figure 3.***Distribution of military expenditures in Kyrgyzstan by years*

Source: Prepared by the author based on World Bank data

**Table 1.***Level values of series*

Azerbaijan					
		Military spending		GDP	
		t-statistics	Possibility	t-statistics	possibility
ADF testing statistics		-3.658876	0.0175	-3.913422	0.0109
Test Critical Values	%1	-3.559148		-3.859148	
	%5	-3.081002		-3.081002	
	%10	-2.681330		-2.681330	
Kazakhstan					
		Military spending		GDP	
		t-statistics	Possibility	t-statistics	possibility
ADF testing statistics		-3.190751	0.0411	-3.452444	0.0256
Test Critical Values	%1	-3.059148		-3.359148	
	%5	-3.081002		-3.081002	
	%10	-2.681330		-2.681330	
Kyrgyzstan					
		Military spending		GDP	
		t-statistics	Possibility	t-statistics	possibility
ADF testing statistics		-3.338960	0.0314	-4.041386	0.0471
Test Critical Values	%1	-3.259148		-3.057910	
	%5	-3.081002		-3.119910	
	%10	-2.681330		-2.701103	

To perform the Granger causality test, it is necessary to know the largest degree of stationarity (dmax) and the appropriate lag length (m) values. It was revealed because of the test that the series showed stationarity at the level of level. Values marked with (\*) in Table 2 indicate the appropriate lag length. The appropriate delay length for each country is given in Table 2.

**Table 2.***Appropriate Delay Length*

Azerbaijan						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	24.41778	NA	8.18e-05	-3.736297	-3.655479	-3.766218
1	33.13084	13.06959*	3.81e-05	-4.521807	-4.279353	-4.611572
2	33.48490	0.413071	7.62e-05	-3.914150	-3.510061	-4.063758
3	41.45865	6.644795	4.94e-05	-4.576442	-4.010718	-4.785894
4	51.89816	5.219751	2.94e-05*	-5.649693*	-4.922333*	-5.918987*
Kazakhstan						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	34.81092	NA	1.45e-05	-5.468486	-5.387669	-5.498408
1	41.94596	10.70256	8.76e-06	-5.990993	-5.748539	-6.080758
2	43.67894	2.021812	1.39e-05	-5.613156	-5.209068	-5.762765
3	55.78788	10.09079*	4.53e-06	-6.964647	-6.398922	-7.174098
4	67.25779	5.734953	2.27e-06*	-8.209631*	-7.482271*	-8.478926*
Kyrgyzstan						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	38.07626	NA	8.40e-06	-6.012710	-5.931892	-6.042632
1	54.08498	24.01308*	1.16e-06*	-8.014163	-7.771710*	-8.103928
2	55.39645	1.530052	1.98e-06	-7.566075	-7.161986	-7.715684
3	60.43872	4.201894	2.09e-06	-7.739787	-7.174063	-7.949239
4	68.29579	3.928533	1.91e-06	-8.382632*	-7.655272	-8.651927*

\*Indicates the appropriate lag length for the relevant test.

In Granger causality analysis, the  $H_0$  basic hypothesis states that there is no causal relationship between the variables, while the  $H_1$  alternative hypothesis states that there is a causal relationship. The findings presented in Table 3 reject the  $H_0$  hypothesis at the 5% significance level, which states that there is no causal relationship from economic growth to defense expenditures in Azerbaijan. The test results obtained indicate that there is a unilateral causality relationship from economic growth to defense expenditures in this country. When we evaluate it in terms of the other two Turkic states, it seems that there is no causal relationship between the series. In other words, while the Benoit hypothesis was confirmed for Azerbaijan, it was concluded that the Benoit hypothesis was not valid for Kazakhstan and Kyrgyzstan.

## 6. Discussion and conclusion

Defence spending, which is classified as a kind of public spending, is seen to either have a negative impact on economic development by discouraging investments under the Neo-Classical Approach or a positive impact by raising total demand under the Keynesian

Approach. According to nations and areas, this scenario is different. In the literature on economics, this area of research is referred to as the Benoit hypothesis. The Benoit hypothesis, which holds that military spending and economic growth are positively correlated, is well-known in the literature. Benoit stated that nations with high military spending often have the strongest economic development rates, whereas those with the lowest defense spending experience the slowest rates of economic expansion. This research adds to the body of knowledge by identifying whether military spending supports economic development in emerging nations in the economy of a few Turkic states. The Benoit hypothesis for the economies of a few chosen Turkic states will also be tested by this research, which is of paramount importance.

**Table 3.**

*Results of Granger Causality Test*

Hypotheses	F-value	Probability value (p)	Decision at 5% significance level
The economic growth of Azerbaijan is the reason for the increase in military expenditures in this country.	11.59873	0.0030	Acceptable
The increase in military expenditures in Azerbaijan is the reason for the economic growth of the country.	1.316588	0.5177	Rejected
The economic growth of Kazakhstan is the reason for the increase in military expenditures in this country.	3.776033	0.1514	Rejected
The increase in military expenditures in Kazakhstan is the reason for the economic growth of the country.	1.225908	0.5417	Rejected
The economic growth of Kyrgyzstan is the reason for the increase in military expenditures in this country.	1.191769	0.5511	Rejected
The increase in military expenditures in Kyrgyzstan is the reason for the country's economic growth.	4.175095	0.1240	Rejected

This analysis uses yearly data for the economies of a few chosen Turkic states from 2005 to 2020 to examine the link between military spending and economic growth. In the research, Granger causality analyses were used. According to the findings of the causality and cointegration analyses conducted throughout the study period, there is a one-way causal connection between Azerbaijan's economic development and military spending, as well as a positive cointegration relationship between the variables. According to Karagöz's (2018) analysis of Türkiye, Kazakhstan, Kyrgyzstan, and Azerbaijan from 1994 to 2015, it was found that rising military spending had a favorable impact on foreign debt. A clear causal relationship between military spending and economic development in the economies of Türkiye, Azerbaijan, and Pakistan over the period under consideration was established because of the research undertaken by Usta (2020). The Benoit hypothesis, which supports the positive correlation between military spending and economic development in the economic literature for Azerbaijan and in analyses for emerging nations, is anticipated to be



supported by this study. The Benoit hypothesis is not supported for the other two nations, according to other research data. In other words, in these nations, there is no correlation between economic development and military spending. While the findings are in favor of the Keynesian theory for Azerbaijan, they are in favor of the Neo-classical theory for other nations, which holds that military spending might hinder economic development by excluding investments. It is impossible to dispute the beneficial impact of military spending for Azerbaijan's economy, which is at war and under threat from foreign powers. Consequently, although the results support the Benoit Hypothesis in terms of the economy of Azerbaijan, they contradict it in terms of the economies of the other two nations.

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