

# Public Expenditures, Economic Growth and Income Inequality: Empirical Evidence from the Commonwealth of Independent States

## Kamu Harcamaları, Ekonomik Büyüme ve Gelir Eşitsizliği: Bağımsız Devletler Topluluğundan Ampirik Kanıtlar

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### ABSTRACT

This study has examined the causality relationship between public expenditures, economic growth and income inequality for transition economies called the Commonwealth of Independent States (CIS). In the study, in which the 1998-2019 period was analyzed, the effects of public expenditures on economic growth and income inequality were determined with the bootstrap panel causality test. Bootstrap panel causality test results show that there is a one-way causality relationship from public expenditures to economic growth for Armenia, Belarus, and Kazakhstan. On the other hand, a one-way causality relationship has been determined from public expenditures to income inequality in Belarus and Kazakhstan, and from income inequality to public expenditures in Kyrgyzstan. In Moldova and Russia, however, no causal relationship could be obtained between the variables. The overall evaluation of the findings obtained from the panel causality tests concluded that public expenditures in CIS member countries are closely related to both economic growth and income inequality. CIS member countries need state interventions in order for the market system to fully settle in transition period. However, implementing policies that do not exclude private investments and do not harm the functioning of the market economy should be elaborated during practicing public expenditure policies in these countries in transition.

**Keywords:** Public expenditures, economic growth, income inequality, fiscal policy, panel causality analysis

**Jel Code:** H50, E62, O40



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## Öz

Bu çalışma kamu harcamaları, ekonomik büyüme ve gelir eşitsizliği arasındaki nedensellik ilişkisini Bağımsız Devletler Topluluğu (BDT) olarak adlandırılan geçiş ekonomileri için incelemektedir. 1998-2019 döneminin analiz edildiği çalışmada, kamu harcamalarının ekonomik büyüme ve gelir eşitsizliği üzerindeki etkileri bootstrap panel nedensellik testi ile belirlenmiştir. Bootstrap panel nedensellik testi sonuçları, Ermenistan, Belarus ve Kazakistan için kamu harcamalarından ekonomik büyüme doğru tek yönlü nedensellik ilişkisi olduğunu göstermektedir. Öte yandan Belarus ve Kazakistan'da kamu harcamalarından gelir eşitsizliğine, Kırgızistan'da ise gelir eşitsizliğinden kamu harcamalarına doğru tek yönlü nedensellik ilişkisi tespit edilmiştir. Moldova ve Rusya'da ise değişkenler arasında nedensellik ilişkisi elde edilememiştir. Panel nedensellik testlerinden elde edilen bulgular genel olarak değerlendirildiğinde, BDT üyesi ülkelerde kamu harcamalarının hem ekonomik büyüme hem de gelir eşitsizliği ile yakın ilişkili olduğu sonucuna varılmıştır. Geçiş döneminde piyasa sisteminin tam olarak oturması için BDT üyesi ülkeler, devlet müdahalelerine ihtiyaç duymaktadır. Ancak geçiş sürecindeki bu ülkelerde kamu harcama politikalarının uygulanması sırasında özel yatırımları dışlamayan ve piyasa ekonomisinin işleyişine zarar vermeyen politikaların uygulanmasına özen gösterilmelidir.

**Anahtar Kelimeler:** Kamu harcamaları, ekonomik büyüme, gelir eşitsizliği, maliye politikası, panel nedensellik analizi  
**Jel Code:** H50, E62, O40

## 1. Introduction

After 1990, the countries of the former Soviet Union experienced a process of transition to the democracy politically and to the free market system economically. This transition process has pushed the state to provide public goods and enable a competitive economic structure that encourages the private sector rather than controlling all economic assets. This situation required reducing public expenditures significantly and making new regulations in this direction (Gray, 2007). As a result, the scope of public expenditures has altered significantly, and the decline in social expenditures, education and health expenditures, and the surge in general public expenditures arising from infrastructure services due to structural adjustment programs have led to significant changes in the quality of public expenditures (Nasibova, 2013). Public expenditures, whose scope and quality have been changed in the transition process, were aimed to be used more effectively in the social and economic fields.

High social expenditures made during the Soviet Union period were supported by budget transfers from the central government, and the share of public expenditures in GDP was reaching significant dimensions. However, after the collapse of the Soviet Union, the end of the subsidies from the central government, the cessation of trade between the countries, and the implementation of strict public policies led to a significant decrease in production. Especially in the first years of the transition period, this situation caused a decrease in per capita income and a significant increase in poverty and income inequality (Falkingham, 2004). From the second half of the 1990s, the economy started to grow again, but due to structural problems, income inequality and poverty continued to increase. The experiences

of these countries have shown that economic growth is not enough to mitigate the impact of inequality without a redistributive effect (Simai, 2006).

Managing scarce public resources in a healthy way was aimed in order to ensure economic growth and reduce poverty in these countries where public expenditures and revenues have been significantly reduced within the transition period. To this end, public expenditure management systems were restructured in order to ensure public expenditure efficiency and policy effectiveness under limited conditions. Accordingly, programs have been developed to help reorganize the budget systems, make modern legal arrangements, and especially, manage public investments (Betley, 2004). However, the results of the practices implemented regarding the efficiency of public expenditures are controversial due to the weak institutional structure, lack of legal regulations, and the incomplete transition to the free market system in these countries (see, e.g., Alexiou 2009; Gurgul, Lach & Mestel, 2012; Ağayev 2012; Dincă & Dincă, 2013; Esen & Bayrak, 2015; Abdieva, Baigonushova, & Ganiev, 2017).

In the transition period from the socialist system to the market system, Eastern European and Baltic countries and some Balkan countries added new dynamics to the financial reforms they made while the European Union membership process continued, but the countries that had tighter economic, financial and political relations with the Soviet system remained in a disadvantageous position in terms of financial reforms since they had a lack of financial management experience (Çevik, 2010). In these countries, reform policies, such as price liberalization, privatization and economic stability, which are important in terms of integration into the market system, were attempted to be implemented, but the problems of economic growth and income inequality could not be solved when fiscal policies were neglected in the early stages of the transition period (Ağcakaya, 2009).

In this sense, among the former Soviet countries, there are countries for which transition to a free-market economy depends on different dynamics. In countries that have more intense relations with institutions and organizations in the socialist system, various social costs may arise from the sudden reduction of public expenditures. In particular, changing the scope and nature of public expenditures is effective on both economic growth and income inequality. Therefore, analyzing only the effects of public expenditures on economic growth or income inequality is insufficient in terms of revealing the effectiveness of public expenditures. Considering the relationship between public expenditures and both variables is a more accurate approach. This study has examined the causality relationship between public expenditures, economic growth, and income inequality through transition economies called the Commonwealth of Independent States (CIS). In the study, in which the 1998-2019 period was analyzed, the effects of public expenditures on economic growth and income inequality were determined with the bootstrap panel causality test.

This paper has been organized as follows: Section 2 presents the theoretical framework on the subject. Section 3 gives a literature review. Section 4 contains developments of public expenditures, economic growth, and income inequality in CIS member countries. Section 5 describes the data set. Section 6 presents the methodology used in the study. Section 7 provides empirical findings and discussion. Finally, Section 8 concludes the study with policy recommendations.

## **2. Theoretical Framework**

The global economic and financial crises have caused economists and policymakers to reevaluate traditional views. Accordingly, the debates on whether public expenditures encourage economic growth have started to gain momentum again. The opinion put forward by Keynesian economists in general is that the intervention of the state in economic activities is crucial in terms of economic growth (Parui, 2021). Wagner (1883), on the other hand, argues that state interventions should increase in order to meet the demands of the increasingly active economy. According to Wagner, as the economy develops, expenditures related to culture, welfare, and especially, health and education should be increased by the state (Popescu & Diaconui 2021, p.1). In this context, consideration of the dynamics of traditional approaches indicates that there is a causality relationship from public expenditures to economic growth according to the Keynesian view and a causal relationship from economic growth to public expenditures according to Wagner's theory (Samudram, Nair, & Vaithilingam 2009, p.711).

On the other hand, in the neoclassical growth model developed by Solow (1956), while fiscal policies encourage investments, they have a temporary effect on growth. In the neoclassical model, taxation and public expenditures are not effective on long-term economic growth (Bleaney, Gemmell, & Kneller, 2001, p.37). However, endogenous growth models accepted that fiscal policies are effective for long-term economic growth. For example, the model of Barro (1990) suggested that public expenditures are accepted as an input in production, and this situation reveals a relationship between public size and economic growth (Hsieh & Lai, 1994, p.535). While Barro (1990) concluded that the effect of public expenditures on economic growth varies according to the type of public expenditure in one of his studies, Barro (1991) concluded that especially public investment expenditures increase economic growth in another study. In addition, endogenous growth theorists such as Romer (1990) and Lucas (1988) emphasized that public interventions in different areas would encourage economic growth.

When traditional and modern theoretical approaches are examined as a whole, the result of the causal relationship between public expenditures and economic growth may vary. In

the literature, various hypotheses attempted to explain the effects of variables on each other. The “Neutrality Hypothesis” states that there is no relationship between public expenditures and economic growth. The “Wagner Hypothesis” states that there is a one-way causality relationship from economic growth to public expenditures. The “Keynesian Hypothesis” states that there is a one-way causality relationship from public expenditures to economic growth, and the “Feedback Hypothesis” states that there is a bidirectional causality relationship between public expenditures and economic growth (Magazzino, 2012).

On the other hand, the fact that economic growth has occurred in a country does not mean that the income distribution is fair. Especially since the high economic growth rates that emerged in the world in the 1990s were achieved without considering the efficiency and social integrity in resource distribution, thus, injustice has emerged in the income distribution (Güzel & Çetin, 2018, p.92). Kuznets (1955) concluded in his study that income inequality increases with economic growth in the early stages of economic development, and income inequality decreases with economic growth as the level of economic development increases. This situation shows that especially in developing economies, income inequality is encountered until a certain income level is reached. Indeed, rising income inequality is a major concern for policymakers of many economies. These concerns have increased with the global unrest, high unemployment due to financial crises, increment of the incomes of the rich class faster than other income groups, and the negative effects of fiscal consolidations on low-income groups (Bastagli, Coady, & Gupta, 2012, p.4). Accordingly, the effect of public expenditures on income distribution has been an important research topic of macroeconomics (Chang, Guo, & Wang, 2021, p.1).

In order to reduce income disparities and improve the socio-economic situation of the country, the public sector develops various policies and implements these policies. Many policies can be implemented, including programs on education, health, social assistance for the elderly and young people (Karim, 2015). These policies have direct or indirect effects on income inequality. Cash payments and direct income support for the poor communities and public expenditures that increase the spending power of individuals have a clear effect on income distribution. On the other hand, indirect effects of public expenditures that increase productivity and job opportunities can significantly affect income inequality (Afonso, Schuknecht, & Tanzi 2008, p.11).

On the other hand, the effects of the said policies may appear to disarrange the effectiveness of incentives and reduce economic efficiency. In this context, policymakers need to make a careful policy selection in order to minimize the negative effects on the economy (Clements, Mooij, Francese, Gupta, & Keen, 2015, p.3). In addition, due to the scarce budget resources of the countries, particular attention should be paid to the efficiency

of the programs while implementing the fiscal policies. Thus, a certain redistribution at lower expenditure levels or a greater redistribution with a certain expenditure can be achieved (Kyriacou, Muinelo-Gallo, & Roca-Sagales, 2016, p.3).

### 3. Literature Review

Since the relationship between public expenditures with economic growth and income inequality has been the subject of research for many years, a comprehensive literature has emerged. In this context, while reviewing the literature, firstly the literature on the relationship between public expenditures and economic growth, and then the literature on public expenditures and income inequality were given.

The selected empirical literature on the relationship between public expenditures and economic growth is presented in Table 1. According to Table 1, the findings obtained from the studies of Holmes and Hutton (1990), Alexiou (2009), Alam, Sultana, and Butt (2010), Gurgul et al. (2012), Dincă and Dincă (2013), Christie (2014), Abdieva et al. (2017), Gnangoin, Du, Assamoi, Edjoukou, and Kassi (2019), and Kutasi and Marton (2020) are such as to support the Keynesian hypothesis. On the other hand, the studies of Ahsan, Kwan, and Sahni (1996), Al-Faris (2002), Rehman, Iqbal, and Siddiqi (2010), Ağayev (2012), Kumar, Webber, and Fargher (2012), and Srinivasan (2013) support the Wagner hypothesis. Moreover, the findings of the studies of Devlin and Hansen (2001), Iyare and Lorde (2004), Samudram et al. (2009), Wu, Tang, and Lin (2010), Magazzino (2012), Esen and Bayrak (2015), and Popescu and Diaconu (2021) are remarkable for indicating that both the Keynesian hypothesis and the Wagner hypothesis are valid.

**Table 1: Selected Empirical Literature on the Relationship between Public Expenditures and Economic Growth**

Author (s)	Country/ Period	Method	Findings
Holmes and Hutton (1990)	India (1950-1981)	Granger causality test	Public Expenditures lead to economic growth.
Ahsan et al. (1996)	Canada (1952-1988)	Engle-Granger cointegration test	Economic growth affects public expenditures positively in the long run.
Devlin and Hansen (2001)	20 OECD Countries (1960-1987)	Granger causality test	A causal relationship has been found from health expenditures to economic growth in some countries, and from economic growth to health expenditures in some other.
Al-Faris (2002)	Gulf Countries (1970-1997)	VAR, Granger causality test	Causality relationships from economic growth to public expenditures have been found.
Iyare and Lorde (2004)	Caribbean Countries	Engle-Granger cointegration test, Granger causality test	A causality relationship mainly from economic growth to public expenditures has been determined.

Alexiou (2009)	South East European Countries (1995-2005)	Panel fixed effects and random effects model estimation	Public expenditures have a positive effect on economic growth.
Samudram (2009)	Malaysia (1970-2004)	ARDL bounds test	Economic growth has a bidirectional causality relationship with, management and health expenditures.
Alam et al. (2010)	10 Developing Asian Countries (1970-2005)	Panel cointegration test	Public expenditure components stimulate economic growth in the long run.
Rehman et al. (2010)	Pakistan (1971-2006)	Toda-Yamamoto causality test	A causality relationship from economic growth to public expenditures has been determined.
Wu et al. (2010)	182 Countries (1950-2004)	Granger causality test	There is no causal relationship from public expenditures to economic growth in low-income countries. Bidirectional causal relationships exist in other income groups.
Ağayev (2012)	10 Former Soviet Union Countries	Pedroni panel cointegration test, Granger causality test	A causality relationship from economic growth to public expenditures has been determined.
Gürgül et al. (2012)	Poland (2000-2008)	Linear and nonlinear Granger causality analysis	Causality relationships from public expenditure components to economic growth have been determined.
Kumar et al. (2012)	New Zealand (1960-2007)	ARDL bounds test, Engle-Granger cointegration, FMOLS, Granger causality test	In the long run, economic growth affects public expenditures positively. In addition, there is a causal relationship from economic growth to public expenditures.
Magazzino (2012)	Italy (1960-2008)	Granger causality test	The direction of the relationship between public expenditures and economic growth differs according to the type of public expenditure.
Dincă and Dincă (2013)	10 Central and Eastern European Countries (2002-2012)	Panel fixed effects model estimation	While public order and security expenditures affect economic growth positively, national defense and general public services affect it negatively.
Srinivasan (2013)	India (1973-2012)	Johansen cointegration, VECM	A one-way causality relationship has been determined from economic growth to public expenditures in the short and long term.
Christie (2014)	136 Countries (1971-2005)	Panel fixed effects model and GMM estimation	When the share of public expenditures in GDP rises above a certain threshold, economic growth is negatively affected. However, this effect turns positive when productive public expenditures are increased.
Esen and Bayrak (2015)	5 Turkish Republics (1990-2012)	Panel cointegration and causality analysis	Public expenditures have a positive effect on economic growth. In addition, there are bidirectional causal relationships between the variables.
Abdiyeva et al. (2017)	Kyrgyzstan and Tajikistan (2000-2013)	Granger causality test	While a one-way causality relationship from public expenditures to economic growth was determined for Kyrgyzstan, no causality relationship was found for Tajikistan.

Gnangoin et al. (2019)	19 Asian Countries (2002-2017)	GMM estimation and Granger causality test	Public consumption expenditures reduce economic growth. Education expenditures are the cause of economic growth.
Kutasi and Marton (2020)	25 EU Countries (1996-2017)	Panel OLS, fixed effects model and GMM estimation	Education and health expenditures affect economic growth negatively. However, when the delayed values of the variables are added to the model, this effect turns into positive.
Popescu and Diaconu (2021)	Romania (1995-2018)	Johansen cointegration, Granger causality test	There is a bidirectional causality relationship between public expenditures and economic growth.

Although the number of studies examining the relationship between public expenditures and income inequality is limited, the effect of public expenditures in the fight against income inequality has been started to be investigated recently. The selected empirical literature on the relationship between public expenditure and income inequality is presented in Table 2. Ospina (2010), Woo, Bova, Kinda, and Zhang (2013), Anderson, D'Orey, Duvendack, and Esposito (2017), Teyyare and Sayaner (2018), Ulu (2018), Doumbia and Kinda (2019), and Samanta and Kayet (2020) found that public expenditures reduce income inequality and contribute income distribution to be fairer. On the other hand, according to Roine, Vlachos, and Waldenström (2009), the relationship between public expenditures and income inequality differs according to income groups. The study of Demiryürek Ürper (2018) indicates that the effects of public expenditure types on income inequality vary. The study of Boustan, Ferreira, Winkler, and Zolt (2013), which analyzes the effect of income inequality on public expenditures, concluded that, unlike other studies, the increase in income inequality causes an increase in public expenditures. In their studies analyzing the effects of public expenditure on both economic growth and income inequality, Goodspeed (2000) concluded that public education expenditures affect economic growth positively and income inequality negatively while Holzner (2011) found that public expenditures affect both economic growth and income inequality negatively.

**Table 2: Selected Empirical Literature on the Relationship between Public Expenditures and Income Inequality**

Author (s)	Country/Period	Method	Findings
Goodspeed (2000)	USA (1973,1981,1989,1997)	OLS estimation	While education expenditures affect economic growth positively, they affect income inequality negatively.
Roine et al. (2009)	16 Countries	Panel regression analysis	While public expenditure decreases the share of upper-middle income groups in total income, it increases the share of low-income groups.

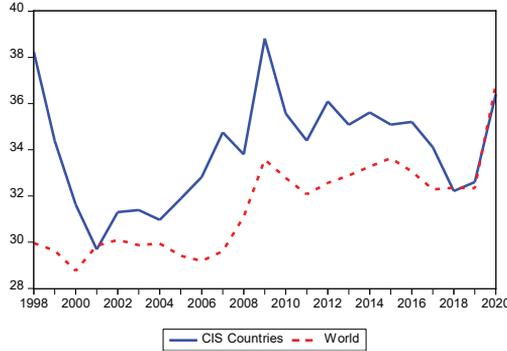
Ospina (2010)	Latin American Countries (1980-2000)	OLS, fixed effects, random effects, and GMM estimation	Education and health expenditures negatively affect income inequality. Social security expenditures, on the other hand, have no effect on income inequality.
Holzner (2011)	28 Transition Economies (1989-2006)	Two-stage OLS	Public expenditures in general negatively affect economic growth and income inequality.
Boustan et al. (2013)	USA (1970-2000)	Panel OLS estimation	Income inequality positively affects total public expenditures.
Woo et al. (2013)	Developed Countries and Emerging Markets (1980-2010)	Fixed effects model and SUR estimation	Social expenditures negatively affect income inequality.
Demiryürek Ürper (2018)	Turkey (1987-2016)	OLS estimation	While current expenditures affect income inequality positively, transfer expenditures affect negatively.
Teyyare and Sayaner (2018)	Turkey (1990-2016)	OLS estimation	Public expenditures negatively affect income inequality.
Ulu (2018)	21 OECD Countries (2004-2011)	Panel cointegration and causality analysis	Public social and education expenditures negatively affect income inequality.
Doumbia and Kinda (2019)	83 Countries (1990-2000)	Driscoll-Kraay fixed effects estimation	In general, public expenditures negatively affect income inequality.
Samanta and Kayet (2020)	15 States of India (1983-2012)	Panel OLS, fixed effects and random effects model estimation	Public education expenditures negatively affect income inequality.

Examination of the literature does not indicate a clear finding in terms of the effects of public expenditures on economic growth and income inequality. In addition, the studies mostly examine the relation of public expenditures with economic growth or income inequality separately. The studies showing the effects of public expenditure on both economic growth and income inequality were limited. The present study contributes to the literature by analyzing the relationship of public expenditures with economic growth and income inequality for CIS member countries in the same research. In addition, the effects of variables on each other can be revealed with the bootstrap causality test used in the study.

#### 4. Public Expenditures, Economic Growth and Income Inequality in CIS Countries

In the early stages of the transition from the socialist system to the market economy, reducing public expenditures in the CIS member countries was one of the most important policy implementations. Thus, it is aimed to reduce the influence of the state, which holds all economic assets, in the market and to open up space for private sector investments. This situation can be seen in Figure 1, which shows the trend of change in public expenditures of CIS member countries and also all countries of the world. In figure 1, the trend corresponding to CIS member countries was created with the data of the countries used in the analysis of the present study.

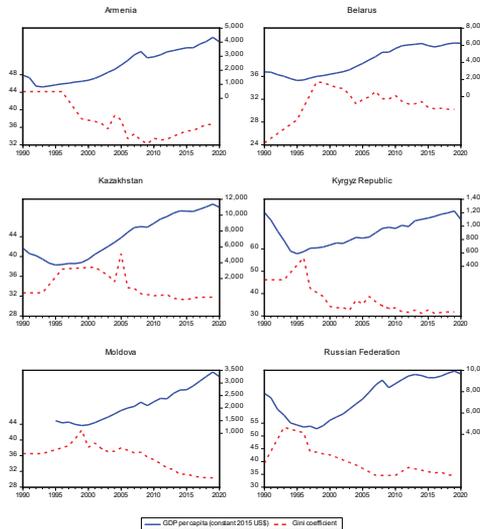
**Figure 1. Public expenditures in the World and CIS Member Countries (% of GDP)**



Source: IMF Government Finance Statistics

Figure 1 shows that the public expenditure ratios in the worldwide GDP decreased towards the end of the 1990s, but this shift was not severe. On the other hand, while no significant change was observed in public expenditure ratios in the 2000–2007 period, public expenditures have increased significantly since 2008, when the global financial crisis took place. In the post-crisis period, no major breaks have been observed in public expenditures, especially between the years 2010–2019, and with the emergence of Covid-19 pandemic, which affected the whole world, public expenditure ratios were seen to be increased significantly with the year 2020. This situation, which has emerged for the year 2020, can be interpreted as a reflection of the shock policies put forward especially within the scope of the fight against the global pandemic.

**Figure 2. GDP per capita and Gini Coefficient in CIS Member Countries**



Source: World Bank World Development Indicators, World Income Inequality Database (WIID)

The public expenditure rates of the CIS countries shown in Figure 1 exhibited a striking decrease towards the end of the 1990s. Due to the transition process they were experiencing, the decrease in the public expenditures of the CIS countries is quite high compared to the world average. However, public expenditure ratios, which have been on the rise since the early 2000s, have reached very high levels with the effect of the global financial crisis. In fact, public expenditure rates in the CIS countries, due to the impact of the global financial crisis, regained the high levels of the late 1990s. The public expenditure rates of the CIS countries, which entered a downward trend after the effects of the global financial crisis were overcome, started to increase as of 2020, when the effects of the Covid-19 pandemic were observed, as in all countries of the world. As a result, the public expenditures in the CIS countries, which were attempted to be reduced during the transition to the market economy in the 1990s, increased above the world average in the 2000s with the effect of both the dynamics of the transition economies and the global crises.

On the other hand, Figure 2 shows the trend of change regarding the real GDP per capita and Gini coefficient of the CIS countries used in the study. On the left axis of Figure 2, there are values for the Gini coefficient while on the right axis there are values for real GDP per capita. Analysis of the Figure 2 indicates a decrease in real income per capita decreased in all countries in the early stages of the transition period due to the crisis that emerged due to the collapse of the Soviet economic system and the significant decrease in public expenditures by severing ties with the central government. However, with the end of the 1990s and the beginning of the 2000s, income per capita generally entered an increasing trend in all countries.

The curve in the Figure 2 representing the Gini coefficient, which is used as an indicator of income inequality, indicates the increase in income inequality for all countries in the first stages of the transition period. Especially in the first periods of the transition period, the increase in income inequality was felt more clearly for Belarus, Kazakhstan, Kyrgyzstan, and the Russian Federation. Positive developments in income inequality, as well as positive developments in per capita income, started to be seen from the beginning of the 2000s, and income inequality has generally decreased. However, the trend in income inequality varies from country to country. For example, while income inequality has clearly decreased in Kyrgyzstan with the 2000s, the decrease in income inequality in Belarus is not very clear. In fact, the income inequality in Armenia was seen to have started to increase again since 2010. Income inequality, which started to decline in the 2000s in Kazakhstan and Russia, increased in some of the years. Therefore, the variation in the Gini coefficients, which give information about income inequality, can be seen from country to country and from period to period. This situation reveals that economic growth has a more stable process compared to income inequality, especially with the 2000s.

This prior information given before the empirical analysis shows the trend of the variables in a certain period and reveals the reflections of the policy changes implemented in the historical process. However, this numerical and visual information provides general information in terms of the variables and sample used in the study. The relationships between the variables will be revealed empirically by testing with bootstrap panel causality test.

## 5. Data

In this study, the relationship of public expenditures with economic growth and income inequality in CIS member countries was examined with the bootstrap panel causality test developed by Kónya (2006). In the study, public expenditures (PE) data were obtained from the International Monetary Fund, economic growth (GDP) data were obtained from the World Bank, and income inequality (GINI) data were obtained from the World Income Inequality Database (WIID). In the study, the share of total public expenditures in GDP was used as an indicator of public expenditures, GDP per capita (constant 2015 US \$) was used as an indicator of economic growth, and the Gini coefficient was used as an indicator of income inequality. Some countries were excluded from the analysis, since comprehensive data for each country of the CIS could not be obtained in these databases. In addition, since Georgia and Ukraine left the union on their own accord due to the political problems they had with Russia, these countries were not included in the analysis. As a result, the countries included in the analysis are Armenia, Belarus, Kazakhstan, Kyrgyzstan, Moldova, and Russia. Considering the availability of the data of the mentioned countries, the research period was determined as 1998-2019. For the analysis of the study, the natural logarithms of the variables were taken while excluding public expenditures variable.

**Table 3: Descriptive Information on Variables**

Symbol	Variable	Definition	Source
PE	Public expenditures	The share of total public expenditures in GDP	IMF- Government Finance Statistics
GDP	Economic growth	GDP per capita (constant 2015 US \$)	World Bank- World Development Indicators
GINI	Income Inequality	Gini coefficient	WIID – World Income Inequality Database

## 6. Econometric Method

In this study, the bootstrap panel causality test developed by Kónya (2006) was used to reveal the causal relationships between the variables. In this panel causality test, direct causality analysis can be performed without performing unit root and cointegration tests. Due to these advantages provided, it is frequently used in the literature. However, since this test takes into account the cross-sectional dependence and heterogeneity in the models to be used for causality analysis, it is necessary to perform the aforementioned prior tests first.

The basic panel data models to be used for cross-sectional dependence and homogeneity tests are as follows:

Model 1:

$$GDP_{it} = \alpha_0 + \alpha_1 PE_{it} + u_{it} \quad (1)$$

Model 2:

$$GINI_{it} = \beta_0 + \beta_1 PE_{it} + \gamma_{it} \quad (2)$$

where PE, GDP and GINI in the models show public expenditures, economic growth, and income inequality, respectively. The countries used in the analysis are demonstrated by “i” (i=1,...N) and the period by “t” (t=1,...T).  $\alpha_0$  and  $\beta_0$  represent the constant terms in the models, and  $u_{it}$  ve  $\gamma_{it}$  represent the error terms.

### 6.1. Cross-Sectional Dependency and Homogeneity Tests

The cross-sectional dependence of the models was examined by the Breusch and Pagan (1980) LM, Pesaran (2004)  $CD_{LM}$ , Pesaran (2004) CD and Pesaran, Ullah and Yamagata (2008)  $LM_{adj}$  tests. The Breusch and Pagan (1980) LM test shown in the equation (3) demonstrate  $\chi^2$  distribution while N is constant for  $T \rightarrow \infty$ .

$$LM = T \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}^2 \sim X_{\frac{N(N-1)}{2}}^2 \quad (3)$$

The  $CD_{LM}$  test for first  $T \rightarrow \infty$ , then  $N \rightarrow \infty$  ( $T > N$ ) and CD test for  $N > T$ , which were developed by Pesaran (2004), show standard distribution asymptotically.  $CD_{LM}$  and CD are shown here with equations (4) and (5), respectively.

$$CD_{LM} = \sqrt{\frac{1}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N (T \hat{\rho}_{ij}^2 - 1) \sim N(0,1) \quad (4)$$

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \sim N(0,1) \quad (5)$$

Pesaran et al. (2008)  $LM_{adj}$  test shown here with equation (6) shows standard normal distribution asymptotically in case of  $T \rightarrow \infty$  and  $N \rightarrow \infty$ .

$$LM_{adj} = \sqrt{\left( \frac{2T}{N(N-1)} \right)} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \frac{(T-k) \hat{\rho}_{ij}^2 - \mu T_{ij}}{\sqrt{U_{Tij}^2}} \sim N(0,1) \quad (6)$$

Among these tests, Pesaran (2004) CD test gives more reliable results in case of  $N > T$  and other tests in case of  $T > N$ . The basic hypothesis in all tests is “No Correlation Between Residues.” If the basic hypothesis is rejected, the existence of a cross-sectional dependency in the model was concluded.

Delta ( $\tilde{\Delta}$ ) and bias-adjusted delta ( $\tilde{\Delta}_{adj}$ ) tests developed by Pesaran and Yamagata (2008) can be used to test whether the slope coefficients of the models used in the study are homogeneous. The bias-adjusted delta ( $\tilde{\Delta}_{adj}$ ) test gives reliable results in very small samples. In both tests, the basic hypothesis is “Slope coefficients are homogeneous.” If the basic hypothesis is rejected, the occurrence of a heterogeneous structure in the model was concluded.

$$\tilde{\Delta} = \sqrt{N} \left( \frac{N^{-1} \bar{s} - k}{\sqrt{2k}} \right) \sim \chi_k^2 \quad (7)$$

$$\tilde{\Delta}_{adj} = \sqrt{N} \left( \frac{N^{-1} \bar{s} - E(\bar{z}_{it})}{\sqrt{\text{var}(\bar{z}_{it})}} \right) \sim N(0,1) \quad (8)$$

## 6.2. Bootstrap Panel Causality Test

The bootstrap panel causality test developed by Kónya (2006) is based on the estimation made with the seemingly unrelated regression (SUR) model developed by Zellner (1962). In order to determine causal relationships, Wald statistics obtained from SUR estimation and country-specific bootstrap critical values in the panel are compared. Thus, the causal relationships between the variables can be obtained on a country basis. In order to determine the causal relationships between public expenditure and economic growth, the estimation of the following model is made by the SUR system:

$$\begin{aligned} GDP_{1,t} &= \alpha_{1,1} + \sum_{l=1}^{IGDP_1} \beta_{1,1,l} GDP_{1,t-l} + \sum_{l=1}^{IPE_1} \gamma_{1,1,l} PE_{1,t-l} + \varepsilon_{1,1,t} \\ GDP_{2,t} &= \alpha_{1,2} + \sum_{l=1}^{IGDP_1} \beta_{1,2,l} GDP_{2,t-l} + \sum_{l=1}^{IPE_1} \gamma_{1,2,l} PE_{2,t-l} + \varepsilon_{1,2,t} \\ &\vdots \\ &\vdots \\ &\vdots \\ GDP_{N,t} &= \alpha_{1,N} + \sum_{l=1}^{IGDP_1} \beta_{1,N,l} GDP_{N,t-l} + \sum_{l=1}^{IPE_1} \gamma_{1,N,l} PE_{N,t-l} + \varepsilon_{1,N,t} \end{aligned} \quad (9)$$

and

$$\begin{aligned} PE_{1,t} &= \alpha_{2,1} + \sum_{l=1}^{IGDP_1} \beta_{2,1,l} GDP_{1,t-l} + \sum_{l=1}^{IPE_1} \gamma_{2,1,l} PE_{1,t-l} + \varepsilon_{2,1,t} \\ PE_{2,t} &= \alpha_{2,2} + \sum_{l=1}^{IGDP_1} \beta_{2,2,l} GDP_{2,t-l} + \sum_{l=1}^{IPE_1} \gamma_{2,2,l} PE_{2,t-l} + \varepsilon_{2,2,t} \\ &\vdots \\ &\vdots \\ &\vdots \\ PE_{N,t} &= \alpha_{2,N} + \sum_{l=1}^{IGDP_1} \beta_{2,N,l} GDP_{N,t-l} + \sum_{l=1}^{IPE_1} \gamma_{2,N,l} PE_{N,t-l} + \varepsilon_{2,N,t} \end{aligned} \quad (10)$$

If Wald statistics are greater than the bootstrap critical values, the basic hypothesis of “public expenditures do not cause economic growth” in equation (9) and the basic hypothesis of “economic growth does not cause public expenditures” in equation (10) is rejected. In order to determine the causal relationships between public expenditures and income inequality, the estimation of the following model is made with the SUR system:

$$\begin{aligned}
 GINI_{1,t} &= \alpha_{1,1} + \sum_{l=1}^{lGINI_1} \beta_{1,1,l} GINI_{1,t-l} + \sum_{l=1}^{lPE_1} \gamma_{1,1,l} PE_{1,t-l} + \varepsilon_{1,1,t} \\
 GINI_{2,t} &= \alpha_{1,2} + \sum_{l=1}^{lGINI_1} \beta_{1,2,l} GINI_{2,t-l} + \sum_{l=1}^{lPE_1} \gamma_{1,2,l} PE_{2,t-l} + \varepsilon_{1,2,t} \\
 &\vdots \\
 &\vdots \\
 GINI_{N,t} &= \alpha_{1,N} + \sum_{l=1}^{lGINI_1} \beta_{1,N,l} GINI_{N,t-l} + \sum_{l=1}^{lPE_1} \gamma_{1,N,l} PE_{N,t-l} + \varepsilon_{1,N,t}
 \end{aligned} \quad (11)$$

and

$$\begin{aligned}
 PE_{1,t} &= \alpha_{2,1} + \sum_{l=1}^{lGINI_1} \beta_{2,1,l} GINI_{1,t-l} + \sum_{l=1}^{lPE_1} \gamma_{2,1,l} PE_{1,t-l} + \varepsilon_{2,1,t} \\
 PE_{2,t} &= \alpha_{2,2} + \sum_{l=1}^{lGINI_1} \beta_{2,2,l} GINI_{2,t-l} + \sum_{l=1}^{lPE_1} \gamma_{2,2,l} PE_{2,t-l} + \varepsilon_{2,2,t} \\
 &\vdots \\
 &\vdots \\
 PE_{N,t} &= \alpha_{2,N} + \sum_{l=1}^{lGINI_1} \beta_{2,N,l} GINI_{N,t-l} + \sum_{l=1}^{lPE_1} \gamma_{2,N,l} PE_{N,t-l} + \varepsilon_{2,N,t}
 \end{aligned} \quad (12)$$

If Wald statistics are greater than the bootstrap critical values, the basic hypothesis of “public expenditures do not cause income inequality” in equation (11) and the basic hypothesis of “income inequality does not cause public expenditures” in equation (12) are rejected. In these models created for causality analysis, PE, GDP, and GINI show the variables used in the analysis.  $N$  is the number of cross-sections in the panel ( $i=1,2,\dots,N$ ), and  $t$  is the time period ( $t=1,2,\dots,T$ ). The optimal lag length determined according to the Akaike information criterion is denoted by  $l$ .

## 7. Empirical Findings and Discussion

For the models used prior to the panel causality analysis, cross-sectional dependence and homogeneity tests were performed in the study. The results of the cross-sectional dependence test made for Model 1 and Model 2 are shown in Table 4.

**Table 4: Cross-Sectional Dependence Test Results**

	Model 1	Model 2
Breusch-Pagan LM	323.722***	319.381***
Pesaran CD <sub>LM</sub>	56.365***	55.572***
Pesaran CD	17.992***	17.871***
Pesaran vd. LM <sub>adj</sub>	12.145***	4.435***

\*\*\* indicates the rejection of the null hypothesis at 1% significance level.

According to the results obtained from Table 4, the basic hypothesis of “There is no Correlation Between Residues” in terms of Model 1 and Model 2 was rejected at the 1% significance level in all cross-sectional dependency tests. This situation reveals that there is a cross-sectional dependency in both models.

**Table 5: Homogeneity Test Results**

	Model 1	Model 2
$\bar{\Delta}$	16.649***	9.636***
$\bar{\Delta}_{adj}$	18.020***	10.430***

\*\*\* indicates the rejection of the null hypothesis at 1% significance level.

On the other hand, the homogeneity test results in Table 5 show that the basic hypothesis of “Slope coefficients are homogeneous” was rejected for both models at the 1% significance level. This result reveals that the models used in the study have a heterogeneous structure. The presence of cross-sectional dependence and heterogeneity in the models makes it possible to perform the bootstrap panel causality analysis developed by Kónya (2006).

**Table 6: Bootstrap Panel Causality Test Results Between Public Expenditures and Economic Growth**

Countries	Wald Stat.	H <sub>0</sub> : PE ≠ > GDP			H <sub>0</sub> : GDP ≠ > PE			
		Bootstrap Critical Values			Bootstrap Critical Values			
		%1	%5	%10	Wald Stat.	%1	%5	%10
Armenia	6.429*	14.137	7.654	5.209	1.477	32.201	20.824	16.656
Belarus	15.92**	17.453	10.843	7.877	0.067	8.219	4.277	2.817
Kazakhstan	4.234**	7.152	3.729	2.509	0.053	6.496	3.147	2.026
Kyrgyzstan	1.549	10.144	5.658	4.032	1.489	8.082	4.447	3.127
Moldova	0.324	6.257	3.476	2.324	1.593	8.040	4.310	3.069
Russian Fed.	0.509	16.775	9.591	6.460	0.869	9.570	5.205	3.597

\*\* and \* indicates the rejection of the null hypothesis at 5% and 10% significance levels, respectively. Critical values are based on 10,000 bootstrap replications.

Table 6 shows the results of the causal relationship between public expenditures and economic growth. According to the findings obtained from Table 6, a one-way causality relationship from public expenditures to economic growth was determined at a significance level of 10% for Armenia and 5% for Belarus and Kazakhstan. This result is in coincidence

with the studies of Holmes and Hutton (1990), Alexiou (2009), Alam et al. (2010), Gurgul et al. (2012), Dincă and Dincă (2013), Christie (2014), Abdieva et al. (2017), Gngain et al. (2019) and Kutasi and Marton (2020). However, there was no causal relationship from economic growth to public expenditure in any country. This situation reveals that the Keynesian hypothesis is valid in half of the CIS member countries included in the study. However, no evidence could be obtained to support the Wagner hypothesis.

**Table 7: Bootstrap Panel Causality Test Results Between Public Expenditures and Income Inequality**

Countries	$H_0: PE \neq GINI$				$H_0: GINI \neq PE$			
	Wald Stat.	Bootstrap Critical Values			Wald Stat.	Bootstrap Critical Values		
		%1	%5	%10		%1	%5	%10
Armenia	2.520	25.273	15.350	11.719	11.277	27.492	16.586	12.502
Belarus	3.238*	7.609	4.038	2.717	0.005	10.579	5.885	4.068
Kazakhstan	6.35*	12.885	6.750	4.635	0.000	7.853	4.073	2.706
Kyrgyzstan	1.051	8.371	4.653	3.220	3.415*	9.517	4.725	2.980
Moldova	0.082	9.033	4.806	3.201	1.311	11.116	6.008	4.216
Russian Fed.	2.650	9.236	4.676	3.222	0.438	13.535	7.189	4.870

\* indicates the rejection of the null hypothesis at 10% significance level. Critical values are based on 10,000 bootstrap replications.

Table 7 shows the results of the causal relationship between public expenditures and income inequality. According to the results obtained here, there is a one-way causality relationship from public expenditures to income inequality at the 10% significance level for Belarus and Kazakhstan. This situation reveals that in some of the CIS member countries, public expenditures are effective on income inequality. Therefore, the findings obtained are in coincidence with the studies of Ospina (2010), Woo et al. (2013), Anderson et al. (2017), Teyyare and Sayaner (2018), Ulu (2018), Doumbia and Kinda (2019), and Samanta and Kayet (2020). On the other hand, a one-way causality relationship from income inequality to public expenditures has been determined for Kyrgyzstan at the 10% significance level. Accordingly, income inequality in Kyrgyzstan creates pressure on public expenditures. This finding coincides with the study of Boustan et al. (2013).

The findings of the country-specific causality results obtained from the study are summarized in Table 8. Table 8 shows the direction of causality in terms of variables in the countries used in the study more clearly

**Table 8: Country-Specific Findings**

Armenia	Belarus	Kazakhstan	Kyrgyzstan	Moldova	Russian Fed.
PE→GDP	PE→GDP	PE→GDP	GINI→PE	-	-
	PE→GINI	PE→GINI		-	-

→ indicates the direction of causality

## 8. Conclusion and Policy Recommendations

In this study, the causality relationship of public expenditures with economic growth and income inequality was analyzed for the CIS member countries for the period 1998-2019. For this purpose, first of all, cross-sectional dependence and homogeneity tests were performed on the models used in the study. Then, the bootstrap panel causality test developed by Kónya (2006) was applied to determine the causal relationships between the variables. The result of the analysis indicated the presence of cross-sectional dependence and heterogeneity in the models included in the study. Bootstrap panel causality results show that there is a one-way causality relationship from public expenditures to economic growth for Armenia, Belarus, and Kazakhstan. On the other hand, a one-way causality relationship has been determined from public expenditures to income inequality in Belarus and Kazakhstan, and from income inequality to public expenditures in Kyrgyzstan. In Moldova and Russia, however, no causal relationship could be obtained between the variables.

According to the findings of the study, it was concluded that the Keynesian hypothesis is valid in the CIS member countries in terms of the relationship between public expenditures and economic growth. In terms of the relationship between public expenditures and income inequality, public expenditures are seen to be effective on income inequality in some countries while income inequality is observed to create pressure on public expenditures in some countries. The overall evaluation of the findings obtained from the panel causality tests concluded that public expenditures in CIS member countries are closely related to both economic growth and income inequality. This situation reveals that the policies that will increase the efficiency of public expenditures, whose scope and quality have been changed, are very important in the CIS member countries in the process of transition from a socialist system in which the state intervenes in the entire economic field to a market economy.

Public expenditures, which have been considerably reduced compared to the socialist system especially in countries in transition, directly affect economic growth and income inequality. As the adaptation to the market economy is achieved, legal regulations regarding the effectiveness of public expenditure policies and practices for the functioning of institutions allow economic growth to be realized again. However, the free-market economy and the transition to the capitalist system further increase income inequality in some

countries and create pressure on public expenditures. Therefore, using public expenditures effectively becomes necessary in order to both increase economic growth and make income distribution fair. In addition, adapting to a new economic system is not easy for any country. Complementary fiscal policies should be featured to combat the social costs of economic stability policies. CIS member countries also need state interventions in order for the market system to fully settle in this transition period. However, implementing policies that do not exclude private investments and do not harm the functioning of the market economy should be elaborated during practicing public expenditure policies in these countries in transition.

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