

Quantifying the Relationship between GDP per Capita and Inequality in the Balkan Region

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ARTICLE INFO	ABSTRACT
<p>Article History</p> <p>Received 20 April 2021; Accepted 16 August 2021</p> <p><i>JEL Classifications</i> O15, O52</p>	<p>Purpose: The paper aims to estimate the effect of inequality on the economic growth of Balkan countries for the period 2001-2017. In addition, the effect of capital stock on GDP per capita (GDPpc) for the Balkan countries was estimated. The low level of financial inclusion on the Balkan region produces an underinvestment of human capital and affects the low-income households, leading to an increase in inequality. Low levels of equality and capital stock negatively impact economic growth.</p> <p>Design/methodology/approach: An unbalanced panel data for Balkan countries for the period 2001-2017 was applied. The Balkans' neighboring countries were included, because a lot of Balkan countries lack data in many years, therefore more countries were added for statistical considerations. A random effects model was run.</p> <p>Finding: The Gini index negatively impacts the GDPpc of Balkan countries for the period 2001-2007. The reduction of inequality may increase the economic growth of the region. Capital stock positively impacts the GDPpc of the region.</p> <p>Research limitations/implications: Due to statistical considerations, we have included neighboring countries of the Balkans, because many Balkan countries do not have data for the entire series from 2001 to 2017. We have not estimated the bi-directionality of the relationship between inequality and GDPpc. The results suggest that public policies against inequality may increase economic growth. Therefore, governments of the region should apply public policies to reduce the income gap.</p> <p>Originality/value: There are many papers that have estimated the effect of the Gini index on economic growth in different regions around the world, but there are not many studies applied to the Balkan region. Therefore, this paper's novelty is the measure of the effect of the Gini index on the GDPpc of the Balkan region.</p>
<p>Keywords: Technology Spillover; Foreign Direct Investment; Turkey</p>	

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1. Introduction

Public policies against inequality have been considered as a cost for efficiency, due to the amount of financial sources applied that could be invested in public goods. According to the previous perspective, governments should not apply public policies to reduce inequality, or at least, not huge amounts. Linked to the above, Kuznets (1955) points out that the relationship between inequality and GDPpc is shaped as an inverted U, meaning that at the first stages of development inequality increases due to economy industrialization, and therefore the wage gap between the agricultural and industrial sector increases to a maximum point. Then, there is a reduction of inequality due to the labor unions demanding higher wages. According to the Kuznets perspective, the government should not intervene to reduce inequality, because this variable would reduce naturally when GDP per capita increases.

Other authors, such as Stiglitz (2012), consider that inequality negatively affects GDP per capita, due to the fact that in societies with high levels of inequality, workers perceive the economy system as unfair and therefore they do not have incentives to increase productivity. Another perspective, similar to the previous one, highlights that there is

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a sub-optimal human capital investment in societies with high levels of inequality, due to the low levels of banking penetration.

The Balkans is not the region with the highest levels of inequality around the world. Nevertheless, the Gini index of the countries of the region is higher than Western European levels. Besides, the GDPpc of this region is not at the same level as the rest of the European economies. So, the research question that arises is: has the level of inequality affected the low economic growth of the Balkan economies? To answer the previous question, the relationship between inequality and economic growth has to be considered. Previous studies have estimated that inequality negatively affects economic growth in developing countries, and positively affects it in developed countries. This paper aims to estimate the effect of inequality on economic growth in Balkan economies. Even though the relationship between inequality and economic growth has been estimated previously, there are few studies which have quantified this relationship in the Balkan region.

A model of random effects panel data was estimated with an unbalanced panel, due to the fact that for some countries only short series were available. The results show a negative relationship between the Gini index and the GDPpc for 16 Balkan economies for the period 2001-2016.

2. Literature Review

The effect of inequality on economic growth depends on the national income level (Cingano, 2014), that is to say, this effect varies according to the national level of GDPpc. Stiglitz (2012) points out that inequality has a negative impact on national income, because in unequal societies workers with low incomes tend to consider the economic system as unfair and not meritocratic, therefore there is an impact on productivity. Piketty (2014) points out that even in meritocratic societies, such as the United States, it is not clear that wage differentials are fair, because it is complex to measure the marginal productivity of high-income workers.

Other authors consider that inequality has a negative effect on economic growth, due to the underinvestment in human capital (Galor and Zeira, (1993); Checchi et al., (1999); and Hassler et al., (2007)). Galor and Zeira (1993) point out that financial market imperfections cause low-income workers to invest in themselves using only their wages. Cingano (2014) points out that workers in the first deciles tend to invest a low amount of income in education and training, despite the fact that the returns on such investments are high, which causes a sub-optimal level of investment in human capital. Low levels of human capital, as well as physical capital, have medium and long-term negative effects on GDPpc. In this way, societies with high levels of income inequality tend to grow less than more egalitarian societies.

There are several studies that analyze the effect of inequality on economic growth (Cingano, (2014); Berg et al., (2018), OECD, (2015)). Table 1 shows some studies that link economic growth with inequality for high-income and low-income countries. In addition, this table shows several methods, and most of these studies use the Gini index as a measure of inequality.

Table 1. Previous studies of Inequality and GDP per capita

Author	Inequality variable	Method	Results
Forbes (2000)	Gini index	First-diff GMM	-Inequality positively affects economic growth on countries with high and medium income.
Barro (2000)	Gini index	3SLS	-Positive effect of inequality on GDP for rich countries -Negative effect of inequality on GDP for poor countries
Banerjee and Duflo (2003)	Gini index	Kenel regressions	-Inequality negatively affects economic growth
Knowles (2005)	Gini index, ratios 90/75, 50/10	Systems GMM	-Inequality positively affects GDP on top inequality distribution. -Inequality negatively affects GDP on bottom inequality distribution.
Castelló-Climent (2010)	Gini index	Systems GMM	-Inequality positively affects GDP for rich countries. -Inequality negatively affects GDP for poor countries.
Halter, Oechslin and Zwemuller (2014)	Gini index	Systems GMM, and First -diff GMM	-Inequality positively affects GDP for rich countries -Inequality negatively affects GDP for poor countries.
Cingano (2014)	-Gini index -Bottom inequality -Top inequality	Systems GMM	-Inequality (Gini index, bottom inequality and top inequality) negatively affects economic growth for OECD countries.
Berg et al., (2018)	-Gini index	Systems GMM	-Inequality (Gini index, bottom

	-Bottom inequality -Top inequality		inequality and top inequality) negatively affects economic growth, due to lower education.
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Source: Own elaboration

Forbes (2000) found a positive relationship between the Gini index and economic growth in the period 1970-1995. Due to the availability of data, this author used middle and high-income countries, and half of them were from the OECD. Barro (2000) found a positive relationship between inequality and GDP for high-income countries, while for low-income countries the previous relationship was negative. Banerjee and Duflo (2003) pointed out that inequality has a negative impact on economic growth, and their results also showed that there is an inverted U-shaped relationship between the previous variables.

Knowles (2005), Castelló-Climent (2010) and Halter, Oechslin and Zwemuller (2014) found that inequality positively affects GDP in high-income countries, while this relationship turns negative when low-income countries are analyzed. Cingano (2014) found that inequality negatively affects the economic growth of OECD countries. Berg et al. (2018) pointed out that inequality negatively affects economic growth, because in unequal countries there are low levels of investment in human capital, which has a negative effect on economic growth.

Most of the papers in table 1 use dynamic panels as a methodology, through GMM systems, with the independent variable as inequality measured through: Gini index, top inequality, bottom inequality, income ratios 90/75 and 50/10.

Table 2 shows studies that analyze the relationship between inequality and GDP in the Balkans. Most of the studies use the Gini index as an independent variable.

Table 2. Inequality and GDP per capita for Balkan countries

Author	Inequality variable	Countries	Method	Results
Ouardighi & Somun-Kapetanovic (2009)	-Theil index (income inequality among countries)	Western Balkans	OLS, GIV	-Real convergence of income and inequality
Koczan (2016)	-Gini index -Bottom inequality -Top inequality	Western Balkans	Fixed effects panel	-Positive relationship between inequality and lagged GDP growth -Negative relationship between inequality and lagged GDPpc
Nikoloski & Gveroski (2017)	-Gini index	North Macedonia	-OLS	-Positive correlation between average income and inequality -Positive correlation between inequality and Headcount ratio.

Source: Own elaboration

3. Data and Methodology

The research question is: has the level of inequality affected the low economic growth of the Balkan economies? Capital stock has been included as a control variable, because it has a lot of variability on the chosen countries, and we consider that the inclusion of capital stock induces more variability to the model and impacts on the link between inequality and GDPpc.

3.1. Data

The effect of income inequality on GDPpc was estimated for the Balkan economies from 2001 to 2017. The variables and databases in table 3 were used. GDP is measured through the level of production at constant US dollars (2010) and is then divided by the population. For that variable the World Development Indicators from the World Bank were used. The Gini index measures income inequality, and we used two databases: The World Development Indicators (World Bank) and The Standardized World Income Inequality Database (SWIID) which collects

information from different databases concerning the inequality of 198 countries. According to Farris (2010: 1) the Gini index is "... a summary statistic that measures how equitably a resource is distributed in a population". Finally, the capital stock at current PPPs (in mil. 2011US\$) is estimated by Feenstra, Inklaar & Timmer (2015) for the Penn World Table. According to Inklaar and Timmer (2013: p. 6) capital stock is defined as "Capital stocks are estimated based on cumulating and depreciation past investments using the perpetual inventory method (PIM)".

Table 3. Variables and Databases

Variable	Description	Values	Data base
GDPpc	-Measures the level of production per person	- Constant 2010 US\$	-World Development Indicators, World Bank.
Gini index	-Measures the income inequality	-Takes values from 1 to 100	-World Development Indicators, World Bank. - The Standardized World Income Inequality Database (SWIID) (https://fsolt.org/swiid/swiid_source/)
Capital stock	-Measures the capital stock	- Capital stock at current PPPs (in mil. 2011US\$)	-Penn world Table

Source: Own elaboration

Initially, the criterion was to choose only the Western Balkan economies according to the World Bank classification: Albania, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro and Serbia. Nevertheless, those countries do not have data for the entire series (2001-2017), for instance, for Albania there are just four years for the Gini index and it is almost the same for other countries, due to the Gini index not being estimated every year, unlike GDP. From an econometrical point of view, and in order to run a regression using panel data, an (n/t) higher than 1 is required (Roodman, 2009), where n are the countries and t the number of years. So that, using only the World Bank classification (n/t) would be less than 1. Therefore, we included more countries of the region.

We included countries considered as the Balkan region, such as: Bulgaria, Croatia, Greece, and Slovenia. Nevertheless, it was not enough to get an (n/t) closer to 1. Therefore, we decided to include neighboring countries that are linked to the region (culturally or geographically) such as: Hungary, Italy, Moldova, Romania, Turkey and Ukraine. Using all the countries (n/t) is closer to 1, and it was possible to apply panel data analysis. Most of the included countries have larger series of Gini index.

3.2 Econometric Model

An unbalanced panel data from 2001 to 2017 for 16 Balkan economies was integrated. The following general panel specification was used (Hsiao, 2014):

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it}$$

The panel data analysis captures a cross-sectional and time series analysis (Wooldridge, 2010).

The following equation was estimated:

$$\ln gdp_{it} = b_0 + b_1 \ln gini_{it} + b_2 \ln cs_{it} + \mu_{it} \quad (1)$$

Where:

i is the country and t is the time period.

μ_{it} is the error term

$\ln gdp_{it}$: is the natural logarithm of aggregation of gross value added divided by population. The GDPpc is at constant 2010 US dollars.

$\ln gini_{it}$: is the natural logarithm of the Gini index. This index measures the income inequality and can take values from 0 (total equality) to 100 (total inequality).

$\ln cs_{it}$: is the natural logarithm of capital stock and measures the capital of nations. The capital stock is at current PPPs in millions of 2011 US dollars.

Equation (1) is theoretically based on the fact that due to financial market imperfections (Hassler et al., 2007) and that low-income households do not have enough money to invest in themselves, low-income households do not go to school, and there is an under-investment in human capital (Cingano, 2014). Low levels of human capital have a negative impact on GDP. Therefore, we consider that b_1 should be negative. The variable capital stock was included

as a control variable, because this variable has a high impact on GDP. Besides, there is a high variation in the capital stock of the Balkan economies. We consider that the inclusion of this variable induces more variability to the model. Table 4 shows statistics of the used variables. Capital stock has the highest variability and the Gini index the lowest.

Table 4. Summary of statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
LnGDPpc	226	8.985	0.874	7.119	10.552
LnGINI	226	3.478	0.150	3.122	3.758
LnCS	214	13.173	1.671	9.781	16.636

Source: Own elaboration

Table 5 shows the correlation matrix of dependent and independent variables. The correlation between the independent variables is low (0.128), which means no multi-correlation problems. Besides, the correlation between the Gini index and GDPpc is negative which indicates a negative relationship between these variables. The correlation between capital stock and GDPpc is positive, which means a positive relationship. Finally, the coefficient of capital stock is the highest.

Table 5. Correlation matrix

	LnGDPpc	LnGINI	LnCS
LnGDPpc	1.000		
LnGINI	-0.053	1.000	
LnCS	0.602	0.128	1.000

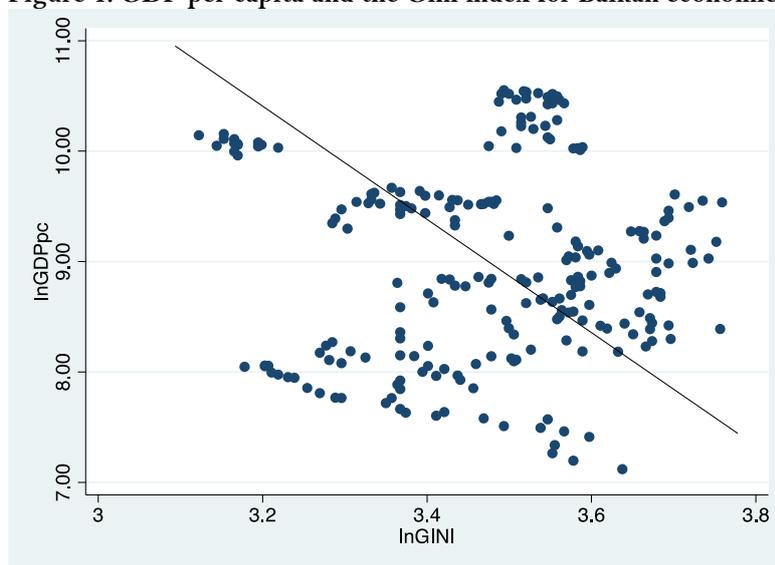
Source: Own elaboration

The Hausman test was applied and the value of the probability of Chi2 was 0.0740, which means that the random effects model was applied. Then, the autocorrelation Wooldridge test was applied and the results show that there is no such problem.

4. Results

Figure 1 shows the relationship between the logarithm of GDPpc and the logarithm of the Gini index. The trend line (right-hand side figure 1) shows a negative relationship between the Gini index and GDPpc as in the previous correlation matrix.

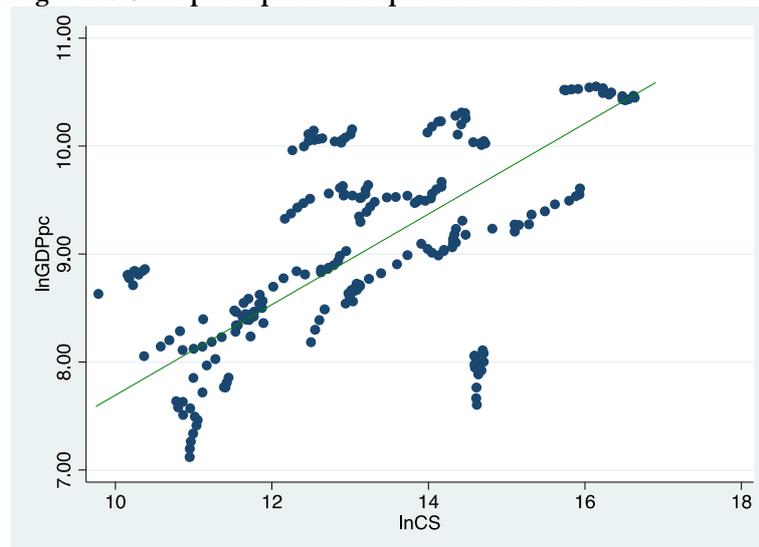
Figure 1. GDP per capita and the Gini index for Balkan economies



Source: Own elaboration

Figure 2 (left-hand side) shows a positive relationship between GDPpc and capital stock. Besides, the trend line (right-hand side figure 2) shows a positive relationship.

Figure 2. GDP per capita and capital stock for Balkan economies



Source elaboration

Table 6 shows the relationship between GDPpc and the independent variables. The results indicate a negative effect of the Gini index on GDP per capita with a 5% level of significance. Capital stock impacts positively on GDPpc at a 1% level of significance. The coefficient of capital stock (12.50) is higher than the coefficient of the Gini index (-2.03), and the R^2 (overall) is 0.36.

Table 6. GDP per capita, Gini and Capital stock for Balkan economies: Panel estimation

LnGDPpc	Coef.	P	s.e.
LNGINI	-2.030	0.042	0.073
LNCS	11.480	0.000	0.025
Constant	12.250	0.000	0.460
Hausman test	8.53	0.0740	Prob>chi2
R-sq (within)	0.55		
R-sq (between)	0.37		
R-sq (overall)	0.36		
Wald (chi-sq)	137.55	0.0000	Prob>chi2
Observations	214		

P = Robust standard error
Random effects

5. Discussion and Conclusions

Some authors suggest that policies against inequality are a cost for national economies and therefore governments should focus on activities that boost economic growth. According to Kuznets, inequality will go down alone, after a long period of high economic growth. However, inequality can negatively affect economic growth, due to the fact that in societies with high levels of inequality, workers see the economic system as unfair and productivity levels are not optimal. The objective of the paper was to estimate the effect of inequality on GDPpc for the Balkan countries. The Balkan region includes countries with lower levels of GDPpc than the rest of Europe, therefore it is important to analyze the previous relationship. The findings are related to the objectives of the paper, because the effect of the Gini index on GDPpc for the Balkan countries was estimated through a panel data model. The results show a negative relationship between inequality and GDPpc.

The results are novel, because the effect of the Gini index on GDPpc in the Balkan countries had not previously been quantified, mainly due to data availability. We run an unbalanced panel for Balkan countries and Balkan neighboring countries were included for statistical purposes. The results are similar to those that find a negative relationship between inequality and GDPpc (Barro, 2000; Banerjee and Duflo (2003); Knowles (2005); Castelló-Climent (2010); Halter, Oechslin and Zwemuller (2014); Cingano (2014); Berg et al., (2018)). Those authors found such a relationship in developing countries, as is the case of the Balkan economies, but not for developed countries, in which there is a positive relationship. Our results are similar to those obtained by Koczan (2016), who found a negative effect of inequality on GDPpc for the Balkan countries.

The findings suggest that policies against inequality can induce higher economic growth in the Balkan region, so we suggest that governments of the region should apply public policies to reduce the wage gap. Piketty (2014) has suggested increasing capital taxes, in order to reduce inequality around the world. This proposal should be applied at an international level, because in that way the capital cannot move to other countries looking for low taxes. We

consider that in the Balkan region the governments should consider applying a marginal increase of direct taxes, because such a policy could increase equality. Besides, public policies that boost education help to reduce income inequality, therefore, we consider that the governments of the region should invest in educational matters, because it is well known that these public policies reduce inequality. We consider that previous public policies reduced inequality, but also boosted economic growth.

Many papers have estimated the effect of inequality on economic growth using different methodologies and have been applied to specific groups of countries around the world. The paper highlights the importance of the policies against inequality because they boost economic growth. There are indications that the COVID19 pandemic has increased inequality around the world, because the unemployment rate has increased. Concerning the Balkan region, the pandemic has increased the income gap at present but also inequality will increase in the future, due to the pandemic's impact on education. Therefore, the public policies against inequality in the Balkan region are quite important, because they increase equality and induce a faster economic growth.

We did not estimate the bi-directionality of the Gini index and GDPpc, and it is rather important, because in the case of bi-directionality a faster economic growth induces a reduction of inequality and vice versa. Using a public policy in the case of bi-directionality of these variables would yield more efficient results. Therefore, we consider that the paper has this limitation. Besides, the inclusion of neighboring Balkan countries, because of statistical considerations, may bias the results.

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