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The Relationship between Income Inequalities and Economic Growth: New Evidence

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Abstract:

Purpose: *The study aims to analyze the relationship between the pace of economic development expressed by the GDP index and the level of income inequalities measured by the Gini coefficient.*
Design/Methodology/Approach: *The research hypothesis assumes that the level of income inequalities influences GDP growth. I hypothesize that this relationship is negative – a lower level of income inequalities favor the economic growth. I use the GDP per capita (per adult) year-to-year index to measure the pace of economic development. GDP index is a dependent variable in all estimated models. The explanatory variables are, GINI index, net national saving, public goods spending, country's dummy variables, year dummy variables.*
Findings: *Using data from 43 countries covering the years 1990-2017, I prove that (1) higher income inequality is related to higher economic growth (but only on the level of the sample); (2) a level of savings affects the economic growth positively; (3) a higher level of spending on public goods affects GDP positively (on the level of the whole sample and in the group of more improve rished countries).*
Practical Implications *The analysis confirms the positive relationship between income inequalities and the pace of economic development, but only at the whole sample level. Higher public spending positively affects economic growth. Savings accumulated by the citizens significantly affect economic growth, as a higher level of savings creates greater investment opportunities.*
Originality/Value: *Inequalities are an inherent part of society and the economy. It is often presumed that if the level of income inequality is too high, it negatively affects the economy by lowering the development pace. Although the previous findings are somewhat mixed, I pose the research hypothesis assuming a low level of income inequality is linked to higher GDP growth.*

Keywords: *Inequalities, sustainable finance, GDP, GINI, savings, public spending.*

JEL classification: *D31, D63, I32.*

Paper Type: *Research study.*

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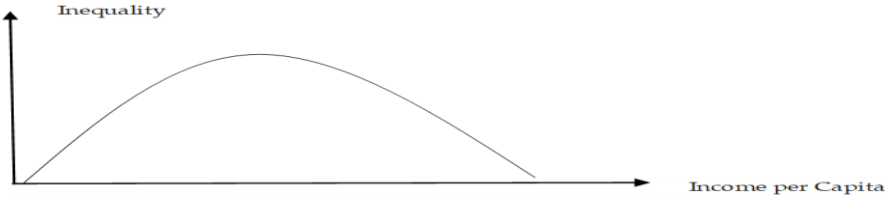
1. Introduction

Sustainable finance is a concept that has over the years been based on the idea of linking environmental, social and governance objectives in the provision of financial services and investment decisions. As social and political patterns evolved, the importance of sustainable finance has gradually grown around the need to provide sufficient financial resources to transition to a more sustainable society and a climate-neutral economy (Migliorelli, 2021). One of the Sustainable Development Goals (SDGs) aims is to reduce inequality (The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015). Income inequality matters for growth and its sustainability (Ostry, Berg, and Tsangarides, 2014). In 1963 President John F. Kennedy used the famous metaphor saying that a flow raises all ships (Kennedy, 1963). This metaphor means that everybody benefits from economic growth – both the poor and the rich. For years it was thought that the development of a free market must be accompanied by an increase in inequality and, what is more - growing disparities are a factor that makes the economy grows (Mikuła, 2005).

There is no one ruling definition of inequality. We can conclude that this is a multidimensional concept (Tomeczek, 2017), which corresponds to the lack of adequateness between a group of objects, people, processes, or circumstances of the same characteristics (Ulman and Wałęga, 2006). Another definition claims that inequality is a state of unequal distribution of material goods or intangible assets among members of the community, in which one group, because of its relatively higher position, benefit from privileges which are the subject of universal aspirations (Politechnika and Wrocławska, 2018). Apart from the definition, we can distinguish two types of inequality, inequality of outcomes (understood as differences in income and wealth) and inequality of opportunities (European Commission, 2017).

One of the first works on the relationships between economic growth and inequality was published by Kuznets (1955). Kuznets's hypothesis assumes that income inequality is higher in less developed countries. He found that for countries that longer belong to the group of developed countries, in the early stages of industrialization, income inequality increases first, and later when the "balancing forces become strong enough", income inequality stabilizes and finally is reduced (Theyson and Heller, 2015). This relationship is shown in Figure 1.

Figure 1. *The Kuznets curve*



Source: *Kuznets 1955.*

Today's discussion is focused not only on the influence of the level of inequality on economic growth but also on the impact of growth rate on the level of inequality. It is believed that this influence can be grouped into four categories (Barro, 1999):

- credit market imperfections,
- political economy,
- civil unrests,
- savings rates.

Piketty (2015) characterizes the credit market imperfections as the fact that "it loans only to rich". The credit market's full effectiveness would allow capital investments every time profitable occasions occur - neither origin nor family fortune should influence enterprising individuals' investment opportunities. The credit rationing mechanism involves the risk assessment and the ability to finance the initial phase of the investment project with internal funds. The own funds requirement compound the phenomenon of loaning only to the rich. Credit market imperfections are also reflected in the insurance market (Piketty, 2015).

Financial inclusion, understood as the availability of loans, savings payments, and insurance from formal service providers for all working adults, would allow the extension of the provision of services to customers currently excluded. According to Kim (2016), it would raise people's living standards and improve overall development and economic growth. Kim believes that income disparities have a negative impact on GDP growth. What's more, this impact is stronger in countries with low income and those characterized by high instability.

Political economy as a source of inequality has its origin in the governmental decisions that are not being taken to maximize welfare function because of the "political interactions" (Ferreira, 1999). Listening carefully to the electorate's expectations, politicians do not take unpopular decisions that are necessary from the point of view of an efficient economy. Simultaneously, they try to attract their electorate by social transfers favoring individual groups that limit investments in the economy. Among determinants that, caused by income inequalities, negatively affect economic development is the political factor - poorer voters favor fiscal redistribution-based solutions that demotivate enterprising individuals, and thus indirectly also economic development (Bagchi and Svejnarb, 2015).

Another source of the negative impact of inequality on economic growth is social unrest. Social conflicts lead to the state's instability and the source of a suboptimal investment level (Alesina and Perotti, 1996). The unstable condition, as well as the increasing social unrest, may increase delinquency and social degradation. In this process, human capital is wasted. Mikuła (2005) indicates that intensified investment in human capital can stimulate economic growth and reduce inequality. Additionally, the uneven development and the atmosphere of threat deter investors and lead to the outflow of foreign capital.

The next category concerns the rate of savings. The level of income inequality affects the level of savings of individual households. So the wealth of the most affluent social class increases along with the increasing inequality level. The bigger are income inequalities, the smaller savings poorer households can put apart (Ciegis, Dilius, and Andriusk, 2017). It should also be pointed out that the increase in income inequality leads to higher levels of debt in the poorest households (Ryoo, 2013). At the same time, poorer households are usually characterized by higher fertility rates, while they cannot transfer funds to build human capital, which is based on building value in all sectors of the economy (De La Croix, 2003). On the other hand, savings, multiplied by the haves, are sources of funds for investments and research and development projects. These, in turn, lead to economic development (Barro, 2000).

The relationship between inequality and economic development is still the subject of scientific discussion. This is always a controversial issue strongly linked to a political and economic concept of the state. The literature doesn't provide clear, unambiguous results. It seems that inequalities - especially income inequalities - can both stimulate or stunt economic growth (Ciegis, Dilius, and Andriusk, 2017; Thalassinos *et al.,* 2019). Stewart (2000) confirms that the pace of economic growth influences differently on its distribution. Also, this relationship's direction is not clearly confirmed – we finally do not know whether economic development stimulates the adjustment in the level of inequality or vice versa.

The study aims to analyze the relationship between the pace of economic development expressed by the GDP index and the level of income inequalities measured by the Gini coefficient. Based on the literature review, I formulate the following research hypothesis:

(H1): There is a negative relationship between the level of economic development and income inequalities.
(H2): There is a positive relationship between savings and economic development.
(H3): There is a positive relationship between spending on public goods and economic development.

I use World Bank data for 43 countries covering the years 1990-2017 to estimate fixed-effects models using the LSDV method. GRETL supports the analysis.

2. Materials and Methods

The research hypothesis assumes that the level of income inequalities influences GDP growth. Although findings presented in the literature are mixed, I hypothesize that this relationship is negative – a lower level of income inequalities favor the economic growth. In this study, I use the GDP per capita (per adult) year-to-year index to measure the pace of economic development. GDP index is a dependent variable in all estimated models. The explanatory variables are:

- GINI index which measures the extent to which the distribution of income among individuals or households within the economy deviates from a perfectly equal distribution, where 0 represents perfect equality and 100 - perfect inequality;
- net national saving (SAV), expressed as a share of GDP, equal to gross national savings less the value of consumption of fixed capital;
- public goods spending (PGS), expressed as a share of total expenses, includes all government payments in exchange for goods and services used for the production of market and nonmarket goods and services;
- country's dummy variables;
- year dummy variables.

The SAV variable refers to one of the mechanisms of inequality's influence on economic growth (Barro, 1999). It describes the ability of businesses and households to accumulate savings. However, it does not provide information about the distribution of savings between income groups. The variable PGS is strongly associated with a particular state's economic and social concept – the more the state is active on the markets (public investment, social transfers), the more funds the public sector transfers. Therefore the variable indirectly describes the scale redistribution in the tax system.

In this study, I first analyze the whole research group (43 countries), while in the second step, I extract two subgroups – wealthy countries (top 25% of GDP per capita country-year observations) and poor countries (bottom 25% GDP per capita country-year observations).

To identify whether I should employ fix-effects of the random-effects model, I use two statistical tests: the Breusch-Pagan test and the Hausman test. The Breusch-Pagan test checks whether the variance of the model's errors is dependent on the values of the independent variables. The null hypothesis is the variance of the unit-specific error = 0. Test results is: asymptotic test statistic: Chi-square(1) = 49.2568 with p-value = 2.24554e-012. Based on that, I cannot reject the null hypothesis about the heteroscedasticity of time series. That suggests the use of the fixed-effects model. The Hausman test also helps you to choose between the fixed-effects model or a random-effects model. The null hypothesis is that the preferred model is random effects. The test results (asymptotic test statistic: Chi-square(28) = 26.8517) with p-value = 0.526335 force us to reject the null hypothesis (p-value is more than 0.05). The results are consistent with the Breusch-Pagan test's result.

3. Results

The first model (Table 1) suggests the highly statistically significant linear relationship between the GDP and explanatory variables (GINI, SAV, PGS). Selected variables describe 53,9% of GDP volatility (Table 1).

First, we can observe the positive relationship between GINI and GDP growth - a higher level of inequality is linked to faster GDP growth. The increase of 0,1% in income inequality is related to the additional one p.p. GDP growth. At the same time, we observe the positive relationship between GDP and SAV. The higher volume of savings is related to faster GDP growth, but we cannot tell anything about savings' distribution if owned by rich or poor households based on this model. We can also observe that the relationship between the ratio of public goods spending (PGS) and the level of economic development (GDP) is positive. This is a very interesting observation because there is a general belief that the higher ratio of public spending instead lowers the GDP growth.

Table 1. *Fixed effects model's estimation (all countries, all years). Dependent variable: GDP growth (model 1)*

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
const	**−0.0787151**	**0.0260722**	**−3.019**	**0.0027*** **
GINI	**0.00119488**	**0.000658433**	**1.815**	**0.0702***
SAV	**0.00171054**	**0.000353864**	**4.834**	**<0.0001*** **
PGS	**0.00254112**	**0.000395309**	**6.428**	**<0.0001*** **
dt_2	−0.00945999	0.0180955	−0.5228	0.6014
dt_3	0.00407765	0.0141012	0.2892	0.7726
dt_4	0.0218899	0.0179739	1.218	0.2238
dt_5	0.00686428	0.0135647	0.5060	0.6130
dt_6	−0.00501889	0.0180704	−0.2777	0.7813
dt_7	0.0149119	0.0147479	1.011	0.3124
dt_8	0.0234079	0.0131648	1.778	0.0760*
dt_9	−0.0143539	0.0131967	−1.088	0.2773
dt_10	−0.0193487	0.0131065	−1.476	0.1405
dt_11	0.00533330	0.0118236	0.4511	0.6521
dt_12	−0.00615143	0.0125041	−0.4920	0.6230
dt_13	−0.00640396	0.0129496	−0.4945	0.6211
dt_14	0.0156879	0.0107962	1.453	0.1468
dt_15	0.0258237	0.0103298	2.500	0.0127**
dt_16	0.0230594	0.0104619	2.204	0.0280**
dt_17	0.0333268	0.0101448	3.285	0.0011***
dt_18	0.0297776	0.0100987	2.949	0.0033***
dt_19	0.00808040	0.00989727	0.8164	0.4146
dt_20	−0.0569076	0.00991314	−5.741	<0.0001***
dt_21	0.0171298	0.00978670	1.750	0.0807*
dt_22	0.0207231	0.00977836	2.119	0.0346**
dt_23	0.000358335	0.00987192	0.03630	0.9711
dt_24	0.0107004	0.00975785	1.097	0.2733
dt_25	0.0135276	0.00972136	1.392	0.1647
dt_26	0.0118095	0.00974282	1.212	0.2260

Source: *Own study.*

Model 1 is characterized by a good model's fitting. The Wald test suggests that year-dummies are statistically insignificant, proving no time effect in the relationship between GINI, SAV, PGS, and GDP. All country dummies are statistically significant (Table 2).

Table 2. *Fitting measures for model 1*

Mean dependent var	0.020030	S.D. dependent var	0.042657
Sum squared resid	0.483366	S.E. of regression	0.030877
LSDV R-squared	0.539624	Within R-squared	0.434020
LSDV F(70, 507)	8.489633	P-value(F)	6.07e-51
Log-likelihood	1227.868	Akaike criterion	−2313.736
Schwarz criterion	−2004.206	Hannan-Quinn	−2193.042
Rho	0.327980	Durbin-Watson	1.220574

Source: *Own study.*

Joint test on named regressors:
Test statistic: F(3, 507) = 22.5565, with p-value = P(F(3, 507) > 22.5565) = 1.0089e-013.
Test for differing group intercepts –
Null hypothesis: The groups have a common intercept
Test statistic: F(42, 507) = 2.97234, with p-value = P(F(42, 507) > 2.97234) = 7.70612e-009
Wald joint test on time dummies -
Null hypothesis: No time effects
Asymptotic test statistic: Chi-square(25) = 233.383, with p-value = 1.00187e-035

In the next step, choose 25% country-year observations with the lowest GDP level. In this way, I allow for considering the changes in countries' wealth during the analyzed time span. Cognately, I sectionalize a group of 25% best country-year observations.

The model estimated that low-income countries suggest no statistically significant relationship between GINI and GDP growth. As in the whole sample, we can observe the positive relationship between SAV, PGS, and GDP (Table 3). As on the whole sample level, we detect the positive relationship between SAV, PGS, and GDP, and the strength of this relationship is comparable.

Table 3. *Fixed effects model's estimation (low-income countries, all years). Dependent variable: GDP growth (model 2)*

	Coefficient	Std. Error	t-ratio	p-value
const	−0.0995226	0.0487457	−2.042	0.0442**
GINI	0.00165142	0.00120151	1.374	0.1728
SAV	0.00158944	0.000533435	2.980	0.0037***
PGS	0.00235441	0.000410428	5.736	<0.0001***
dt_3	0.0302325	0.0412286	0.7333	0.4653
dt_5	0.152801	0.0543302	2.812	0.0061***
dt_6	−0.0220375	0.0521066	−0.4229	0.6734
dt_7	0.00282595	0.0394235	0.07168	0.9430
dt_8	0.0161163	0.0201631	0.7993	0.4263
dt_9	−0.0358419	0.0204111	−1.756	0.0826*
dt_10	−0.0316922	0.0193134	−1.641	0.1044
dt_11	−0.0113936	0.0179678	−0.6341	0.5277

dt_12	−0.0101906	0.0178268	−0.5716	0.5690
dt_13	−0.00171120	0.0185339	−0.09233	0.9266
dt_14	0.0198972	0.0169186	1.176	0.2427
dt_15	0.0131821	0.0160827	0.8196	0.4146
dt_16	0.0154436	0.0165694	0.9321	0.3539
dt_17	0.0166932	0.0160958	1.037	0.3025
dt_18	0.0176007	0.0160879	1.094	0.2769
dt_19	0.0144202	0.0156864	0.9193	0.3605
dt_20	−0.0776508	0.0153720	−5.051	<0.0001***
dt_21	0.0297541	0.0153967	1.932	0.0565*
dt_22	0.0219625	0.0154204	1.424	0.1579
dt_23	0.00337560	0.0152609	0.2212	0.8255
dt_24	0.0220708	0.0156802	1.408	0.1628
dt_25	0.0104603	0.0147582	0.7088	0.4803
dt_26	−0.00124299	0.0146791	−0.08468	0.9327

Source: *Own study.*

Joint test on named regressors -
Test statistic: F(26, 88) = 8.61226, with p-value = P(F(26, 88) > 8.61226) = 7.69867e-015
Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(14, 88) = 5.59266, with p-value = P(F(14, 88) > 5.59266) = 1.39577e-007

Model 2 is characterized by the better fit to data (the values of Akaike criterion and Schwarz criterion are lower). It covers 80% of GDP growth volatility (Table 4).

Model 3 is estimated for 25% "best" country-year observations. As in model 2, we can observe no statistically significant relationship between GINI and GDP. In the poorest countries, the level of savings seems to the only factor (from those included in the model) that affects economic development.

Table 4. *Fitting measures for model 2*

Mean dependent var	0.026700	S.D. dependent var	0.045488
Sum squared resid	0.050908	S.E. of regression	0.024052
LSDV R-squared	0.807782	Within R-squared	0.717875
LSDV F(40, 88)	9.245317	P-value(F)	3.62e-18
Log-likelihood	322.4783	Akaike criterion	−562.9566
Schwarz criterion	−445.7043	Hannan-Quinn	−515.3146
rho	−0.059947	Durbin-Watson	1.916723

Source: *Own study.*

Although R-squared is lower than model 2, the Akaike criterion and Schwarz criterion show better fitting than models 1 and 2.

Joint test on named regressors -
Test statistic: F(20, 119) = 6.2333

with p-value = P(F(20, 119) > 6.2333) = 4.4623e-011
Test for differing group intercepts -
Null hypothesis: The groups have a common intercept
Test statistic: F(13, 119) = 1.933
with p-value = P(F(13, 119) > 1.933) = 0.0327787

According to the presented results, I cannot confirm the H1 hypothesis. I detect the opposite relationship. On the other hand, all estimated models establish the relationship between the GDP growth and savings accumulated in the economy. Hence the H2 hypothesis is adopted without reservations. Regarding the H3 hypothesis – it can be assumed only partially as the projected relationship's existence is proven only on the level of the whole group and the group of poorer countries.

Table 5. *Fixed effects model's estimation (high-income countries, all years). Dependent variable: GDP growth (model 3)*

	Coefficient	Std. Error	t-ratio	p-value
const	−0.0724846	0.0673373	−1.076	0.2839
GINI	0.000660617	0.00197787	0.3340	0.7390
SAV	0.00302612	0.000940853	3.216	0.0017***
PGS	0.000188878	0.00237381	0.07957	0.9367
dt_5	0.0542763	0.0224946	2.413	0.0174**
dt_8	0.0483804	0.0287545	1.683	0.0951*
dt_11	0.0554067	0.0223867	2.475	0.0147**
dt_12	0.0498319	0.0296390	1.681	0.0953*
dt_14	0.0339643	0.0198209	1.714	0.0892*
dt_15	0.0496171	0.0183143	2.709	0.0077***
dt_16	0.0387626	0.0189295	2.048	0.0428**
dt_17	0.0465379	0.0183395	2.538	0.0125**
dt_18	0.0412915	0.0179353	2.302	0.0231**
dt_19	0.0216327	0.0183760	1.177	0.2415
dt_20	−0.0121928	0.0185924	−0.6558	0.5132
dt_21	0.0454822	0.0179071	2.540	0.0124**
dt_22	0.0411953	0.0182810	2.253	0.0261**
dt_23	0.0257637	0.0187485	1.374	0.1720
dt_24	0.0311552	0.0180152	1.729	0.0863*
dt_25	0.0456375	0.0189264	2.411	0.0174**
dt_26	0.0606781	0.0184263	3.293	0.0013***

Source: *Own study.*

Table 6. *Fitting measures for model 3*

Mean dependent var	0.007212	S.D. dependent var	0.032091
Sum squared resid	0.070789	S.E. of regression	0.024390
LSDV R-squared	0.547779	Within R-squared	0.511627
LSDV F(33, 119)	4.368048	P-value(F)	1.56e-09
Log-likelihood	370.3066	Akaike criterion	−672.6132
Schwarz criterion	−569.5783	Hannan-Quinn	−630.7587
rho	0.635269	Durbin-Watson	0.870706

Source: *Own study.*

4. Discussion

The relationship between income inequalities and economic growth is a widely discussed and studied issue among economists—some of them in their research present as a conclusion, a negative relationship (Panizza, 2002). Alesina and Rodrik indicate the relationship between inequality of wealth and income and the rate of taxation - the greater the disparity of wealth and income, the higher the rate of taxation, and the lower growth. Their empirical results have shown that inequality in land and income ownership is negatively correlated with subsequent economic growth (Alesina and Rodrik, 1994). This theory also has its opponents - Hongyi and Zou (1998), in their research, directly indicate that *"(...) income inequality is positively, and most of the time significantly, associated with economic growth. These findings stand in sharp contrast to the negative association between inequality and growth propounded by Alesina and Rodrik and by Persson and Tabellini. "* (Hongyi and Zou, 1998).

In his article, Easterly states that large structural inequalities are a large and statistically significant obstacle in developing mechanisms by which economic development is achieved (Easterly, 2007). In theory, it is also believed that income inequality is detrimental to growth as it leads to policies that fail to protect property rights and do not allow for the total private appropriation of investment returns (Persson and Tabellini, 1991).

Some indicate that this relationship is relatively tiny and system-independent because it occurs both in democratic and non-democratic countries (Clarke, 1995). However, other authors note that the impact of inequality on growth is more pronounced in less developed countries than in rich countries (Neves, Afonso, and Silva, 2016). Barro points out in his research that it depends on the level of GDP per capita and is negative for GDP per capita below $ 2,070 and then becomes positive (Barro, 2000). Moreover, inequality in high-income countries has a significant negative effect on transitional growth (Brueckner and Lederman, 2018).

Reducing inequality can have a positive effect on increasing productivity progress. Moreover, it also allows for limiting the accumulation of human capital. Similar arguments can be made for innovative incentives (Foellmi and Zweimueller, 2003). Some authors argue that inequality can have a positive effect on economic growth. R.J. Barro points out that developed countries may benefit from a positive influence (Barro, 2000). On the other hand, Idowu and Adeneye confirm R.J. Barro's theory and prove that Europe can benefit from inequality instead of Africa or North and South America (Idowu and Adeneye, 2017). Forbes adds to the view of the positive impact of inequality on subsequent economic growth that it takes place in the short and medium term (Forbes, 2000). Another argument for a positive impact, noticed by researchers, is the ability to accumulate savings. Savings rates often increase with income. Thus redistributing income from the poor to the rich should increase aggregate savings. These play an essential role in the development of economic

growth. Another argument raised is that a certain degree of inequality reflects that people are paid according to merit incentives for hard and smart work (Angelsen and Wunder, 2006).

5. Conclusions

The analysis confirms the positive relationship between income inequalities and the pace of economic development, but only at the whole sample level. However, in the case of 25% poorest and 25% richest observations, this is statistically non-significant. This positive relationship is consistent with some previous findings (Barro, 1999; 2000; Hongyi and Zou, 1998). Barro (1999; 2000) indicates that there is little overall relation between income inequality and growth rates, and investment rates. I also prove this relationship in our study. However, Barro (2000) concludes that inequalities destimulate economic growth in poor countries while richer once the growth can e positively stimulated. My research is inconsistent as the relationship between GDP growth and income inequalities, although positive, is statistically insignificant.

My research also suggests that higher public spending positively affects economic growth. This may be a consequence of the impact of public services, which, through equal access to education, health care, or financial benefits, tend to compensate for one of the types of socio-economic inequality – the inequality of opportunities. Education, investment in human capital, affordable health care system, or social transfers allow shaping the human potential. By leveling the chances, such actions create the ability to obtain a higher personal income, stimulate entrepreneurship or savings accumulation.

Savings accumulated by the citizens significantly affect economic growth, as a higher level of savings creates greater investment opportunities. Additionally, people with a higher level of savings have the largest share in financing investments – even if those investments are not co-financed with debt. Savings allow for the financial inclusion of social groups and their participation in investment and research and development. And financial inclusion helps to reduce income inequality in lowing come countries (Kim, 2016). Also, individuals with greater savings spend them on research and development, which leads to the implementation of innovative solutions in all sectors by making them more competitive. Thus they can generate higher GDP (Ciegis, Dilius, and Andriusk, 2017). I am aware that my study doesn't include all factors important from the point of view of the pace of economic growth. Hence, further research would be focused on other factors/relationship, which influences economic growth.

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