UDK 336.76/.77:338.121]:303.723(100)"2016/2020"

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QUANTITATIVE ANALYSIS OF THE IMPACT OF THE FINANCIAL MARKET ON THE ECONOMIC GROWTH

Abstract: The subject of this paper is an analysis of the correlation between the financial market's development level and the level of economic growth. The paper also quantitatively tests a model that describes the impact of the financial market on economic growth. More specifically, it aims to provide the creators of the economic policies and financial markets regulators with a better understanding of the financial market's role in explaining the variance in the gross domestic product.

The paper analyzes the correlation between financial market development level and market capitalization per listed company in 56 countries from 2016 to 2020, using two linear regression models and two panel regressions. The results of the analysis suggest that there is a strong positive correlation between the analyzed variables. These findings indicate that the stock market capitalization can reliably estimate the gross domestic product. Thus, the key implication of the paper is for the policymakers who should strive to stimulate the stock market development.

Keywords: Financial market development, stock market capitalization, panel data analysis.

JEL classification: *B26, E43, G15, O40, G10.*

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Introduction

A growing body of evidence shows the critical importance of financial markets and institutions for economic growth. Some economists argue that finance does not cause growth; it simply responds to changing demands from the "real sector." Joan Robinson (1952, p.86) famously declared that "where enterprise leads finance follows". Nobel Laureate Robert Lucas (1988, p.6) dismisses finance as an "over-stressed" determinant of economic growth. In contrast, others believe that financial systems have a critical function in economies' growth. Namely, Walter Bagehot (1873) and John Hicks (1969) argued that the financial sector was vital in promoting industrialization in England. Nobel Laureate Merton Miller (1988, p.14) argues that "the idea that financial markets contribute to economic growth is a proposition too obvious for serious discussion."

However, Schumpeter (1911) was the first to highlight that financial sector development is related to economic growth. Since then, economic theory has tested if a well-functioning financial system promotes technological innovations when sufficient funds are distributed to the entrepreneurs, which are key to economic growth. Further research also reviewed the link between financial sector development and economic growth (Goldsmith (1969); Durusu-Ciftci et al., (2017); Mesagan et al., (2018)). As a result, the argument of Schumpeter was upgraded many times in terms of a policy analysis tool for developing countries, with a recommendation and high priority for policymakers on the efficiency of the financial system in facilitating capital accumulation and financial intermediation. Yadirichukwu and Chigbu (2014), Levine and Zervos (1996), Cooray (2010), Beck and Levine (2004), Narayan and Narayan (2013), as well as Isola and Mesagan (2018), pointed that the financial sector provided a direct stimulus that is necessary for growth. In summary, many authors believe that when financial systems function properly, they can exert a powerful influence on economic development, poverty alleviation, and economic stability. However, as The Global Financial Crisis of 2007-2009 has demonstrated, finance can also be a source of fragility.

The importance of knowing the elements of economic growth has been high since the theory of economic policy. Torado and Smith (2011) concluded that economic growth measured as an increase in GDP is a widely accepted indicator to measure the country's development. Decades of research studies try to define country-specific economic growth indicators, and in every one of them, the role of financial markets is acknowledged. Nwaolisa, Kasle, and

Egbunike (2013) pointed out one key segment of the country's economy, the capital market, as a specific part of the financial market that plays an essential role in economic growth because of its unique way in the mobilization of the saving and investments. Thus, its impact on economic growth should motivate policymakers to work on reforms toward capital market development.

Greenwood and Jovanovic (1990), and Pagano (1993) explicitly tested the model of the link between the financial intermediation role of capital markets and growth indicators. These models find a strong relationship between the capital market and the economic growth of emerging economies. Furthermore, capital markets are also considered a variable in explaining the economic growth in the most-developed countries, Yadirichukwu (2014).

Given the previously mentioned, the paper's goal is to test empirically:

1. First is the existence of a link between the level of financial market development and economic growth.

2. Second, the paper questions whether economic growth can be estimated based on financial market development.

The paper structure continues with the literature review, with a perspective of the recent research in the field. The third part describes the methodology, and the fourth part of the paper interprets the results of empirical data analysis. Finally, the last part represents the decision and conclusion from the research.

1. LITERATURE REVIEW

Using ordinary least squares (OLS) and vector autoregression (VAR) methods, Kehinde *et al.* (2013) tested the impact of the Nigerian capital market on the country's economic growth in the long run, using annual data from 1981 to 2010. The Johansen cointegration identifies three co-integrating equations, and the VA suggests a long-run relationship between the stock market and GDP. Wild and Lebdaoui (2014) tested if there is a relationship between the Moroccan stock market development and economic growth from 2000 to 2013. Testing quarterly, the results show a long-run relationship between stock market development and economic growth. Other studies find that the case for developing countries where financial markets were poorly organized and their output growth was not substantially enhanced is very different from developed ones (Singh (1997); Nili and Rastad (2007); Adusei (2014); Owusu and Odhiambo (2014); Mesagan and Nwachukwu (2018)). However, the past few decades were filled by researchers from developing nations such as (Bol-

bol et al. (2005); Odhiambo (2010); Acquah-Sam and Salami (2014); Mesagan and Shobande (2016); Mesagan et al. (2019); Yusuf et al. (2020)), which among others, have been more interested in examining the relationship between growth and the financial sector such as the studies by Levine and Zervos (1996), established for developed nations.

Analytical studies of Atje and Jovanovic (1993); Demirguc-Kunt and Levine (1996); Korajczyk (1996); Levine and Zervos (1996), Levine and Zervos (1998) suggest that there exists a strong positive link between the stock market development and economic growth. World Bank (1994) found that stock market development impacts the growth rates in capital, productivity, and GDP per capita. The work of Francis Xavier and Raja (2007) showed that a developed stock market protects shareholders bringing confidence to the stock market, which should boost economic growth. However, other studies done by Bencivenga and Smith (1991), Naceur and Ghazouani (2007), suggest that in developing countries, there is no strong relationship between stock market development and economic growth. Furthermore, the study of Barro (1989) underlines that stock market development cannot be considered a key indicator of economic movements.

Prats and Sandoval (2019), using the VAR model, analyzed the link between stock market capitalization and real GDP in ten Central and Eastern Europe countries, questioning the role of financial markets in economic growth. Results suggest that there is a positive correlation. Dökmen, Aysu, and Bayramoğlu (2015) focus their analysis on eight developing countries using time series data from 1991 to 2012, again proving the positive correlation between economic growth and financial market movements. Like the previous research, Levine and Zervos (1996) proved that in a sample of 46 countries, there is a positive link between stock market development and economic growth. Finally, Boubakari and Jin (2010) analyzed the data set from 5 countries (Belgium, France, the UK, Portugal, and the Netherlands) for 13 years and the causality between the stock market and economic growth. The results indicate a positive relationship between these two variables in some countries.

2. DATA AND METHODOLOGY

The data set is obtained from the IMF database (https://data.worldbank.org) and the official data generator of The Global Economy (https://theglobaleconomy.com). Essential data refers to the yearly market capitalization and GDP of 56 countries from 2016 to 2020. Data were analyzed using the

statistical software SPSS (IBM). The analysis tests two models: (1) the correlation between average market capitalization and average nominal GDP for 2016-2020, and (2) the average market capitalization for every listed company and the average GDP per capita for the same period. Before conducting our analysis, we organized the data for each country into 20 columns, and each of the columns represents an input variable. The input variables are described in Table 1.

Table 1. Input variables

Variable name	Variable description
market_cap_plc_2016 -2020	Market capitalization per listed company
average_market_cap	Average market capitalization
average_no_lc	Average number of listed companies
average_market_cap_plc	Average market capitalization per listed company
average_gdp	Average nominal GDP
average_gdp_pc	Average GDP per capita

Correlation and linear regression were used to understand and model the relationship between the level of financial market development and economic growth. To diagnose the impact of the financial market development on economic growth, after the test for linear regression, the paper continues with panel regression on average total market capitalization and average market capitalization of different listed companies as an independent variable. In contrast, as dependent variables, the paper defines the average total GDP and GDP per capita, respectively.

According to the data set, the average market capitalization in the analyzed period is 1.201 billion us dollars, but this parameter has a relatively high standard deviation of 4.522 billion us dollars. A high standard deviation is expected since the countries in the sample have many different economic and other characteristics; thus, they have different market capitalization levels. However, since the sample represents around 29% of the population (46 countries in the sample and 195 countries in the world), a standard deviation of the average is 7,5 times smaller, reaching around 604 billion us dollars.

Market capitalization value depends on the number of listed companies in a particular capital market. Since this number differs among countries, anal-

ysis and interpretation of the above statistics may be more relevant to market development parameters, such as market capitalization per listed company.

Table 2. Descriptive statistics of market capitalization (2016-2020), in billion us dollars

		2016	2017	2018	2019	2020	Average 2016-2020
N	Valid	56	56	56	56	56	56
	Missing	0	0	0	0	0	0
Mean		984.8752	1194.712	1055.221	1258.634	1512.326	1201.1537
Std. Error of Mean		502.1468	591.5979	552.6255	621.8612	755.8586	604.26282
Median		91.05	113.905	110.325	132.57	132.14	122.112
Std. Deviation		3757.723	4427.113	4135.47	4653.583	5656.328	4521.88888
Minimum		2.34	2.82	2.4	2.22	1.87	2.44
Maximum		27352.2	32120.7	30436.31	33890.83	40719.66	32903.94

Source: Author's calculations.

The lowest average market capitalization per listed company is 0,0402 billion us dollars (around 40 million), and the highest market capitalization is 7,64 billion dollars. The lowest average value is in Cyprus, and the highest is in the USA. The mean value is 1,245 billion, and the standard deviation is 1,724 billion us dollars.

The lowest GDP is seen in Barbados, with a total of 4,37 billion dollars in 2020, and the highest GDP value is observed in the USA, with 21.433 billion us dollars in 2019. The lowest average value of this parameter is 4,9 billion in Barbados, and the highest average value is 20.254 billion in the USA. The mean is 1.097,57 billion us dollars, and the standard deviation is 3.195,45 billion dollars.

Table 3. Descriptive statistics of countries' nominal GDP (2016-2020), in billion us dollars

		2016	2017	2018	2019	2020	Average 2016-2020
N	Valid	56	56	56	56	56	56
N	Missing	0	0	0	0	0	0
Mean		994.3452	1067.628	1137.099	1162.738	1126.032	1097.5685
Std. Error of Mean		385.4741	407.8016	438.4046	453.8036	450.5353	427.01006
Median		266.63	263.37	284.2	290.975	271.255	285.6
Std. Deviation		2884.624	3051.708	3280.719	3395.955	3371.498	3195.45067
Minimum		4.83	4.98	5.09	5.21	4.37	4.9
Maximum		18745.08	19542.98	20611.86	21433.22	20936.6	20253.95

Source: Author's calculations.

Table 4. Descriptive statistics of countries' GDP per capita (2016-2020), in US dollars

		2016	2017	2018	2019	2020	Average 2016-2020
N	Valid	56	56	56	56	56	56
	Missing	0	0	0	0	0	0
Mean		19393.93	20503.4	21781.04	21522.76	20282.25	20696.677
Std. Error of Mean		2908.509	3016.078	3233.611	3177.595	3118.905	3088.1994
Median		9749.705	10655	11332.51	11455.93	10451.1	10560.769
Std. Deviation		21765.29	22570.26	24198.13	23778.95	23339.74	23109.968
Minimum		1401.56	1563.77	1698.13	1855.69	1900.71	1697.59
Maximum		104278.4	107361.3	116597.3	114685.2	115873.6	111759.15

Source: Author's calculations.

When analyzing the GDP per capita, Bangladesh has the lowest level, with 1.401 us dollars in 2016, and the highest level is in Luxemburg, with 116.597 us dollars per capita in 2018. On average, GDP per capita in the period of 2016-2020 in the sample is 20.696 us dollars, and its standard deviation is 23.109 us dollars.

3. RESULTS

Descriptive statistics suggest that the countries with higher stock market capitalization tend to have higher GDP. Furthermore, this may indicate a positive link between these two parameters. The paper tests the following two hypotheses:

H_o: There is no link between market development and economic growth, i. e. $r \leq 0$.

H_1: There is a positive link between market development and economic growth, i. e. $r > 0$.

The confidence level α is set to 0,05.

The results are displayed in the following order: First, the authors present the correlation between the two empirical research models. Second, the linear regression between the variables in the two models is presented, and third, the paper presents the results of Panel regression for the two models.

Model 1: Dependent variable is defined by the average GDP, and the independent variable is the average market capitalization.

Model 2: Dependent variable is the average GDP per capita, and the independent is the average market capitalization per listed company.

3.1 Correlation test. The results of the analysis done by using statistical software confirm the assumption of a positive correlation between market capitalization and the nominal GDP, with a coefficient of 0,93 in model 1. Using the correlation coefficients, the authors calculate the coefficient of determination R^2. In our case, the value of the determination coefficient is 0,8656, meaning that the stock market capitalization can explain more than 86% of the variations in GDP. The observed p-value is 0, and with a confidence level set at 0,05, the analysis can conclude that the coefficient of correlation is significant. Therefore, continuing with a rejection of H0 and H_1 is accepted, which states that stock market capitalization positively correlates with economic growth.

Table 5. Correlation results

	Model 1		Model 2	
	Average market capitalization	Average GDP	Average market capitalization per listed company	Average GDP per capita
Pearson Correlation	1	0,93039**	1	0,48916**
Sig. (1-tailed)		0,000		0,000
N	56	56	56	56
Pearson Correlation	0,93039**	1	0,48916**	1
Sig. (1-tailed)	0,000		0,000	
N	56	56	56	56
	**Correlation is significant at the 0.01 level (1-tailed).			

Source: Author's calculations.

The results of the analysis of model 2, where the paper tests the correlation between GDP per capita and stock market capitalization per listed company, are similar to the ones in model 1. Here, the coefficient is 0,489, the observed p-value is 0, and the H_0 is rejected, thus accepting that the GDP per capita and market capitalization per listed company is positive and significant. However, the link may need to be revised since the coefficient of determination is 0,2393, meaning that the capitalization per listed company explains only 24% of the movements of GDP per capita. It is still respectable, but 3,62 times lower than that in model 1.

3.2 Linear regression - Regression models and Model diagnostics. *Regression models:* A strong positive linear correlation between market development level and GDP means that analysts can model the impact market development has on economic growth. To that extent, further, the authors conduct regression analysis between the two already explained variables in this paper.

Using the results of the analysis, we can generate the following function:

The results show that with a confidence level of 95%, the regression coefficient is between 0,587 and 0,728 in model 1, and 3.367,163 and 9.746,704 in model 2.

Table 6. Linear regression

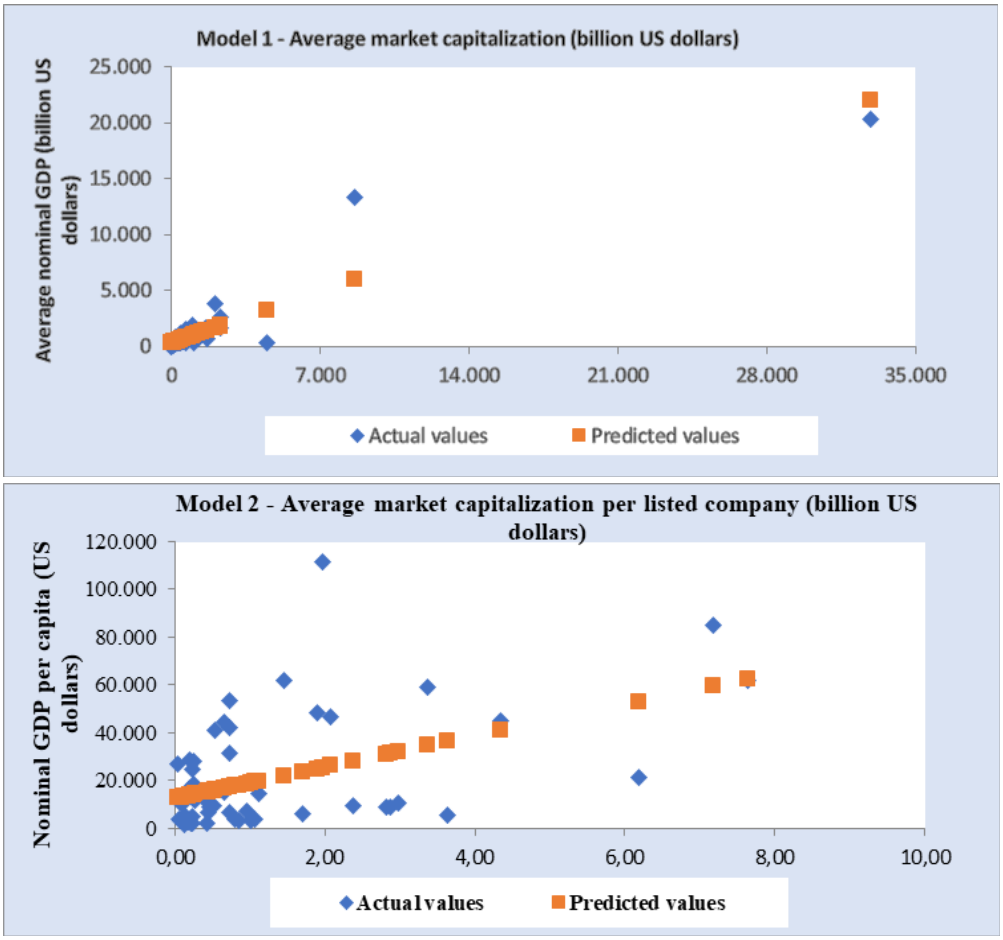
B		Unstandardized Coefficients		Standardized Coefficients	t	Sig. Lower Bound	95,0% Confidence Interval for B	
		Std. Error	Beta				Upper Bound	
M 1	(Constant)	307,846	163,552		1,882	0,065	(20,056)	635,749
	Market capitalization (billion USD)	0,657	0,035	0,930	18,651	0,00	0,587	0,728
M 2	(Constant)	12530,481	3363,875		3,725	0,00	5786,317	19274,645
	Market capitalization per listed company (billion USD)	6556,933	1591,004	,489	4,121	0,00	3367,163	9746,704

Source: Author's calculations.

Model diagnostics: To test the significance and the strength of the linear regression models, for each of the 2 models, we test the following assumptions:

1. The relationship between the outcomes and predictors is (approximately) linear.
2. The mean of the residuals is zero.
3. The residuals have constant variance.
4. The residuals are uncorrelated.
5. The residuals are normally distributed, or the sample size is adequate to rely on a large sample theory.

Graph 1. Model fit line



Source: Author's calculations.

As can be seen from Graph 1, the linearity between the outcomes and predictors in Model 1 is stronger than the linearity in Model 2. Again, it is expected given that the linear correlation coefficient for the first model is 0,930, while the second model is 0,489. In the first model, two observations visually have relatively large residuals and three leverage points (including the two outliers). However, these observations cannot be considered influential since they have very little influence on the slope of the line. The linear relationship between the variables in Model 2 is much weaker than the relationship; thus, this model is less reliable than Model 1.

In both models, the mean of the residuals is 0, and their variance is relatively constant. 54 out of the 56 standard residuals in Model 1 and 55 out of the 56 residuals in Model 2 have a standardized value between -2 and 2. However, we still must be cautious with both models since two residuals in Model 1 and one residual in Model 2 have a standardized value less than -2 or greater than 2.

Table 7. Residual Statistics

Model 1	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	309,4505	21941,1895	1097,5685	2973,00492	56
Residual	(2905,66406)	7314,72852	0,00000	1171,38668	56
Std. Predicted Value	(0,265)	7,011	0,000	1,000	56
Std. Residual	(2,458)	6,187	0,000	0,991	56
Model 2					
Predicted Value	12794,1104	62602,1172	20696,6770	11304,37089	56
Residual	(31684,94141)	86354,39844	0,00000	20156,43406	56
Std. Predicted Value	(0,699)	3,707	0,000	1,000	56
Std. Residual	(1,558)	4,245	0,000	0,991	56

Source: Author's calculations.

To test if the residuals are correlated (assumption 4), we used the Durbin-Watson test, and the test results are in Table 10. The observed Durbin-Watson test statistic for Model 1 is 2,843, and the observed statistic for Model 2 is 2,025. This means that in Model 1, residuals have a negative

autocorrelation. The value of 2,843 is between 1 and 3, and Field (2009) suggests that values under one or more than 3 are a cause for concern. The value of 2,025 for Model 2 means that there is non-significant negative autocorrelation in residuals.

3. 3. Panel data – results and discussion. Since the development level of the financial market and the nominal GDP are time-varying variables, we also study (and model) their relationship using the fixed effects model. Furthermore, since the individual cases are measured over time, they serve as their controls with this model.

Table 8: Panel data analysis: ANOVA, Tests of Between-Subjects Effects

Model 1 Dependent variable: Nominal GDP (billion US dollars)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2811366512,754[a]	56	50202973.44	1021.066	0	0.996
Intercept	56697789.75	1	56697789.75	1153.162	0	0.838
market_cap	3367637.767	1	3367637.767	68.494	0	0.235
Country	409391991.6	55	7443490.757	151.391	0	0.974
Error	10964290.8	223	49167.223			
Total	3159634633	280				
Corrected Total	2822330804	279				

a. R Squared = ,996 (Adjusted R Squared = ,995)

Model 2 - Dependent variable: GDP per capita (US dollars)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	146870189527,650[a]	56	2622681956	861.63	0	0.995
Intercept	27406695410.985	1	27406695411	9003.923	0	0.976
market_cap_plc	764889.787	1	764889.787	0.251	0.617	0.001
country	116443509654.716	55	2117154721	695.549	0	0.994
Error	678781114.110	223	3043861.498			
Total	267487653103.679	280				
Corrected Total	147548970641.761	279				

a. R Squared = ,995 (Adjusted R Squared = ,994)

Source: Author's calculations.

To do the fixed effects panel regression, we transformed the data into a long format (for the simple regression analysis, the data was in a comprehensive form). In addition, because we were dealing with a relatively large number of cases (56 countries), instead of using the dummy variable approach, we used the univariate general linear model approach offered by SPSS.

Considering that the variable "country" is the case identifier variable, we used this same variable as the fixed factor. In contrast, given that the market capitalization and the market capitalization per listed company are the time-varying predictors, we used them as covariates in model 1 and model 2, respectively.

The value of the coefficient of determination is 0,996, and since the level of significance is 0, this means that the panel data analysis is better than the linear regression. Results for model 1 suggest that the value of the coefficient is between 0,122 and 0,198, with a current value of 0,16, and a p-value of 0, giving a statistically significant result.

In model 2, the coefficient of determination is 0,995, which explains 99,5% of the variations of GDP per capita in country *i* and time *t*. Further analysis will show us that, with the elimination of the time factor, the coefficient of determination in panel data is different from the same coefficient in linear regression. This means that in the linear regression model the authors were analyzing the average values. Including the time series in the analysis upgrades the general regression model by including the different period specifics and the fixed factors for other countries. In model 2, even though the panel data analysis explains 99,5% of the variations in the dependent variable, the market capitalization per listed company independently explains only 0,1% of the variations in the GDP per capita. This is also statistically nonsignificant, with a p-value more significant than 0,05, reaching 0,617.

Conclusion

Research results suggest that the level of capital market development gives a reliable estimation of the country's economic growth. There is a strong positive and statistically significant relationship between the level of capital market development and nominal GDP, which means that the movement of one variable in a particular direction corresponds with the movement of the other variable in the same order. However, the regression model in which the nominal GDP is expressed as a linear function of the market capitalization has better predictability than the model in which the GDP per capita is described

as a linear function of the market capitalization per listed company. One possible reason for such a conclusion is the difference in listed companies among different countries.

A high positive correlation between the level of capital market development and nominal GDP should be granted as something other than causality between these two variables. Instead, the positive correlation does not necessarily mean that the reason for a high level of economic growth is the level of capital market development and vice versa – that the reason for the low level of economic growth is related to the low level of capital market development.

Each national economy has interconnected variables, and finding the reason for the particular behavior of a specific variable requires many different approaches. In this paper, the authors try to find the relationship between two country-specific and rather aggregate variables with two different estimation techniques, meaning that further research should test the relation between its components or between them and other different variables with varying estimation processes.

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