Review of Socio-Economic Perspectives **Allazov, M. pp. 1-21**
Vol. 5 Issue: 3/ September 2020

DEVELOPMENT PERSPECTIVE AND OPTIMIZATION OF THE USE OF FINANCIAL INSTRUMENTS IN THE FUND MARKETS OF THE REPUBLIC OF AZERBAIJAN

Mahammad Allazov[1]

Abstract

The paper assesses the impact of financial instruments in Azerbaijan on the stock market and joint stock companies and determines the effect of the stock market capitalization level on budget revenues and expenditures and the optimal threshold. A significant part of financial resources for investment purposes arises in the securities market, especially in the corporate securities sector. The main factor in improving the efficiency of the securities market should be increasing the volume of trading operations and creation of favorable conditions for this, increasing the variety and use of capital instruments, the issuance of new financial instruments. Based on the correlation between budget expenditures and budget revenues and the level of capitalization of the stock market with the application of economic-mathematical methods, the optimal level of capitalization of the stock market was determined. Based on the elasticity coefficient, it was determined that budget revenues and budget expenditures will change by 0.17% due to a 1% change in the capitalization level of the stock market in Azerbaijan. As a result of economic-mathematical methods, it was determined that a 1% increase in the capitalization level of the stock market in Azerbaijan results in a 0.17% increase in GDP.

Keywords: Financial markets, stock markets, financial instruments, stock market efficiency.
JEL Codes: D53, E44, G15.

Citation : Allazov, M. (2020). Development Perspective and Optimization of the Use of Financial Instruments in the Fund Markets of the Republic of Azerbaijan, *Review of Socio-Economic Perspectives, Vol 5(3),* 1-21.

Article Type: Research Article
Application Date: 30.07.2020 **& Admission Date:** 03.09.2020
DOI: 10.19275/RSEP086

[1] Ph.D. in Domestic fiscal policy and public finance, Azerbaijan State Economics University, Faculty of Finance and Financial Institutions, Baku, Azerbaijan
ORCHID ID: 0000-0003-4925-1479
E-mail: allazov@gmail.com

1. Introduction

The financial markets in parallel with the banking system plays a significant role as a conductor of cash flows in the economy to revive the real sector, so development and improvement of all segments of the financial market is of important matter. In particular, the problem of redistribution of incomes concentrated in the oil sector of Azerbaijan to other sectors of the economy is a reason for special attention to the financial sector of the country. The successful formation of the financial market is possible if the market infrastructure is created through the implementation of economic and legal reforms. One of the most important segments of an organized market infrastructure is the securities market. The securities market, along with the state budget and the banking system, is the most important element of financing the economy. This market ensures the redistribution of financial resources between various sectors and spheres of the economy in favor of promising and profitable dynamically developing industries by stimulating the mobilization of capital.

In many countries, including Azerbaijan, one of the tasks facing the economy and requiring its immediate resolution is the problem of mutual debts, including mutual non-payments of enterprises. The point is that the existence of the problem of non-payments simultaneously creates new problems. Businesses are unable to pay taxes because customers do not pay debts for products purchased. The state, in turn, cannot fulfill the budget plan due to a lack of tax revenues, as a result of which state aid to some sectors of the economy is delayed or not at all implemented. All this taken together affects the economic life of the country, and the state loses its power, be it in the economic, political or any other sphere. Currently, both at the government level and across the enterprise, the necessary measures are being taken to solve these problems. The improvement and development of this securities market in Azerbaijan will not only contribute to the solution of these problems, which have a tangible impact on the development of the economy but will also give impetus to the business activity of economic entities.

2. Literature review

Extensive researches were done on the development issues of financial infrastructure. The International Finance Corporation (IFC) views the financial infrastructure as the backbone of the financial system and defines it as the set of institutions that ensure the efficient operation of financial intermediaries (https://www.ifc.org/). In a broader sense, financial infrastructure encompasses the existing regulatory framework for financial sector operations. The infrastructure of the securities market consists of a trading system, an accounting system, a securities storage system, a clearing system, a payment system, a regulatory system and an information disclosure system. The financial infrastructure is an important part of the entire financial system. The need for intermediary services is associated with minimizing the investor's risks.

The nature of the financial infrastructure is most accurately described by the theory of evolutionary economics, since it allows one to consider negative processes in the economy. This concept views the infrastructure of the stock market as a living organism in which the work of each organ is vital. Deficiencies in the system of one organ entail negative consequences for the whole organism. Therefore, in the economy it is important

to achieve a clear interaction of all elements. J.S. Mill, K. Marx and J. Schumpeter are the predecessors of evolutionary economics who used the methodology of the evolutionary approach in research. Currently among scientists working in the framework of the evolutionary approach, one can note R. Nelson, S. Winter, A. Alchian, K. Friedman, J. Dosey, K. Perez.

Neoclassical theory, along with evolutionary economics, is a theory of technological change. Its representatives R. Solow and M. Brown associate technological changes with the parameters of production functions. According to this concept, the development of the economic system depending on the size and integrity is determined by its technological structure. The efficiency of the system is possible with relatively small differences in the technological level of related industries. The introduction and replacement of outdated information technologies with innovative ones will ensure the effective functioning of this system along the entire technological chain: from information support to cash settlements and registration of property rights when changing the owner of securities. (Brown, 1966); (Solow, 1957)

When analyzing the interaction of elements of the financial market infrastructure, it is advisable to use a marketing approach. It will allow to apply methods that detect the influence of various factors on the formation and functioning of the stock market, which are real or potential market niches / market segments. Therefore, the definition of segments of issuers and investors, sellers and buyers of securities, taking into account their needs and preferences for differentiated groups based on differences in age, gender, education, nationality, income level, and makes it possible to identify new economic prospects, to ensure the flow of additional investment resources, as well as modernization and growth of the country's economy. The infrastructure of the stock market is a large-scale complex socio-economic system, consisting of many interacting elements, therefore, the issues of the regulatory behavior of participants in this market remain relevant. The concept of "large systems", which also implies the infrastructure under consideration, obliges to take into account the property of synergy of large systems, according to which the unidirectionality of actions of the components of subsystems increases the efficiency of its work as a whole.

3. Data and Methodology

Stock market analysis includes various methods and techniques for studying its indicators, factors, indicators, etc. To conduct an effective analysis of the stock market stock indices are used, which are indicators calculated for a representative set of securities traded on the market (stocks, bonds) in order to assess the level and general direction of movement of their value. In general, these are indicators of changes in prices of a certain group of securities.

An important parameter that characterizes any stock market, is its efficiency, which shows how well the stock market copes with the task of a fair assessment of the issuing company. In general, developed markets are significantly more efficient than emerging markets, which makes them more stable and attracts many investors. (Ross & Westerfield, 2002)

In 1953, Maurice Kendall studied the behavior of stock prices, and to his great amazement, he could not find any predictability in their behavior. The prices seemed to behave in a

random fashion. Prices could either rise on a day or decline, regardless of previous values. Trading data did not provide an opportunity to predict prices. Initially, Kendal's results baffled some economists. In their opinion, the stock market was influenced by market psychology. In other words, it seemed that he was permeated with "animal instincts", that is, did not follow any logical rules. In short, the results showed that the market was irrational. However, later economists came to the opposite interpretation of the above results, it became clear that the randomness of the movement of market prices is an indicator of a well-functioning or efficient market. (Kane &Marcus, 1999)

There are many definitions of an efficient market, but the most accurate definition corresponding to the efficient market hypothesis can be given by imagining a situation in which all investors, first, have free access to current information that allows them to make predictions for the future. Secondly, all investors are good analysts and, thirdly, they all closely monitor market rates and react accordingly to their changes.

Based on these parameters, the following most capacious definition of the stock market efficiency can be offered: An efficient market is a market in which the value of securities instantly reacts to new information. In this case, the price of the security will be a good estimate of its investment value. Investment value is the present value of a security, considering the prospective estimate of the level of its demand price and future returns, calculated by well-informed and capable analysts, which can be considered fair value. (Sharpe et.al, 1998)

In this case, an effective market can be called a market in which the price of each security is always equal to its investment value. Since in such a market each security is sold at its fair price, it is impossible to find securities with the wrong prices. For making it possible to test this hypothesis, it is necessary to deeply consider the question of the awareness of agents of the effective market. As described above, in an efficient marketplace, the information array is complete and new information is instantly reflected in market rates. In terms of information efficiency, the definition of an effective market will sound as follows - the market is efficient in relation to certain information if, using this information, it is impossible to make a decision to buy or sell securities, which allows obtaining super profits.

A national model of regulating the financial activities of enterprises is currently being formed in Azerbaijan. This model combines four main aspects:

- regulation based on financial methods;

- use of financial methods;

- Orientation to compliance with the legislation;

- use of stock market instruments.

One of the main indicators determining the scale of stock markets is the level of capitalization. It should be noted that the level of capitalization of the country's stock market is also an important factor in assessing the institutional security of the economy. There is a high correlation between the level of economic development of countries and the level of capitalization of their stock markets. The level of development of national companies affects the growth of stock markets, increasing the level of market capitalization. The development of stock markets increases the share of the level of

capitalization of national companies in GDP. The increase in the share of national companies in the level of capitalization has a significant impact on the share of their stocks sold in GDP. It should be noted that the level of capitalization of stock markets is related to the level of capitalization of financial instruments.

The level of capitalization of financial instruments is formed and developed due to investments in fixed assets, deposits of the population, foreign investments. Table 1 reflect the above-mentioned indicators through 2011-2017.

Table 1: Data for analyses

Indicators	2011	2012	2013	2014	2015	2016	2017
Capitalization level of financial instrument	2,11	8,43	8,43	8,47	13,10	8,44	5,7
Foreign investment	0	8,67	10,31	10,54	11,7	10,72	10,2
Fixed capital investment	9,91	12,8	15,41	17,86	17,62	15,95	14,9
Deposits of the population	3,03	4,12	5,11	6,4	7,19	9,47	7,45

Source: The figures in the table were calculated and compiled by the author according to the data of State Statistics Committee of the Republic of Azerbaijan.

In order to determine the opportunities for independent development of stock markets in Azerbaijan, the above-mentioned data is used, which reflects the level of capitalization of financial instruments and investment in fixed assets in 2011-2017.

Capitalization level of financial instrument and fixed capital investment will be selected as indicators for the model to determine the opportunities for independent development of stock markets in Azerbaijan. When studying the dependence of changes in investments in fixed assets (ΔI) on the changes in the level of capitalization of financial instruments (ΔY), the time condition is considered. Thus, in order to develop economic sectors, as a rule, investments is transferred from the increase in capitalization level of financial instrument account of current year to the fixed capital investment account for the following year. As a result, ΔI_t increases of fixed capital investment in the current t year are formed due to ΔY_t-1 increases in the capitalization of financial instruments in the previous (t – 1) year. Considering this rule Table 2 is formulated to assess the ability of stock markets to develop independently in Azerbaijan between 2012-2017.

Table 2: 2012-2017 data on variables

Years	ΔI_t	ΔY_{t-1}	Calculation indicators		
n=6	Y	X	x^2	Xy	$\Delta\dot{I}_t^* = 5{,}06 + 0{,}118\ \Delta Y_{t-1}$
1	2	3	4	5	6
2013	2,61	2,89	8,3521	7,5429	-22
2014	2,45	2,61	6,8121	6,3945	14,721
2015	-0,24	2,45	6,0025	-0,588	35,289
2016	-1,67	-0,24	0,0576	0,4008	8,986
2017	-1,05	-1,67	2,7889	1,7535	6,815
Σ	2,1	6,04	24,0132	15,5037	2,0998908

Source: The figures in the table were calculated and compiled by the author according to data in Table 1

4. Results and Discussion

As shown in the table above, the dependence of investment-oriented changes in fixed capital in year t on the changes in the level of capitalization of financial instruments in year (t – 1)

$$\Delta\dot{I}_t = (a_0 + a_1\Delta Y_{(t-1)})$$

sought in the form of a linear equation. In this dependence: ΔI_t - investment increases directed to an increase fixed capital in year t; $\Delta Y_{(t-1)}$ - increases in the capitalization of financial instruments in the year (t-1); a_1 is the acceleration indicator. The acceleration indicator a_1 represents the amount of investment directed to the growth of fixed capital due to the increase in the capitalization of financial instruments in the previous period (t-1).

Coefficients a_0 and a_1 in the linear equation found by solving the following system of equations: (Noskov, 2002)

$$a_0 n + a_1\sum(\Delta Y) = \sum(\Delta\dot{I})$$

$$a_0 \sum(\Delta\dot{I}) + a_1\sum (\Delta Y)^2 = \sum (\Delta\dot{I}\Delta Y)$$

The coefficients a_0 and a_1, which are included in the system of linear equations, are determined by solving the Kramer method using the Mathcad program. For this purpose, the main determinant Δ of the system of equations and additional determinants Δ_0, Δ_1 related to the coefficients a_0, a_1 are calculated. The coefficients are calculated by dividing the additional determinants into the main determinant:

$$a_0 = \Delta_0/\Delta;\ a_1 = \Delta_1/\Delta$$

The accuracy of the found values of the coefficients a_0 and a_1 in the linear equation is checked by means of equations 1 or 2 of the system of equations.

The assessment is done in the following sequence.

1. Based on the information in Table 2, the following system of equations has been developed:

$$5{,}000\ a_0 + 6{,}04a_1 = 2{,}1$$

$$6{,}04a_0 + 24{,}0132a_1 = 15{,}5037$$

2. The system of equations was solved by the Kramer method and the coefficients a0 and a1 were found:

$$\Delta = \begin{vmatrix} 5 & 6{,}04 \\ 6{,}04 & 24{,}0132 \end{vmatrix} = 83{,}5844$$

$$\Delta_0 = \begin{vmatrix} 2{,}1 & 6{,}04 \\ 15{,}5037 & 24{,}0132 \end{vmatrix} = -43{,}2146$$

$$\Delta_1 = \begin{vmatrix} 5 & 2{,}1 \\ 6{,}04 & 15{,}5037 \end{vmatrix} = 64{,}8345$$

$$a_0 = \Delta_0/\Delta = -0{,}51702;\ a_1 = \Delta_1/\Delta = 0{,}775677.$$

The acceleration indicator is in the range $(0 < \acute{\alpha} \leq 1]$.

3. The values of the obtained coefficients a_0 and a_1 are first checked according to:

$5{,}000\ a_0 + 6{,}04a_1 = 2{,}1$

$5 * (-0{,}51702) + 6{,}04 * 0{,}775677 = 2{,}1.$

Conclusion: The equation of growth of investments in fixed assets in the Republic of Azerbaijan in 2012-2017 due to the increase in the level of capitalization of financial instruments is expressed by:

$$\Delta\dot{I}_t^* = -0{,}51702 + 0{,}775677\Delta Y_{t-1}$$

Based on the index $a_1 = 0.776$ in the obtained equation, we consider that the stock markets in the Republic of Azerbaijan had the ability to develop independently during the period under study.

Based on the acceleration indicator obtained as a result of the report, it is possible to determine the amount of investments in fixed assets required for the projected increase in the capitalization level of financial instruments for any prospective period.

The density of correlation between economic-capital investment goals and the level of capitalization of the stock market is higher. In order to determine this relationship, the relationship between fixed capital investments affecting the level of capitalization of the stock market of the Republic of Azerbaijan for 2011-2017, foreign investments attracted to the country, deposits attracted by banks from the population, state budget revenues and state budget expenditures should be found.

Table 3: 2011-2017 data on variable in million manats

Years	Fıxed capital investment, (X1)	Foreign investment (X2)	Deposits from population, (X3)	State budget revenues (X4)	State budget expenditures (X5)	Capitalization of stock market (Y)
2011	9906	4851	3030	11403	11766	2110
2012	12799	5102	4120	15701	15398	8433
2013	15407	6067	5113	17282	17417	8433
2014	17851	6200	6396	19496	19144	8476
2015	17619	6928	7188	18401	18709	13103
2016	15957	18329	9474	17498	17785	8456
2017	14903	17271	7449	17499	17744	5696

Source: The figures in the table were calculated and compiled by the author according to the data of State Statistics Committee of the Republic of Azerbaijan.

Using the Eviews software package, the following results in Table 4 are obtained.

Table 4: Results

Dependent Variable: Y

Method: Least Squares

Date: 26/08/20 Time: 11:59

Sample: 2011 2017

Included observations: 7

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X5	9.736863	1.357199	7.174235	0.0882
X4	-3.631258	0.864168	-4.202027	0.1487
X3	5.868573	0.600922	9.765954	0.0650
X2	-2.025740	0.188678	-10.73649	0.0591
X1	-6.683437	0.806593	-8.286006	0.0765
C	-12830.48	2140.164	-5.995091	0.1052

R-squared	0.997055	Mean dependent var	7815.286
Adjusted R-squared	0.982332	S.D. dependent var	3331.961
S.E. of regression	42.8870	Akaike info criterion	14.79288
Sum squared resid	96148.9	Schwarz criterion	14.74652
Log likelihood	-45.77509	Hannan-Quinn criter.	14.21985
F-statistic	67.71961	Durbin-Watson stat	2.626953
Prob(F-statistic)	0.091987		

Source. The E-views application was developed by the author based on the software package.

Similarly, using the MS Excel application software package, we obtain the following result based on the data in Table 3.

Table 5: Summary results

Regression statistics	
Multiple R	0,998527
R-square	0,997055
Adjusted R square	0,982332
Standard error	42,887
Observation	7

Dispersion analysis

	Df	*SS*	*MS*	*F*	*Significance F*
Regression	5	66415631	13283126	67,71961	0,091987
Residual	1	196148,9	196148,9		
Total	6	66611779			

	Coefficients	*Standard error*	*t-Stat*	*P-Value*	*Lower 95%*	*Upper 95%*
Y-intercept	-12830,5	2140,164	-5,99509	0,105221	-40023,8	14362,88
X1	-6,68344	0,806593	-8,28601	0,076461	-16,9322	3,565302
X2	-2,02574	0,188678	-10,7365	0,059124	-4,42312	0,371641
X3	5,868573	0,600922	9,765954	0,064961	-1,76686	13,50401
X4	-3,63126	0,864168	-4,20203	0,148736	-14,6116	7,349039
X5	9,736863	1,357199	7,174235	0,088169	-7,50798	26,98171

Source. MS Excel application is developed by the author based on the software package.

Based on the results obtained from the Eviews and MS Excel software packages, the regression equation will be as follows:

Y=-12830,5-6,68344*X1-2,02574*X2+5,868573X3-3,63126*X4+9,736863*X5

The next step is constructing a newly corrected regression equation by analyzing the correlation dependence between the free variables in the above model and the dependent variable, removing the factors with weak correlation dependence from the object of study. For this purpose, if we build a correlation matrix in the MS Excel application software package, we get the following table:

Table 6: Correlation Matrix

	Y	*X1*	*X2*	*X3*	*X4*	*X5*
Y	1	0,796874	-0,04166	0,477998	0,754883	0,758765
X1	0,796874	1	0,236778	0,718741	0,967107	0,97626
X2	-0,04166	0,236778	1	0,81227	0,288508	0,344747
X3	0,477998	0,718741	0,81227	1	0,698647	0,748785
X4	0,754883	0,967107	0,288508	0,698647	1	0,993861
X5	0,758765	0,97626	0,344747	0,748785	0,993861	1

Source. MS Excel application is developed by the author based on the software package.

There is a high direct relationship between the variables Y and X1 according to the Chedok scale. There is almost no connection between the variables Y and X2, a medium direct relationship between the variables Y and X3, and a high direct relationship between the variables Y and X4, Y and X5. The regression equation will be as follows:

Y=-12830,5-6,68344 *X1+5,868573 X3-3,63126*X4+9,736863* X5

According to this established contact equation,

$$y = \alpha_0 + \alpha_1 x_1 + \alpha_2 x_2 + \alpha_3 x_3 + \alpha_4 x_4 + \alpha_5 x_5 = \mathbf{-12830,5 - 6,68344}\, x_1 + \mathbf{5,868573}\, x_3 - \mathbf{3,63126} x_4 + \mathbf{9,736863}\, x_5$$

Here $(\alpha_3 > 0)$, $(\alpha_5 > 0)$. This means that the level of capitalization of the stock market is increasing due to the increase in deposits and budget expenditures attracted by banks from the population. Conversely, since $(\alpha_1 < 0)$, $(\alpha_4 < 0)$, the level of capitalization of the stock market decreases due to increased investments in fixed assets and x_3 budget revenues. From the relationship equation, it can be concluded that a single increase in factor X1, which represents the volume of investments in fixed assets, leads to a decrease in the capitalization of the stock market in Azerbaijan by 6.68344 units, a single increase in deposits from banks (X3) by 5.868573 unit increase, one unit increase of state budget revenues (X4) leads to a decrease of 3.63126 units of stock market capitalization, one unit increase of state budget expenditures (X5) leads to 9.736863 units increase of stock market capitalization level.

Multiply R = 0.998527 indicates that the relationship between the variables X and Y on the Cheddock scale is very high. The fact that the coefficient of determination is R^2 = 0.997055 means that the corresponding regression equation is explained by 99.7% of the variance result, and 0.3% by the influence of other factors. The high coefficient of determination indicates that the regression equation is better able to express the initial data and that most part of the result factor (99.7%) is explained by the factors included in the model.

If we calculate the value of $y_{account}$ in Excel for 2011-2017, we get the following table.

Table 7: Data for equation building

Years	Y	Y account	$\left\|\frac{y - y_{account}}{y}\right\|$
2011	2110	12351,79183	4,85392978
2012	8433	19170,47541	1,27326876
2013	8433	21485,26122	1,54776014
2014	8476	21456,26578	1,53141408
2015	13103	27395,42797	1,09077524
2016	8456	46201,0295	4,46369791
2017	5696	40958,67229	6,19077814
Total		189018,924	20,951624

Source. The Eviews application was developed by the author based on the software package.

The average error of approximation can be determined according to the following formula:

$\mathbf{A=\frac{1}{n}\sum\left|\frac{(y-\widehat{y})}{y}\right| * 100\% = 20,951624/7*100\% = 299,3\%}$

A= 299,3%

The mean error of approximation is assumed to be practically no more than 12-15% [124].

With the help of the F-Fisher criterion, the statistical significance of the set of regression equations can be checked. For this purpose, the F-Fisher criterion can be calculated as follows [136].

$$\text{F-Fishe criterion} = \frac{RSS/m}{ESS/(n-m-1)} = (66415631/5)/(196148,9/(7-5-1)) = 67,7196059$$

The result of the report is the same as the result obtained from the initial data in EXCEL.

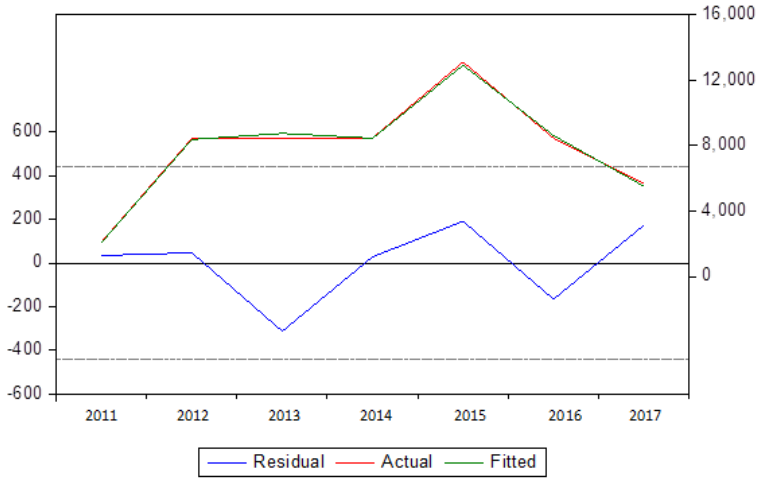
If we set the value of table F in EXCEL using the formula F_{table} (a; m; n-m-1) = F,

$$F_{table}\ (a; m; n-m-1) = F\ (0,05; 5; 7-5-1) = 3,79$$

When the F-Fisher criterion is compared with the value of F_{table} (a; m; n − m − 1) =, it appears that the F-Fisher criterion > F_{table} (67,7196059 >3,79). This means that the regression equation is statistically significant, and the model is adequate.

The below graph shows Fitted and actual values of the model, as well as the residuals between them obtained by equation

Graph 1: Dynamics of fitted and actual values and residuals obtained by the regression equation



Source. Compiled by the author using the EViews software package.

The level of capitalization is closely linked to GDP. It should be noted that the relationship between these indicators is easily determined using economic mathematical methods. It is more expedient to determine the relationship between the level of capitalization of the stock market and GDP using the econometric model. (Baraz, 2010)

Thus, the relationship between the studied indicators can be determined using the method of correlation-regression analysis. To determine the relationship between GDP and the level of capitalization of the stock market, the following table based on preliminary statistics is built:

Table 8: Capitalization level of the stock market with the GDP of the Republic of Azerbaijan for 2010-2016.

Years	Capitalization level of stock markets billion. manats, (x)	GDP, billion. manats. (y)
1	2	3
2010	2,11	42,5
2011	8,43	52,1
2012	8,43	54,7
2013	8,48	58,2
2014	13,1	59
2015	8,44	54,4
2016	5,7	60,4
n=7	$\sum x$ =54,69	$\sum y$ = 381,3

Source: Compiled by the author according to data of Central Bank of the Republic of Azerbaijan

Based on the data, using the E-views software package, we obtain the following result.

Dependent Variable: Y

Method: Least Squares

Date: 26/08/20 Time: 16:00

Sample (adjusted): 2010 2016

Included observations: 7 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X	1.214422	0.601614	2.018608	0.0995
C	44.98332	5.053075	8.902167	0.0003

R-squared	0.449022	Mean dependent var	54.47143
Adjusted R-squared	0.338827	S.D. dependent var	6.035372
S.E. of regression	4.907516	Akaike info criterion	6.254369
Sum squared resid	120.4185	Schwarz criterion	6.238915
Log likelihood	-19.89029	Hannan-Quinn criter.	6.063357
F-statistic	4.074777	Durbin-Watson stat	1.109135
Prob(F-statistic)	0.099547		

According to the parameters of the regression model, the regression model between GDP and the level of capitalization of the stock market will be as follows:

$$y = \alpha_0 + \alpha_1 x = 44{,}98332 + 1{,}214422\text{X}$$

According to this defined relationship equation, $y = \alpha_0 + \alpha_1 x = 44{,}98332 + 1{,}214422\text{X}$, the parameter α_1 is a positive number. This means that the level of capitalization of the stock market increases due to the increase in GDP. It can be concluded that an increase of 1 billion manat in the capitalization of the stock market will result in an average increase in GDP of 1.21 billion manat.

Adequacy of the regression model is determined by correlation analysis. For this purpose, the density of the correlations between the variables (x) and (y) is determined. The density of correlation relationships is measured by empirical correlation relationships.

When calculating the correlation relations, the rules of variance distribution are followed. The theoretical formula of correlation relations will be as follows [136]:

$$R^2 = \frac{S_y^2 - S_{yx}^2}{S_y^2} \quad \rightarrow \quad R = \sqrt{\frac{S_y^2 - S_{yx}^2}{S_y^2}}$$

The expression of correlation relations expresses the coefficient of determination. [136]

The coefficient of determination indicates the specific gravity of the variation. That is, the result changes under the influence of the variation factor.

Theoretical correlations are used to measure the density of the relationship between the result and the factorial and are calculated by the following formula.

$$R^2 = \frac{S_y^2 - S_{yx}^2}{S_y^2} = \frac{31{,}22254194 - 17{,}19035269}{31{,}22254194} = 0{,}449$$

The theoretical correlation relating to the model of GDP dependence on the stock market capitalization level was calculated according to the following formula:

$$R = \sqrt{\frac{S_y^2 - S_{yx}^2}{S_y^2}} = \sqrt{0{,}449} = 0{,}67$$

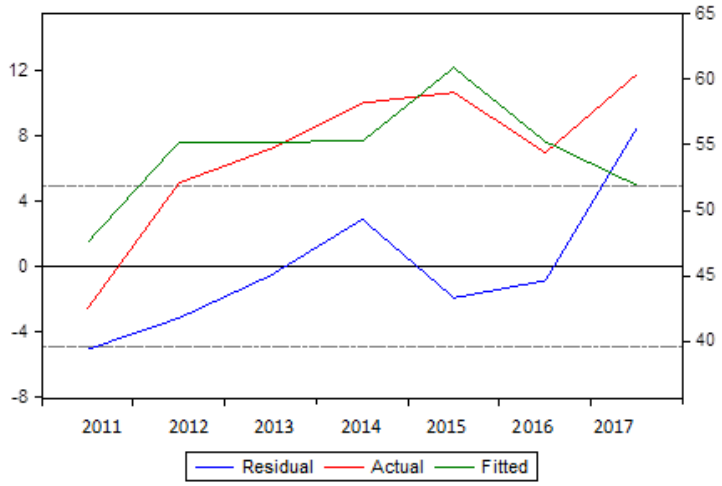
The fact that the multiple correlation coefficient R = 0.67 indicates that the relationship between the variables X and Y on the Cheddock scale is at a noticeable level. The fact that the coefficient of determination is R^2 = 0.449022 means that the corresponding regression equation is explained by 44.9% of the variance results, and 55.1% by the influence of other factors.

Based on the above reports, the determination coefficient was 0.67. According to the correlation equation between the level of capitalization of world stock markets and GDP, compiled based on data from 60 countries, the correlation coefficient was equal to $R = \sqrt{0{,}6154}$ =0,7845. This shows a high correlation between the level of capitalization of world stock markets and world GDP on the Cheddock scale. In Azerbaijan, this figure is 0.67, which is higher than the average on this scale meaning that the increase in the level of capitalization of stock markets plays an important role in GDP growth.

As can be seen from the Cheddock scale, the dependence of the stock market capitalization level on GDP is moderate. Coefficient of determination varies in the range of [0; 1]. A ratio close to 1 indicates a high-quality connection. The importance of the coefficient of determination is that it shows that the share of change in the result indicators changes due to the conditioned variation factor. (1-r_{xy}) indicates that the change in the result indicator is due to other factors not included in the model. On this basis, we can say that due to the level of capitalization of the stock market, GDP changed by 44.9%, and due to other indicators (1-0,449) 55.1%.

The below graph shows Fitted and actual values of the model, as well as the residuals between them obtained by equation.

Graph 2: Dynamics of fitted and actual values and residuals obtained by the regression equation



Source: Compiled by the author

Linear regression expressing the dependence of the stock market capitalization level variable (x) on the the GDP (y).

Fisher's F-test is used to determine the stability of the equation ($y = \alpha_0 + \alpha_1 x =$ 44,98332 + 1,214422X). For this, a zero hypothesis is put forward. H_0:b=0 In this case, the regression coefficient is equal to 0. A regression factor of 0 means that the cause factor does not affect the outcome factor.

The F-criterion is related to the determination coefficient and its value is calculated as follows (Baraz, 2010):

$$F_{accounted.} = \frac{R_{xy}^2}{1 - R_{xy}^2} \times \frac{(n - m - 1)}{m}$$

where, n- the number of observations; m - the number of factors.

In this case, $F_{accounted.} = \frac{0,449}{1-0,449} \times \frac{(7-1-1)}{1} = 4,07$

$$F_{critical.} = 0,83$$

There is a linear relationship between Y and X since $F_{accounted.} > F_{critical.}$ To evaluate the quality of the built model, it is necessary to calculate the average error of the approximation. This indicator is determined by the following formula [31, 32]:

$$A = \frac{1}{n} \sum \frac{y - \bar{y}}{y} \times 100\%$$

Here, the average error of the A-approximation is the average deviation of the resultant value from the actual value of the resultant value (Y) [68]. According to this formula,

$$A = \frac{1}{7} \times \frac{0{,}1567}{381{,}3} \times 100\% = 0{,}006\%$$

The selected regression model is considered quite normal if the value of the average approximation error does not exceed 10%. As can be seen, A = 0.006%. This means the correct regression model is selected.

Correlation between stock market capitalization and GDP.

$y = \alpha_0 + \alpha_1 x = 44{,}98332 + 1{,}214422X$ For the linear regression equation of the double correlation, it is necessary to calculate the coefficient of elasticity, which represents the percentage change in the dependent variable as a result of a 1% change in the free variable.

$$E = \frac{\alpha_1 \bar{x}}{\bar{y}}$$

where, α_1 is the regression coefficient;

$\bar{x}$ - average value of the factorial factor;

$\overline{y}$ - average value of the result factor;

The coefficient of elasticity (E) shows how many percent the factor (x) will change as a result of a 1% change in the value of other factors (y). [136]

$$E = \frac{\alpha_1 \bar{x}}{\bar{y}} = \frac{1{,}21 \times 7{,}81}{54{,}45} = 0{,}17$$

As a result of the report, it was determined that a 1% increase in the capitalization level of the stock market in Azerbaijan resulted in a 0.17% increase in GDP.

Thus, based on the method of correlation-regression analysis with the application of economic-mathematical methods, it can be concluded that there is a moderate correlation between the level of capitalization of the stock market in Azerbaijan and GDP. The assigned regression model $y=44{,}98332 + 1{,}214422X$ is fully adequate. From the relationship equation, it can be concluded that increasing the capitalization level of the stock market by 1 billion manat will lead to an average GDP growth of 1.21 billion manat.

5. Conclusion

So, the impact of financial instruments in Azerbaijan on the stock market and joint stock companies was assessed, the effect of the stock market capitalization level on budget revenues and expenditures and the optimal threshold were determined. Based on the analysis the efficiency of the use of financial instruments in the development of joint stock companies, several recommendations were obtained. A significant part of financial resources for investment purposes arises in the securities market, especially in the corporate securities sector. Research shows that today the main part of the securities

market in Azerbaijan is concentrated in government short-term bonds, which prevents the allocation of financial resources at the required level, efficiently and effectively. The main factor in improving the efficiency of the securities market should be increasing the volume of trading operations and creation of favorable conditions for this, increasing the variety and use of capital instruments, the issuance of new financial instruments. In order to ensure liquidity in capital bases, the activities of relevant government agencies should be coordinated, optimal solutions should be found through the application of fiscal and monetary policy, and necessary measures should be taken in this direction. In order to expand trade, it is necessary to assess the opportunities and awareness of several state-owned enterprises in the stock market, as well as the formation of appropriate legal and organizational mechanisms.

Besides all of this when financing projects in the private sector, state support should be provided by stock market instruments, and in this case, preference should be given to companies listed on the stock exchange, and the cost of obtaining financial resources should be determined by capital market instruments. In order to expand the opportunities for financing SME projects from the capital markets, a trading platform should be formed on the Baku Stock Exchange. It is important to increase the range of investment instruments offered on the stock exchange. Also, the application of financial instruments offered in the international market in the local market, and the possibility of bringing instruments offered in the local market to the world market should be evaluated. Relevant normative-legal base and organizational measures should be taken to offer local securities in foreign capital markets.

Expansion of supply of competitive financial instruments in the securities market, study and application of the practice of financing infrastructure projects with stock market instruments should be realized, trade mechanisms for various debt securities and futures contracts should be established. Favorable tax environment is of great importance in expanding investment opportunities in both the private and public sectors. From this point of view, it is necessary to study the possibilities of conducting the conditions of taxation in the securities market in accordance with international practice, including the application of certain tax benefits to income from securities, income from the purchase and sale of securities. Favorable fiscal conditions should be created to stimulate the activity of investment funds and the inclusion of companies in the listing of stock exchanges.

The development of horizontal and vertical integration processes through mergers and acquisitions based on share capital is gaining momentum. Carrying out these transactions implies the need and expediency of assessing the market value of share capital. Mergers and acquisitions facilitate the flow of share capital from one place to another, have a significant impact on the structural reorganization of the economy, which serves the purpose of increasing the economic efficiency of the economy. Preliminary results of the shareholding prove that the market value of privatized enterprises, which do not consider all the components, has been reduced. During this period, there is a tendency for large institutional investors to acquire a controlling stake in the privatized enterprise. At the same time, most of the privatized enterprises had an unacceptable share capital structure and needed to be restructured. The distinctive feature of privatization in Azerbaijan was that it was carried out in such a short period of time that it did not allow the state to take the necessary measures to increase their competitiveness until its enterprises were sold by checks and then at money auctions.

As a result, the next stage in the implementation of the shareholding mechanism was the activity of institutional investors in the restructuring of assets and liabilities of joint-stock companies, including measures for financial rehabilitation in the form of reduction of receivables and payables. As a result, there has been an increase in the number and volume of corporate mergers and acquisitions.

Commercial banks seeking to own shares in society through a controlling stake and thus influencing the real sector of the economy are helping to reduce the liquidity of their capital. In this context, the method of integration of banking and industrial capital based on financial-industrial groups becomes a more flexible method. In our country, these processes are influenced by certain state support, the direction and scope of which could be further expanded due to the obvious lack of national bank capital for the implementation of investment projects arising from the requirements of the real sector of the economy. On the other hand, it is expedient to expand the practice of administrative integration in several leading sectors of the economy, as it can negatively affect the pricing of shares of Azerbaijani companies in the stock market.

The income approach to valuing a company is more acceptable in terms of investment reasons, because any investor, first, receives a set of future income, not the sum of the assets of the enterprise. In addition, this approach can be used to evaluate any operating entity. The application of the income approach can be considered as a basis for the assessment of an enterprise with a certain history of economic activity and located in the stage of growth or stable economic development. However, this method is less appropriate for companies that are systematically operating at a loss, as well as for new businesses with uncertain returns.

Inflation of the fund's assets has a certain impact on the choice of reasonable methods and techniques for valuing the company's share capital. In the context of inflation, the cash flow discounting method is preferred because it is based on taking into account changes in the price of the company's shares over time, eliminating time discrepancies between cash inflows and outflows, thus reflecting the quality of a dynamic approach. The development of a business valuation methodology provides the tools to address a wide range of investment issues in mergers and acquisitions. In this case, the income method for the valuation of the existing enterprise is superior to the methods of comparison and cost approach. In determining the liquidation value of the company, it is more appropriate to use a method based on the sale of assets in parts and considering the time factor, which reflects the statistical approach.

Based on the correlation between budget expenditures and budget revenues and the level of capitalization of the stock market with the application of economic-mathematical methods, the optimal level of capitalization of the stock market was determined. Based on the elasticity coefficient, it was determined that budget revenues and budget expenditures will change by 0.17% due to a 1% change in the capitalization level of the stock market in Azerbaijan. As a result of economic-mathematical methods, it was determined that a 1% increase in the capitalization level of the stock market in Azerbaijan results in a 0.17% increase in GDP. Based on the equation of the relationship between the level of capitalization of the stock market and GDP in Azerbaijan, it was concluded that increasing the level of capitalization of the stock market by 1 billion manat will lead to an average GDP growth of 1.21 billion manat.

References

Baraz V.R. (2010). *Correlation and regression analysis of the relationship between indicators of commercial activity using the Excel program*. Ekaterinburg: State Educational Institution of Higher Professional Education "USTU – UPI". 102 p.

Brown M. (1966). *On the Theory and Measurement of Technical Change* (Cambridge University Press), p.214

EVPA, (2018). Investing for Impact, https://evpa.eu.com/download/Investing_for_Impact_The_EVPA_Survey_2017-2018_report.pdf (accessed on 01 August 2020).

Kane A., Marcus A., (1999). *Investments*, 4th edition,

Noskov V.II. (2002). *Econometrics*, Moscow, p. 285.

Ross S., Westerfield R. (2002) Corporate Finance", 6th edition

Solow, R.M. (1957) Technical Change and the Aggregate Production Function, *Review of Economics and Statistics, Vol. 39*, 312-320.

Sharpe, William, Gordon J. Alexander, and Jeffrey W. Bailey. (1998) *Investments*, 6th ed. Upper Saddle River, NJ: Prentice Hall.

Review of Socio-Economic Perspectives **Chapfuwa, D.F. & Baur, P., pp. 23-49**
Vol. 5 Issue: 3/ September 2020

INSTITUTIONS, FOREIGN DIRECT INVESTMENT (FDI) AND ECONOMIC GROWTH: DOES THE EXISTENCE OF STRATEGIC NATURAL RESOURCES MATTER?

Dzingai Francis Chapfuwa[1]
Peter Baur[2]

Abstract

The paper analysed the interlinkages among institutions, FDI and economic growth. The paper analysed whether institutions play a role in determining the effect of FDI on economic growth and whether the existence of strategic natural resources matter. Dynamic Panel General Method of Moments Technique (GMM) model with Weidmeijer corrected errors and orthogonal deviations is applied for the period 1996 to 2016. The results show that the effect of FDI on economic growth is both negative and positive across the estimated models indicating the heterogeneity in terms of the initial host country conditions. The thesis found that institutions as a whole are weak for SADC countries hence a negative relationship between institutions and economic growth for the SADC countries. What is however key is that FDI on its own without institutional indicators can lead to an increase in economic growth for the SADC countries. The effect of institutions on FDI and hence economic growth was not significant in the full sample. However, after taking out countries endowed with strategic natural resources, good institutional indicators leads to an increase in economic growth eliminating the natural resource endowment bias.

Keywords: FDI, Institutions, Economic growth, SADC, MNCs, GMM
JEL Codes: E, E02

Citation : Chapfuwa, D.F. & Baur, P. (2020). Institutions, Foreign Direct Investment (FDI) and Economic Growth : Does the Existence of Strategic Natural Resources Matter ?, *Review of Socio-Economic Perspectives, Vol 5(3),* 23-49.

Article Type: Research Article
Application Date: 12.06.2020 **& Admission Date:** 29.08.2020
DOI: 10.19275/RSEP087

[1] University of Johannesburg, Faculty of Economics and Econometrics, Johannesburg, South Africa
ORCHID ID: 0000-0003-1815-3147
E-mail: dchapfuwa@gmail.com

[2] Ph.D. Economics, University of Johannesburg, Faculty of Economics and Econometrics, Johannesburg, South Africa
ORCHID ID: 0000-0002-9202-2826
E-mail: peterb@uj.ac.za

1. Introduction

This study examines the relationship among institutions, Foreign Direct Investment (FDI) and economic growth and estimates the effects of FDI and institutions on the economic growth of Southern African Developing Countries (SADC) for the period covering 1996-2016. The role of the existence of strategic natural resources in the host countries is also explored. Institutional quality also determines the absorptive capacity of the host country and, in the process, the effect of FDI on economic growth. Previous studies, such as those by Carkovic and Levine (2005) and Alfaro (2003), ignored the role of institutions in host countries in determining the impact of FDI on economic growth. How FDI influences economic growth via institutions is a fundamental academic question with significant policy implications. This will provide the basis for appropriate policies to attract FDI and reform certain institutional variables with the aim of improving the FDI-growth nexus in the SADC region.

There are perceived economic benefits from the inflow of FDI and thus both developed and developing countries implement policies that encourage the inflow of FDI, such as the removal of capital barriers and the reduction of regulatory burden. A primary reason for this is FDI being regarded as a solution to boost economic growth (Jude & Levieuge, 2017). Generally, economists such as Malikane and Chitambara (2017), Iamsiraroj and Ulubasoglu (2015), Li and Liu (2004), Baltabaev (2014), and Batten and Vo (2009) agree that FDI inflows can lead to an increase in economic growth. However, over the years, there have been numerous theoretical and empirical arguments regarding the impact of FDI on the host country's economy.

Several variables and methodologies to determine the effect of FDI on economic growth all yielded different results. These arguments make it quite difficult for policymakers to determine whether advocating for FDI inflows into their countries will be an appropriate policy decision. Busse and Groizard (2008) argued that FDI might provide new capital into the host country's economy. In addition, De Mello (1999) concluded that FDI is expected to drive long-run economic growth through technological upgrading and knowledge spillovers. The fact that these respectable researchers are not writing with certainty shows that the effect of FDI on the host country's economy is not a given. As countries aim to increase FDI inflows, they should concentrate not only on the quantity or volume of FDI inflows; thought should also be given to the quality of FDI inflows into the host country and the quality of institutions. Greenfield FDI is preferred to brownfield FDI. Furthermore, FDI in the primary sector of the economy is regarded as poor quality FDI compared to the secondary sector of the economy.

FDI is an important source of growth for developing countries especially those with low savings rate and hence a financing gap (Ntembe & Sengupta, 2016). FDI has increased its role as a source of capital for emerging countries, particularly in SSA countries (Adeleke, 2014). A point supported by Wijeweera et al., (2010) who concluded that increased foreign capital is essential in reducing the savings gap. Because most SSA countries do not have access to international capital markets, they have to rely on FDI and loans from multilateral organisations as a source of capital (Adeleke, 2014). This can be interpreted to mean that FDI has become an important source of capital for development finance.

FDI compliments domestic savings and investments, leads to the creation of employment, encourages technology transfer and in the process raises the country's economic

performance (Karim et al., 2016). FDI can supplement the host country's domestic capital and hence stimulate economic growth (Iamsiraroj, 2016). Furthermore, higher growth rates attracts FDI as it is regarded as a signal that firms can maximise their profits by doing business in that economy. Beugelsdijk et al., (2008), Suliman and Elian (2014), Parezanin et al., (2016) as well as SU and Liu (2016) argued that FDI has a positive and significant impact on economic growth for developing countries. It is in this regard, that policy makers in most countries with SADC included are always creating incentives and implementing reforms in a bid to attract FDI inflows (Beugelsdijk et al., 2008).

FDI influences the host country's economic growth through different channels, which include the market structure, the degree and level of competition, employment effects and knowledge spillovers (Beugelsdijk et al., 2008). To further complicate the debate surrounding the impact of FDI on economic growth, researchers such as Ahmed, (2010), Hermes and Lensink (2010) argued that the impact of FDI on economic growth strongly depends on the host country's initial conditions. For example, a host country must reach a minimum level of economic development threshold for FDI to have a positive and significant impact on economic growth (Ahmed, 2010). Thus, the impact of FDI on economic growth depends on the absorptive capacity of the host country. However, this is still a subject of debate.

The study contends that the conflicting results on the interlinkages between institutions, FDI and economic growth could be due to inconsistency in the estimation methods. Due to the possibility of bi-directional causality between FDI and economic growth, the association is most likely to be dynamic. This could mean that there is a possibility of endogeneity and simultaneity that was missed by previous studies. Most studies concentrated on examining the role of institutions in attracting FDI inflows, and very few studies examined how institutions can aid the effect of FDI on the host country's economy. As a contribution to the academic debate, this study created an additional interactive variable which seeks to examine how the interaction of FDI and institutions can impact on the host country's economic growth.

This study applied the dynamic panel GMM technique to deal with the endogeneity problem. Moreover, the three-way linkages among institutions, FDI and economic growth for all the SADC countries were examined. To the best of the researchers' knowledge, no empirical studies have focused on the examination of the three-way linkages among institutions, FDI and economic growth using a dynamic panel GMM-equation model, applying the growth model framework. The model makes it possible to examine how institutions, FDI and economic growth are interrelated and the respective impacts thereof. This means that the methodology applied in this study goes beyond previous studies that analysed only the impact or effect of FDI on economic growth or vice versa; for example, Nair-Reichert and Weinhold (2001) and Durham (2004). Thus, the methodology allows us to examine the indirect effects of FDI for the SADC countries in terms of economic growth, or the other way around. Furthermore, unlike other studies, this study also analyse the impact of FDI on economic growth for a sub-sample of countries, which are not endowed with strategic natural resources.

The next section discuss the theoretical framework, followed by a discussion of a simplified model of institutions, FDI and economic growth. A brief empirical and

theoretical literature review then follows before the discussion of the methodology, results of the estimated models as well as conclusion and policy recommendations.

2. Theoretical Framework: Endogenous Growth Model by Romer (1990)

Stemming from the neoclassical and endogenous growth models, there are contrasting views in the theoretical literature on the effects of FDI on economic growth. The neoclassical growth model postulates that long-run economic growth can only come about because of technological progress, the labour force or a combination of both factors. These factors are considered exogenous. However, due to diminishing returns to capital inputs, economies will eventually converge to their steady state; thereby, FDI will only affect economic growth in the short-run, thus leaving the long-run growth rate unchanged (De Mello, 1997).

This shortcoming of the neoclassical model led to the development of the endogenous growth model that has been accepted by many researchers – including Iamsiraroj and Ulubasoglu (2015) and De Mello (1997) – in explaining the effect of FDI on economic growth, emphasising the role of technology. Paul Romer, Robert Lucas and Robert Barro first developed the endogenous growth theory in the 1980s. FDI is deemed to promote economic growth by augmenting domestic capital accumulation, in the process facilitating technological transfer to the local firms (Edwards, Romero & Sajadi, 2016).

Technological diffusion could play a key role in promoting economic growth. Unlike the traditional growth theories where the technological effect is treated as residual and unexplained, recent literature on economic growth emphasises the existing domestic technology compared to that of the rest of the world. The endogenous growth model requires that long-run growth be determined within the model rather than by exogenous factors alone.

De Mello (1997) boldly declares that the only channel for growth to happen through FDI is through permanent technological shocks to the host country's economic system. Due to the availability of FDI, aggregate production in the host country will increase because of the combination of labour and physical capital (De Mello, 1999). The endogenous growth model states that the long-term growth of the economy is achieved through the accumulation of knowledge. Thus, FDI can provide mechanisms of knowledge accumulation and become the engine of growth in the host country's economy.

2.1. Endogenous Growth Model Variables

The endogenous growth model also emphasises the accumulation of human capital and R&D. If FDI can increase productivity, generate positive externalities and spillover effects, it can be argued that it stimulates economic growth endogenously. There are two types of endogenous growth models, namely:

i. Endogenous growth models of AK nature – these emphasise the role of production factors in determining growth. These models focus on the accumulation of knowledge through on-the-job training.

ii. Endogenous growth models in which technological change is based on the level of investments as well as R&D.

The study adopted the endogenous growth model with R&D as developed by Romer (1990). Technical progress is endoginised in the model by firms seeking to maximise profit through innovation introducing research on new ideas. The model has two components, which are:

i. The production function equation

ii. All equations that show how the inputs evolve over time

The aggregate production function is as follows:

$$Y = K^{\alpha}(AL_Y)^{1-\alpha} \quad (2.1)$$

Where α is a constant parameter $0<\alpha<1$

Production factors: K – Capital; L_Y – Labour, A – Knowledge

The labour and capital factors experience constant returns to scale, while technology has increasing returns to scale that will result from the non-rival use of ideas. The equation of labour and capital accumulation is similar to the Solow model and represented as follows:

$$K = skY - \delta K \quad (2.2)$$

Where: skY is the income savings rate

δK is the rate of capital depreciation

The equation for technological progress evolution:

$$A = rL_A \quad (2.3)$$

Where: A is the number of ideas invented every moment and it depends on:

L_A - the number of people putting time aside for research

r - The rate of new ideas achievement

It is through the endogenous growth model that there has been much interest in the transmission mechanism of FDI to economic growth (Omri & Kahouli, 2014). In the model, growth is sustained if the number of innovations created in each period continues to increase. It is also assumed that firms operate in a competitive environment with the aim of maximising profit, and the engine for growth is innovation. It is then expected that FDI will have a positive effect on economic growth by providing technology to the host country and encouraging local production, as well as the diffusion of new knowledge and innovation (Mehic, Silajdzic & Hodovic, 2016).

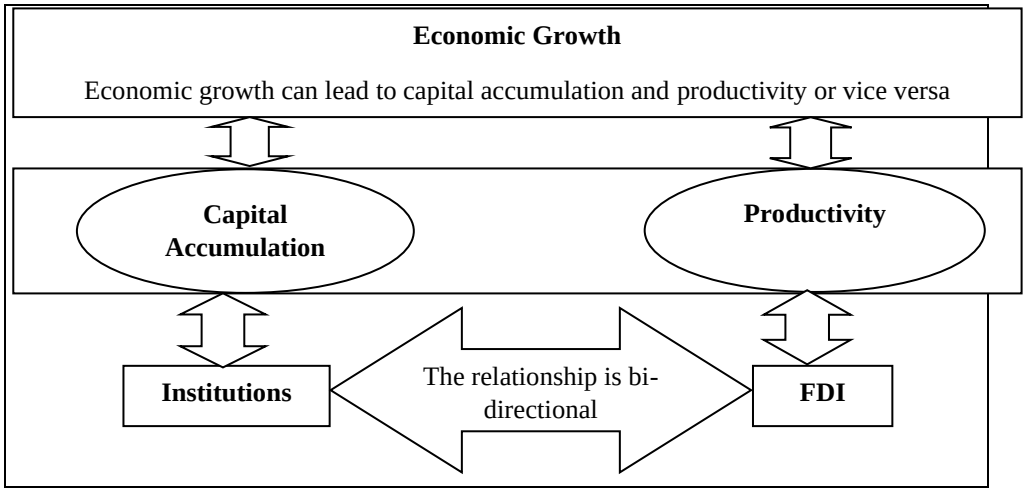
2.2. Institutions, FDI And Economic Growth Interlinkages

Stemming from the preceding section that established the endogenous growth model, the study applied a simple model adopted from Rodrik (2000) to show and examine the interlinkages of FDI, institutions and economic growth. The model allows for interactions, as well as feedback, with other variables (including institutions) to demonstrate the complex nature of the subject. This model, however, simplifies the relationship and allows us to examine the impact of FDI on economic growth, the impact of institutions on economic growth, and the impact of the interaction of FDI and institutions on economic growth.

In the model, there are deep and proximate determinants of economic growth. Deep determinants include the integration into the world economy, institutions and geographical location. Proximate determinants are factors such as the accumulation of human capital, level of productivity and technological improvements. The model allows feedback effects whereby economic growth is not only affected by the said factors but can also affect the mentioned factors. This framework makes it possible to answer questions on how institutions, FDI and economic growth interact. For the purposes of this study, the model assisted in examining the role of FDI in economic growth – directly and indirectly – through interaction with institutions. Figure 2.1 shows the modified version of Rodrik's (2000) model.

The first panel of Figure 2.1 shows the proximate determinants of economic growth. In this case, economic growth is determined by the accumulation of physical and human capital[1] as well productivity and technological progress. This is the traditional way of understanding the factors that determine economic growth. However, it does not include other significant factors such as the role of institutions in determining FDI flows and economic growth. Including these factors can assist in understanding the factors that affect capital accumulation, productivity and technological progress. Above all, it can assist in understanding why capital moves in certain directions. The assumption is that there will be technological diffusion from the advanced countries to the inferior countries in terms of technology. The second panel answers these questions by allowing the interaction of institutions and FDI.[2] Based on the above discussions, this chapter therefore applies the endogenous growth theory and the institutional theory as the basis for the study.

Figure 1: Institutions, FDI and Economic Growth Interlinkages



Source: Adopted from Rodrik (2000)

[1] This can also be referred to capital deepening.
[2] In this developed model, institutions and FDI are the deeper determinants of economic growth.

2.2.1. Reviewed Literature on Institutions, FDI and Economic Growth

It should be emphasised that the relationship between FDI and economic growth differs depending on the host country's institutions, hence the need to understand the role of institutions in aiding economic growth (Mehic et al., 2016). The effect of FDI on economic growth varies across countries partially due to the heterogeneity of institutions. Therefore the orthodox assumption of a homogenous marginal return to FDI may be misleading. If heterogeneity exists, host country policies, which are supposed to promote the effect of FDI on economic growth, should not be homogenous across countries. This notion is supported by McCloud and Kumbhakar (2012), who argued that institutional qualities[3] are the main reason why different countries have different absorptive capabilities, hence a heterogeneous FDI-growth relationship.

A country with poor institutions is most likely to experience economic challenges such as low levels of investment, low productivity growth and slow output growth (Jude & Levieuge, 2017). For example, firms are willing to be continuously innovative if they expect to profit from innovations. However, intellectual property rights (IPRs) should protect these innovations. Thus, a host country whose economic growth depends on innovations is likely to be boosted by the existence of IPRs. On the other hand, quality institutions will most likely ensure that there is factor allocation efficiency, investment in higher return activities, a reduction in business uncertainty, and a well-coordinated economic system (Jude & Levieuge, 2017). This will promote economic growth.

In a study on FDI, democracy and economic growth for eight Southern African countries, Malikane and Chitambara (2017) concluded that democratic institutions are a strong driver of economic growth. Thus, the impact of FDI on the host country's economic growth depends significantly on the country's level of democracy. This could mean that countries with strong democratic institutions absorb the positive spillover effects of FDI compared to countries with weak democratic institutions. However, the role of democracy in the FDI-growth nexus is still a subject of debate. Furthermore, Malikane and Chitambara (2017) used only one institutional indicator to determine the interlinkages among institutions, FDI and economic growth, and this study employed all 12 institutional indicators.

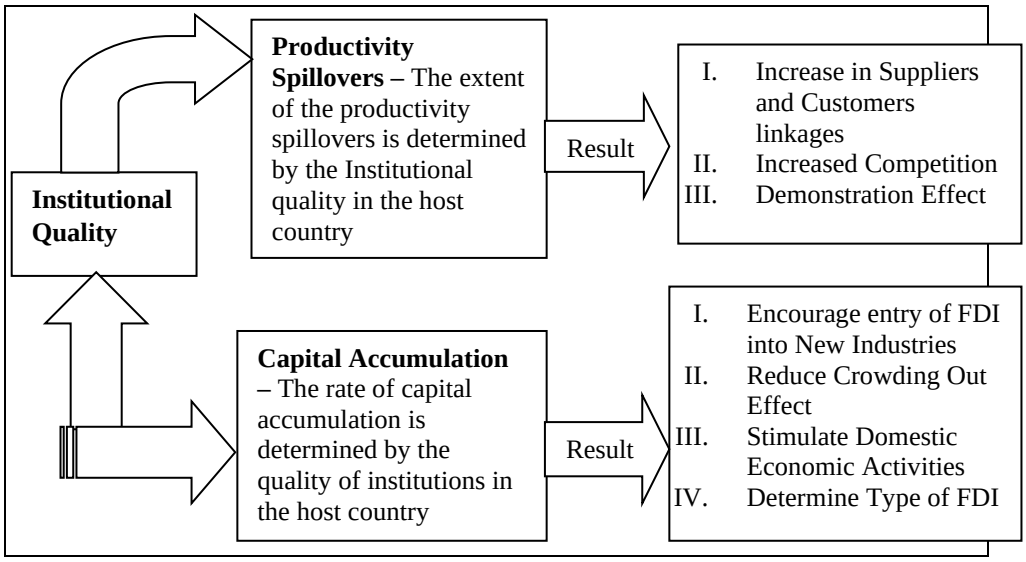
According to Jude and Levieuge (2017), institutional quality determines the effect of FDI on economic growth for developing countries. It is my argument that, just like there is a need to have a minimum level of human capital for the impact of FDI to be maximised, there is also a need to have a minimum threshold level of institutional quality in the host country. Therefore, a minimum institutional quality is required to trigger a growth-enhancing effect. Figure 2.2 illustrates the channels through which institutional quality can aid FDI in promoting economic growth.

From Figure 2.2, the assumption is that FDI influences economic growth through productivity spillovers from foreign firms to domestic firms. This could be because of the linkages between suppliers and customers, through the demonstration effect and increased competition. It is in this regard that the quality of institutions will influence the relationship

[3] The quality of institutions can determine the extent to which the host country can capitalise on the productive spillover effects from the foreign firms.

between domestic and foreign firms and the type of FDI, thereby affecting the extent of the spillovers and economic growth.

Figure 2: Channels of Institutional Quality to Economic Growth



Source: Author's own configuration

The quality of institutions also influences capital accumulation. If the institutions are poor, the host country is likely to attract low technology and resource-based FDI with limited growth effect. Similarly, the demonstration effect is stronger for a country with quality institutions than one with poor institutions. Quality institutions can deal with the crowding-out problem by encouraging foreign firms to enter new industries, thereby reducing competition with domestic firms. As the new foreign firms enter the new markets, there will be a multiplier effect. For example, demand for inputs that local firms can supply will increase, thus stimulating domestic economic activity.

A study by Adhikary (2011) on Asian countries, concluded that a combination of FDI and good institutional variables such as the rule of law, property rights, political stability and absence of violence lead to economic growth. Furthermore, fundamental institutional variables such as political stability, civil rights, property rights and socio-economic variables play an important role in determining the effect of FDI on the economic growth of host countries (Ntwembe & Sengupta, 2016). Elkomy et al. (2016) share these sentiments, and argue that the level of institutional development and the quality of policy-making in the host country determines the magnitude of the impact of FDI on economic growth. It should be acknowledged that these institutional variables aid the effect of FDI on economic growth at different rates. Therefore, priority should be given to those institutional variables that can have an incremental effect on economic growth.

The FDI-growth nexus is highly sensitive to country-specific factors, which include the kind of institutions in those countries (De Mello, 1999). For FDI to have a significant impact on the host country's economic growth, host governments must first ensure that

their institutions are functioning well (Busse & Groizard, 2008). For example, host countries with more regulations will be less able to benefit from the presence of MNCs in their economies compared to less regulated economies. Technology and knowledge transfer to the host country heavily depends on the kind of existing institutions in that host country (De Mello, 1999), which is further evidence that initial conditions in the host country determine the impact of FDI on economic growth.

Williams (2017) argued that political instability affects FDI inflows and growth differently. Saini et al. (2010) indirectly supported this notion by arguing that host countries with better property rights should ideally benefit more from FDI inflows compared to those with poor property rights. Therefore, when we consider the host country's initial conditions, the institutional variables should take centre stage in how FDI influences economic growth. Institutions such as commercial banks and credit agencies play a significant role in ensuring that savings are not spent on consumption but rather fund investment expenditure, leading to economic growth (Jayaraman, 2017). The effect of FDI on the host economy is thus enhanced when there is institutional stability (Edwards et al., 2016).

Furthermore, in host countries with higher levels of institutional capabilities, as measured by the degree of property rights protection, the effect of FDI is stronger (Stancheva-Gigov, 2016). These were similar to the findings of a study of 32 developed and developing countries. Panel data results indicated that FDI has a positive impact on economic growth if the host country has relatively high human capital and high-quality institutions (Mehic et al., 2016). However, other studies such as that by De Mello (1999) found weak evidence that FDI leads to economic growth and that the quality of institutions for the host country matters (Mehic et al., 2016).

Elkomy et al. (2016) pointed out that a more democratic political system is likely to amplify the positive effect of FDI on the host country's economic growth. This is because there is a high chance of the redistribution of the income and gains from FDI towards further investments in human capital development, thereby promoting economic growth. Furthermore, democratic political systems are most likely to promote international trade and integration into the global economy. Therefore, these countries can attract internationally competitive export-oriented FDI and promote economic growth. The opposite is expected to be true for countries with autocratic political systems. These countries are expected to have poor policies and closed economies. These conditions, in turn, attract FDI that is less technologically advanced, resulting in limited spillover effects.

Another institutional variable that is important in aiding the effect of FDI on the host country's economic growth is corruption. A country that is less corrupt compared to its peers is likely to experience an increase in economic growth due to FDI inflows (Wijeweera et al., 2010). This, however, is not a straightforward relationship. Existing literature is inconclusive on the effect of corruption on FDI inflows and economic growth. Corruption can act as additional tax to foreign firms, heightening insecurity and uncertainty for would-be foreign direct investors. It is in this regard that the effect of corruption on the host country's economic growth is indirect.

An additional institutional variable which can determine the impact of FDI on economic growth is governance. A study by Adeleke (2014), on the FDI-growth nexus in Africa, indicated that most African countries have weak governance structures and this inhibits

growth. Thus, the assumption is that a good governance structure attracts more FDI and hence, growth. This is further evidence that FDI leads to economic growth. The next section discusses the methodology which is applied in this study.

3. Methodology

3.1.The model, data and variable definitions

This section discusses the empirical model used to establish the role of institutions and FDI in determining economic growth for the SADC region. The research design, population, sample and data, as well as model specification and estimation technique, are also discussed. In addition, the section gives a brief description of the data used and the *a priori* expectations. Further to this, the section develops an argument for the support of the model as a significant tool in the development of policies that would help address international economic policy.

3.2. Research design

The study applied quantitative data techniques. Thus, specifically, the study estimated a dynamic panel data model for the period 1996 to 2016. Given the interactions among FDI, institutions and economic growth for all the SADC countries, the development of a panel model that allows these interactions to happen is justified. Furthermore, panel data models capture the heterogeneity of institutions across countries, which is imperative for an empirical examination of the impact of FDI and institutions on the economic growth of host countries. In the developed model, the impact of FDI on economic growth is decomposed into the direct impact and the indirect impact that should work via institutions. Thus, the model assists in understanding how institutions aid the effect of FDI on the economic growth of the host country. The quality of institutions determines how FDI affects the host country's economic growth. High-quality institutional variables, such as the rule of law, military not being involved in politics, and the existence of property rights, among other institutional variables, are expected to positively affect the impact of FDI on the host country's economic growth. Likewise, poor-quality institutional variables, such as high levels of corruption, bureaucracy, and military involvement in politics, are expected to be associated with low levels of economic growth in the host countries.

Endogeneity is a problem which requires attention in examining the relationship among institutions, FDI and economic growth. The potential endogenous relationship between FDI and economic growth may lead to an over-estimation of the impact of FDI on economic growth. Since FDI can be correlated with the country-specific error term, it could lead to a wrong and biased estimation of the coefficients. It can be argued that the more income a country has, the better the institutions are compared to those of a developing country. Thus, economic growth could be as a result of an improvement in the quality of institutions.

3.3. Population, Sample and Data

This is a regional-based study that empirically examined the roles of institutions and FDI in promoting economic growth for all the SADC countries using secondary data for the period 1996 to 2016. All the data were taken from the World Development Indicators, PRS, country-specific reserve banks, and statistical agencies/departments.

Furthermore, the study divided the SADC countries into two samples: one with all the countries, which is the full sample, and the other sample where countries endowed with strategic natural resources were removed from the full sample. Using this process l was able to estimate how the interrelationship among institutions, FDI and economic growth could vary according to the different environments in terms of the existence of strategic natural resources.[4] This allowed me to remove outliers from the sample and examine whether there were any dynamic changes. Outliers refer to countries that are endowed with strategic natural resources which may make foreign direct investors overlook negative institutional variables such as corruption, military involvement in politics, and bureaucracy, among others. Thus, foreign direct investors will invest in these countries regardless of the negative institutional variables. Angola and the Democratic Republic of Congo are two examples of countries endowed with strategic natural resources, but poor quality institutional variables; yet they still receive large FDI inflows. The removed countries in the sub-sample are shown in Table 1.

Table 1: Natural Resource-Endowed Countries

Country	Available Natural Resource (s)
Angola	Oil and minerals
Democratic Republic of Congo	Minerals
Republic of South Africa	Minerals
Mozambique	Gas and Minerals
Zambia	Minerals

Source: Author's own configuration

3.4. Definition of Variables, Proxies and A Priori Expectations

Table 2 shows the institutional variables, definitions and expected sign of the coefficient.

Table 2: Definition of Variables, Proxies and a Priori Expectations

Variable	**Proxies and Definitions**	**Proxies by**	**Expected Sign of Coefficient**
Economic Growth	The current growth rate of the gross domestic product.	Jude and Leviuge (2017)	Positive
Economic Growth of Previous Period	The previous period growth rate of the gross domestic product.	Liu (2016)	Positive
Foreign Direct Investment	FDI expressed as a percentage of GDP.	Jude and Leviuge (2017)	Positive

[4] This encompasses oil, natural gas, coal, forestry and other minerals.

Variable	Proxies and Definitions	Proxies by	Expected Sign of Coefficient
Institutions	All the country's institutions, i.e. government and private. It is proxied by 12 different measures of institutional and political factors.	Cleeve (2012)	Negative/Positive depending on the quality of institutions
FDI/Institutions	The interaction of FDI and all the institutional indictors. This is to capture the interactive effect between FDI and institutions on economic growth. This further shows the conditional role of FDI on economic growth.	Agbloyor, Gyeke-Dako, Kuipo and Abor, (2016), Jude and Leviuge (2017)	Negative/Positive depending on the quality of institutions
GDP per Capita	The initial level of GDP per capita. This is necessary to take care of the effects of convergence.	Adams and Opoku (2015), Jude and Leviuge (2017)	Positive
Population	Population annual growth rate to capture the market capacity.	Jude and Leviuge (2017)	Positive
Domestic Investment	The growth rate of domestic investment. Measured by the gross capital formation as a percentage of GDP.	Adams and Opoku (2015), Malikane and Chitambara (2017)	Positive
Trade Openness	This is the policy variable that measures the openness of the country to trade and investment. It is measured by the mean of the tariff rate to capture the effect of trade policy on FDI flows.	Jude and Leviuge (2017)	Positive

Variable	Proxies and Definitions	Proxies by	Expected Sign of Coefficient
Inflation	Annual inflation rate. This is a proxy for macro-economic and fiscal stability.	Jude and Leviuge (2017)	Negative

3.5. Model Specification

The study followed the endogenous growth model. Since literature on the relationship between FDI and economic growth is inconclusive, even after including control variables such as the initial GDP, domestic investments, degree of openness and human capital, the study applied panel data techniques and treated endogeneity with caution. Furthermore, most studies conducted on the subject did not have enough data, hence there are constraints in the use of relevant and appropriate estimation methods. In this regard, the study examined the impact of FDI on economic growth for SADC countries based on the endogenous growth theory.

The panel model estimation is as follows:

$y_{it} = \beta_1 y_{it-1} + \beta_2 FDI_{it} + \beta_3 Institutions_{it} + \beta_4 (FDI*Institutions_{it}) + \sum_{J=0}^{N} \beta_j X_{it-1} + \varepsilon_{it} \ldots$ (3.1)

y_{it} is the change in GDP (economic growth).

FDI_{it} is the FDI for country *i* at time *t for* $i = 1 \ldots\ldots, N$ *and* $t = 1 \ldots\ldots, T$ and it is expressed as a percentage of GDP.

y_{it-1} is the first lag of y_{it} and β_1 is the coefficient of the lag of economic growth.

β_3 is the coefficient of the institutional variables.

All the data for the institutional variables were sourced from the PRS.

The average of the 12 sub-indicators of political risk is used as an aggregate measure of institutional quality. Furthermore, the 12 subcomponents of institutional variables are sequentially included in the regressions. This therefore means that l estimated 30 different regression equations. β_4 captures the interactive effect between FDI and institutional variables. Furthermore, FDI and the various institutional variables are included in the model to enable the capturing of the interactive effect between FDI and institutions. ε_{it} is the random error term, which breaks down into $\mu_{it} + \nu_{it}$. μ_i represents the time-invariant country-specific effect, while vit represents the remainder of the disturbance in the estimated regressions.

The set of control variables is captured by X_{it-1}. Existing literature has widely used these control variables, which include:

- Economic growth for the previous period
- Initial level of GDP per capita to take care of the effects of convergence

- The population annual growth rate
- Domestic investment
- Trade openness
- The annual inflation rate

3.6. Estimation Technique

Existing empirical literature used various techniques, for instance, instrument variables such as the 2SLS, to deal with the potential endogeneity bias. However, the concern over the 2SLS estimator is that it is not efficient when heteroscedasticity is present. Jude and Leviuege (2017) proved that nonlinear modelling, such as the use of the Panel Smooth Transition Regression Model could assist in mitigating the challenge of endogeneity and reverse causality problems.

This study applied the GMM estimator. The GMM technique makes it possible to treat economic growth as a dynamic process, thus accounting explicitly for the possibility that the current growth rate can be influenced by the previous growth. Furthermore, the use of GMM techniques makes it possible to deal with the potential problem of endogeneity and the autocorrelation of the independent variables. GMM techniques also remove the country-specific effects and therefore affect the element of heterogeneity. The GMM makes it possible to have a clear understanding of the short-run (dynamic) effect within the model, and to exploit the group variations in the data. Consequently, a dynamic relationship is structured in the model to include the dependent lagged variable (See equation 3.1).

The study therefore estimated the dynamic GMM with Windmeijer's (2005) corrected standard errors, and the 2SLS instrument weighting matrix orthogonal deviations. The orthogonal deviations are used to maximise the sample size because there are gaps in the panel data. The study estimated a total of 30 models. First, the base model with the traditional known factors in economic literature that affect economic growth is estimated. Institutional indicators are then added to the base model, one at a time, so that their effect on economic growth can be quantified.

3.7. Empirical Results and Discussion

This sub-section presents and examines the results of the empirical analysis. First, there is a presentation of the descriptive statistics to understand the data on which the research is based. A correlation matrix is then discussed to aid the empirical specification. Thereafter, the empirical analysis on institutions, FDI and economic growth is presented for the full sample and the sub-sample, which excludes countries endowed with natural resources. Descriptive statistics results are presented in Table 3.3.

The average economic growth rate for all the SADC countries is 4.5 percent, and the average initial GDP per capita is USD2 700. The GDP and GDP per capita figures show that the average income per capita in SADC is relatively high compared to SSA. These could mean a potential market for the foreign direct investor. Maximum GDP recorded is 26.8, while the minimum is negative 17.7. This shows the heterogeneity which exist in the SADC region and that there is an outlier in terms of GDP figures.

FDI as a percentage of GDP averaged 5.7 percent over the period 1996 to 2016. Thus, the researcher infers that FDI has been an important source of development finance for SADC countries. The maximum number for FDI is 66.7, which is significantly different from the median, minimum, mean and standard deviation. This demonstrates that there is an outlier in the data, thereby confirming heterogeneity[5] which exists within the SADC region. The institutional average, which proxies the quality of institutions in the SADC region, is 60.5 percent; the maximum being 80.8 percent and the minimum 27 percent. These results can be interpreted to mean that institutions, as a whole, are not poor in SADC countries.

The average government stability in the SADC region is 3.8 out of a maximum of six. The median is 3.9, which indicates the scoring for most of the SADC countries. The most stable government in the SADC region has a scoring of 5.5 out of six. The data also indicate that in terms of government stability, there are no indicated outliers within the SADC countries.

Internal conflict recorded a maximum score of six and a minimum of 0.07 for all SADC countries. The average score in terms of internal conflict is 4.2 out of six, with a median of 4.4. This mirrors the general government stability that exists in the SADC region. Furthermore, the data show that there are few incidents of internal conflicts in the SADC region.

Moreover, investment promotion averages 3.5 out of six for the SADC region. The maximum score for investment promotion is 5.7 out of six, with a minimum of 0.77. This shows that not all SADC countries are taking deliberate efforts to promote foreign investment inflows. The pairwise correlation matrix is presented in Table 3.4.

Economic growth is negatively correlated with most of the institutional variables, for example, bureaucratic quality, corruption, democratic accountability and external conflict. Although there is a positive correlation between economic growth and the institutional average, descriptive statistics analysis seems to suggest that there are generally good institutions in SADC countries.

However, the correlation between economic growth and the interaction term of FDI and institutions is positive, proving the theory that FDIs' impact on economic growth depends on initial host-country conditions such as the quality of institutions. For example, Saini et al. (2010), in a study of 85 developed and developing countries, concluded that FDI on its own does not have an impact on economic growth. Instead, the impact of FDI on economic growth depends on the host country's initial conditions, such as the quality of institutions. Also, as mentioned earlier, Jude and Leviuege (2017) concluded that FDI alone has no significant impact on economic growth.

In line with the *a priori* expectations supported by the findings of Stancheva-Gigov (2016), there is a positive correlation between economic growth and FDI. There is also a positive correlation between economic growth and the initial level of GDP per capita and the rate of population growth. However, there is a negative correlation between trade openness and economic growth. This is not in line with *a priori* expectations. It should, however, be appreciated that correlation does not mean causation. Therefore, rigorous

[5] SADC countries experienced political independence and hence institutional transformation at different periods. Furthermore, the countries are at different stages of economic development (Country Watch 2017).

empirical examination of the interlinkages among institutions, FDI and economic growth is required, which is therefore the focus of the next sub-section.

3.8. An Analysis of the Regression Results

Under this sub-section, the empirical results from cross-section regressions are discussed. A total of 30 models were estimated for the full sample and the sub-sample, taking cognisance of natural resource endowments for particular SADC countries. In both the full sample and the sub-sample, the first model examines the control variables, and the subsequent models introduce the various institutional variables into the estimated models.

Table 3: Descriptive Statistics

	BURQUA_	CORRUP	DEMAC_	ETHTEN	EXCON	FDI	GDP	GDP_PC	GOVSTA_	INCON	INFL	INST_AV_	INVPRO	LAWOR_	MILPOL	RELTEN	SOCIO_	TARIFF	TAX	TELE
Mean	2.513	2.745	4.257	4.116	5.396	5.679	4.5	2671	3.853	4.183	1.40	60.584	3.450	3.615	3.520	2.520	1.715	9.037	37	5.781
Median	2.558	2.500	4.500	4.340	5.192	3.572	4.6	1018	3.869	4.385	7.404	62.667	3.353	3.577	3.500	2.119	1.266	8.150	35	1.901
Maximum	5.300	5.300	6.000	6.000	9.500	66.869	26.8	15687	5.462	6.000	2.310	80.875	5.731	5.462	6.000	5.000	5.192	39.010	89	31.50
Minimum	0.400	0.400	0.000	1.131	1.154	-2.943	-17.7	102	0.077	0.256	-9.616	27.333	0.077	0.077	0.000	-0.192	-0.192	0.500	11	0.000
Std. Dev.	0.929	1.269	1.518	0.863	1.573	7.287	4.7	3206	1.064	0.939	1.830	12.069	1.163	1.198	1.366	1.686	1.339	7.430	15	8.515
Skewness	-0.476	0.208	-1.387	-0.434	0.739	3.646	-0.3	1	-0.830	-0.627	12.430	-0.477	-0.777	-0.922	-0.225	0.115	1.090	1.465	0.9	1.810
Kurtosis	3.033	2.404	4.679	2.787	4.600	22.875	8.6	5	3.632	3.910	15.600	2.355	4.187	3.944	2.299	1.523	3.416	5.230	4	5.015
Jarque-Bera	11.911	6.929	138.061	10.502	62.257	58826.08	419.5	258	41.419	31.499	313375	17.378	50.164	56.287	9.108	29.332	64.671	177.921	54	225.3
Probability	0.003	0.031	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000	0.000
Observations	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315

Source: Author's own calculation based using Eviews

Table 4: Pairwise Correlation Matrix

	LBURQUAL	LCORRUPT	LDEMACC	LDOMESTIC_INVESTMENT	LETHTEN	LEXCON	LFDI	LFDI_INST	LGDP_GROWTH_RATE	LGDP_PC	LGOVSTAB	LINCON	LINST_AVER	LINVPRO	LLAWORD	LMILPOL	LPOP_GROWTH_RATE	LRELTEN	LSOCIO_ECON	LTRADE_OPENNESS
LBURQUAL	1.000																			
LCORRUPT	0.950	1.000																		
LDEMACC	0.121	0.178	1.000																	
LDOMESTIC_INVESTMENT	0.737	0.811	0.056	1.000																
LETHTEN	0.338	0.385	0.611	0.360	1.000															
LEXCON	0.309	0.384	0.437	0.353	0.587	1.000														
LFDI	-0.087	-0.182	-0.155	-0.087	0.077	0.073	1.000													
LFDI_INST	-0.016	-0.104	-0.100	-0.010	0.172	0.153	0.993	1.000												
LGDP_GROWTH_RATE	-0.003	-0.114	-0.055	-0.042	0.075	-0.046	0.741	0.734	1.000											
LGDP_PC	0.573	0.628	-0.150	0.863	0.315	0.374	0.223	0.287	0.198	1.000										
LGOVSTAB	-0.047	-0.002	0.185	-0.015	0.384	0.523	0.216	0.265	0.260	0.072	1.000									
LINCON	0.300	0.296	0.370	0.319	0.745	0.532	0.081	0.165	0.106	0.335	0.290	1.000								
LINST_AVER	0.578	0.631	0.438	0.632	0.803	0.682	0.057	0.176	0.027	0.563	0.435	0.716	1.000							
LINVPRO	0.236	0.236	0.175	0.268	0.311	0.267	0.157	0.227	0.065	0.286	0.112	0.386	0.600	1.000						
LLAWORD	0.244	0.289	0.202	0.333	0.261	0.244	0.058	0.122	-0.099	0.301	0.003	0.228	0.545	0.930	1.000					
LMILPOL	-0.009	0.021	0.432	0.029	0.546	0.467	0.028	0.085	0.198	0.071	0.703	0.404	0.473	0.157	-0.004	1.000				
LPOP_GROWTH_RATE	-0.357	-0.497	0.025	-0.666	-0.029	0.016	0.246	0.215	0.148	-0.547	0.210	-0.034	-0.231	-0.114	-0.232	0.169	1.000			
LRELTEN	0.540	0.552	-0.156	0.609	0.199	0.205	0.033	0.103	-0.148	0.566	-0.080	0.243	0.586	0.594	0.655	-0.228	-0.380	1.000		
LSOCIO_ECON	0.579	0.655	0.238	0.674	0.530	0.497	-0.030	0.068	-0.136	0.592	0.121	0.440	0.817	0.630	0.674	0.147	-0.389	0.838	1.000	
LTRADE_OPENNESS	-0.301	-0.266	-0.022	-0.312	-0.334	0.000	-0.168	-0.216	-0.229	-0.388	-0.182	-0.315	-0.417	-0.306	-0.185	-0.298	0.212	-0.289	-0.283	1.000

Source: Author's own calculations using E-views

3.9. Full Sample with Countries Endowed with Strategic Natural Resources Included

3.9.1. Previous economic growth rate and economic growth

The results of the estimated panel dynamic GMM models are shown in Table 3.5 across all the estimated models. The results indicate that there is a positive relationship between the previous year's economic growth rate (LGDP_Growth_Rate (-1)[6]) and economic growth of the host country. The results are further justification for the use of the dynamic panel GMM estimation technique. This is in line with the findings of Alfaro and Johnson (2013), who concluded that FDIs' impact on economic growth depends on initial host-country conditions such as the previous year's economic growth.

3.9.2. FDI and economic growth

The effect of FDI on economic growth is both negative and positive across the estimated models. Gui-Diby (2014) had similar findings and concluded that FDI has a mixed impact on the host country's economic growth, depending on the period under study. Similarly, Edwards et al. (2016) and Zilinske (2010) claim that there are positive and negative effects of FDI on the host country's economic growth.

Another study by Alfaro et al. (2006) failed to confirm that FDI has a positive influence on the host country's economic growth. Instead, the results were mixed and consistently found either no effect of FDI on host countries' firms' productivity and/or aggregate growth or negative effects. This is contrary to popular belief by policymakers that FDI generates positive productivity externalities for host countries.

[6] The relationship is statistically significant at the 10 percent level of significance.

However, the effect of FDI on economic growth varies across countries partially due to the heterogeneity of institutions. This view is supported by McCloud and Kumbhakar (2012), who agree that institutional qualities are the main reason why different countries have different absorptive capabilities, hence a heterogeneous FDI-growth relationship.

Table 5: Full Sample Institutions, FDI and Economic Growth

GMM Estimated Models full Sample															
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15
LGDP_GROWTH_RATE(-1)	2.15	1.99	1.99	2.09	1.97	2.02	1.81	2.27	1.95	1.92	1.92	1.98	1.72	1.81	1.92
	**(0.08)	**(0.09)	**(0.09)	(0.12)	(0.16)	(0.11)	**(0.05)	(0.15)	(0.10)	(0.1)	**(0.09)	(0.10)	**(0.06)	**(0.05)	**(0.07)
LGDP_PC	-1.69	-1.48	-1.48	-1.60	-1.54	-1.54	-1.25	-1.85	-1.42	-1.40	-1.41	-1.47	-1.16	-1.25	-1.37
	(0.29)	(0.34)	(0.34)	(0.37)	(0.34)	(0.42)	(0.32)	(0.38)	(0.36)	(0.35)	(0.34)	(0.35)	(0.34)	(0.32)	(0.33)
LDOMESTIC_INVESTMENT	0.06	0.05	0.05	0.06	0.06	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.03	0.04	0.05
	(0.63)	(0.66)	(0.66)	(0.65)	(0.63)	(0.70)	**(0.10)	(0.71)	(0.66)	(0.66)	(0.68)	(0.66)	(0.72)	**(0.10)	(0.64)
LFDI	0.06	0.06	0.19	0.16	-0.19	0.26	-0.27	-0.69	0.20	0.06	0.36	0.20	0.57	-0.27	-0.27
	(0.38)	(0.34)	(0.66)	(0.73)	(0.77)	(0.69)	(0.63)	(0.53)	(0.64)	(0.89)	(0.52)	(0.75)	(0.30)	(0.63)	(0.68)
LTRADE_OPENNESS	0.13	0.12	0.12	0.12	0.13	0.12	0.11	0.17	0.12	0.11	0.10	0.12	0.09	0.11	0.12
	(0.36)	(0.34	(0.35)	(0.38)	(0.44)	(0.37)	(0.32)	(0.34)	(0.35)	(0.39)	(0.41)	(0.36)	(0.38)	(0.32)	(0.33)
LPOP_GROWTH_RATE	-0.43	-0.39	-0.39	-0.41	-0.46	-0.41	-0.35	-0.53	-0.38	-0.36	-0.36	-0.39	-0.34	-0.35	-0.37
	(0.27)	(0.30)	(0.30)	(0.32)	(0.37)	(0.31)	(0.26)	(0.33)	(0.31)	(0.34)	(0.32)	(0.31)	(0.26)	(0.26)	(0.28)
LINST_AVER		-0.13													
		(0.76)													
LFDI_INST			-0.13	-0.10	0.27	-0.20	0.35	0.79	-0.14	0.00	-0.30	-0.14	-0.51	0.35	0.33
			(0.76)	(0.82)	(0.67)	(0.73)	(0.53)	(0.48)	(0.74)	(0.99)	(0.59)	(0.81)	(0.35)	(0.53)	(0.60)
LBURQUAL				-0.07											
				(0.75)											
LDEMACC					-0.96										
					(0.21)										
LMILPOL						0.06									
						(0.88)									
LRELTEN							-0.16								
							(0.17)								
LSOCIO_ECON								-0.23							
								(0.31)							
LCORRUPT									0.03						
									(0.89)						
LETHTEN										-0.24					
										(0.6)					
LEXCON											0.15				
											(0.65)				
LGOVSTAB												0.01			
												(0.98)			
LINCON													0.26		
													(0.39)		
LLAWORD														0.16	
														(0.17)	
LINVPRO															-0.12
															(0.29)
Observations	276.00	276.00	276.00	276.00	257.00	257.00	276.00	270.00	276.00	276.00	276.00	276.00	276.00	276.00	276.00
R- Squared	58.53	49.67	49.67	54.93	52.37	52.05	38.62	64.30	47.58	46.66	46.04	49.43	36.50	51.00	43.81
** denotes significance at 10%															

Source: Author's own calculations using E-views

3.9.3. GDP per capita and economic growth

The results indicate that there is a negative relationship across all the estimated models between the initial levels of GDP per capita and economic growth in the SADC host countries. This could be interpreted to mean that countries that start from a rich base tend to grow at a slower pace than those starting from a poor base. This result is not in line with *a priori* expectation and the market size and output hypothesis. GDP per capita is an indicator of the size of the market and hence the expectation is that a higher GDP per capita should promote more FDI inflows, which will then translate to economic growth for the host country. However, most of the FDI into the SADC countries is resource-based, thus, the motive for FDI into the SADC countries is mainly resource extraction and not market seeking (Asiedu & Lien, 2011).

3.9.4. Trade openness and economic growth

There is a positive relationship between trade openness and the economic growth of the host countries across all estimated models. Therefore, an increase in trade openness leads to an increase in the host country's economic growth. Open trade makes it possible for countries to import and export goods and services, in the process promoting economic activities and economic growth. These are similar to the findings by Stancheva-Gigov (2016), El-Wassal (2012), and Batten and Vo (2009), who all concluded that the effect of

FDI on the host countries' economic growth is positive and significant when the countries are open to trade. Furthermore, trade openness increases economic growth through efficiency gains.

3.9.5. Domestic investment and economic growth

The level of domestic investment is positively associated with the economic growth of the host countries across all estimated models. This is in line with *a priori* expectations. Domestic investment adds to foreign capital and economic growth. The findings are supported by the conclusion of De Mello (1999), who argued that the extent to which FDI impacts on economic growth depends on the degree of complementarity and substitution between FDI and domestic investment. Sengupta and Ntembe (2015) also concluded that domestic capital influences economic growth in SSA rather than USA FDI. Thus, the SADC region can promote economic growth by mobilising domestic resources which will compliment FDI.

3.9.6. Population growth rate and economic growth

Although the population growth rate should be one of the key drivers of economic growth in classical economics, the case is different for SSA and SADC countries, in particular. The population growth rate is negatively associated with economic growth across all estimated models for the SADC countries. This could be because SSA and SADC countries still lag behind in terms of investment in physical capital, hence the increase in population will translate into a decrease in the capital-labour ratio. This means a decrease in TFP and a decrease in economic growth.

3.9.7. Institutions and economic growth

As expected, the results indicated that there is a negative relationship between institutions and economic growth for the SADC countries, because the quality of institutions for this group of countries is weak. A country with poor institutions is likely to experience economic challenges such as low levels of investment, low productivity growth, and slow output growth. The quality of institutions also influences capital accumulation. If the institutions are poor, the host country is likely to attract low technology and resource-based FDI with limited growth effect.

This is in line with the findings of Adeleke (2014), who determined that many African countries have weak governance structures that are a constraint to economic growth. To further prove that the average quality of institutions is poor for SADC countries, the interaction term of FDI and institutions yielded a negative relationship with economic growth. Jude and Leviuege (2017) also concluded that institutional quality affects the effect of FDI on the host country's economic growth.

3.9.8. Democracy and economic growth

The empirical results showed that there is a negative effect between democratic accountability and economic growth for the SADC countries. This is not in line with *a priori* expectations, as an increase in democratic accountability is expected to be associated with an increase in economic growth. This point is supported by Malikane and Chitambara (2017), who concluded that countries with strong democratic institutions benefit more from the presence of FDI in terms of economic growth. However, the results confirm the arguments of Cao (2009), who claimed that democractic institutions have a

conflicting impact on FDI inflows, and ultimately, the economic growth of the host country.

3.9.9. Investment promotion and economic growth

The coefficient of investment promotion is negative. Thus, an increase in investment promotion leads to a decrease in economic growth for the host countries' economies. The results are, however, not statistically significant. This could be because of the poor institutions in SADC countries. This point is supported by the findings of Adeleke (2014), who concluded that African countries must improve their governance structures if they want to increase economic growth. The same sentiments are shared by Batten and Vo (2009), who stated that countries that intend to attract more FDI should ensure the institutional variables are improved in order for FDI to have a maximum impact on the host countries' economic growth.

3.9.10. Corruption and economic growth

Ideally, corruption should lead to lower investor confidence and, in the process, discourage future foreign investments. However, in 1964 Nathaniel Leff claimed that embracing corruption could help with government inefficiencies, and an increase in corruption leads to an increase in economic growth for the host country. This is not in line with *a priori* expectations. It should be acknowledged that the link between corruption and economic growth is not direct, but through FDI inflows into the host country.

One logical explanation for this anomaly could be the existence of strategic natural resources in the selected SADC countries, which will mean that MNCs will ignore all the negative institutional variables and invest in corrupt countries. The usual effects of FDI on the host country's economy will then kick in, and economic growth will thus be experienced. A country with vast mineral deposits is often claimed to have positive effects which may outweigh the impact of institutional factors. A case in point is Nigeria, Angola and Zimbabwe, where there is corruption, but the high returns from the extractive industries seem to compensate for the negative factors such as corruption, institutional quality, and political instability in attracting FDI inflows (Cleeve, 2012).

Some countries which are deemed to be corrupt, for example, Sudan and Nigeria (as measured by the corruption index) received a larger share of FDI inflows compared to countries which were deemed less corrupt, such as South Africa, Mauritius and Botswana. Ali and MacDonald's (2010) study also concluded that institutions do not matter in determining FDI flows in the primary sector. This leads to the discussion in the next sub-section, where countries that are endowed with strategic natural resources are removed from the sample.

3.9.11. Law and order, government stability, religious and ethnic tensions and economic growth

Other institutional variables, such as the increase in law and order, government stability and a decrease in religious and ethnical tensions all show the right signs in terms of their impact on the host country's economic growth. This is in line with *a priori* expectations and the findings of other studies. A study by Adhikary (2011), on Asian countries, concluded that a combination of FDI and good institutional variables, such as the rule of law, property rights, political stability and the absence of violence lead to economic

growth. De Mello (1999) also found that the FDI-growth nexus is highly sensitive to country-specific factors, which include the kind of institutions in those countries.

3.10. Sub-sample that Excludes Natural Resource-endowed Countries

This section presents the results for the sub-sample that excludes countries endowed with strategic natural resources. These countries lie above the mean of the indicator of natural resource endowment. In terms of control variables, the empirical results are almost the same as those of the preceding section, except that under the sub-sample, the results are statistically significant. The models' results are presented in Table 6.

Table 6: Institutions, FDI and Economic Growth- Sub-sample without Resource-Endowed Countries

GMM Estimated Models Sub Sample Without Resource Endowed Countries															
Variables	Model 16	Model 17	Model 18	Model 19	Model 20	Model 21	Model 22	Model 23	Model 24	Model 25	Model 26	Model 27	Model 28	Model 29	Model 30
LGDP_GROWTH_RATE(-1)	1.41	1.29	1.29	1.22	1.04	1.25	1.27	1.28	1.39	1.25	1.06	1.38	1.28	1.25	1.26
	*(0.00)	*(0.00)	*(0.00	*(0.00	*(0.01)	*(0.00)	*(0.00)	*	*(0.01)	*(0.00)	*(0.00)	*(0.01)	*(0.00)	*(0.00)	*(0.00)
LGDP_PC	-0.76	-0.61	-0.61	-0.50	-0.38	-0.52	-0.52	-0.59	-0.72	-0.59	-0.33	-0.71	-0.59	-0.52	-0.54
	(0.21)	(0.32)	(0.32)	(0.38)	(0.48)	(0.35)	(0.35)	(0.32)	(0.32)	(0.33)	(0.43)	(0.33)	(0.35)	(0.34)	(0.33)
LDOMESTIC_INVESTMENT	0.06	0.04	0.04	0.04	0.01	0.05	0.03	0.02	0.04	0.05	0.03	0.05	0.04	0.03	0.03
	(0.43)	(0.52)	(0.52)	(0.58)	(0.85)	(0.49)	(0.60)	(0.74)	(0.61)	(0.50)	(0.54)	(0.52)	(0.55)	(0.60)	(0.59)
LFDI	0.09	0.09	0.22	0.27	0.68	0.08	-0.25	-0.37	0.16	0.09	0.71	-0.03	0.25	-0.01	-0.02
	**(0.05)	***(0.03)	(0.45)	(0.33	***(0.03)	(0.83)	(0.58)	(0.45)	(0.63)	(0.79)	*(0.01)	(0.96)	(0.54)	(0.96)	(0.96)
LTRADE_OPENNESS	0.08	0.08	0.08	0.07	0.05	0.07	0.10	0.10	0.09	0.07	0.03	0.09	0.08	0.08	0.08
	(0.24)	(0.24)	(0.24)	(0.23)	(0.46)	(0.30)	(0.14)	(0.16)	(0.25)	(0.32)	(0.32)	(0.25)	(0.25)	(0.21)	(0.21)
LPOP_GROWTH_RATE	-0.24	-0.22	-0.22	-0.19	-0.15	-0.21	-0.25	-0.26	-0.24	-0.18	-0.12	-0.26	-0.21	-0.21	-0.21
	(0.16)	(0.19)	(0.19)	(0.20)	(0.38)	(0.18)	(0.12)	(0.13)	(0.20)	(0.31)	(0.32)	(0.21)	(0.18)	(0.17)	(0.17)
LINST_AVER		-0.13													
		(0.66)													
LFDI_INST			-0.13	-0.18	-0.57	-0.01	0.33	0.47	-0.07	0.02	-0.62	0.11	-0.16	0.09	0.10
			(0.66)	(0.51)	**(0.07)	(0.98)	(0.45)	(0.33)	(0.83)	(0.96)	***(0.03)	(0.83)	(0.71)	(0.79)	(0.78)
LBURQUAL				-0.21											
				(0.33)											
LDEMACC					0.36										
					(0.18)										
LMILPOL						-0.15									
						(0.59)									
LRELTEN							-0.11								
							0.15)								
LSOCIO_ECON								-0.14							
								**(0.09)							
LCORRUPT									-0.32						
									(0.36)						
LETHTEN										-0.23					
										(0.48)					
LEXCON											0.40				
											***(0.02)				
LGOVSTAB												-0.11			
												(0.60)			
LINCON													0.02		
													(0.93)		
LLAWORD														-0.07	
														(0.22)	
LINVPRO															-0.07
															(0.24)
Observations	185.00	185.00	185.00	185.00	166.00	185.00	179.00	179.00	185.00	185.00	185.00	185.00	185.00	185.00	185.00
R- Squared	10.98	9.26	9.26	7.91	6.04	8.10	7.95	8.49	10.60	9.04	5.78	10.79	8.95	8.19	8.38

** denotes significance at 10%, *** denotes significance at 5 percent and *denotes significance at 1 percent. Numbers in parethensis represents the p-value

Source: Author's own calculations using E-views

3.10.1. Previous rate of economic growth, domestic investment, trade openness and economic growth

The previous rate of economic growth, the level of domestic investment, and trade openness all positively impacted the host countries' economic growth. The previous year's economic growth proved to be an especially important determinant of the current economic growth rate by being significant at one percent level of significance for all 15 estimated models. This is in line with the empirical findings of Alfaro and Johnson (2013), who determined that the effect of FDI on economic growth depends on the host country's initial conditions, including the previous rate of economic growth.

3.10.2. FDI and economic growth

The effect of FDI on the host countries' economic growth is proven to be both negative and positive and significant at five and 10 percent levels of significance, depending on the institutional variable with which it interacted. This shows that FDI and institutions on their

own, without the existence of strategic natural resources, can contribute to economic growth for SADC countries. Similarly, Gui-Diby (2014) and Edwards et al's. (2016) studies reported that FDI has a mixed impact on the host country's economic growth, depending on institutional quality.

Significantly, FDI on its own, without institutional variables, can lead to an increase in economic growth for the SADC countries. This is contrary to the findings of many researchers such as Jude and Leviuge (2017) and Saini et al. (2010), who concluded that, on its own, FDI does not have an impact on the host country's economic growth. Countries with higher levels of FDI inflows experience high productivity in the export sector compared to those with low levels of FDI. Furthermore, FDI is significant in improving factor productivity and makes it possible for domestic firms to be linked with foreign firms, hence it creates linkages that will aid in economic growth. FDI is associated with globalisation, and it is this association that has increased the spread of technology across borders. Thus, through FDI and globalisation, host countries can gain access to foreign knowledge. The increasing use of available foreign knowledge and technology boosts the innovation capacity and labour productivity for domestic firms; according to Coady et al. (2019), knowledge flows from global technology leaders between 2004 and 2014 were estimated to have increased labour productivity by 0.7 percent for developing countries.

3.10.3. FDI/institutions and economic growth

The results show that the interaction of FDI and institutions has both a negative and positive effect on the host country's economic growth. The results are statistically significant at the five and 10 percent level of significance. This is in line with the findings of other researchers such as Jude and Leviuge (2017), who concluded that institutional quality affects the effect of FDI on the host country's economic growth. Saini et al. (2010) also claim that FDI on its own does not have an impact on the host country's economic growth; instead, institutional quality plays a role.

3.10.4. Democracy and economic growth

Under the full sample, an increase in democratic accountability was negatively associated with economic growth. This could have been due to the presence of strategic natural resources where dictatorship is favoured by MNCs. However, after removing countries endowed with strategic natural resources, an increase in democratic accountability leads to an increase in economic growth. The results are in line with the findings of Malikane and Chitambara (2017), who concluded that countries with democratic institutions benefit more from the presence of FDI. This shows the importance of institutions in amplifying the effect of FDI on economic growth without the natural resource bias to impact on MNCs' decision making. However, it is not statistically significant.

3.10.5. Corruption and economic growth

Likewise, an increase in corruption is associated with a decrease in economic growth. This result is contrary to the findings of the full sample, which included resource-endowed countries, indicating the resource bias element where MNCs overlook poor institutional indicators if the host country is endowed with strategic natural resources. This is in line with *a priori* expectations and the findings of Wiljeweera et al. (2010), who concluded that corruption has a negative impact on economic growth.

3.10.6. Military in politics and economic growth

Under the full sample, an increase in military involvement in politics led to an increase in economic growth. This is not in line with *a priori* expectations, perhaps due to the existence of strategic natural resources. However, under the sub-sample, which excludes countries with strategic natural resources, a military increase in politics is associated with a decrease in economic growth. This is in line with *a priori* expectations, and further highlights the importance of good institutions aiding economic growth.

3.10.7. Investment promotion and economic growth

The results show a negative effect of investment promotion on economic growth, the same finding as that under the full sample. This can be interpreted to mean that other institutional indicators are more important compared to the investment promotion institutional indicator. This is supported by the findings of Batten and Vo (2009), who concluded that countries that intend to attract more FDI inflows should first ensure that the other institutional indicators are of good quality. However, the results are not statistically significant, meaning that SADC countries can still take deliberate action to promote investment in their respective economies. This view is supported by Egan (2015), who argued that host countries have to deliberately establish and promote investment-promoting agencies and efficient institutions in a bid to attract FDI inflows.

3.10.8. Institutions and economic growth

Overall, the results show that through FDI, institutions can have an indirect role in influencing economic growth. Thus, government stability, a reduction in corruption, less military involvement in politics, democratic accountability and enhanced regulatory quality and governance structures can lead to better economic growth outcomes for SADC countries. The results of the estimated models for the sub-sample without resource-endowed countries are presented in Table 3.6.

4. Conclusion and Policy Recommendations

The chapter examined the interrelationships among institutions, FDI and economic growth for SADC countries. The study examined how FDI interacts with institutions to promote economic growth in various country environments, with the exclusion of countries endowed with strategic natural resources. A panel dynamic GMM technique with Windmeijer corrected standard errors and orthogonal deviations was used to empirically examine the interrelationship among institutions, FDI, and economic growth for SADC countries.

The interrelationship among institutions, FDI, and economic growth differs, depending on country characteristics, including initial host-country conditions. The reviewed literature highlighted that initial host-country conditions and their absorptive capacities determine FDI's effect on economic growth. There is a need to increase the absorption capacity of the host country to ensure FDI's maximum impact on economic growth. These absorptive capacities include human capital, trade openness, institutions, macro-economic stability and the initial levels of GDP per capita. There is heterogeneity in terms of absorptive capacities due to the differences in the quality of institutions. This therefore means SADC countries require a targeted approach to FDI.

The results of the study showed that SADC countries have relatively weak institutions, which, in turn, affect FDI's impact on economic growth. The study clearly showed that the quality of institutions determines the effect of FDI on economic growth. As the institutional variables improve, so does the impact of FDI on economic growth. This is more evident in the sub-sample without resource-endowed countries. For example, there is a negative correlation between corruption and economic growth, indicating that a reduction in the level of corruption is associated with an increase in economic growth, while an increase in corruption is associated with a decrease in economic growth.

Thus, institutions indirectly affect economic growth for the SADC countries through the interaction with FDI. However, the institutions' interactions and FDI effect on economic growth is both negative and positive, regardless of whether or not the countries are endowed with strategic natural resources.

The results also show that for countries that are not endowed with strategic natural resources, FDI and institutions on their own can promote economic growth. Thus, as a policy recommendation, SADC governments, especially those without strategic natural resources, should aim to implement policies that improve the quality of their institutions and FDI promotion. Thus, non-resource FDI has a direct and significant effect on the host country's economy, as it tends to create more jobs. Furthermore, there is a higher level of technology transfer and an increased supply of domestic inputs to the MNC as it relies on host countries for inputs.

Significantly, the results of the study show that FDI on its own can actually increase the level of economic growth for SADC countries. Therefore, SADC countries should implement measures that promote FDI inflows as a major determinant of economic growth in the region. This could include tax incentives, a reduction in the interest rate, a reduction of red tape and the provision of other incentives. However, the undertaking of rigorous investment promotion activities in the respective economies should be done simultaneously with an improvement in governance structures.

Furthermore, reforms should target improving the socio-economic dimensions, political stability, and law and order; reduce corruption; improve the levels of democratic accountability; and reduce the involvement of the military in politics. Governments in SADC countries should ensure fully developed financial sectors to derive the maximum benefits from FDI inflows. Furthermore, SADC countries should put together policies to boost human capital as a way of building up their absorptive capacities.

The level of domestic capital investment is of paramount importance in boosting the domestic country's economic growth. Thus, there is a complementary relationship between the host country's economic growth and the level of domestic capital investment. It is therefore vital that as a policy recommendation, SADC countries should increase domestic capital investment to promote economic growth.

References

Adeleke, A. (2014). FDI-Growth Nexus in Africa. Does governance matter?, *Journal of Economic Development, 39(1),* 111-135.

Ahmed, A. (2010). *Essays on foreign direct investment, institutions and economic growth*. PhD thesis. Scotland: University of Glasgow.

Alfaro, L. and Johnson, M. S. (2013). *Foreign direct investment and growth.* In Caprio, G. (ed.), *The evidence and impact of financial globalization* (pp. 299-308). UK / USA: Elsevier Inc.

Alfaro, L. (2003): *Foreign direct investment and growth: Does the Financial sector matter?* Working Paper, Harvard: Harvard Business School.

Aurangzeb, Z. and Stengos, T. (2014). The role of foreign direct investment in a dualistic growth framework: A smooth coefficient semi- parametric approach. *Journal of Borsa Istanbul Review, 14,* 133-144.

Baltabaev, B. (2014). Foreign direct investment and total factor productivity growth: New Macro Evidence. *The World Economy, 37(2),* 311-334.

Batten, J. and Vo, X. (2009). An analysis of the relationship between foreign direct investment and economic growth. *Journal of Applied Economics, 41(13),* 1621-1641.

Beugelsdijk, S., Smeets, R. and Zwinkels, R. (2008). The impact of horizontal and vertical FDI on host country's economic growth. *Journal of International Business Review, 17(4),* 452-472.

Busse, M. and Groizard, J. L. (2008).Foreign direct investment, regulations and growth. *Journal of the World Economy, 31(7),* 861-886.

De Mello, L. R. (1999).Foreign direct investment-led growth: Evidence from time series and panel data. *Oxford Economic Papers, 51(1),* 133-151.

De Mello, L. R. (1997). Foreign direct investment in developing countries and growth: A selective survey. *The Journal of Development Studies, 34(1),* 1-34.

Durham, J. B. (2004). Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. *Journal of European Economic Review, 48(2),* 285-306.

Dutta, N. and Roy, S. (2011). Foreign direct investment, financial development and political risks. *The Journal of Developing Areas, 44(2),* 303-327.

Edwards, J. A., Romero, A. A. and Sadjadi, Z. M. (2016). Foreign direct investment, economic growth, and volatility: A useful model for policymakers. *Journal of Empirical Economics, 51(2),* 681-705.

Gui-Diby, S. L. (2014). Impact of foreign direct investments on economic growth in Africa: Evidence from three decades of panel data analyses. *Journal of Research in Economics, 68(3),* 248-256.

Iamsiraroj, S. and Ulubasoglu, M. A. (2015). Foreign direct investment and economic growth: A real relationship or wishful thinking? *Journal of Economic Modelling, 51(C),* 200-213.

Jayaraman, T. K., Choong, C. K. and Fatt Ng, C. (2017). Foreign direct investment and growth of India. Does financial sector development help in improving absorptive capacity? *International Journal of Business and Society, 18(1),* 171-188.

Jude, C. and Levieuge, G. (2017). Growth effect of foreign direct investment in developing economies: The role of institutional quality. *The World Economy, 40(4),* 715-742.

Kapingura, F. M., Ikhide, S. and Tsegaye, A. (2018).Determinants of external financial flows to the Southern African development community region. An empirical study. *Global Business and Economic Review, 20(2),* 141-160.

Karim, M. and Abu, N. (2016). The relationship between foreign direct investment, domestic savings, domestic investment and economic growth: The case of Sub-Saharan Africa. *Journal of Society and Economy, 38(2),* 193-217.

Li, X. and Liu, X. (2004). Foreign direct investment and economic growth: An increasingly endogenous relationship. *Journal of World Development, 33(3),* 393-407.

Mehic, E., Silajdzic, S. and Hodovic, V. (2016). The impact of FDI on economic growth: Some evidence from Southeast Europe. *Emerging Markets Finance & Trade, 49(1),* 5-20.

Omri, A. and Kahouli, B. (2014). The nexus among, foreign direct investment, domestic capital and economic growth: Empirical evidence from MENA region. *Journal of Research in Economics, 68(3),* 257-263.

Parežanin, M., Jednak, S. and Kragulj, D. (2016). The impact of FDI on the economic growth of Serbia. *Journal of Sustainable Business and Management Solutions in Emerging Economies, 21(78),* 25-32.

Su, Y. and Liu, Z. (2016). The impact of foreign direct investment and human capital on economic growth: Evidence from Chinese cities. *Journal of China Economic Review, 37(C),* 97-109.

Suliman, A. and Elian, M. (2014). Foreign direct investment, financial development and economic growth: A cointegration model. *Journal of Developing Areas, 48(3),* 219-243.

Wijeweera, A., Villano, R. and Dollory, B. (2010). *Economic growth and FDI inflows: A stochastic frontier analysis*. Australia: University of New England.

Williams, K. (2017). Foreign direct investment, economic growth, and political instability. *Journal of Economic Development, 42(2),* 17-37.

Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics, 126,* 25-51.

Zilinske, A. (2010). Negative and positive effects of foreign direct investment. *Journal of Economics and Management, 15,* 332-336.

Review of Socio-Economic Perspectives **Varela, M. & Salazar, G., pp. 51-81**
Vol. 5 Issue: 3/ September 2020

TAX DECENTRALIZATION AND ECONOMIC GROWTH IN LATIN AMERICA: EVIDENCE OF PANEL DATA: 2000-2018

Amílcar Marcelo Varela Enríquez [1]
Gustavo Adrián Salazar Espinoza [2]

Abstract

The objective of this research is to determine the relationship between fiscal decentralization and economic growth for Latin America from a heterodox perspective based on the research question, what is the relationship between fiscal decentralization and economic growth? For this, the evidence and the empirical works, as well as the methodologies used, which are contrasted to determine their viability are widely discussed. The methodology used is an ordinary least squares model based on balanced panel data to correct possible errors, that is, a panel data specification model that measures the fixed and random effects that combine appropriate interest variables with variables of interest, control to avoid bias of mutual causality. The tests applied for the selection of the most appropriate estimators determine that the null hypothesis is accepted that a greater fiscal decentralization affects economic growth, in which the public investment of the Latin American countries from the application of decentralization, it has allowed its impact on per capita GDP to be stronger. Finally, the null hypothesis is accepted and there is no structural change in the slopes of the model in the public investment variable. So, it is not necessary to create dummy variables to pick up the change in the public investment coefficient.

Keywords: Fiscal decentralization, economic growth, panel data, GDP per capita, public investment.
JEL Codes: O43; H77; C33

Citation : Varela, M & Salazar, G.. (2020). Tax Decentralization and Economic Growth in Ltin America : Evidence of Panel Data : 2000-2018, *Review of Socio-Economic Perspectives, Vol 5(3)*, 51-81.

Article Type: Research Article
Application Date: 15.05.2020 **& Admission Date:** 26.07.2020
DOI: 10.19275/RSEP088

[1] Universidad Central del Ecuador / Instituto de Altos Estudios Nacionales, Av. Universitaria, Quito 170129 Ecuador
ORCHID ID: 0000-0003-4721-8229
E-mail: avarela@uce.edu.ec & marcelo.varela@iaen.edu.ec

[2] Universidad Central del Ecuador, Av. Universitaria, Quito 170129 Ecuador
ORCHID ID: 0000-0003-4942-0842
E-mail: adriansalazar20@hotmail.com

1. Introduction

The relationship between fiscal decentralization and economic growth has always been manifested from the neoclassical perspective, in which the representative agent and the stimulus of taxes on economic activity have been the ruler to determine this relationship. In addition, private income has been considered as a fundamental variable in relation to economic growth. From Tiebout, Musgrave and Oates, until today, the relationship between fiscal decentralization and economic growth has been defined from the conditionality of the inverse relationship, that is, how the level of economic growth is affected by fiscal decentralization, and all studies have marked positive relationships.

In the present study, it is a matter of turning this neoclassical understanding of measuring this relationship between economic growth and fiscal decentralization from the representative agent, to move on to a heterodox vision of measurement from the field of investment and public consumption, as determinants of economic growth, from defining the existence or not fiscal decentralization. This different approach must allow us to understand the actions of the state through public policy, to promote the conditions of economic growth, based on a process of decentralization that allows the state to generate, through investment and public consumption, the necessary conditions so that the relationship between economic growth and fiscal decentralization has a direct relationship with investment and public consumption.

This alternative approach seeks to present the role of the state as the revitalizer of the economy, hence the importance of measuring the relationship of economic growth and fiscal decentralization from the definition of investment and public consumption, as determining variables in a process of fiscal decentralization, defining for this also the existence of fiscal decentralization or not, a dummy variable, in a dynamic of change of economic growth measured from investment and public consumption, before and after decentralization.

Furthermore, this approach aims to capture the role of the state, not only as an engine of the economy in a process of fiscal decentralization, but as a determinant of social improvements. This understanding defines whether the state, at any level of government, applies a fiscal policy of greater income generation, these should via investment and public consumption generate the necessary conditions for the economy and social conditions to improve, since from the year 1980, Latin America becomes one of the geoFigureical areas that present the greatest inequality worldwide, a situation that has made it increasingly necessary to apply public policies that aim at a sustained improvement in the redistribution of income and wealth. In this sense, fiscal policy plays a fundamental role, considering fiscal policy as the set of public income and expenditure policies applied in order to guarantee the economy and the social conditions of the population, in distributive spheres (Varela, 2009).

Although the literature and evidence on the relationship between decentralization and economic growth, have been referred to the analysis of the representative agent, income and incentives to the private sector, in this study we neglect this approach to focus on investment and consumption (spending) in Latin American and its impact on economic growth. For this, we consider two stages of study, the first between 2000 and 2009, a period where there was no regulation on decentralization, and the second between (2010-2018), where regulations on decentralization already prevail.

In the international arena, the theoretical interest on the relationship between economic growth and fiscal decentralization dates back to the 50s of the previous centuries. Several studies at international level have been developed in this regard: Tiebout (1956), Musgrave (1959) and Oates (1972, 1993); and currently with studies by Martínez-Vázquez and McNab (2003), Brueckner (2006), Carrión i Silvestre, Espasa and Mora (2008); Rodríguez and Escurra (2009); Feld, Kirchhanner and Schalteger (2012); Baskaran (2012); Kappeler, Solé-Ollé, Stephan, Bird (2013), Blöchliger (2013); Cournéde, Lagos and Martínez Vasquez (2017).

All of the above have focused on the main agent and the incentive for investment and private consumption, as mechanisms for the relationship between decentralization and economic growth. In the present study, we will no longer focus on the main agent and the private sector as an engine in the relationship between decentralization and economic growth, but we will refer to the public sector as the engine of this relationship, a situation that frames us in a different approach to that traditionally He has analyzed the relationship between decentralization and economic growth.

In an alternative approach, Braña and Serna (1997), analyze the decentralization of public spending competencies, giving a different direction to the analysis of fiscal decentralization as a fundamental part of spending, that is, it is analyzed from the demand side. Likewise, there are studies as part of the analysis of the variables that would affect economic growth in relation to a greater or lesser decentralization tied to public investment spending as in De Mello (2010), Sachhi and Salotti (2011); Kappeler, et al (2013); Kis-Katos and Suharnoko (2017).
Studies of the inverse relationship, that is, how the level of economic growth is affected by fiscal decentralization have marked positive relationships as presented by Oates (1972), Woo (1977), Pommerehne (1977), Bahl and Nath (1986), Wasylenko (1987), Panizza (1999), Stansel (2005); Balaguer et al (2010); Kappeler et al (2013), Kis-Katos and Suharnoko (2017).

The aforementioned demonstrates that relationship between fiscal decentralization and economic growth. However, we must emphasize that all studies have focused on analysis at the country level, or on federations but in developed countries. In developing countries such as Ecuador there are no studies in this regard, but studies have been conducted in Colombia at the regional level but considering the restriction of the representative agent in a function of production of constant yields with standard preferences of a representative household based on the Ramsey-Cass-Koopmans model. For the Ecuadorian case, we will focus on a fiscal decentralization model focused on provincial public investment and spending as a function of public goods production that depends on the financing of public goods of the provincial councils.

2. Literature Review

2.1. Fiscal Decentralization and Economic Growth: Theoretical Studies

From the traditional view, Hatfield and Prado (2012) reviewed the classic problem of fiscal competition in the context of federal nations and derive a positive theory of partial decentralization. This theory explains that using redistributive taxes on capital to provide public goods means that high taxes establish what is supposed to result in a small stock of

capital that decreases the returns of redistribution, so all this leads to a lower level of taxes on capital, and this must be done by establishing in the Constitution a partial degree of decentralization.

Martínez, Vásquez, Lago Peñas and Sacchi (2015), examine two crucial but not yet resolved issues in the decentralization literature: its correct measurement and the possible endogeneity of fiscal decentralization with many of the variables of interest that we are trying to investigate, and point out that decentralization is motivated by quite different reasons. In recent decades, a large number of countries have sought decentralization as a means to seek a more efficient and effective public sector. Other countries were disenchanted with the performance of previous planning and centralized policies. In fact, fiscal decentralization addresses how the public sector is organized and how to create opportunities for greater growth and well-being.

These authors indicate that fiscal decentralization can indirectly affect poverty and income distribution in innumerable ways (for example, through growth, the degree of institutional development, the size of government intervention in the economy, the quality of governance) and the final impact depends on the specific characteristics of each decentralization process. The relevance of this fact is that many countries simultaneously implemented policies aimed at reducing income inequality and poverty, as well as in fiscal decentralization reforms.
Davoodi and Zou (1998) analyzed the per capita growth rate in relation to the decentralization of public expenditure and income on the Gross Domestic Product in a conglomerate study of 46 countries.

De Melo and Barenstein (1996) in a study for 29 countries analyzed the growth rate per capita in relation to the decentralization of spending considering the tax autonomy ratio. Martínez-Vásquez and McNab (2002) in a study for 52 countries analyzed the growth rate per capita in relation to the decentralization of expenditure and the decentralization of income. Xie, Zou and Davoodi (1999) in a study for the US analyzed the per capita growth rate in relation to the decentralization of spending and the ratio of public revenue to national GDP.

There are also studies at regional level within the countries, we can mention those conducted by Zhang and Zou (2001) who in a study for 28 Chinese provinces analyzed the rate of growth of income and provincial Gross Domestic Product based on the decentralization of the expenditure, public revenues on the national Gross Domestic Product and different categories of expenditure at central and provincial level. Feld, Kirchhanner and Schalteger (2012) in a study for 26 Swiss cantons analyzed the rate of per capita per capita growth in relation to the cantonal decentralization of expenditure, cantonal decentralization of income, leveling transfers received by the canton, fiscal competence indicator and Canton fragmentation indicator.

Agundez (2002) in a study for 15 autonomous communities in Spain with a common financing regime analyzed the regional growth rate per capita based on the self-sufficiency ratio of regional public spending over regional GDP. Rodríguez et al (2009) in a study for 17 autonomous communities in Spain with a common financing regime analyzed the regional difference in the growth rate of the Gross Domestic Product per capita based on the difference in the level of regional public expenditure per capita. All these studies have

determined the variables to be used to establish the relationship between fiscal decentralization and economic growth at the regional or local level.

Feld, Baskaran and Schnellenbach (2012) found that the distribution of competences between the different levels of a federal system can have very significant effects on economic growth, mainly due to the contribution that regions of a country make to economic development, so Both the central government's economic policy has an impact on regional policies. While Angus and Yang (2012) developed an endogenous growth model with indirect effects of public goods, Leviatán taxation, and mobile capital to examine the relative merits of centralized and decentralized tax systems

2.2. Fiscal Decentralization and Economic Growth: Empirical Studies

What is intended in this part is to review the empirical evidence that marks the relationship between fiscal decentralization and economic growth, for which studies that determine that relationship will be analyzed, trying to show in detail the proposals, models, contributions and limitations. In the same way, it is proposed to analyze models directed to the expenditure approach and not to the representative agent.

Heng Fu Zou in 1996 considered two levels of government, one local and one federal, both levels of government with its own income based on consumption taxes, transfers between levels of governments and budgetary balances. With this, based on the accumulation of local public capital, it draws a regional economic growth model to examine "how variations in taxes and transfers affect the long-term equilibrium values of consumption and the stock of private capital, as well as the consumption and stock of local public capital "(Zou, 1996, p. 12).

From a dynamic system, it establishes four differential equations and four endogenous variables: public consumption and private consumption, and public capital and local private capital. This dynamic system is obtained from a utility function of the family (producer) based on private consumption (c) and local public consumption (E). Under these conditions, the total income of the local government will be determined by what it receives from the central government, this is taxes and transfers, and its expenditure determined by the consumption and local investment of the public sector. Assume again a balanced budget in such a way that you have: τs and $+ \tau c\ c + \alpha\ k\dot{}s + \beta E = k\dot{}s + E$, determining with this equation a budgetary restriction of local and central governments.

Xie et al. (1999), like Zou, determined a framework of understanding from a CES production function: $y = [\alpha\ k\ \zeta + \beta\ f\ \zeta + \gamma\ s\ \zeta + \omega\ l\ \zeta]\ 1 / \zeta$ with $- \infty < \zeta < 1$; where ζ is a substitution parameter, the elasticity of constant substitution. Following the same procedure as Zou (1996), the authors arrive in the long term to determine the rate of growth of per capita income, and in contrast to the previous work "determine the maximizing tax rate of economic growth (τ *)", that is, the tax rate that influences economic growth (Xie et al., 1999, p. 8).

Unlike the works of Davoodi and Zou (1998) or Xie et al. (1999), in the work of Akai & Sakata (2002) due to the condition that each local government taxes income differently, it cannot be considered a single consolidated budget restriction for the different levels of government, but two budgetary restrictions are considered different, one for the local government and one for the national government. Subsequently, in order to establish the relationship between the structure of local government revenues and economic growth at

the country level, the following variables are specified: local government income and national government income that constitute "participation in the total of local revenues that involve transfers from the national government and own income, respectively"(Agúndez, 2002, p. 20).

With this statement, it defines the public expenditure ratio over national income to obtain "the value of income decentralization that maximizes the rate of local economic growth in the long term and the value of the ratio public expenditure on local income that also maximizes such growth" (Akai & Sakata, 2002, p. 25) with the objective of analyzing the distribution of local government resources to maximize economic growth from the two sources of financing, observing that according to the general case that is presented "the greater the Efficiency of the assets that finance a type of resources in the production function greater is the proportion of that type of resources in the optimal distribution "(Akai & Sakata, 2002, p. 23). Finally, the different types of taxation are defined, as well as the ratio of public expenditure to local income for particular cases.

These authors according to Xie et al. (1999) determined that when "the central transfers to the local government match the collection by the national income tax, the optimal decentralization of total local income coincides with the optimal decentralization of public expenditure" (Akai & Sakata, 2002, p. 24). Therefore, the optimal ratio of public spending to local income must necessarily have the same relationship as the tax rate applied, making this result the first model that measures the relationship between income decentralization and economic growth (Agúndez, 2002, p. 24).

With this statement, it defines the public expenditure ratio over national income to obtain "the value of income decentralization that maximizes the rate of local economic growth in the long term and the value of the ratio public expenditure on local income that also maximizes such growth" (Akai & Sakata, 2002, p. 25) with the objective of analyzing the distribution of local government resources to maximize economic growth from the two sources of financing, observing that according to the general case that is presented "the greater the Efficiency of the assets that finance a type of resources in the production function greater is the proportion of that type of resources in the optimal distribution "(Akai & Sakata, 2002, p. 23). Finally, the different types of taxation are defined, as well as the ratio of public expenditure to local income for particular cases.

These authors according to Xie et al. (1999) determined that when "the central transfers to the local government match the collection by the national income tax, the optimal decentralization of total local income coincides with the optimal decentralization of public expenditure" (Akai & Sakata, 2002, p. 24). Therefore, the optimal ratio of public spending to local income must necessarily have the same relationship as the tax rate applied, making this result the first model that measures the relationship between income decentralization and economic growth (Agúndez, 2002, p. 24) .

On the other hand, Zhang and Zou (2001) studied the effect of the composition of public spending on growth from what was stated by Devarajan (1996), that is, from a nested Cobb-Douglas production function, identify contributions in each level of government from different types of public spending. To do this, these authors work with an invariable tax rate with budgetary restriction that maximizes the profit reaching in the long term a higher per capita income from "the allocation of the public budget between different levels

of government and different types of capital within each of these levels "(Zhang and Zou, 2001, p. 11).

For the Latin American region, Lozano and Julio (2016) establish a panel data analysis to measure the relationship between fiscal decentralization and economic growth at the level of departments in Colombia. The applied model "takes as an initial reference a simple version of the endogenous growth model of Barro (1990), according to which the government acquires a fraction of the private sector's product to provide free public services to private producers (infrastructure services, rights ownership, among others)"…" In order to introduce the discussion on fiscal decentralization, government purchases are broken down between those financed by central, local and state authorities (Davoodi and Zou, 1998).

Therefore, the discussion about the role of government in growth not only refers to the typical advantages of a centralized or decentralized tax regime, but also to the indirect effects of public goods financed by the regions. The complementarity hypothesis is incorporated through a function of aggregate production of public goods, which depends in part on a broad set of public inputs financed by subnational governments (education and health programs, infrastructure, libraries, parks, rights of property, social services, among others) "" (p. 74).

3. Methodology

3.1. Methodology for the analysis of short panel data

This sub-section presents the methodology for the econometric analysis of panel data proposed by various authors. It is exposed initially, which implies the analysis of panel data, its advantages and disadvantages. Subsequently, the different types of models that can be made in short panels are detailed. Finally, the steps and test to follow to obtain the best estimators are established.

3.2. Types of models for panel data analysis

Generally, the starting point in longitudinal models is the grouped Ordinary Least Squares (MCO) model. According to Cameron and Trivedi (2009, p. 248), in this estimate the variations within (in time for an individual) and between (for individuals at the same time) are used simultaneously. The resulting estimators are consistent if the appropriate model is that of random effects and inconsistent in the opposite case. In addition, it assumes that the regressors do not relate to the error. It presents the following form in equation (1), where a common intercept is included and the individual effects (α-α) focus on zero:

$$y_{it} = \alpha + \beta_k X'_{it} + (\alpha_i - \alpha + \varepsilon_{it}) \quad (1)$$

This type of model has a variation, when considering the structure of the errors, giving rise to a grouped model FGLS or estimator of the averaged population. In it you can specify if the model presents, by way of example an autoregressive process of order one with the following specification of the error (2), where the model error presents a significant lag:

$$\mu_{it} = \rho_1 \mu_{it-1} + \varepsilon_{it} \quad (2)$$

The random effects estimator is consistent if this model is appropriate. This model assumes that the time-invariant component of the error can be treated as random and also does not relate to the regressors. It captures both individual effects over time and those between individuals. It presents the following specification containing a weighting and unobserved heterogeneity (3):

$$(y_{it} - \widehat{\theta_\iota}\bar{y}_i) = (1 - \widehat{\theta_\iota})\alpha + (X_{it} - \widehat{\theta_\iota}\bar{X}_\iota)'\beta_k + \left\{\left(1 - \widehat{\theta_\iota}\right)\alpha_i + (\varepsilon_{it} - \widehat{\theta_\iota}\overline{\varepsilon_{\iota t}})\right\} \qquad (3)$$

According to Cameron and Trivedi (2009, p. 256), the component (θ_i)ˆ is estimated consistently as shown in equation (4) It is worth mentioning that if (θ_i)ˆ= 0, then it is a case of grouped regression MCO. While if (θ_i)ˆ= 1, the model implies fixed effects.

$$\theta_i = 1 - \sqrt{\frac{\sigma_\varepsilon^2}{(T_i\,\sigma_\propto^2 + \sigma_\varepsilon^2)}} \qquad (4)$$

The fixed effects model (within) eliminates the individual effects not observed through the calculation of means. So, αi is removed from the equation. The model is consistent when appropriate, and inconsistent if the random effect is ideal. Efficient estimators are achieved despite endogeneity with the invariant component at the time of error. The model specification is as follows (5), an estimated intercept is included in the STATA program that expresses the average of the individual effects of αi, and the large means of: $\bar{\bar{y}}$, $\bar{\bar{X}}$, $\bar{\bar{\varepsilon}}$ (6).

$$(y_{it} - \bar{y}_i) = (X_{it} - \bar{X}_\iota)'\beta_k + (\varepsilon_{it} - \overline{\varepsilon_{\iota t}}) \qquad (5)$$

$$(y_{it} - \bar{y}_i + \bar{\bar{y}}) = \alpha + \left(X_{it} - \bar{X}_\iota + \bar{\bar{X}}\right)'\beta_k + (\varepsilon_{it} - \overline{\varepsilon_{\iota t}} + \bar{\bar{\varepsilon}}) \qquad (6)$$

Finally, if the fixed effects model is appropriate, one way to treat the endogeneity caused by omitted variables that do not change over time, is by calculating the estimator of the first differences. It provides better estimators than those of fixed effects if the regressors present lags in the first order. Present the following specification (7):

$$(y_{it} - y_{it-1}) = (X_{it} - X_{it-1})'\beta_k + (\varepsilon_{it} - \varepsilon_{it-1}) \qquad (7)$$

3.3. Process for selecting the appropriate estimators in panel data

According to Álvarez, Perdomo, Morales and Urrego (2013, p. 374), the beginning of the process consists in choosing between grouped least squares and fixed or random effects. So we start from the Breusch and Pagan test, which allows us to distinguish whether there are constant effects in the error term, which would imply a residual autocorrelation.

In that sense, an estimate of grouped least squares must be made and the Lagrange multiplier estimator applied to accept or reject the hypothesis. As a null hypothesis, there is no evidence of constant effects on the error, resulting in grouped MCOs presenting better estimators than fixed or random effects models.

If the null hypothesis is rejected in the previous test, it should continue to verify whether the fixed effects model prevails over the random effects model or vice versa. For which the Hausman test is applied, which raises as a null hypothesis the non-existence of endogeneity in the model, resulting in accepting the hypothesis that the estimators for random effects are adequate, otherwise the effect model must be applied fixed. In summary, the test compares the coefficients of both models and analyzes whether the differences are systematic.

Additionally, tests must be carried out to verify if the variables of the model have a unit root (non-stationarity). In addition to verifying the assumptions to obtain the best linear estimators: i) no high correlation between the regressors - not perfect multicollinearity; ii) constant variance of errors –homocedasticity-; iii) no serial correlation and / or autocorrelation in the model. To deal with heterocedasticity and that statistical inference is not prone to error, in STATA it is possible to use robust standard errors or cluster errors.

In addition, there is evidence of one (or several) components that vary between individuals but not in the time present in the error, which implies that there is heterogeneity not observed in the model. Therefore, fixed effects and random effects models prevail over the grouped MCO model. In addition, through the Hausman test it is observed that the appropriate model that provides better estimators is that of Fixed Effects.

However, because the series have a unit root, that is, they are stationary (variance and constant mean over time) in first differences, it is necessary to perform a transformation to avoid spurious regressions (finding false relationships due to trend factors). In that sense, an estimate of fixed effects is made by first differences, subtracting the first lag in time to each observation of the panel and estimating by MCO. So, the model would be defined as follows (8), it should be clarified that the sub-indices of the slopes were maintained, although their values and interpretation are not the same as the base model.

$$pibppl_{il} = \propto + \beta_1 cgpl_{il} + \beta_2 igpl_{il} + \beta_5 ppil_{il} + \beta_6 inf_{il} + \beta_7 rcel_{il} + \beta_8 pobl_{ij} + \mu_{il} \quad (8)$$

To facilitate nomenclature, in the regressions used in Stata, the first differences are identified by putting the capital letter "D" before each variable, for example: D_LNPPI expresses the first difference of the natural logarithm of the Investment of the GADs per capita. If constant (β_0) is included in the model, it implies that the original model has a temporal tendency as follows (9):

$$\delta t - \delta(t-1) = \delta \quad (9)$$

When transforming the variables, the interpretation of the estimators changes, so that, for example, the coefficient of D_LNCGPL in the grouped MCO model expresses how much the difference (in two consecutive years) of the CGPL changes (β_1 / 100) when it increases in 1% the difference of the natural logarithms (percentage variation) of the total income of the natural resources with respect to the GDP. That is, it approximates the impact of a percentage variation that has the weight of income towards the variation in units of the CGPL. The application of natural logarithms approximates the results to this type of analysis. For variables that do not have a logarithm, it is considered as a change in

the increase in units compared to a change of the same type. This is because in general terms the estimators are explained as follows:

$$\beta_k = \frac{\Delta E\left(\frac{y}{x}\right)}{\Delta \ln(x)} \approx \frac{\Delta E\left(\frac{y}{x}\right)}{\frac{\Delta x}{x}} \quad (10)$$

$$\frac{\beta_k}{100} \approx \frac{\Delta E\left(\frac{y}{x}\right)}{100 * \frac{\Delta x}{x}} \quad (11)$$

If the process of selecting better estimators and analysis of invariant component over time is replicated (see annexes), there is no evidence of constant effects on the model. Therefore, MCO and FGLS prevail over fixed or random effects. Additionally, to check if the estimators are appropriate, it is evident in the Hausman test with a 95% confidence level that random effects prevail in first differences. Giving green light, to the analysis of the estimators obtained by MCO and FGLS.

Table 1: Analysis of classic assumptions of the model and test used.

ASSUMPTION ANALYZED	CONDITION COMPLIANCE	CAUSES OF BREACHING	CONSEQUENCES OF BREACHING	APPLIED TESTS
No perfect multi-collinearity	The model should not present perfect or very high multicollinearity. That is, the model regressors must have a weak correlation.	Some causes are: incorrect specification of the model (overdetermination), shared trend in time series data, among others.	If there is perfect multicollinearity it is not possible to calculate the estimators. The confidence intervals are wider, so there is a tendency to accept zero hypotheses.	Matrix of correlations of the regressors (determinant). Inflation factor of the variance of the regressors.
Homocedasticity	The perturbations or errors of the model must be homocedastic (have the same variance). If this is not the case, the model presents heterocedasticity.	It can be generated by: outliers, asymmetric distribution of one or more return, incorrect functional form, among others.	The model has no minimum variance, so the inference made with the calculated confidence intervals is wrong (t and F tests).	Wald test. Estimation with robust errors or cluster.
Non-autocorrelation	The model should not present disturbances that	Some causes are: inertia between the	The estimators have no minimum variance. The	Test Wooldridge.

	are related to themselves over time.	study variables, specification bias by excluded variables present in the error, incorrect functional form, among others.	problem is similar to that of heterocedasticity, so inference should not be made with the traditional hypothesis tests t and F.	Correlation of errors.
Stationarity	Variables must have a constant mean and variance over time.	Or if not, the series is non-stationary. It can be generated by autoregressive processes of different order in the variable.	Spurious regressions are calculated, with a high R2 and individual significance, but their correlation represents the trend.	Unit root test Levin, Lin and Chu. Pesaran test.
Model specification	Model specification biases should be avoided, either by sub specification or over specification.	If a variable that is relevant to the model is omitted, sub specification is available. While if you include an irrelevant variable to the model you have an over specification.	In the case of sub specification the estimators have no minimum variance and the inference with hypothesis tests is not valid. While if there is a specification in the model the inference of the parameters are less precise.	Analysis of individual and global significance. Ramsey test.

Source: Author

3.4.Model specification

The model is defined as presented in equation [12]. The variable of interest in the model is the Investment of the GADs, to demonstrate the change in the slopes of the variable caused by the application of COOTAD, two dummys have been created and dummy variables have been constructed, described in equation [12].

$$pibppl_{il} = \propto + \beta_1 cgpl_{il} + \beta_2 igpl_{il} + \beta_5 ppil_{il} + \beta_6 inf_{il} + \beta_7 rcel_{il} + \beta_8 pobl_{ij} + \mu_{il} \quad (12)$$

$$pibppl_{il} = \propto + \beta_1 cgpl_{il} + \beta_3 igpld1_{il} D1 + \beta_4 igpld2_{il} + \beta_5 ppil_{il} + \beta_6 inf_{il} + \beta_7 rcel_{il} + \beta_8 pobl_{ij} + \mu_{il} \quad (13)$$

Where:

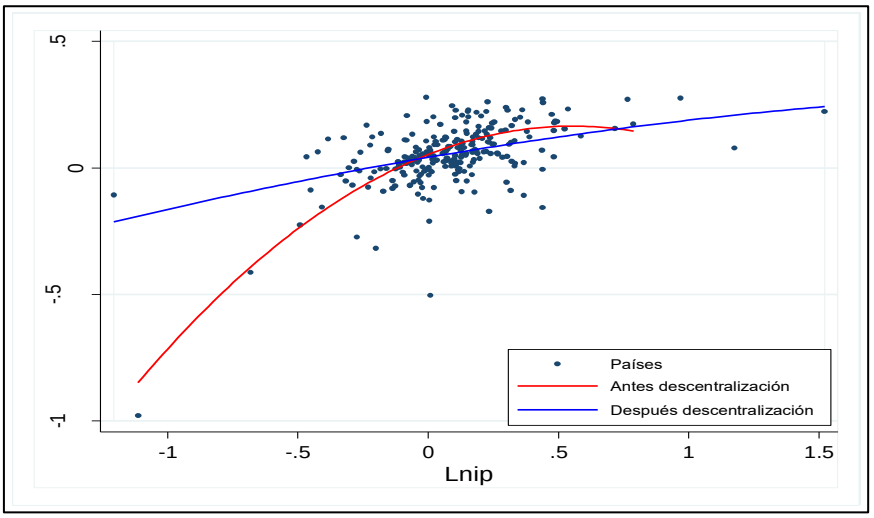
pibppl = First difference of the natural logarithm of the Provincial GDP per capita.
∝ = Trend effect of time in the model ∝_t-∝_ (t-1) = ∝.
cgpl = First difference of the natural logarithm of the Consumption of the GADs per capita.
lnppi = First difference of the natural logarithm of the Investment of the GADs per capita.
lnppid1 = First difference of the natural log of the Investment of the GADs per capita 2010-2018
lnppid2 = First difference of the natural log of the Investment of the GADs per capita 2000-2009
ppil = First difference of the natural log of income poverty.
inf = First difference of the national Inflation.
rcel = First difference of the ratio of National Foreign Trade.
pobl = First difference of the natural logarithm of the provincial Population.

4. Results

4.1. Descriptive Analysis

Figure 1 shows the evolutionary process of GDP growth per capita in Latin American countries, and in many of them, this greatest increase has occurred when public investment increases, that is, as Public Investment per capita increases, the GDP per capita also. This trend improves when the decentralization process occurs. In addition, the positive trend in all countries is shown, as greater fiscal decentralization (or going from non-decentralization to fiscal decentralization), greater public investment per capita generates greater growth per capita.

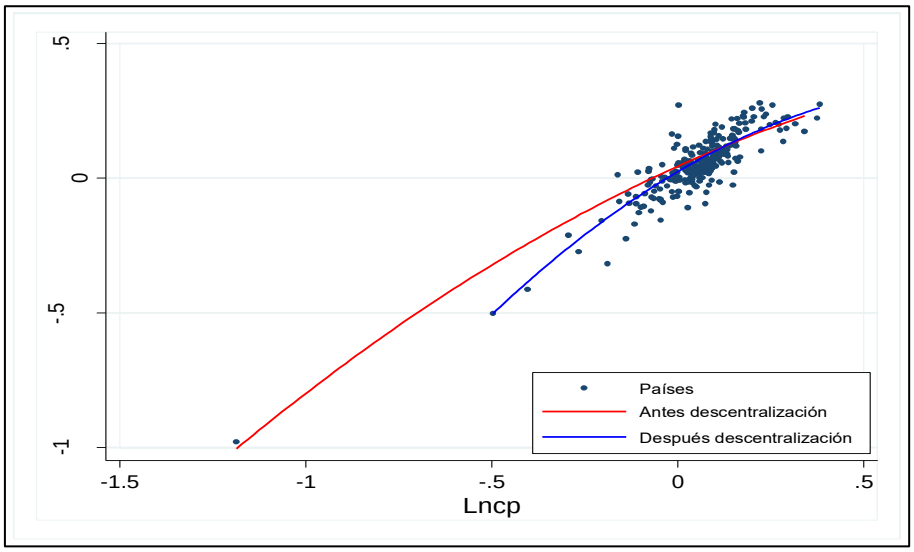
Figure 1: Relationship between GDP per capita and Public Investment, Latin America 2000-2018



Source: World Bank, ECLAC, Central Bank of Ecuador, Ministry of Economy and Finance. Elaboration: Authors.

Thus, Argentina, which begins a process of decentralization in 2010, GDP per capita improves, going from $ 8,357.5 in 2000 to $ 10,428.7 in 2010, reaching 2017 at 14,485.7, although 2018 decreases dramatically to 8,756, 6 dollars. In the same way, per capita investment has the same trend, going from $ 83.6 in 2000 to $ 281.6 in 2010, to reach $ 558.6 in 2014, and ending a decline in 2018 with 277.6 Dollars. This clearly shows that public investment within a decentralization process is a determining factor in the improvement of the GDP of the countries. Also, Figure 2 shows the same trend of decentralization in the relation GDP pc and Public Consumption per capita. In other words, the greater the growth in public consumption per capita, the GDP pc is higher, even more so when a process of fiscal decentralization has occurred.

Figure 2: Relationship between GDP per capita and Public Consumption, Latin America 2000-2018

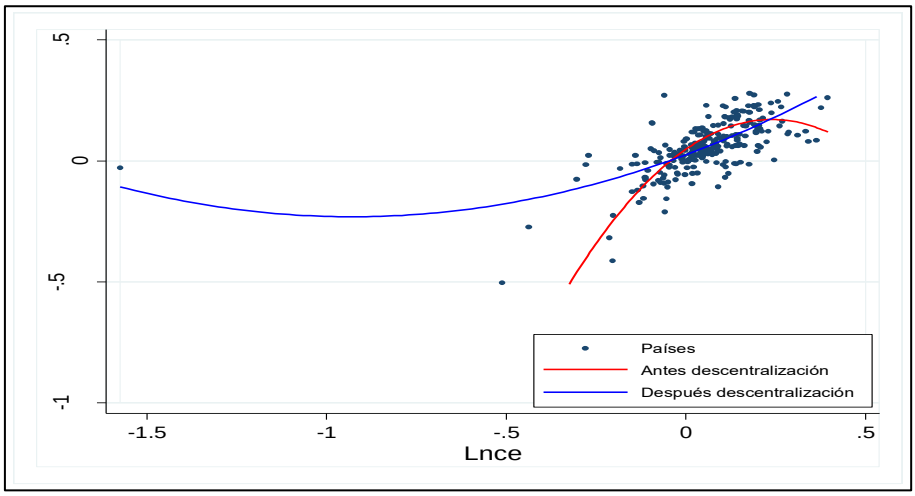


Source: World Bank, ECLAC, Central Bank of Ecuador, Ministry of Economy and Finance. Elaboration: Authors.

In Ecuador, for example, the GDP pc goes from 1,444.6 dollars in 2000 to 4,633.6 in 2010, when the decentralization process begins. This goes hand in hand with the growth of public consumption per capita that goes from $ 202.2 in 2000 to $ 653.3 in 2010. Already in the decentralization process, GDP pc increases to $ 6,344.9 in 2018, in conditions where public consumption per capita increases to $ 968.2 in 2018. The positive trend in figure 2 shows this directly proportional relationship between GDP pc and Public consumption pc, and upon greater decentralization, the trend is better.

Figure 3 also shows a positive relationship between GDP pc and the ratio of foreign trade, in all Latin American countries. This positive trend shows that if exports grow higher than imports, GDP pc will be higher, although this relationship is not directly marked by whether or not it has a decentralization process, this positive relationship of the foreign trade ratio (higher exports over imports) With respect to GDP pc, it is determined because a country with a positive foreign trade ratio does not generate a balance of payments problem, and therefore that country does not need to borrow to cover a trade deficit, but rather, has greater availability to allocate resources towards investment or public spending.

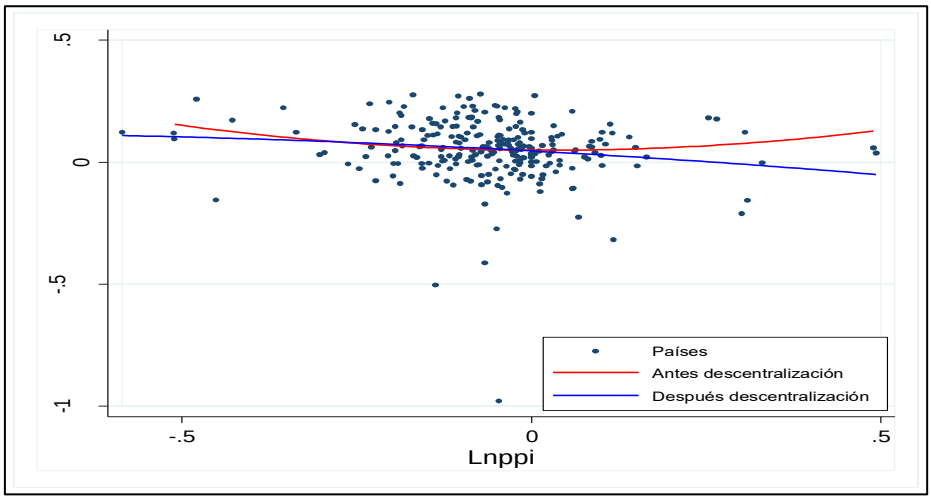
Figure 3: Relationship between GDP per capita and Foreign Trade, Latin America 2000-2018



Source: World Bank, ECLAC, Central Bank of Ecuador, Ministry of Economy and Finance. Elaboration: Authors.

In the Ecuadorian case, without decentralization the GDP pc and the foreign trade ratio are lower, with respect to values per capita in the process of decentralization. Thus, the GDP pc before decentralization is $ 4,231.62 on 2009 (the year before fiscal decentralization) and $ 6,344, 87 in 2018 (8 years after the decentralization process), the same happens with the trade ratio abroad, which went from $ 3,978.59 in 2009 (the year prior to fiscal decentralization) to $ 6,282.4 on 2018 (8 years after the decentralization process). This condition shows that is greater in the process of decentralization, the foreign trade improves, as a result of the increase in consumption and public investment, with a higher GDP pc. This relationship is shown in all countries, in the same way.

Figure 4: Relationship between GDP per capita and Poverty by Income, Latin America 2000-2018

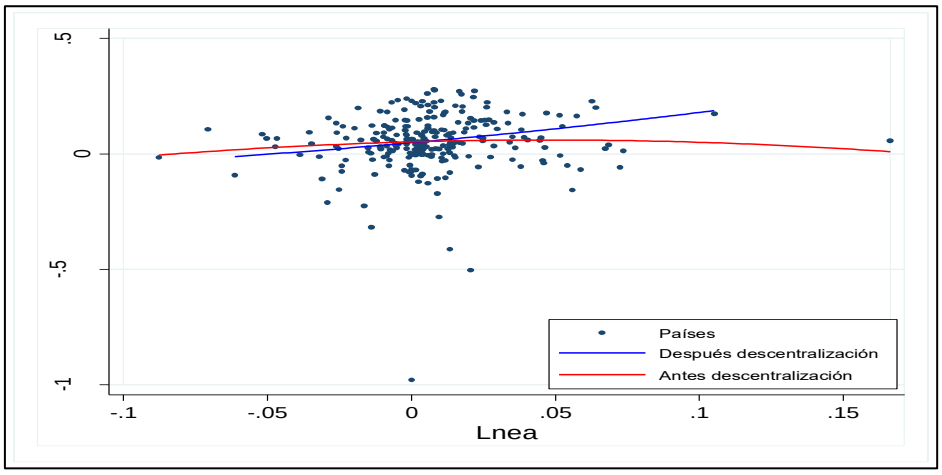


Source: World Bank, ECLAC, Central Bank of Ecuador, Ministry of Economy and Finance. Elaboration: Authors.

Figure 4 shows an inversely proportional relationship between GDP pc and income poverty, determined in the process of fiscal decentralization. In other words, as decentralization becomes greater, GDP pc will be greater and consequently income poverty will decrease. In the Ecuadorian case, income poverty is 64.7% on 2000 and it drops to 32.76% on 2010, before fiscal decentralization. In the process of fiscal decentralization, on 2010, income poverty is decreasing in Ecuador until reaching 21.5% on 2017. In addition, the GDP pc before decentralization is $ 4,231.62 on 2009 (year prior to fiscal decentralization) and from $ 6,344, 87 in 2018 (8 years after the decentralization process), while income poverty decreased by almost 13 percentage points, going from 36% (year prior to fiscal decentralization) to 23% , 2% on 2018 (8 years after the decentralization process), there are other factors that allow this reduction, those factors are mainly due to public investment. In other words, this inverse relationship between GDP pc and income poverty is actually marked by greater investment by the central government, in social areas.

Figure 5 shows a growing trend after decentralization in the relationship between GDP pc and adequate employment, in all Latin American countries. In other words, a greater process of fiscal decentralization accompanied by greater investment and public consumption per capita generates more adequate employment. Although there is a slight decrease on 2009 and 2015, possibly due to the impact of the world economic crisis, the Figure clearly shows an improvement in employment in decentralization processes. In the case of Ecuador, a more directly proportional relationship appears, but that does not happen with other countries such as Paraguay, for example. In Ecuador, for 2009, the year before decentralization, the adequate employment rate was 60.7%, while in 2018, 8 years after decentralization, the adequate employment rate increased to 66%.

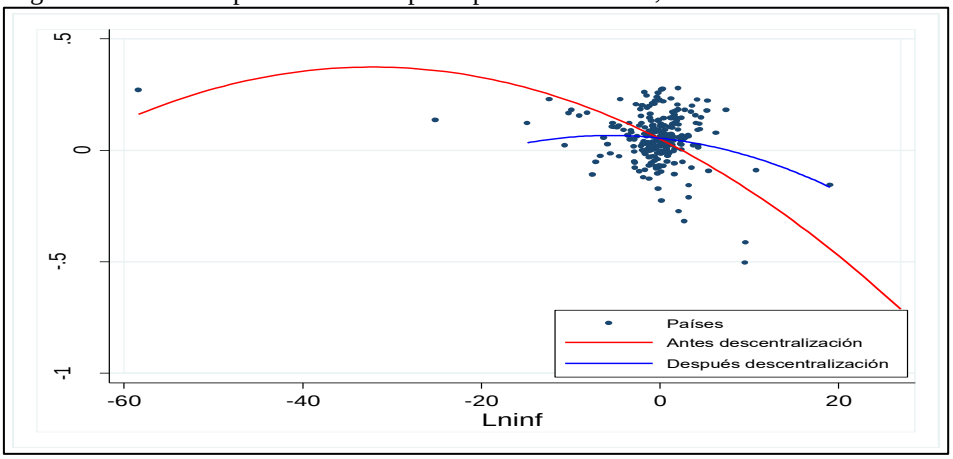
Figure 5: Relationship between GDP per capita and Adequate Employment, Latin America 2000-2018



Source: World Bank, ECLAC, Central Bank of Ecuador, Ministry of Economy and Finance. Elaboration: Authors.

Figure 6 illustrates a more stable inflation relationship in decentralization processes. Furthermore, this better behavior of inflation is accompanied by stability in GDP pc, produced because as the fiscal decentralization process manifests itself, public investment pc determines a higher GDP pc. In other words, in processes of greater decentralization, both GDP pc and inflation are more stable than in processes of fiscal non-decentralization.

Figure 6: Relationship between GDP per capita and inflation, Latin America 2000-2018



Source: World Bank, ECLAC, Central Bank of Ecuador, Ministry of Economy and Finance. Elaboration: Authors.

4.2. Empirical evidence

To present the results obtained from the 2000-2018 panel, 8 different models were carried out, with their different corrections for heterogeneity, autocorrelation, heterocedasticity, contemporary correlation; as well as the Ramsey, Wald, Breusch and Pagan, Hausmann, and Wooldridge tests. The models used were as follows:

1. The Pooled OLS model to omit the space and time dimensions of the pooled data and only calculate the usual OLS regression.

2. The model of random effects (Random Effects) that allows us to suppose that each transversal unit has a different intercept, it is assumed that the intercept of the regression is the same for all the transversal units.

3. The Fixed Effects model that does not assume that the differences between states are random, but constant or "fixed" —and therefore we must estimate each intercept.

4. The term fixed effects model (grade 1 autoregressive (AR1) that controls for the dependence of t with respect to t-1, which is performed when there is an autocorrelation problem.

5. The heteroskedasticity correction model (FGLSH), although the Breusch and Pagan Test works, according to Greene (2000), this and other tests are sensitive to the assumption about the normality of the errors; Fortunately, Wald's Modified test for Heteroskedasticity works even when that assumption is violated. For this reason, running this model corrects this problem.

6. The contemporary correlation model (FGLSC) to correct correlation problems when the observations of certain units are correlated with the observations of other units in the same period of time. In other words, we have contemporaneously correlated errors if there are unobservable characteristics of certain units that are related to unobservable characteristics of other units.

7. The autocorrelation correction model (FGLSHA) is used to address the violation of the OLS estimators when the errors of different units are correlated (contemporary correlation), or when the errors within each unit are temporarily correlated (serial correlation), or both.

8. The heteroskedasticity correction model, contemporary correlation and autocorrelation that is used to solve together with Feasible Generalized Least Squares (FGLS) estimators with Corrected Standard Errors for Panel (Panel Corrected Standard Errors or PCSE). Since Beck and Katz (2001) demonstrated that PCSE standard errors are more accurate than FGLS. Since then, many papers in the discipline have used PCSE in their panel estimates.

The results obtained from the econometric panel data model are presented in Table 2 to the first differences in the series of 14 Latin American countries in the period 2000-2018. It is evident that, in all the models, there is a positive and significant impact of investment and public consumption towards GDP per capita. According to decentralization, there are two effects: public investment per capita has a greater impact on processes after decentralization, while public consumption per capita generates a greater impact on processes without decentralization.

Table 2: Econometric Model Results, Latin America 2000-2018

Variable	MCO (1)	EA (2)	EF (3)	AR1 (4)	FGLSH (5)	FGLSC (6)	FGLSHA (7)	FGLSCA (8)
lnipsd	.12047475***	.12518566***	.12835083***	.11434156***	.12608589***	.10102858***	.11912324***	.09712954***
lnipcd	.03303982*	.03164152*	.03062708*	.04300891**	.04994615***	.03598811***	.05787951***	.04209329***
lncpsd	.52561969***	.51963683***	.51568029***	.53511478***	.52458437***	.52312235***	.53313259***	.52634599***
lncpcd	.7202313***	.72144066***	.72204181***	.70701805***	.69628216***	.67989077***	.68923933***	.67371089***
lncesd	.291002***	.29478152***	.29781627***	.30117286***	.29757497***	.30619302***	.30634766***	.31451226***
lncecd	.11945474*	.11764838*	.11638794*	.12098985*	.14203499***	.11213607***	.14360335***	.11479884***
infsd	-.00294632***	-.00303338***	-.00309342***	-.00295514***	-.00289161***	-.00361158***	-.00289168***	-.00359133***
infcd	-.0012676	-.00110309	-.00099052	-.00110281	.00011521	-.0016428***	.00032251	-.00147886***
lnppisd	.0083599	.00311514	-.00126755	.01796154	-.01180195	-.00266847	-.00518892	.00364227
lnppicd	-.04253462*	-.03660966	-.03256611	-.05080212*	-.04167019*	-.03826087***	-.0453136***	-.04219796***
lneasd	-.17633366	-.18142996	-.18217191	-.14599634	-.22223492	-.17768257*	-.16453264	-.14576963*
lneacd	.50829436**	.51885813**	.52518621**	.47906542**	.40862625***	.5399689***	.38380472***	.52224707***
_cons	-.00308173	-.00290944	-.00280079	-.00354923	-.00340403	.0011664	-.00392494	.00056687
N	252	252	252	252	252	252	252	252
r2	.85894693		.86455732					
re_o								
r2_b		.65739286	.6475475					
r2_w		.86450567	.86455732					
sigma_u		.01444556	.01292429					
sigma_e		.04859954	.04859954					
rho		.08117753	.06604999					

*Elaboration: Authors. Note: d: * p<.15; ** p <.05; *** p<.01*

In order to present Table 2, the first-order Wooldridge autocorrelation test was previously performed, as well as the regression correlation matrix, and the autocorrelation correction, which presented an adequate fit of the model, as presented in tables 3, 4, 5. It is important to note that even though we have modeled temporal and spatial heterogeneity in our model, the equation may be poorly specified in other respects. Recall that according to the Gauss-Markov assumptions, the OLS estimators are the Best Linear

Bias Estimators (MELI) as long as the errors are independent of each other and are identically distributed with constant variance. Unfortunately, these conditions are often violated in panel data: independence is violated when errors from different units are correlated (contemporary correlation), or when errors within each unit are temporarily correlated (serial correlation), or both. In turn, the "identical" distribution of errors is violated when the variance is not constant (heteroskedasticity). In this section we will address the problem of serial correlation or "autocorrelation"; that is, when errors are not independent with respect to time. In our example, it is highly likely that the level of spending at t is associated with the level of spending at t-1.

There are many ways to diagnose autocorrelation problems. However, each of these tests works under certain assumptions about the nature of the individual effects. Wooldridge developed a very flexible test based on minimum assumptions that can be run on Stata with the xtserial command. The null hypothesis of this test is that there is no autocorrelation; naturally, if it is rejected, we can conclude that it does exist, for this we carry out the autocorrelation test, as Table 5 indicates.

Table 3: Wooldridge test in first differences, Latin America 2000-2018

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
F (1, 13) = 0.000
Prob > F = 0.9838

Elaboration: Authors

The test indicates that we have an autocorrelation problem that needs to be corrected. One way to do this is through a term fixed effects model (ρ) Grade 1 autoregressive (AR1) that controls for the dependence of t with respect to t-1. The AR1 model with fixed effects is specified as: $Y_{it} = v_i + \beta_1 X_{1it} + e_{it}$, where $e_{it} = \rho e_{i,t-1} + \eta_{it}$, that is, errors have a first-degree correlation, ρ.

Table 4: Correlation matrix of the regressors in first differences, Latin America 2000-2018

	Lnipsd	lnipcd	lncpsd	lncpcd	lncesd	Lncecd	infsd
Lnipsd	1.000						
Lnipcd	-0.0356	1.000					
Lncpsd	0.6614	-0.0450	1.000				
Lncpcd	-0.0510	0.4162	-0.0645	1.000			
Lncesd	0.4074	-0.0589	0.6070	-0.0844	1.000		
Lncecd	-0.0279	0.2467	-0.0353	0.5237	-0.0462	1.000	
Infsd	-0.4441	0.0228	-0.3867	0.0327	-0.1580	0.0179	1.000
Infcd	0.0002	0.0383	0.0002	-0.1333	0.0003	-0.1383	-0.0001

Lnppisd	-0.0978	0.0585	-0.1454	0.0838	-0.1734	0.0459	0.0688
Lnppicd	0.0454	-0.0763	0.0575	-0.2083	0.0752	-0.1318	-0.0291
Lneasd	0.3420	-0.0535	0.2703	-0.0767	0.2128	-0.0420	-0.0738
Lneacd	-0.0237	0.1028	-0.0300	-0.0535	-0.0392	-0.0700	0.0152

	Infcd	lnppisd	lnppicd	lneasd	lneacd
Infcd	1.000				
Lnppisd	-0.0003	1.000			
Lnppicd	-0.1091	-0.0746	1.000		
Lneasd	0.0002	-0.1606	0.0683	1.000	
Lneacd	0.0956	0.0389	-0.0353	-0.0356	1.000

Elaboration: Authors.

In table 5, correction of the autocorrelation, we can see how investment and public consumption do not present autocorrelations and are significant at 99% with a chi2 probability of 100%.

Table 5: Autocorrelation Correction, Latin America 2000-2018

Cross-section time-series FGLS regression						
Coefficients	generalized least	squares				
Panels:	heteroskedastic					
Correlation:	common AR (1)	coefficient for all panels		(-0.0855)		
Estimated covariences		14		Number of obs =		252
Estimated autocorrelations		1		Number of groups =		14
Estimated coeficients		13		Time periods =		18
				Wald chi2(12) =		1889.24
				Prob >chi2 =		0.0000
Lnpibp	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Lnipsd	.1191232	.0245967	4.84	0.000	.0709145	.167332
Lnipcd	.0578795	.0149701	3.87	0.000	.0285386	.0872204
Lncpsd	.5331326	.0452295	11.79	0.000	.4444845	.6217807
Lncpcd	.6892393	.0396902	17.37	0.000	.6114479	.7670307
Lncesd	.3063477	.048948	6.26	0.000	.2104113	.4022841
Lncecd	.1436033	.0249644	5.75	0.000	.0946741	.1925326
Infsd	-.0028917	.000625	-4.63	0.000	-.0041167	-.0016666

Infcd	.0003225	.001233	0.26	0.794	-.0020942	.0027392
Lnppisd	-.0051889	.029533	-0.18	0.861	-.0630726	.0526948
Lnppicd	-.0453136	.0232661	-1.95	0.051	-.0909144	.0002872
Lneasd	-.1645326	.18585	-0.89	0.376	-.528792	.1997268
Lneacd	.3838047	.1318786	2.91	0.004	.1253274	.642282
_cons	-.0039249	.0030826	-1.27	0.203	-.0099668	.0021169

Elaboration: Authors.

Finally, we run the autocorrelation model to find out if the problem was corrected, and the results show us the improvements in pc GDP due to increases in public investment after decentralization with a significance of 1%.

Table 6: Autocorrelation Model, Latin America 2000-2018

Cross-section time-series FGLS regression						
Coefficients generalized least squares						
Panels:	Heteroskedastic					
Correlation:	common AR (1) coefficient for all panels				(-0.0855)	
Estimated covariences		14		Number of obs	=	252
Estimated autocorrelations		1		Number of groups	=	14
Estimated coeficients		13		Time periods	=	18
				Wald chi2(12)	=	1889.24
				Prob >chi2	=	0.0000
Lnpibp	Coef.	Std. Err.	Z	P>|z|	[95% Conf. Interval]	
Lnipsd	.1191232	.0245967	4.84	0.000	.0709145	.167332
Lnipcd	.0578795	.0149701	3.87	0.000	.0285386	.0872204
Lncpsd	.5331326	.0452295	11.79	0.000	.4444845	.6217807
Lncpcd	.6892393	.0396902	17.37	0.000	.6114479	.7670307
Lncesd	.3063477	.048948	6.26	0.000	.2104113	.4022841
Lncecd	.1436033	.0249644	5.75	0.000	.0946741	.1925326
Infsd	-.0028917	.000625	-4.63	0.000	-.0041167	-.0016666
Infcd	.0003225	.001233	0.26	0.794	-.0020942	.0027392
Lnppisd	-.0051889	.029533	-0.18	0.861	-.0630726	.0526948
Lnppicd	-.0453136	.0232661	-1.95	0.051	-.0909144	.0002872
Lneasd	-.1645326	.18585	-0.89	0.376	-.528792	.1997268
Lneacd	.3838047	.1318786	2.91	0.004	.1253274	.642282
_cons	-.0039249	.0030826	-1.27	0.203	-.0099668	.0021169

Elaboration: Authors

Table 7 describes the tests applied to select the most appropriate estimators. The null hypothesis (Ho) that the model does not present omitted variables with the Ramsey Test is accepted. The null hypothesis (Ho) is accepted that the model does not present problems of heteroscedasticity with the Wald test. The model does not present first order autocorrelation, the Wooldridge Test is accepted because there is no autocorrelation. With the Breusch and Pagan Test, OLS estimators prevail over fixed effects (EF) or Random Effects (EA). And with the Hausman test the fixed effect estimators (EF) prevail. These tests show that the model is properly adjusted.

Table 7: Tests applied to the model in first differences Latin America, 2000-2018

Test	Null Hypothesis (Ho)	Prob>" Estadístics"	Result
Test Ramsey	Model does not present omitted variables	0.0176	Ho accepted with significance of 1%
Test de Wald	Sigma (i) ^ 2 = Sigma ^ 2 for all i, there is constant variance	0.0000	Constant variance Ho is rejected and we accept Ha for heteroskedasticity
Test Wooldridge	No first order autocorrelation	0.9838	Ho is accepted with a significance of 1%.
Test Breusch y Pagan	Non-observable component that generates heteroscedasticity. Var(u)=0	0.3393	Ho is accepted. MCO model prevails before EF or EA.
Test Hausman	Non-systematic difference in the coefficients	0.2592	Ho prevails EF model over EA.

Elaboration: Authors.

Table 8 presents the interpretation of the regressor coefficients for the pooled OLS model. To summarize, a positive effect of decentralization is observed, measured by government consumption per capita, going from an effect of 0.58% to 0.71%. Additionally, it is observed how other control variables used in the model negatively affect GDP per capita, such as inflation and income poverty (significant at 20%). For their part, foreign trade and adequate employment positively affect GDP per capita. The rest of the model results are presented in annexes.

Table 8: Interpretation of grouped model OLS betas Latin America, 2000-2018.

Variable	Nomenclature B	Significative:	Value B	Interpretation
Lnipsd	β_1	1%	0. 1204748	Faced with a 1% increase in lnipsd differences, on average lnpibp differences are expected to increase by 0.12%.
Lnipcd	β_2	14%	0. 0330398	Faced with a 1% increase in lnipcd differences, it is expected that on average lnpibp differences will increase by 0.03%.

Variable	Nomenclature B	Significative:	Value B	Interpretation
Lncpsd	β_3	1%	0. 5256197	Faced with a 1% increase in lncpsd differences, on average lnpibp differences are expected to increase by 0.52%.
Lncpcd	β_4	1%	0. 7202313	Faced with an increase of 1% in the differences in lance, it is expected that on average the differences in lnpibp will increase by 0.29%.
Lncesd	β_5	1%	0. 291002	Faced with an increase of 1% in the differences in lance, it is expected that on average the differences in lnpibp will increase by 0.11%
Lncecd	β_6	13%	0.1194547	Faced with a unit increase in the differences in inf it is expected that on average the differences in pibpl will decrease by 0.002%.
Infsd	β_7	1%	-0. 0029463	Faced with a unit increase in the differences in inf it is expected that on average the differences in pibpl will decrease by 0.001%.
Infcd	β_8	53%	-0. 0012676	Faced with a unit increase in the differences in inf it is expected that on average the differences in pibpl will decrease by 0.001%.
Lnppisd	β_9	76%	0.0083599	Faced with a 1% increase in lnppi differences, it is expected that on average lnpibp differences will increase by 0.01%.
Lnppicd	β_{10}	12%	-0. 0425346	Faced with a 1% increase in lnppi differences, it is expected that on average lnpibp differences will decrease by 0.04%.
Lneasd	β_{11}	69%	-0. 1763337	Faced with a 1% increase in line differences, it is expected that on average the lnpibp differences will decrease by 0.17%.
Lneacd	β_{12}	2%	0. 5082944	Faced with a 1% increase in line differences, it is expected that on average the lnpibp differences will increase by 0.50%.

Source: Authors

Table 9 shows how the unit root test shows the correction and adjustment of the model with a significance level of 100%.

Table 9: Unit Roots Test Latin America, 2000-2018

Test de raíces unitarias: Levin-Lin-Chu unit-root			
		Statistic	p-value
Lnip	Unadjusted t	-12.1526	

	Adjusted t*	-6.0960	0.0000
Lncp	Unadjusted t	-10.6973	
	Adjusted t*	-4.4153	0.0000
Lnce	Unadjusted t	-11.1249	
	Adjusted t*	-4.4670	0.0000
Inf	Unadjusted t	-20.4291	
	Adjusted t*	-12.9796	0.0000
Lnppi	Unadjusted t	-12.9493	
	Adjusted t*	-6.0184	0.0000
lnea	Unadjusted t	-13.7053	
	Adjusted t*	-7.7150	0.0000

Elaboration: Authors.

4.3. Structural change test:

To verify if the results presented in the three models correspond to a structural change in the slopes of investment and consumption per capita of the governments, the following chow test or structural change test is applied, described in equation [8].

$$Fexp = \frac{\frac{SCR_R - SCR_{SR}}{q}}{\frac{SCR_{SR}}{n-k}} \qquad (8)$$

Donde:

Fexp= Xperimental stadístics $Fexp \sim F_{n-k}^{q}$

q = Number of parameters subjected to contrast.
n = Number of observations included in the sample.
k = Number of parameters to estimate of the model under alternative hypothesis.
In such a way that the restricted model is defined as follows [1 and 2]:

$$lnpibp_{il} = \propto + \beta_1 lnip_{il} + \beta_2 lncp_{il} + \beta_3\, lncpcd_{il} + \beta_4 lnce_{il} + \beta_5 inf_{il} + \beta_6 lnppi + \beta_7 lnea_{ij} + \beta_8 lnpob_{ij} +_{ij} \mu_{il} \text{ (1).}$$

l = 1 al 10 (In the case of Latin America it depends on the decentralization process of each country).

$$lnpibp_{il} = \propto + \beta_1 lnip_{il} + \beta_2 lncp_{il} + \beta_3\, lncpcd_{il} + \beta_4 lnce_{il} + \beta_5 inf_{il} + \beta_6 lnppi + \beta_7 lnea_{ij} + \beta_8 lnpob_{ij} +_{ij} \mu_{il} \text{ (2)}$$

l = 11 al 18 (In the case of Latin America it depends on the decentralization process of each country).

Mientras que el modelo sin restricciones se especifica cómo sigue [3 y 4]:

$$lnpibp_{il} = \propto + \beta_9 lnip_{il} + \beta_{11} lncp_{il} + \beta_3\, lncpcd_{il} + \beta_4 lnce_{il} + \beta_5 inf_{il} + \beta_6 lnppi + \beta_7 lnea_{ij} + \beta_8 lnpob_{ij} +_{ij} \mu_{il} \text{ (3)}$$

l = 1 al 10 (In the case of Latin America it depends on the decentralization process of each country).

$$lnpibp_{il} = \propto + \beta_{10} lnip_{il} + \beta_{12} lncp_{il} + \beta_3\, lncpcd_{il} + \beta_4 lnce_{il} + \beta_5 inf_{il} + \beta_6 lnppi + \beta_7 lnea_{ij} + \beta_8 lnpob_{ij} +_{ij} \mu_{il} \quad (4)$$

l = 11 al 18 (In the case of Latin America it depends on the decentralization process of each country).

As can be seen, only the betas of the lnip and lncp variables change. Therefore, the hypotheses for the test are as follows:

Ho: B1 = B1
B2 = B2
(α= α)
(B3 = B3)
(B4 = B4)
(B5= B5)
(B6 = B6)
(B7= B7)
(B8= B8)

HA: B9 ≠B10
B11 ≠B12
(α= α)
(B3 = B3)
(B4 = B4)
(B5= B5)
(B6 = B6)
(B7= B7)
(B8= B8)

The statistical calculations for the model are as follows:

Latin American Model

$$Fexp = \frac{\frac{0.62753685 - 0.60986794}{2}}{\frac{0.60986794}{252-11}} = 3.49$$

Prob = 0.06

Therefore, for the Latin American model, the null hypothesis that there is no structural change in the slopes of per capita income and consumption of governments is rejected, that is, a partial rupture caused by a structural change after the internal decentralization processes of each country.

5. Conclusion

Fiscal decentralization in the public sector must be understood from two perspectives: income and expenses to include the transfer of authority and management mechanisms from the central level to local governments. However, there are two justifications for the concept of decentralization: a) Economic justification and b) Non-economic justification. The first has to do with the social welfare economy and the institutional economy, while the second justification is decentralization from the grassroots perspective.

The theoretical discussion in economics on fiscal decentralization and growth focuses on the efficiency aspects of a decentralized provision and the financing of public services. While the empirical discussion analyzes fiscal decentralization tied to spending on public investment, governance, taxes, health, inequality, and even economic policy. Furthermore, it should be mentioned that there are theoretical studies of the relationship between fiscal decentralization and economic growth at the country level. There are also regional studies in countries.

The quantification of the impact of fiscal decentralization on macroeconomic behavior, it is economic growth, the size of the public sector, budgetary stability or inflation, has considered the use of the expense ratio indicator (or income) of sub-national governments. or the self-sufficiency ratio of sub-national governments - their own resources over their total resources. Fiscal decentralization - which includes sources of revenue from local governments - has become the main theme in the decentralization process in many developing countries, being crucial to the effectiveness of decentralized institutions, without which local governments cannot achieve the desired development objectives at the local level.

Theoretical interest on the problem of how economic growth can be affected by fiscal decentralization has led to the development of several studies at the international level. All theoretical studies have shown that efficiency is a factor in decentralization that would affect economic growth. Therefore, transfers from the central government to the local government are not always directed to economic growth, with incentives becoming elements that are contrary to the promotion of production, thus, fiscal decentralization would not affect economic growth.

The relationship between fiscal decentralization and economic growth is defined by public policies that promote a more effective local policy than that carried out by the central government, since local officials can control the situations of policy promotion from the supply side and the demand. Empirically, the relationship between fiscal decentralization and economic growth has been analyzed in the context of the Ecuadorian economy based on a time series. For this, the decentralization indicators and explanatory variables proposed by various authors have been used. The research has been quantitative, since a relationship is sought between two variables, fiscal decentralization and economic growth by applying a multiple regression model, ordinary least squares.

The Adequacy of Design has been based on what was stated by Xie et al. (1999) for the United States, Zhang and Zou (2001) for China and India, Pérez and Cantarero (2001) for Spain, Akai and Sakata (2002) for the United States, Feld, Kirchhanner and Schalteger (2005) for Switzerland, Martínez Vásquez et al (2016) for Spain, Lorenzo and Julio (2017) for Colombia, and were used to evaluate the presence of a relationship between fiscal

decentralization and economic growth for the Ecuadorian case, based on a linear equation for the period 2000-2018. The instrumentation started from the statement that marks the relationship between fiscal decentralization and economic growth circumscribed in the correction of specification errors, the specification of the growth equation. For this reason, the sensitivity analysis was essential, allowing us to assess the consistency and robustness of the relationship between fiscal decentralization and economic growth, as suggested by Levine (1998). Thus, the important need to incorporate the appropriate control variables to avoid disguised correlations is highlighted.

The methodology proposed by Cameron and Trivedi (2009) and Álvarez, Perdomo, Morales and Urrego (2013), among other authors, was followed to select the most appropriate estimators. Thus, it allowed performing the Breusch and Pagan test where it was identified if there was a component that generates heteroscedasticity in the model. Next, the Hausman test was calculated to select between fixed and random effects. The commands described by Hoechle (2007) were taken into account to deal with heteroscedasticity, autocorrelation, serial correlation, among other problems that the model may present. Finally, several tests were carried out to validate the classic assumptions in the model.

In all models, GDP pc presented a directly proportional relationship with investment and public consumption, and this trend was extended in processes of fiscal decentralization. In any measurement that was made, the effects of decentralization were greater. This evidenced that a greater process of fiscal decentralization generates greater economic growth.

The results obtained from the econometric panel data model applied to the first differences in the period 2000-2018, evidenced that, in all models, there is a positive and significant impact on GDP per capita, generated by public investment, which it becomes steeper after the application of COOTAD, demonstrating the positive benefits of decentralization. The tests applied for the selection of the most appropriate estimators have determined that the null hypothesis that the model did not present omitted variables with the Ramsey Test is accepted. The model presented heteroscedasticity problems, therefore, to have a correct inference, cluster or robust errors were used. With this correction, the model did not present first order autocorrelation, so the Wooldridge Test was accepted. With the Breusch and Pagan Test, the OLS estimators prevailed before EF or EA. This was corroborated with the acceptance of the null hypothesis of the Hausman test.

In the interpretation of the betas for the grouped OLS model, as a summary, the investment of the GAD's after the application of decentralization has allowed its impact on GDP per capita provincial to be stronger, going from 0.018 % to 0.026%. Additionally, it was observed how the control variables used in the model negatively affect GDP, that is, both national poverty, national inflation, population growth, and the foreign trade ratio, decreased the per capita GDP.

Finally, for the decentralization model of Latin America, the null hypothesis that there is no structural change in the slopes of per capita income and consumption of governments was rejected, that is, a partial rupture caused by a structural change after the internal decentralization processes of each country.

References

Agúndez García, A. & Pedraja Chaparro, F. (2002). La descentralización del impuesto sobre la renta. Madrid: *Instituto de Estudios Fiscales.* Tomado de http://www.ief.es/documentos/recursos/publicaciones/libros/Investigaciones/Inves2003_02.pdf

Akai, N. & Sakata, M. (2002). Fiscal Decentralization Contributes to Economic Growth: Evidence from State-Level Cross-Section Data for the United States. *Journal of Urban Economics*, *52*(1), 93-108. http://dx.doi.org/10.1016/s0094-1190(02)00018-9

Álvarez, R., Perdomo, J., Morales, C., & Urrego, J. (2013). *Fundamentos de econometría intermedia: teoría y aplicaciones.* Bogotá: Ediciones Uniandes. Obtenido de ProQuest Ebook Central, https://ebookcentral.proquest.com/lib/ucesp/detail.action?docID=3211266.

Angus Chu & C.C. Yang (2012). Fiscal centralization versus decentralization: Growth and welfare effects of spillovers, Leviathan taxation, and capital mobility. Journal of Urban Economics, 2012, vol. 71, issue 2, 177-188. https://doi.org/10.1016/j.jue.2011.10.003

Asamblea Constituyente del Ecuador (2008). Constitución de la República del Ecuador. Ecuador: Montecristi.

Bahl, R. & Nath, S. (1986). Public Expenditure Decentralization in Developing Countries. *Environment and Planning C: Government And Policy*, *4*(4), 405-418. http://dx.doi.org/10.1068/c040405

Balaguer-Coll, M., Prior, D., & Tortosa-Ausina, E. (2010). Devolution Dynamics of Spanish Local Government. *Environment And Planning A*, *42*(6), 1476-1495. http://dx.doi.org/10.1068/a42506

Baskaran, T. (2012). Tax Decentralization and Public Deficits in OECD Countries. *Publish: The Journal of Federalism*, *42*(4), 688-707. http://dx.doi.org/10.1093/publius/pjr051

Bird, R. (2013). Below the Salt: Decentralizing Value-Added Taxes. *International Center for Public Policy*, Working Paper 13-02. Recuperado de http://scholarworks.gsu.edu/cgi/viewcontent.cgi?article=1032&context=icepp

Blöchliger, H. (2013). Decentralization and Economic Growth – Part 1: How Fiscal Federalism Affect Long-Term Development. *OECD Working Papers on Fiscal Federalism, No. 14.* OECD Publishing, pp. 1-22. http://dx.doi.org/10.1787/5k4559gx1q8r-en

Braña, Francisco, Víctor Manuel Serna (1997). *La Descentralización de competencias del gasto Público. Teoría y Aplicación a España.* Biblioteca Civitas Economía y Empresa. Colección Economía. España, Madrid; Editorial Civitas.

Brueckner, J. (2006). Fiscal Federalism and Economic Growth. *Journal of Public Economics*, *90*(10-11), 2107-2120. http://dx.doi.org/10.1016/j.jpubeco.2006.05.003

Cameron, C., & Trivedi, P. (2009). *Microeconometrics Using Stata.* Texas: StataCorp LP.

Carrion-i-Silvestre, J., Espasa, M., & Mora, T. (2008). Fiscal Decentralization and Economic Growth in Spain. *Public Finance Review*, *36*(2), 194-218. http://dx.doi.org/10.1177/1091142107304649

Cournéde, B., Pina, Á., & Goujard, A. (2017). Reconciling Fiscal Consolidation with Growth and Equity. *OECD Journal: Economic Studies*, *2013*(1), 7-89. http://dx.doi.org/10.1787/eco_studies-2013-5jzb44vzbkhd

Davoodi, H. & Zou, H. (1998). Fiscal Decentralization and Economic Growth: A Cross-Country Study. *Journal of Urban Economics*, *43*(2), 244-257. http://dx.doi.org/10.1006/juec.1997.2042

De Mello, L. (2010*).* Fiscal Decentralization and Public Investment: The Experience of Latin America. *OECD Economics Department Working Papers, No. 824, OECD*. Publishing. http://dx.doi.org/10.1787/5km347r2hhbp-enJT03293997

Devarajan, S. (1996). The Composition of Public Expenditure and Economic Growth. *Journal of Monetary Economics*, *37*(2-3), 313-344. http://dx.doi.org/10.1016/0304-3932(96)01249-4

Feld, L., Kirchhanner G. y C. Schalteger (2005). Fiscal Federalism and Economic Performance: Evidence from Swiss Cantons. *German Economic Review, 10(1),* pp. 91-114. http://dx.doi.org/10.1111/j.1468-0475.2008.00443.x

Hatfield, J. W. & Prado, G. (2012). A Political Economy Theory of Partial Decentralization. *Journal of the European Economic Association.* http://dx.doi.org/10.1111/j.1542-4774.2012.01066

Kappeler, A., Solé-Ollé, A., Stephan, A., & Välilä, T. (2013). Does Fiscal Decentralization Foster Regional Investment in Productive Infrastructure?. *European Journal Of Political Economy*, *31*, 15-25. http://dx.doi.org/10.1016/j.ejpoleco.2013.03.003

Kis-Katos, K & Suharnoko, B. (2017). The Impact of Fiscal and Political Decentralization on Local Public Investments in Indonesia. http://dx.doi.org/10.1353/jhr.2011.0008

Lago Peñas, Santiago, and Jorge Martínez-Vazquez (2010). "La Descentralización Tributaria. En las Comunidades Autónomas de Régimen Común: Un Proceso Inacabado. (Tax Decentralization in the Autonomous Communities: An Unfinished Process. With EnglishSummary.)." Hacienda Pública Española /Revista de Economía Pública 192 (2010): 129–151

Martínez-Vásquez, J. & McNab, R. (2003). Fiscal Decentralization and Economic Growth. *World Development*, *31*(9), 1597-1616. http://dx.doi.org/10.1016/s0305-750x(03)00109-8

Musgrave, R. (1959). *The Theory of Public Finance*. New York: McGraw-Hill.

Oates W. (1993). Fiscal Decentralization and Economic Development. *National Tax Journal, Vol 46*, issue 2, pp. 237-43. Recuperado de http://www.ntanet.org/NTJ/46/2/ntj-v46n02p237-43-fiscal-decentralization-economic-development.pdf

Oates, W. (1972). *Fiscal Federalism*. New York: Harcourt Brace Jovanovich.

Panizza, U. (1999). On the Determinants of Fiscal Centralization: Theory and Evidence. *Journal Of Public Economics*, *74*(1), 97-139. http://dx.doi.org/10.1016/s0047-2727(99)00020-1

Pommerehne, W. (1977). Quantitative Aspects of Federalism: A Study of Six Countries. *Journal Of Cultural Economics, 21(3),* 249-271. http://dx.doi.org/10.1023/a:1007388024711.

Rodríguez-Pose, A. & Ezcurra, R. (2009). Does Decentralization Matter for Regional Disparities? A Cross-Country Analysis. *Journal Of Economic GeoFigurey*, *10*(5), 619-644. http://dx.doi.org/10.1093/jeg/lbp049

Sacchi, A. & Salotti, S. (2011). The Effects of Fiscal Decentralization on Household Income Inequality: Some Empirical Evidence. *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.2098757

Stansel, D. (2005). Local Decentralization and Local Economic Growth: A Cross-Sectional Examination of US Metropolitan Areas. *Journal Of Urban Economics*, *57*(1), 55-72. http://dx.doi.org/10.1016/j.jue.2004.08.002

Tiebout, C. (1956). A Pure Theory of Local Expenditures. *Journal Of Political Economy*, *64*(5), 416-424. http://dx.doi.org/10.1086/257839

Varela, Marcelo (2011). *Valoración y ponderación de las actividades económicas para el cobro de impuesto por patente municipal*. Gran Bretaña - Alemania: Editorial Académica Española.

Wasylenko, M. (1987). Fiscal Decentralization and Economic Development. *Public Budgeting & Finance*, *7*(4), 57-71. http://dx.doi.org/10.1111/1540-5850.00764

Woo, S. K. (1977). Fiscal Decentralization and Economic Development. *Public Finance Review*, *5*(1), 79-97. http://dx.doi.org/10.1177/109114217700500106

Xie, D., Zou, H., & Davoodi, H. (1999). Fiscal Decentralization and Economic Growth in the United States. *Journal Of Urban Economics*, *45*(2), 228-239. http://dx.doi.org/10.1006/juec.1998.2095

Zhang, T. & Zou, H. (2001). The Growth Impact of Intersectorial and Intergovernmental Allocation of Public Expenditure. *China Economic Review*, *12*(1), 58-81. http://dx.doi.org/10.1016/s1043-951x(01)00043-8

Zou, H. (1996). Taxes, Federal Grants, Local Public Spending, and Growth. *Journal Of Urban Economics*, *39*(3), 303-317. http://dx.doi.org/10.1006/juec.1996.0016

Review of Socio-Economic Perspectives **Kobilov, A. & Kurbanov, O., pp. 83-92**
Vol. 5 Issue: 3/ September 2020

ANALYSIS OF FACTORS AFFECTING THE VOLUME OF FOREIGN DIRECT INVESTMENT

Anvar Kobilov [1]
Oybek Kurbanov [2]

Abstract

This paper investigates the determinants of Foreign direct investment (FDI) in selected 78 countries. The paper uses the data sets from 2000 to 2018, according to World Bank Statistics. The chosen empirical model is based on FDI theories and previous empirical studies on this subject. Due to availability of data, selected counties are divided into 4 groups (advanced economies, developing countries, transition economies and low income counties). The results indicate trade openness is significant factor for FDI inflows in selected countries.

Keywords: Foreign direct investment, grows rate of per capita GDP, age dependency ratio, gross domestic savings, trade openness, inflation, real interest rate.
JEL Codes: E22, E44.

Citation : Kobilov, A. & Kurbanov, O. (2020). Analysis of Factors Affecting the Volume of Foreign Direct Investment, *Review of Socio-Economic Perspectives, Vol 5(3)*, 83-92.

Article Type: Research Article
Application Date: 22.05.2020 **& Admission Date:** 24.08.2020
DOI: 10.19275/RSEP089

---

[1] PhD Candidate, Department of "Economics and Service", Faculty of Social Sciences, Kashkadarya region, Karshi sity, Kuchabag street, 17, Karshi State University, Uzbekistan
ORCHID ID: 0000-0001-6019-7771
E-mail: kobilovanvar@gmail.com

[2] Researcher, Department of "Economics and Service", Faculty of Social Sciences, Kashkadarya region, Karshi sity, Kuchabag street, 17, Karshi State University, Uzbekistan
ORCHID ID: 0000-0002-8667-2419
E-mail: kurbonovoybek@gmail.com

1. Introduction

International capital migration has a paramount role to develop the World Economy since it results in the strengthening of foreign economic relations and political ties. Besides, increasing foreign trade turnover, the international capital migration brings about economic development accelaration and product increase. At the same time, it improves, in the world market, the competitiveness of manufactured goods and technical capacity of importing countries; this, in turn, leads to the higher employment rate in the country. However, in the world economy, investors do not donate capitals to other countries and regions without any feasible reasons. To achieve the capital investment, foreign investors should be attracted to the country's economy and interested to invest in this country and the region forming a material interest towards them. It is, nowadays, very controversial to develop a favorable investment atmosphere in the country and analyze the factors that influence positively or negatively the volume of investment at a time.

2. Literature Review

According to the purpose of attraction, foreign investment is classified into foreign direct investment (FDI) and portfolio investment. Based on emperical studies, a higher priorty is given to the foreign direct investment as it is considered to have a much more positive influence on the economy. Being the main source of financing for production, FDI is regarded as an optimum way to develop human capital with the help of new modern technologies and advanced management skills. In many developed countries, however, enterprises do not have sufficient capital, technology, modern management, technical and skilled resources; these shortcomings obviously indicate their demand on the involvement of FDI in their economy.

FDI will not only expand the country's aconomic access to global capital markets, but also its ability to trade goods and services. This is because FDI provides an increase in the country's export potential, which in turn leads to an increase in GDP. In particular, emperical analysis shows that 1% increase in FDI staying relative to GDP would lead to 0.4% rise in GDP. In developed countries, 14% increase will lead to 5.6% rise in GDP.

A number of factors (economic, political, social and technological) can be shown as the reason for an uneven distribution of FDI in countries around the world. Researchers analyzed the change in investment volume considering various factors.

F. Campos and Yu. Kinoshita's researches consider institutional changes and the level of trade openness to be the main factors influencing the size of the FDI involved in 25 transition countries between 1990 and 1998.

According to P. Sahoo's study, the FDI volume in 5 South Asian countries (India, Pakistan, Sri Lanka and Nepal) was immensely affected by national market size, labor force growth rate, the infrastructure index and trade openness.

E. Cleeve asserts that the change in the volume of investment in 16 African countries is characterized by factors, such as the market size, level of infrastructure development, labor quality and cost. Besides, the author says that the introduction of political and macroeconomic stability, protection of property rights and other investment incentives will be somehow interrelated with the changes in investment.

As has been stated in the study conducted by M. Salahuddin and R. Islam for 97 developing countries in 1973-2002, the level of trade openness for investment is one of the most important factors.

P. Mauro's, based on the results of his researches on several countries, followed the "corruption indicator" which is inversely related to the volume of investment [7]. Analysizing institutional factors, A. Brunetti and B. Weder listed law inefficiency, high levels of corruption, and instability in real exchange rates as the factors that had the highest negative effect on the investment volume.

An empirical analysis of the factors influencing the volume of investment shows that factors such as the level of trade openness, infrastructure index, labor potential and price, tax burden, exchange rate, interest rate are important for the volume of foreign investment in the economy. However, due to the fact that the study covers the period up to 2012, there, over the last decade, have been many economic, financial and institutional problems in the world economy, significant changes in the geography of investment flows require a re-examination of factors affecting investment.

3. Database and research methodology

In our study, a statistical analysis was conducted in 78 countries selected on the basis of World Bank data, studying the growth rate of investment in 2000-2018 and the factors affecting investment. Next, in the statistical analysis, the selected countries were conditionally arranged for 4 groups (developed, developing, transition countries and less developed), and appropriate conclusions were drawn for each group of countries. The top 20 countries in the world, in terms of GDP, are developed countries, the 21st-40th countries in the world, in terms of GDP, as developing countries, transition countries that became independent after the collapse of the former Soviet Union and Western European countries with socialist regimes until 1991. Less developed countries were those with the lowest GDP per capita.

To carryi out the research, the following model was taken as the basis:

$$FDI_{it} = \alpha_0 + \beta_0 GR_{it} + \beta_1 DEP_{it} + \beta_1 GDS_{it} + \beta_1 TO_{it} + \beta_1 INF_{it} + \beta_1 IRR_{it} + \varepsilon_{it}$$

Here:

FDI (foreign direct investment) - the share of foreign direct investment in GDP (%);

GR (growth rate per capita GDP) - GDP growth rate per capita (%);

DEP (age dependence ratio) - the level of age dependence of the population (the ratio of the total population aged 15-64 years of the population under 15 years and over 64 years);

GDS (gross domestic savings) - Gross domestic savings (as a percentage of GDP);

TO (trade openness) - level of trade openness (Export + import / GDP), in%;

INF (inflation) - the rate of inflation;

RIR (real interest rate) - real interest rate (nominal interest rate - inflation rate);

ε *- error indicator;*

i - selected country and t - selected time;

The selected factors being studied in relation to the size of FDIs are very important for foreign investors. The GDP growth rate (GR) per capita is an indicator that determines enhancement in the standard of living and production efficiency in a country.

The coefficient of the age dependence ratio of the population indicates how much percent of people capable to work, and what percentage is in need of social protection. The level of this ratio can be explained by the lack of labor force in the country, the large number of pensioners or children in the population, the high or low birth rate, the government's social spending and high tax rates.

The Gross Domestic Savings Index (GDS) is a measure of the difference between total consumption expenditures and GDP, which means that the investment climate in the country has deteriorated, leaving the country dependent on foreign funds. The high level of this indicator will serve as a catalyst in attracting FDI and ensure high growth rates as well as increase the country's financial competitiveness.

There are several reasons for the importance of the inflation rate (INF) for an investor: its high level reduces investment returns, affects all sectors of the economy, and simultaneously includes consumer spending, unemployment, tax policy and interest rates.

The Real Interest Rate (RIR) describes the expected level of economic growth of the economy over a period of time and the real return on the investor’s investment. A negative real interest rate is negative for the country’s economy.

4. Results of statistical analysis

According to preliminary statistics, the share of foreign direct investment in GDP in all 78 countries surveyed between 2000 and 2018 averaged 4.67% of GDP, 2.6% in developed countries, 5.6% in developing countries, and 6% in transition countries. , 4% and 4.1% in less developed countries. The highest value of FDI occurred in the period of review was observed in Hungary in 2007 (51.9% of GDP). The average age of the population was 57.5 units, 49.9 in developed countries, 51.05 in developing countries, 46.8 in transition countries, and 81.1 in less developed countries. The maximum values of this coefficient were observed in Uganda and the minimum values were in the UAE.

Table 1: Descriptive Statistical Aanalysis

	Variable	Mean	StDev	Minimum	Median	Maximum
For a total of 78 countries	**FDI**	4.671	6.279	-16.418	3.000	51.896
	DEP	57.459	17.418	16.543	52.000	108.207
	GR	3.224	4.338	-17.545	3.207	33.030
	GDS	19.913	16.469	-58.544	21.296	85.366
	TO	90.20	61.27	13.70	76.20	448.30

	INF	8.157	11.104	-18.932	5.530	185.291
	RIR	5.365	8.816	-41.230	4.300	51.229
For developed countries		**Mean**	**StDev**	**Minimum**	**Median**	**Maximum**
	FDI	2.608	2.702	-3.500	2.086	16.391
	DEP	49.858	6.246	36.000	49.650	72.185
	GR	2.353	3.325	-7.795	2.000	13.600
	GDS	26.068	9.050	12.433	24.255	55.416
	TO	59.69	27.29	13.70	56.05	167.70
	INF	5.729	7.036	-18.932	3.550	52.851
	RIR	4.261	9.259	-9.633	2.569	47.700
For developing countries		**Mean**	**StDev**	**Minimum**	**Median**	**Maximum**
	FDI	5.596	7.341	-6.744	3.184	38.651
	DEP	51.048	12.488	16.543	52.214	88.493
	GR	2.282	4.245	-13.333	2.561	30.344
	GDS	27.773	9.300	7.965	26.542	53.197
	TO	116.52	99.35	21.90	81.80	448.30
	INF	6.356	8.146	-12.733	3.850	45.943
	RIR	2.913	6.402	-18.909	3.136	29.120
For countries in transition		**Mean**	**StDev**	**Minimum**	**Median**	**Maximum**
	FDI	6.415	7.463	-16.418	4.628	51.896
	DEP	46.756	5.824	37.806	46.094	71.154
	GR	4.984	5.173	-17.545	5.293	33.030
	GDS	20.16	18.24	-34.03	21.97	85.37
	TO	107.97	28.84	46.10	105.80	180.50
	INF	12.21	18.09	-18.93	7.55	185.29
	RIR	4.310	9.191	-41.230	5.034	48.056
For less developed countries		**Mean**	**StDev**	**Minimum**	**Median**	**Maximum**
	FDI	4.248	5.917	-3.753	2.728	46.494
	DEP	81.105	14.039	49.771	79.716	108.207
	GR	3.444	3.996	-15.284	3.624	28.738

	GDS	5.57	17.00	-58.54	8.53	42.04
	TO	78.97	36.79	30.70	72.90	209.90
	INF	8.737	6.907	-10.949	7.412	34.193
	RIR	9.686	8.725	-17.122	8.864	51.229

Source: Derived from Author's Own Calculations

GDP growth per capita averaged 3.2% in all selected countries between 2000 and 2018, 2.3% in developed and developing countries, and 4.98% in transition countries, and an average of 3.44% formed in less developed countries.

The level of Gross National Savings averaged 19.9% in all selected countries, 26.07% in developed countries, 27.8% in developing countries and 20.1% in transition countries. In selected less developed countries such as Tongo, Tajikistan, Kyrgyzstan, Haiti and Rwanda, the level of GNS is very low (5.57% on average) having negative values of this indicator which may have negative outcomes for the economy.

The trade openness ratio averaged 90.2% in all selected countries, 59.7% in developed countries, 116.7% in developing countries, 107.97% in transition countries, and 78.97% in less developed countries. The highest values of this coefficient were observed in Hong Kong and Singapore. Between 2000-2018, the trade openness ratio was 393% of average GDP in Singapore and 369% in Hong Kong.

The inflation rate averaged 8.1% in all selected countries, 5.7% in developed countries, 6.3% in developing countries, 12.2% in transition countries and 8.7% in less developed countries. The highest inflation rate was observed in Belarus in 2000 (185.3%) during the selected period.

The average real interest rate was 5.3% in selected countries, 4.2% in developed countries, 2.9% in developing countries, 4.3% in transition countries and 9.7% in less developed countries. The highest negative value of the real interest rate was observed in 2000 in Belarus (-41.2%).

The correlation matrix, for all selected countries, between the FDI and the available factors shows that while there is a high correlation between the FDI levels of trade openness, there is no correlation with the remaining factors.

Table 2: Correliance Coefficiency Matrix for Selected 78 Countries

	FDI	**DEP**	**GR**	**GDS**	**TO**	**INF**	RIR
FDI	1.0000						
DEP	-0.0178	1.0000					
GR	0.102	0.0322	1.0000				
GDS	0.0949	-0.4238	0.1250	1.0000			
TO	0.7309	-0.2919	0.0506	0.14.03	1.0000		
INF	0.0144	0.0735	0.1435	-0.0339	-0.0826	1.0000	
RIR	0 .0158	0.2956	-0.0485	-0.2041	-0.1041	-0.4219	1.0000

Source: Derived from Author's Own Calculations

According to the correlation matrix for developed countries, there is not any significant link between the FDI size of this group's countries and the selected factors. However, while there is a weak direct relation between the FDI and the Gross National Funds, there is a weak negative correlation between the FDI and the age of the population. Based on a pairwise comparison of factors, it can be seen that in developed countries there is an inverse relation between the level of age dependence and the size of the Gross Domestic Savings, the positive connection between the Gross National Savings and the GDP growth rate per capita.

Table 3: Correliance Coefficiency Matrix for 20 Developed Countries

	FDI	**DEP**	**GR**	**GDS**	**TO**	**INF**	**RIR**
FDI	1.0000						
DEP	-0.3895	1.0000					
GR	0.2861	0.3558	1.0000				
GDS	0.4254	-0.4967	0.63205	1.0000			
TO	-0.0611	-0.1870	-0.00287	0.2423	1.0000		
INF	0.0745	-0.01670	0.43767	0.4506	-0.38104	1.0000	
RIR	0.1507	0.00280	0.15150	0.0651	-0.1572	0.16145	1.0000

Source: Derived from Author's Own Calculations

There is a strong correlation between the FDI and the level of trade openness for developing countries. The implementation of state policies supporting exports and imports in the countries of this group, most of the world's largest companies and firms' relocation their production in these countries had a positive impact on FDI volumes and served to ensure high economic growth. At the same time, the high level of trade openness, in this group of countries, has led to an increase in the volume of gross national funds.

Table 4: Correliance Coefficiency Matrix for 20 Seşected Developing Countries

	FDI	**DEP**	**GR**	**GDS**	**TO**	**INF**	**RIR**
FDI	1.0000						
DEP	-0.2925	1.0000					
GR	0.1401	0.2779	1.0000				
GDS	0.2321	-0.4694	-0.1364	1.0000			
TO	0.8759	-0.4987	-0.0270	0.5128	1.0000		
INF	-0.3401	-0.1755	-0.0928	0.1446	-0.2769	1.0000	
RIR	-0.0183	0.3845	0.3076	-0.1742	-0.0117	-0.2136	1.0000

Source: Derived from Author's Own Calculations

Although there is no strong correlation between FDI and selected factors for countries in transition, the countries included in this group (Uzbekistan, Turkmenistan, Azerbaijan, and Kazakhstan) have achieved high economic growth in recent years, and the volume of FDI attracted to these countries is growing year by year.

Table 5: Correliance Coefficiency Matrix for 18 Selected Transition Countries

	FDI	**DEP**	**GR**	**GDS**	**TO**	**INF**	**RIR**
FDI	1.0000						
DEP	-0.0118	1.0000					
GR	0.4065	0.2299	1.0000				
GDS	0.4259	-0.3229	0.2056	1.0000			
TO	0.1323	-0.3499	0.0320	0.0641	1.0000		
INF	0.3603	-0.0989	0.1396	0.1703	0.1104	1.0000	
RIR	-0.0937	0.42382	-0.1314	-0.4428	-0.3142	-0.8501	1.0000

Source: Derived from Author's Own Calculations

From the correlation coefficient matrix for less developed countries, it can be seen that there is a positive connection between the FDI volume and the level of trade openness. However, the volume of FDIs involved in these countries remains low due to the instability of the political system, poor infrastructure, and very slow economic growth.

Table 6: Correliance Coefficiency Matrix for Selected 20 Less-Developed Countries

	FDI	**DEP**	**GR**	**GDS**	**TO**	**INF**	**RIR**
FDI	1.0000						
DEP	0.1733	1.0000					
GR	-0.0892	-0.5486	1.0000				
GDS	-0.0725	0.1668	0.0158	1.0000			
TO	0.5255	-0.3011	-0.0925	-0.28575	1.0000		
INF	0.0401	-0.1331	0.0714	-0.0871	0.1924	1.0000	
RIR	0.0434	0.2819	-0.2742	0.0933	-0.3450	0.2668	1.0000

Source: Derived from Author's Own Calculations

Based on the selected model chosen in the study, 95% accuracy was chosen as the main criterion to create the final regression model with FDI volume and factors influencing it, the R-critical value> 0.05 observed variables were omitted from the model. As a result, the final prediction model looked different for the selected group of countries. In particular, GR, GDS, INF, RIR were omitted because the R-critical value> 0.05 was observed in the regression model for the selected 78 countries. Depending on the regression model, it can be concluded with 95% accuracy that for all selected countries, an increase in the age dependency ratio per unit would result in an 8% decrease in FDI and increase of trade openness to 1 unit in FDI by 7%. It is suggested to use this model as a prediction model because the value of R^2 (58.65) can be satisfactory the selected model.

In the final regression model for developed countries, only the TO indicator retained its place in the model; nevertheless, due to the low value of R^2 (7.5%), it is not appropriate to use this model as a forecast model.

Since the R-critical value for the variables DEP, GR, GDS, INF, RIR was greater than 0.05 when constructing the forecast model for developing countries, only TO retained in the model. For this group's countries, an increase in trade openness of 1 unit would lead to an 8% rise in FDI. Due to the high value of R^2 (77.2%), the selected model can be used to predict the size of the FDI.

In the regression model for transition countries, only the GR index remained in the model, but since the value of R2 is low (7.2%), it is not important to use this model as a prediction model.

In the regression model for less developed countries, TO stay permanent as a variable that affects the size of the FDI. However, the fact of the value of R^2 in this model's not being very high (27.6%) does not allow qualitative forecasting of the volume of FDI attracted to less developed countries with the indicator of the level of trade openness.

5. Conclusion

Based on the results of our research, it can be concluded that for developed countries the role of foreign investment in improving the structure of the national economy, solving the problem of unemployment and increasing export potential, mastering advanced management techniques is insignificant. In the countries included in this group, foreign investment is more invested in high-capacity industries to produce investment goods.

For developing countries, transition countries and less developed countries, the role of foreign investment in improving the sectoral structure of the national economy, solving the problem of unemployment, increasing export potential and adopting advanced management techniques is high. Besides, foreign investment in countries remaining in these groups replenishes and stabilizes the capital market. Foreign investment will stabilize the consumer market and have a direct impact on its development, as more and more mining, resource-intensive and labor-intensive sectors, as well as import-substituting consumer goods.

References

Tarzi, S. (2005). Foreign Direct Investment into Developing Countries: Impact of Location and Government Policy, *The Journal of Social, Political and Economic Studies, 30(4),* 497-516.

Dobson, W., and Hufbauer, G., (2005). World Capital markets: Challenge to the G10, Institute for International Economics, Washington, D.C.in: Tarzi, S., Foreign Direct Investment into Developing Countries: Impact of Location and Government Policy, *The Journal of Social, Political and Economic Studies, 30(4),* 497-516.

Nauro F. Campos and Yuko Kinoshita (2005). *Why Does FDI Go Where it Goes? New Evidence from the Transition Economies*. IMF Working Paper.

Sahoo, P., (2006). *Foreign Direct Investment in South Asia: Policy, Trends, Impact and Determinants.* ADB Institute Discussion Paper No. 56

Cleeve, E., (2008). How Effective are Fiscal Incentives to Attract FDI to Sub-Saharan Africa?, *The Journal of Developing Areas, 42 (1),* 135-153.

Mohammad Salahuddin., Md. Rabiul Islam (2008). Factors Affecting Investment in Developing Countries: A Panel Data Study. *The Journal of Developing Areas, 42(1),* 21-37.

Mauro, Paolo.(1995). Corruption and Growth. *Quarterly Journal of Economics, 110* (7) 681-712.

Brunetti, Aimo and Beattice Weder (2002). *Investment and Institutionla Uncertainty: A Comparative Study of Different Uncertainty Measures*. IFC Technical Paper 4. Washington, D.C.

Review of Socio-Economic Perspectives **Santos, S. C., pp. 93-116**
Vol. 5 Issue: 3/ September 2020

ARE THE INDUSTRIAL DISTRICTS STILL ALL RIGHT? SOME BRAZILIAN CONTRIBUTIONS

Samuel Cruz dos Santos[1]

Abstract

Industrial districts were elected as one of the priorities by Brazilian governments in the 2000s. Four of them received financial and technical support from both national and international institutions. This paper aims to investigate what happened to those four districts officially supported by the Inter-american Development Bank to serve as models to a large number of other districts all around the country. Italian districts were again seen as a path for development to some regions with productive tradition and history behind chain of production. A great amount of money was directed to those four districts as well as great efforts were made by the *government* and the private sector to improve the productivity and performance of the districts. Ten years after an evaluation made by this author in a doctoral dissertation, the objective is to assess the performance of some indicators for the counties or regions: GDP growth; sector employment; income and other indexes that can be calculated by using Brazilian researches. Due to the support received and to the fact that those districts were a part of the industrial policy of the country, some of the districts chosen perform as well as expected, but some of them, considering different measures, did not. In part, the reason was the lack of continuity of the support, that, for some of them, would be necessary for a larger period of time. On the other hand, the maturity differences between the chosen districts and a non-homogeneous selection might have influenced the results that did not show a shift towards local development.

Keywords: Districts; economic development; regional economics.
JEL Codes: R1, R11, O47

Citation : Santos, S.C. (2020). Are the Industrial Districts Still All Right ? Some Brazilian Contributions. *Review of Socio-Economic Perspectives, Vol 5(3),* 93-116.

Article Type: Research Article
Application Date: 12.05.2020 **& Admission Date:** 26.08.2020
DOI: 10.19275/RSEP090

[1] PhD, Castelo Branco University, Praça Augusto Ruschi, 26/104 Recreio dos Bandeirantes 22790-045 Rio de Janeiro – RJ, Brazil
ORCHID ID: 0000-0001-6977-1776
E-mail: samuelcruz2009@gmail.com

1. Introduction: Regional Economy, Space and Local Development

Time, a fundamental variable for the economic analysis, has always overmastered space (Harvey, 2007) and space has always disturbed the economic analysis. Most often, space has been included in the *ceteris paribus* condition, meaning the variable has been either considered as constant or has it been in the analysis but scarcely problematized.

There are exceptions, of course, that simply confirms the rule: Von Thünen is, probably, the main one as, in the XIX century, with his urban model showing that competition between settlers would lead to a gradient of land rents that would decline from a maximum in the city to zero at the furthest limit from cultivation (Fujita et. al., 2002).

We could probably consider the Physiocrats also as an exception, but this would let us to a circular discussion as wealth creation itself was directly linked to the only space considered to be productive. On the other hand, the problem here is linked to something else: it was not the space itself the main concern of the physiocrats, but the agriculture as an activity. Again, the focus was the economic activity rather than the land itself.

While capital accumulation occurs at a given time in space, return rates are given "*per time*". While accumulation took precedence in its primitive or original phase, space emerges as a contingency. If space participates in the analysis, it does so as necessary for accumulation (in Marx) or as a relevant element for the generation of agglomeration economies (Marshall) that must be appropriated in the productive process and in profits realization. Perhaps, except in Lenin's thinking about imperialism, space did not play a relevant role in left thinking (Santos, 2009).

On the other hand, if we consider that the time of capital circulation has to be shortened for the absorption of surplus generated in the production sphere and, therefore, markets must be conquered (Lenin, 1985) as a condition of absorption, the territory emerges as a relevant variable. Nevertheless, this doesn't mean that the territory is endowed with any value to be added.

We can also think about David Ricardo and his comparative advantages model as a way of having space in focus. Anyway, it is, again, a great effort to think about Ricardo's model as a space problematizing one much more than a productivity focused model.

Some other authors can be quoted here. The model of Dixit-Stiglitz, considering monopolistic competition and its spatial implications and other authors dealing with center-periphery models surely treated *the space question* someway.

The regional analysis has three major milestones: the German School, the School of Regional Planning and Theories of Regional Development. Synthetically, the German School and its Classical Theories of Location is represented by the contributions of Von Thünen, Walter Christaller, Augusto Lösch, Alfred Weber and Walter Isard. For these authors, the region resembles the neoclassical firm as an analytical unit that combines production factors in the most efficient and rational possible way.

On the other hand, for the followers of Regional Planning, measurements of regional incomes and the active participation of the State in the conductiion of development policies must be prioritized. Here, keynesian and neokeynesian inputs (Harrod, Domar and Kaldor, mainly) are the basis for planning.

Finally, Regional Development Theories group together an uncomfortable eclecticism: theories that derive from the "theories of economic development" of Marx, Lenin, Keynes, Kalecki and Marshall deal with the influences of agglomeration economies and have subnational scales as their analytical unit. Of course, not all of these authors had a clearly established or peacefully accepted theory of capitalist development. However, the highlight made here is related to the use of concepts from different economic thinking as anchors for the inclusion of space in the economic analysis via the region. Here, Perroux's contributions with his ideal of growing poles as well as the theories of circular and cumulative causation of Myrdal (1968) and the effects upstream and downstream of Hirschman (1959) can also be mentioned.

It was in the 1970s that the theories of regional development established space as a social production, highlighting it as a "place" of class struggle and conflicts. Lipietz, Harvey, Castells, Milton Santos and other authors stood out at that period, each with specific contributions to the debate. However, it was in the 1980s, when the movement of capital imposed itself harshly and brought with it the deregulation of markets, that the regional analysis saw its dynamics "broken" and became innocuous to explain the structural changes that were present then.

The reaction has come with several attempts to explain the local phenomenon and the regional analysis, as a rule, has started to merge with the local analysis. At that moment, the theories have been concerned, *a posteriori*, to explain the factors that have generated this or that behavior of a local/region and, *a priori*, have them provided analytical benchmarks so that other regions could have benefits from a general prescription for development. Anyway, polysemy has been present according to ideological thoughts, and has highlighted, in the "reification of the local", the prospects of flexible specialization, the industrial district, Paul Krugman's new economic geography, endogenous development, neo-schumpeterians, the innovative environment, neo-institutionalists, associations, the "milliieux-innovateurs" and the regional planning (Santos, 2009, p. 52).

Present in an economic analysis, the local territory plays its role. The 1980s were emblematic years for the local-global issue. In a contexts of stagnation and crisis, in regions of production and employment decline some *iles of prosperity* were found. Areas with no growth perspectives have taken the lead in their development. Italian districts that have started their development in the 1950s (Becattini, 2002) are the best example of this protagonism: the Third Italy.

Although still showing dynamism, the north of the Italy experienced a crisis in the 1970s, contrasting with a region populated by small and medium-sized companies in about 60 to 100 socio-territorial districts, mainly in the center and in the northern region of the country. It was the production of these districts and their differentiated organization in relation to the fordist accumulation regime, in addition to the generation of exportable surpluses, which drew the world's attention to a possible canonical model of development and, extrapolating the analysis, to a model where the district it is the flexible accumulation unit that marks a new accumulation regime for some people (Piore, Sabel and Storper, mainly).

Arnaldo Bagnasco described the *terza Italia*, the Third Italy, as a region with the highest average number of family members in the country and where, based on small production, historical tradition and hierarchy, an unprecedented development in Italy in the middle of a severe crisis was developed. In that region, even the export development was higher than the one of large companies in Italy. This kind of social construction of the market started to be a research subject for regional economics.

2.Brazil and Local Development: Macroeconomic Issues and Industrial Policy

The 1990s were years of great shift in Brazilian development from both conceptual and practical perspectives. Import tariffs were suddenly lowered, and "non-orthodox methods" were applied to both tax and monetary policies. In 1994, the country started do experience its most successful stabilization plan which succeeded in lowering inflation with a cambial anchorage that, later, has been shifted to a fluctuation band and managed to succeed not only in price stabilization but also in creating a new environment for investments in Brazil.

The country has followed the normative approach derived from Washington Consensus which has led Brazil to consider what I call ¨theory of failures¨ in order to use some tools that moved Brazilian economy towards a path of monetary stability and growth (here we cannot use the adjective ¨sustained¨). The main questions treated were, then, the macroeconomic ones. A development policy was not a question if compared to a need for macroeconomic stabilization and a fiscal rearrangement. However, the years 2000 brought the issue of development back.

Brazil is a large and complex country in many ways. It is not different when social and economic development are the variables taken into account. The solutions for the equation have shown different patterns and a broad variety of instruments. One of those instruments, adopted by Brazilian industrial policy in 2003, was an explicit incentive for development of industrial districts all over the country.

The incentives for industrial districts development were a consequence of a major orientation towards a reduction of regional inequalities in the country. As a result, in addition to other paths for Brazilian industrial policy, there came the old Marshall Industrial Districts as a pattern for local development and, as it should be, the *Third Italy* has come to the scene as a major example to be followed.

The Italian pattern of development was not the only one observed by Brazilian authorities and institutions. The US Silicon Valley and the Route 128 as well as the German districts in Baden-Wurttemberg, among other experiences, were observed as signs of a different dynamics in local development that should be observed.

From the year 2003 on, as already mentioned, Brazil has adopted the Industrial, Technological and Foreign Policy, the PITCE, as a guide to the development of the country. The aim of the document was to create the necessary conditions to increase investment rate and its major guidelines were:

i. to improve the regulatory framework of the infrastructure sectors;

ii. to adopt measures of competitive equality to, among other things, exempt exports;

iii. to reduce the cost of credit and the cost of investment;

iv. to increase foreign trade by improving the country's productive structure in order to obtain productivity gains.

The PITCE established the articulation of regional policies in order to build a national integration:

> *Especially relevant are the links with the physical-economic integration of the territory, through the efforts of the public sector, in partnership with the private sector, in improving the transport, energy and telecommunications infrastructure. The improvement of infrastructure, together with a regional policy aimed at facilitating greater territorial integration, will strengthen regional skills, vocations and technological opportunities (Casa Civil, 2003, p.3).*

It is important to notice that Brazil is a republican federation of States which have autonomy in many aspects. Each State of the federation has its own government structure. Thus, although subordinated to the central power represented by the President of the Nation, the federated States have their own structures for the Executive, Legislative and Judicial Powers. One of the greatest problems of Brazilian political structure is that the federation is asymmetric not only in terms of development but also in terms of tax resources, which, eventually, implies that federated units end up receiving a tax counterpart not always equivalent to what is generated by them. However, this is a historical issue of the country's political and institutional formation and is beyond the scope of this article. On the other hand, differences in development between Brazilian States are fundamental for explaining regional questions and for the selection of specific development policies that seek to mitigate those differences.

Back to the PITCE and its guidelines, four lines of action were determined for the country's development:

i. innovation and technological development

The government intended to structure a national innovation system to articulate agents focused on the production with innovative processes. It was a neo-Schumpeterian approach, with clear institutionalist references. There was not only the recognition of the importance of innovation in the capitalist dynamic, but also the need for articulation of the actors involved in the innovative process. One can also perceive the importance given to the harmonization of the legal-institutional base with the definition of the “institutionality” of actors and management elements in addition to the search for strengthening public and private research institutions.

ii. external insertion

The actions provided for external insertion are related to the sustained expansion of exports, with a clear intention to expand the Brazilian presence in foreign production chains. The inspiration for this agenda is, in our view, a hybrid of neoschumpeterian and neoliberal characteristics, since the prescriptions vary from the need for trade liberalization, with the removal of tariff and non-tariff barriers, to the assumption that innovation creates new needs for use and consumption, with a clear idea of building a "Brazil brand" and capturing premium prices.

iii. industrial modernization and actions related to productive capacity and scale

The PITCE states that modernization problems are more serious in small and medium-sized enterprises due to the difficulty of accessing credit, technology and appropriate management techniques. This item of the document mentions that there is an important concentration of companies that need modernization in more traditional sectors of the economy. Here, therefore, there's a reference to local productive districts[1], although a formal definition of the term is not clearly made.

> *The second is the regional dimension, in which local productive arrangements should be privileged. In other words, modernization programs must act primarily in productive arrangements, taking advantage of the proximity of companies and the ease of cooperation between them and with technological and financial institutions for the diffusion of production techniques and management and expansion of business. Based on these conditions, the modernization programs may become more ambitious, moving towards technological innovation, the densification of the productive fabric and the manufacture of products with greater added value (Casa Civil, 2003, p. 15).*

The regional question is present as a consequence of local productive districts which is, *per se*, a mistake, since the region is not just the district, but a complexity of internal and external relations. Although the detailed examination of the region x local issue is also out of the scope of this article, it is important to point this difference. For those interested in this question we can suggest, among other texts, the analysis found in Santos (2009).

iv. productive capacity and scale

The agenda, in this item, seems to bring a keynesian inspiration with an option for the support of public policies to the sector of intermediate goods. This is a result of the diagnosis that the sector has a production capacity close to the limit. Considering the maturity period for investments in such sectors, the government indicates the performance of the public sector as fundamental to guarantee the expansion of the Brazilian economy

[1] In this article, the terms *industrial districts, clusters, productive agglomerations* and *local productive arrangements* are used as synonymous.

because, once the production limit of the intermediate goods sector has theoretically been reached, there would surely occur “bottlenecks” for production of goods.

The identification of clusters, agglomerations or productive arrangements as central elements of development strategies by Brazilian States was clearly marked as “the way to development” in the 2000s and has generated a kind of "cluster wave", a movement that involved official government agencies, several representative entities of the productive sector, all with a common axis: to defend the strategy of productive arrangements as an alternative for local/regional development.

The identification of productive agglomerations has turned out to be a kind of widespread panacea. One of the reasons for that has been the availability of credit lines destined for some cluster projects. Another reason has been the need of institutions representing entrepreneurs to show new paths for the development of their States. The consequence, however, has been the identification of an enormous number of productive arrangements across the country. In many cases, certainly, such arrangements were far from the definition of production carried out in a territory with socio-historical tradition. In fact, the concept has been applied to any set of companies of a certain activity (or from different activities) in a given location. This can be clearly seen in the definition of productive arrangement released by the Federation of Industries of the State of Minas Gerais, an entity representing the industrial sector of the state:

> *Local productive arrangement is the realization of a cooperative work that groups companies that are dedicated to producing goods and related products, the public and private powers, research institutions and technology centers. The articulation of actions promotes benefits for the entire production cycle, with reduced costs and access to new markets. And that does not mean creating new expenses. The cooperative work is going to build bridges to a new level, without each partner losing their identity (Sistema Fiemg, 2001, p.2).*

In the same document, the Federation points out that "*most of the entrepreneurs have already proven that the sustained growth of the industry necessarily passes through the strengthening of the local productive arrangement*"[2]. Thus, several initiatives have been established with the clear option for the unique alternative of the local productive arrangements (LPA) as a vital element of local development, which leads us to the reflection on the imprisonment of different paths and possibilities for the place to develop.

Considering the cluster wave, the Brazilian government, under the industrial policy of that time, has created the GTPAPL - Permanent Working Group for Local Productive

[2] Sistema Fiemg (2001). Arranjo Produtivo Local, um acordo em que todos ganham. FIEMG (ed.). Mimeographed. Belo Horizonte: FIEMG System.

Arrangements, composed of thirty-two institutions, in addition to the Brazilian Ministry of Development. The GTAPL defined a local productive arrangement as:

> *a large geographically defined productive complex, characterized by a large number of firms involved in the various production stages and, in various ways, in the manufacture of a product, where the coordination of the different phases and the control of the regularity of their operation are submitted to the game of market and a system of social sanctions applied by the community [...]. Spatial contiguity allows the territorial system of firms to make productive and technological externalities feasible without losing their flexibility and adaptability (Grupo, 2006, p.12).*

The GTPAPL definition deals with what the specialized literature calls "local productive system", since a "productive complex", "several productive stages" and other characteristics that point to production systems with a high degree of complexity in their production chains and in the inter-company relationship and between companies and support/development/ development institutions, governmental or not.

Based on the GTPAPL vision, the following productive arrangements have received support in the country:

Table 1: Local Productive Arrangements by Regions and States

Region	**State**	**LPA**
North	Acre	Wood and Furniture; Brazilian Nuts; Manioc
	Amapá	Wood and Furniture; Pottery and Ceramic
	Amazonas	Phytotherapics and Drugs; Pisciculture; Nuts; Forestry and Wood; Technology and use of Forest Products
	Pará	Fibers; Fruits; Wood and Furniture
	Rondônia	Fruits; Coffee; Pisciculture
	Roraima	Fruits; Grains
	Tocantins	Agribusiness; Wood; Livestock
Midwest	Goiás	Pharmaceutical; Grains; Pigs and Poultry; Mining
	Mato Grosso	Cotton; Amazonian wood, extraction and furniture industry; Livestock; Beekeeping

Region	**State**	**LPA**
	Mato Grosso do Sul	Livestock; Hides and Derivatives; Natural Gas; Microbiology applied to animal pathology and aquaculture; Aquaculture; Pottery
	Distrito Federal	Information and Communication Technology
Northeast	Alagoas	Cotton, Corn and Manioc; Clothing; Fish Farming; Ovinoculture and Caprinoculture; Aquaculture; Dairy products; Beekeeping
	Bahia	Cocoa; Ornamental Rocks; Sisal; Telecommunications
	Ceará	Cashew Culture; Rocks; Flowers; Clothing; Pottery
	Maranhão	Soy; Wood and Furniture
	Paraíba	Ovinoculture and Caprinoculture; Sugar and Alcohol; Information and Communication Technology; Leather and Footwear
	Pernambuco	Medical Center; Information and Communication Technology; Creative Industries; Plaster; Construction
	Piauí	Beekeeping; Shrimp farming; Carnauba; Cashew; Gems and Jewels
	Rio Grande do Norte	Marine shrimp farming; Dairy Products; Clothing; Ovinoculture; Caprinoculture; Mining
	Sergipe	Fruits; Dairy Products; Pottery
South	Paraná	Metal mechanics; Auto parts; Wood and Furniture; Manioc; Support projects; Clothing; Plaster, Lime and Limestone; Ceramics; Medical, Dental and Hospital Equipment, Apparatus and Instruments; Agricultural Equipment and Implements
	Santa Catarina	Malacoculture; Wood and Furniture; Pig farming; Textile; Red Ceramics; Information and communication technology; Metal mechanics; Footwear; Aquiculutra and Fishing
	Rio Grande do Sul	Auto parts; Leather and Footwear; Wood and Furniture; Grape Culture; Viniculture; Gems and Jewels; Computer Systems; Metal mechanics; Food

Region	State	LPA
Southeast	Espírito Santo	Fruits; Ornamental Rocks
	Minas Gerais	Fruits; Information and communication technology; Wood and Furniture; Gems and Jewels; Support Projects; Biotechnology; Stone Artifacts; Footwear; Microelectronics; Electronics
	Rio de Janeiro	Underwear; Information and communication technology; Ornamental rocks; Support Projects; Aplicated math; Computing Methodologies and Techniques; Gems and Jewels
	São Paulo	Leather and Footwear; Wood and Furniture; Support Projects; Plastic; Ornamental rocks; Footwear; Health Materials and Equipment

Source: Author's compilation. Primary data obtained from the Ministry of Development, Industry and Trade

It is important to notice that the support received by the districts mentioned above hasn't been an isonomic one. Some of the LPA have received money and institutional support; some others have received only government recognition that they were productive arrangements and could be a cell development in their regions. Among them, however, four were chosen to take part in a project of local systems development. The chosen LPA were:

Table 2: Local Productive Arrangements Supported by UNDP

State	County	Local Productive Arrangement
Pará	Paragominas	Wood and Furniture
Paraíba	Campina Grande	Leather and Footwear
Rio de Janeiro	Nova Friburgo	Intimate Fashion (Underware)
Sergipe	Tobias Barreto	Clothing and Crafts

Source: Author's elaboration

Paragominas is located south in the State of Pará, 307 km from Belém, the capital of the State. In 2010, the city had 97,819 inhabitants and, in 2018, 18,456 were employed.

Located 132 km west of the capital João Pessoa, in the State of Paraíba, Campina Grande had, in 2010, 385,213 inhabitants and 110,075 people were working in 2018.

Located west in the mountains of the State of Rio de Janeiro, 138 km from the city of Rio de Janeiro, capital of the State, Nova Friburgo had, in 2010, 182,082 inhabitants and, in 2018, 59,397 of the inhabitants were employed.

Tobias Barreto is located sowthwest in the State of Sergipe, 132 km from the capial of the State, Aracaju. In 2010, there were 48,040 inhabitants in the city and, in 2018, 5,280 were employed.

The project, carried out under the United Nations Development Program (UNDP), has received financial contributions from the Inter-American Development Bank (IDB), from the Chamber of Commerce, Industry and Crafts from Milan and from Brazilian Government via the Brazilian Service to Support Micro and Small Companies (SEBRAE). The objective of the project was to develop the so-called "productive polos" by improving the productive agglomerations and turning them into production systems integrated to the global dynamics.

3. The UNDP Project and the Local Productive Districts – Methodology and Results

The project developed under the UNDP/SEBRAE was a product from a series of agreements between the institutions mentioned above, the first one was signed in 2002. The project started in 2003 and ended in 2006 and conceptualized a local productive arrangement as follows:

> *[...] constitutes a particular type of cluster, formed by small and medium-sized companies, grouped around a profession or a business, where the role played by the relationships - formal and informal - between companies and other institutions involved is emphasized. The firms share a common culture and interact as a group, with the local socio-cultural environment (Gianni, 2004, p.9).*

When considering any cluster formed around a profession or business as a LPA, the polysemy around what would be a productive arrangement is obviously widened. Once again, the topic is beyond our scope, but allows us to say that, due to the scope of the definition and as a result of the game of political-institutional forces that took place around an object capable of channeling resources of all kinds, the comprehensive definition have identified about 230 productive arrangements in Brazil at that time.

The methodology for the productive arrangements was conceived from three main fundamental axes:

3.1. District Dynamics

On this axis, interests were in the interactions between the institutions involved with the arrangement, adopting a theoretical perspective of Douglas North's institutionalism as the basis for action. Organizations that worked in the areas of labor training, civil society organization and the government should be involved in order to make the connection with the business sector feasible. As a consequence, good governance was sought and was created the District Forum as the management body of the arrangement. The Forum was a

group of representatives of the productive sector, class entities, public sector, and non-governmental organizations.

Also in the scope of District Dynamics, issues related to access to credit were dealt with, mainly in search for reduction of interest rates for the companies and in the "unblocking of bottlenecks" in the guarantee for the production of small companies via, for example, auction of receivables always taking into account the Italian experience as a base of action.

3.2. Business Development and Production Organization

Production, productivity, design, quality, logistics and all topics related to production were treated in the scope of business and production organization. Management qualification programs, improvement of human capital, entrepreneurship and other topics that lead to better business performance and increased product quality were the main concern.

3.3. Information and Market Access

Sales, full knowledge of the market, product quality assessments, after-sales of the arrangement companies, competition, access to new markets and internationalization of the arrangement were the main concerns of this axis.

It should be noted, within the scope of the methodology used in the project, which involved, within the aforementioned axes, the adoption of a logical matrix, monitoring indicators, performance probabilities, etc., that the territory was an important part of the methodological organization. The territoriality was seen as an active dimension of competitiveness, that is, there was an understanding that the territory attributes, *per se*, value to products, institutions and agents.

> *The local particularity is the same as the qualities and characteristics that make a place unique. The factors that make up the differentiation of a territory are of a cultural, environmental, landscape, and socioeconomic nature. [...] The history and culture of a place represent an essential component of the economy of a territory, of an area, but in any case it can be impoverished by inattentive observations. [...]. It is necessary, then, to analyze all the small and large unique characteristics of a territory. [...] The local particularity is a relatively new concept that must be explored and deepened in order to make the competitive territory in the midst of a global market and always more aggressive (Sebrae, 2004, p. 84).*

4. Are the local arrangements still all right?

In order to assess the health of the arrangements supported by the IDB Project, we will use some indicators from the period prior to the start of the project, results from the year 2006 or later (end of the project) and the last available data. It should be noted that, as results are almost always related to municipalities, we do not always have the information

we would like for the assessment. However, we believe that the data can, at least, point out whether the aforementioned arrangements have achieved the expected success.

4.1 Budget Data

Tables 3 to 6 present budget data for the municipalities where the chosen districts are located. A large part of Brazilian municipalities survive thanks to transfers of resources from the central government. A measure of success of a productive arrangement could be a significant positive change in the percentage of own revenues, since tax revenue growth would be expected due to an increase in economic activity.

Table 3: Budget Data – Nova Friburgo (%)

	2002	2006	2018
Transfers/Total Revenue	75.7	68.3	68.2
Own Revenue/Total Revenue	24.3	31.7	31.8

Source: derived from author's calculation. Primary data obtained from the SIAFI System, National Treasury Secretariat/ Ministry of Economy.

Table 4: Budget Data – Tobias Barreto (%)

	2002	2006	2018
Transfers/Total Revenue	96	N.A.	90
Own Revenue/Total Revenue	4	N.A.	10

Source: derived from author's calculation. Primary data obtained from the SIAFI System, National Treasury Secretariat/ Ministry of Economy.

Table 5: Budget Data – Campina Grande (%)

	2002	2006	2018
Transfers/Total Revenue	84	77	75
Own Revenue/Total Revenue	16	23	25

Source: derived from author's calculation. Primary data obtained from the SIAFI System, National Treasury Secretariat/ Ministry of Economy.

Table 6: Budget Data – Paragominas (%)

	2002	2006	2018
Transfers/Total Revenue	92	73	77.3
Own Revenue/Total Revenue	8	27	22.7

Source: derived from author's calculation. Primary data obtained from the SIAFI System, National Treasury Secretariat/ Ministry of Economy.

Nova Friburgo's own revenues registered an increase in 2006 if we consider the year 2002 for comparison: in 2002, the municipality financed its expenses with 24% of its own revenues and in 2006, this percentage reached 32%, the same result achieved in 2018. It is likely that the own revenues grew due to the greater density of the arrangement. However, the maintenance of the same level in a recent period may point to the stagnation of the dynamics of the arrangement. Obviously, other factors may be the cause of the result: reduction in the dynamics of other economic activities, concession of tax incentives, etc, but one cannot ignore the growth shown after the project. Almost the same results are found in the other districts. Although Paragominas experienced a relative decrease in the participation of own revenues, the number is still much higher than the one for 2002.

4.2 Human Development Index

Another index that can be considered is the human development index (with all the criticisms that can be made of it) as a measure of improvement in the municipality. The numbers are shown in tables 7 to 10.

In 2000, Nova Friburgo had one of the largest HDIs in the state of Rio de Janeiro (0.654) and in 2010, the index reached 0.745. Thus, the growth amounts to 13.9% and a decrease of 73.7% in human development gap was achieved. Again, one cannot say the result was due to the dynamics of the productive arrangement, but, together with other indicators, this improvement is a positive number especially because there was a great growth in the income index for the municipality in the period.

If the period 1991-2010 is considered, the growth rate was 38.7%. If this result is compared to the one of the State of Rio de Janeiro (from 0.573 to 0.761), we can say the growth was very good, especially if we consider the rate of reduction of the human development gap of 55.08% for the municipality and 53.85% for the State of Rio de Janeiro.

Table 7: Human Development Index – Nova Friburgo

	1991	2000	2010
HDI	0.537	0.654	0.745

Source: Human Development Atlas in Brazil

Table 8: Human Development Index – Paragominas

	1991	2000	2010
HDI	0.336	0.471	0.645

Source: Human Development Atlas in Brazil

Considering the period 2000-2010, the HDI for Paragominas grew from 0.471 to 0.645: a growth of 36.9% which reduced the human development gap in 67.1%. This result also shows a great shift for the municipality and, as the income and education indexes were responsible for the HDI growth, one can point out that the district has played a great role in that movement.

Table 9: Human Development Index – Tobias Barreto

	1991	2000	2010
HDI	0.290	0.407	0.557

Source: Human Development Atlas in Brazil

The HDI went from 0.407 to 0.557 in the period 2000-2010, which means a 36.9% growth rate and a 74.7% drop in the human development gap. Again, education and income were responsible for the result a and it is not an exaggeration to attribute to the performance of the productive pole a fundamental role in this result for Paragominas economy depends fundamentally on the wood activity.

Table 10: Human Development Index – Campina Grande

	1991	2000	2010
HDI	0.476	0.601	0.720

Source: Human Development Atlas in Brazil

The HDI went from 0.601 in 2000 to 0.720 in 2010 which represented a growth rate of 19.8% and a 70.2% reduction in the human development gap. In Campina Grande the same pattern was observed: education and income are clearly responsible for the drop in the human development gap and it wouldn't be wrong to link this reduction to the district activities.

4.3 Income and Labor

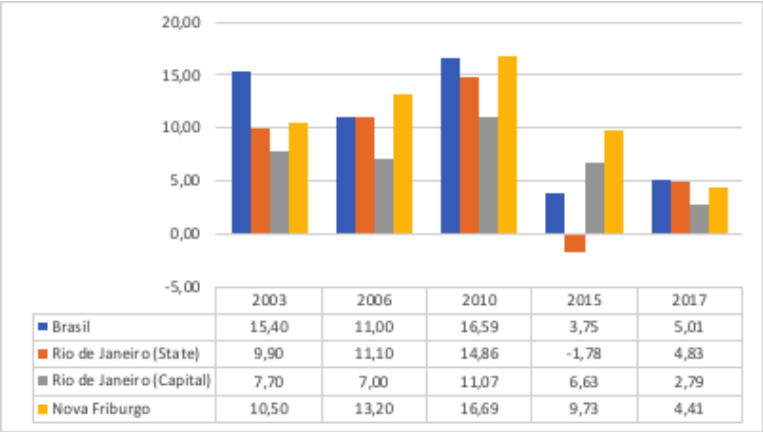
Considering, now, the impacts of the LPA on employment and income generation, two indicators were used: GDP at current prices and employment data. It is worth remembering that a positive or negative variation in GDP growth does not necessarily result from the productive arrangement since other activities may have contributed to GDP performance. However, due to the absence of economic indicators for the subnational scale and, in the Brazilian case, for the "substate" scale, we chose to use the municipalities' GDP as a reference.

One way to minimize this problem is to compare it with the dynamics of GDP growth or decline with other territorial references. Here, we used data from Brazil, from the State and from the capital of the State where the arrangement is located do make some comparisons (Graphs 1 to 4). Obviously, we know that we are using nominal growth. For this reason, we need to take into account that the intertemporal comparison carries an inflationary bias. However, based on the hypothesis that inflation is, on average, the same for all municipalities, we believe that we have, at least, a measure of comparison between the behaviors of the territories. The alternative option would be to consider GDP deflated by the implicit deflator or by another indicator that is deemed appropriate. For our purposes, however, the comparison of nominal growth is sufficient.

Nova Friburgo experienced a nominal GDP growth above Brazilian growth and, as a rule, above the State and the capital growths for the post-project period (2006 onwards). With some exceptions (fundamentally, the year 2015, when macroeconomic situation was already deteriorated in Brazil), the other municipalities host to the productive arrangements also registered nominal growth above the Brazilian growth and above the State and capital growths.

Can the observed behavior be attributed to the arrangements? As already said, certainly not. Other activities are carried out in the municipalities and other dynamics may have influenced the results. However, as the municipalities where the arrangements are located are small or medium-sized cities, one can think that the arrangements contributed to the results found since they are the main activities present in the municipalities studied. This does not mean that additional issues such as the elasticity of demand, the behavior of the price system and conjunctural factors should not be evaluated in order to allow a more accurate analysis.

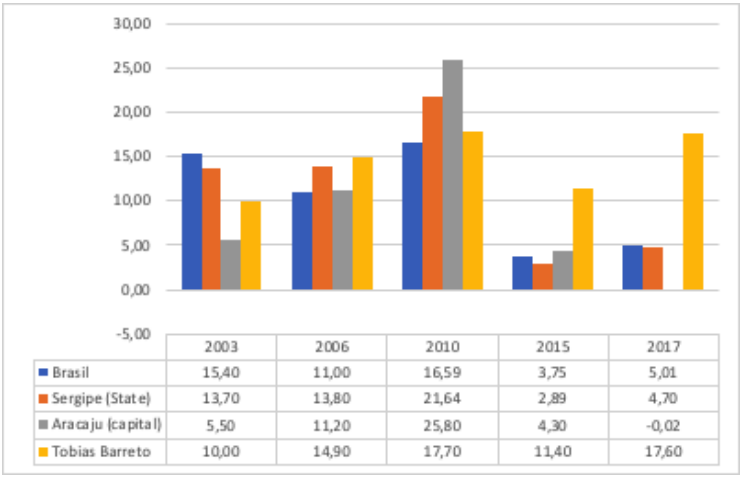
Graph 1: Nominal GDP Growth (%) – Brazil, State of Rio de Janeiro, City of Rio de Janeiro and Nova Friburgo



	2003	2006	2010	2015	2017
Brasil	15,40	11,00	16,59	3,75	5,01
Rio de Janeiro (State)	9,90	11,10	14,86	-1,78	4,83
Rio de Janeiro (Capital)	7,70	7,00	11,07	6,63	2,79
Nova Friburgo	10,50	13,20	16,69	9,73	4,41

Source: Derived from Author's Own Calculation. Source of primary data: Brazilian Institute of Geography and Statistics, IBGE.

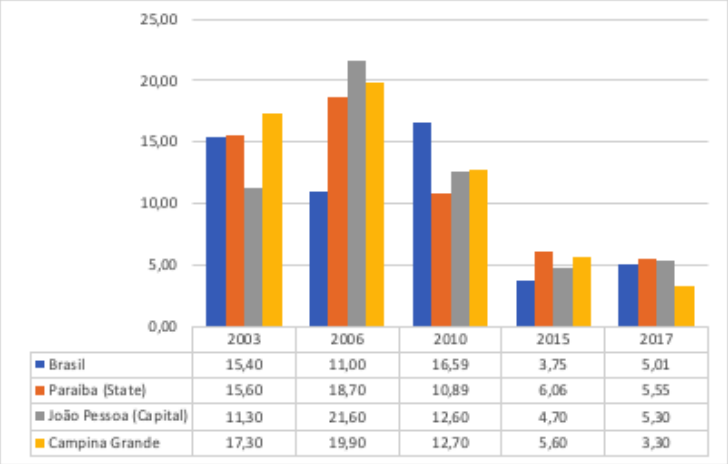
Graph 2: Nominal GDP Growth (%) – Brazil, State of Sergipe, City of Aracaju and Tobias Barreto



	2003	2006	2010	2015	2017
Brasil	15,40	11,00	16,59	3,75	5,01
Sergipe (State)	13,70	13,80	21,64	2,89	4,70
Aracaju (capital)	5,50	11,20	25,80	4,30	-0,02
Tobias Barreto	10,00	14,90	17,70	11,40	17,60

Source: Derived from Author's Own Calculation. Source of primary data: Brazilian Institute of Geography and Statistics, IBGE.

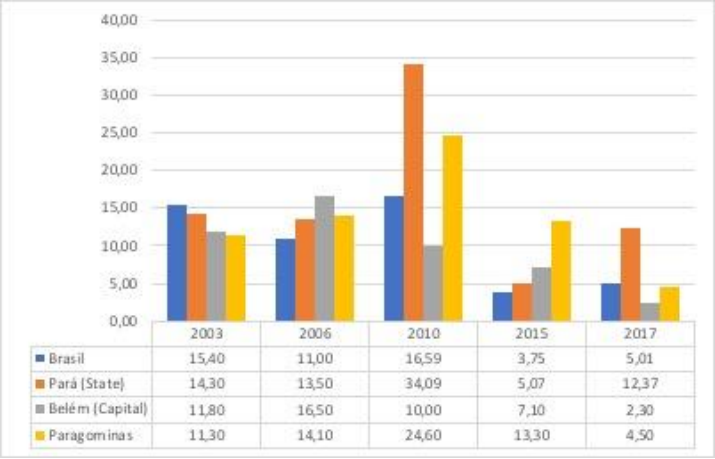
Graph 3: Nominal GDP Growth (%) – Brazil, State of Paraíba, City of João Pessoa and Campina Grande



	2003	2006	2010	2015	2017
Brasil	15,40	11,00	16,59	3,75	5,01
Paraíba (State)	15,60	18,70	10,89	6,06	5,55
João Pessoa (Capital)	11,30	21,60	12,60	4,70	5,30
Campina Grande	17,30	19,90	12,70	5,60	3,30

Source: Derived from Author's Own Calculation. Source of primary data: Brazilian Institute of Geography and Statistics, IBGE.

Graph 4: Nominal GDP Growth (%) – Brazil, State of Pará, City of Belém and Paragominas



	2003	2006	2010	2015	2017
Brasil	15,40	11,00	16,59	3,75	5,01
Pará (State)	14,30	13,50	34,09	5,07	12,37
Belém (Capital)	11,80	16,50	10,00	7,10	2,30
Paragominas	11,30	14,10	24,60	13,30	4,50

Source: Derived from Author's Own Calculation. Source of primary data: Brazilian Institute of Geography and Statistics, IBGE.

Better conclusions can be obtained if formal employment data is used. The employment data are compared from the pre-project phase to those in the post-project phase. Employment data used are from the specific activities of each arrangement.

Tables 11 below shows the results of employment in the clothing sector for the micro-region of influence of the district host city (contiguous area and immediate influence). The pre-project phase corresponds to the 2000-2003 period and the immediate post-project phase, to the 2004-2007 period. The figure for 2018, defined as post-project B, is also presented.

Table 11: Employment by Arrangements Activities

LPA	**Pre-Project (2000-2003 average data) (A)**	**Post-Project (2004-2007 average data) (B)**	**Growth (B)/(A)**
Nova Friburgo	5,809	7,021	20.9%
Tobias Barreto	38	28	- 26.5%
Campina Grande	461	586	27.1%
Paragominas	23	63	173.9%

Source: Derived from Author's Own Calculation. Source of primary data: Labor Ministry of Brazil and Brazilian Institute of Geography and Statistics, IBGE.

As a first observation of the data in the previous table, it should be noted that in columns (A) and (B) data refer to the average job generation. That said, it is worth noting the fact that all arrangements, except the one in Tobias Barreto, registered growth in the number of jobs in their activities.

More recent data were not used due to methodological problems, since it would be necessary to use another source that, although showing growth in all arrangements, would generate high percentages of employment increase, which could lead us to overestimate the performance of the arrangements. Anyway, even Tobias Barreto has been showing growth in employment in the clothing and handicrafts sector in more recent years.

Here, again, there is evidence that support for productive agglomerations can result in virtuous cycles of job growth. Obviously, this virtuosity will always depend on macroeconomic issues since the actions of development of local productive arrangements such as those mentioned here are mostly aimed at correcting microeconomic and managerial aspects.

Tables 12 to 15 show the participation of formal employment in the productive arrangements in two moments: in the pre-project phase (2000-2003) and in the post-project phase (2004-2007). As a consequence of the implemented actions, it was expected an increase in the formalization of employment for one of the characteristics of the classic productive arrangements is the informality in labor relations, since they derive from spontaneous productions related to the historical-family tradition.

Table 12: Nova Friburgo – Formal Jobs in the Productive Arrangement (%)

Period	**Share**
Pre-Project	39.8
Post-Project	45.5

Source: Derived from Author's Own Calculation. Source of primary data: Labor Ministry of Brazil.

Table 13: Tobias Barreto - Formal Jobs in the Productive Arrangement (%)

Period	**Share**
Pre-Project	4.0
Post-Project	3.0

Source: Derived from Author's Own Calculation. Source of primary data: Labor Ministry of Brazil.

Table 14: Paragominas - Formal Jobs in the Productive Arrangement (%)

Period	**Share**
Pre-Project	5.8
Post-Project	8.2

Source: Derived from Author's Own Calculation. Source of primary data: Labor Ministry of Brazil.

Table 15: Campina Grande - Formal Jobs in the Productive Arrangement (%)

Period	**Share**
Pre-Project	16.0
Post-Project	19.5

Source: Derived from Author's Own Calculation. Source of primary data: Labor Ministry of Brazil.

The results show the greater formalization of work relations in all arrangements, with the exception of Tobias Barreto.

Tobias Barreto's arrangement had the peculiarity of being the "most disorganized" in terms of production and labor relations among the districts studied. Most of the production in this arrangement was carried out by families in their own houses, maintaining the tradition of producing typical lace from the northeast of Brazil, mainly from that region of the State of Sergipe. Therefore, the result is not surprising if we take into account the larger organization found in the other arrangements, mainly in Nova Friburgo and Campina Grande.

4.4**.** The Locational Quotient

The locational quotient os specialization index is calculated as follows:

$$LQ_{ij} = (\frac{Eij}{\sum Eij}) / (\frac{\sum Eij}{\sum\sum Eij})$$

Eij – Jobs in sector i from region j

$\sum Eij$ ou E*j = Jobs in all sectors of region j

$\sum Eij$ ou Ei* = Jobs in sector i in all regions

$\sum\sum Eij$ ou E** = Jobs in all sectors of all regions

The LQ allows assessing the greater or lesser specialization of the productive arrangement over time and also allows a better conclusion on the inducing effects of the project. The higher the LQ, the greater the specialization.

It should be noted, however, that LQs cannot be compared between regions because the presence of a single company in a poorly developed location leads to a high LQ. Table 16 shows the LQs calculated for the years 2002, 2004, 2006 and 2018 for the counties of the productive arrangements.

Table 16: Locational Quotient by Municipalities

County	**2002**	**2004**	**2006**	**2018**
Nova Friburgo	9.23	9.87	9.24	12.67
Tobias Barreto	1.33	3.34	3.82	15.55
Paragominas	0.38	0.28	0.49	2.95
Campina Grande	0.73	0.69	0.80	0.57

Source: Derived from Author's Own Calculation. Source of primary data: Labor Ministry of Brazil and Brazilian Institute of Geography and Statistics, IBGE.

In all cases, except in Campina Grande, the specialization index shows great growth, which corroborates the hypothesis that the project generated positive results in these regions.

On the other hand, Campina Grande shows, at least in recent years, that there was greater productive diversification (to be verified) than productive specialization. However, it is worth noting that the period immediately after the implementation of the IDB Project shows greater LQ, that is, greater specialization in the activity of the productive arrangement.

The most recent result for Campina Grande, therefore, can mean both greater productive diversification and the inability of the project to maintain its long-term results in the region, or even a change in the production structure itself, with greater density of the arrangement's own production chain, movement that was not analyzed here.

5. Conclusions

The productive arrangements are based on the cooperation-competition binomial and seek, in agglomeration economies, to reduce transaction costs. They are one of the possible ways for local/regional development, but not the only way. On the one hand, the socio-productive tradition that unites agents around a socio-technical production can generate density of production chains if, and only if, the governance structure derived from the actions of the members of the arrangement (and outside it) contributes to the cohesion. However, this tradition changes, undergoing mutations due to the movement of capital and the adaptation of agents to institutions and dynamic transactions.

Neither “Third Italy” nor any other experience can be a canonical model. The sustainability of the productive arrangements supported by the IDB/SEBRAE Project highlighted here depends on a business/institutional organization capable of coordinating antagonistic mechanisms of cooperation and competition that affect, among others, issues of credit and financing. Obviously, there will always be conjuncture and macroeconomic movements involved, but, from the point of view of the productive arrangement, the internal actions of its components seem to be of extreme importance.

The productive arrangements mentioned here are part of the group of traditional industries, the "rearguard of capitalism", with innovative processes that increasingly need the avant-garde search in terms of materials and design (except perhaps for Tobias Barreto's handicrafts and clothing). These economies depend on agglomeration economies to become extrapolable and not just agglomerative.

The IDB / SEBRAE Project had the merit of opening the space necessary for the reflection of local actors on innovation in design and technologies. In addition, it brought financial resources, fundamental for the insertion of producers in the Brazilian and international scenario.

Finally, the answer to the question in this article, whether the arrangements are in good health, is simple and not conclusive: yes, it seems so. However, some of them, like that of Tobias Barreto, show that they deserve greater attention. It is likely that this arrangement in particular deserves greater investment contributions (not only financial, but of organization, management, disclosure, etc). Nova Friburgo is inserted in the national and in the international scenes, since it accounts for about 25% of Brazilian underwear exports. Despite the reduction in the specialization index, Campina Grande has the advantage of being already consolidated in leather-footwear production and in complete harmony with the its State capital, João Pessoa, forming a "distribution corridor". Paragominas is a success story in terms of forest management and economic growth. This, of course, is due to the work carried out from the IDB Project.

In Brazil, there are, in fact, many productive arrangements if we consider the classic definition that includes the socio-historical tradition of production, that is, the territorial dimension that gives specific value to production in addition to the mere productive agglomeration. These arrangements, although not a complete solution for national development, are, in fact, a possible path for local development, for the generation of jobs and income and for the maintenance of workers in their cities, giving them a greater sense of belonging and generating added value in their own territory.

References

Atlas do desenvolvimento humano no Brasil. http://atlasbrasil.org.br/2013/pt/. (Access: August 1st, 2020).

Becattini, G.(2002). Del distrito industrial marshalliano a la teoria del distrito contemporánea: una breve reconstrucción crítica. *Investigaciones Regionales, Asociación Española de Ciéncia Regional. Madrid, (1) otoño 2002.*

Benko, G.(2000*). La richesse des régions, la nouvelle géographie socio-économique*. Paris: PUF.

Benko, G. & Lipietz, A.(1994). *As regiões ganhadoras: distritos e redes. Os novos paradigmas da geografia económica.* Oeiras: Celta Editora.

Casa Civil (2003). *Diretrizes de Política Industrial, Tecnológica e de Comércio Exterior*. Brasília: Presidency of Federative Republic of Brazil (ed).

Castells, M. (1999). *A sociedade em rede*. Rio de Janeiro: Paz e Terra.

Gianni, S. (2004). "Instrumentalizar para o desenvolvimento". *Metodologia de desenvolvimento de arranjos produtivos locais. Projeto Promos/Sebrae/BID. (2),* 9-10.

Grupo de Trabalho Permanente para Arranjos Produtivos Locais (2006). *Brasília: Ministry of Foreign Affairs, Indusrty and Commerce*. 106p. Mimeographed.

Fujita, M.; Krugman, P. & Venables, A.(2002). *Economia Espacial.* São Paulo: Futura.

Harvey, D. (2007). *A produção capitalista do espaço*. São Paulo: Annablume.

Hirschman, A.O. (1959). *Strategy of economic development*. New Haven: Yale University Press.

IBGE. Brazilian Institute of Geography and Statistics. http://www.ibge.gov.br . (Acess: July 25th, 2020).

Kalecki, M. (1980). *Crescimento e ciclo das economias capitalistas*. São Paulo: Hucitec.

Keynes, J.M. (1988). *A teoria geral do emprego, do juro e da moeda*. São Paulo: Nova Cultural.

Krugman, P. (1999). The role of geography in development. *International Regional Science Review. 22(2),* 143-161.

Lenin, V.I. (1985). *O desenvolvimento do capitalismo na Rússia*. São Paulo: Nova Cultural.

Marshall, A.(1998). *Princípios de Economia*. Vol.1. São Paulo: Nova Cultural.

Mark, K.(1985). *O Capital.* São Paulo: Nova Cultural.

Myrdal, G.(1968). *Teoria econômica e regiões subdesenvolvidas*. Rio de Janeiro: Saga.

Perroux, F.(1967). O conceito de polo de crescimento. *Economia Regional.* pp 145-156.

Piore, M. & Sabel, C. (1984). *The second industrial divide: possibilities for prosperity*. New York: Basic Book.

Santos, M. (2007). *Por uma outra globalização: do pensamento único à consciência universal*. Rio de Janeiro: Record.

Santos, M. & Silveira, M.I.(1999). *O Brasil: território e sociedade no início do século XXI*. São Paulo: Record.

Santos, S.C. (2009). *Arranjos produtivos locais no Brasil pós-1990: práxis polissêmica e desenvolvimento.* Non-published PhD Dissertation. Rio de Janeiro: Institute of Urban and Regional Planning, Universidade Federal do Rio de Janeiro.

Sebrae. Serviço Brasileiro de Apoio às Micro e Pequenas Empresas. (2004). *Metodologia de desenvolvimento de arranjos produtivos locais*. Projeto Promos/BID/Sebrae. Sebrae; IDB & Promos (ed). Brasília: Sebrae.

Sistema Fiemg (2001). *Arranjo Produtivo Local, um acordo em que todos ganham*. FIEMG (ed.). Mimeographed. Belo Horizonte: FIEMG System.

Review of Socio-Economic Perspectives **Terziev, V., pp. 117-134**
Vol. 5 Issue: 3/ September 2020

SCIENCE AS A TOOL FOR SOCIAL DEVELOPMENT

Venelin Terziev[1]

Abstract

Defining social efficiency and social technology is the core element of assessment methods and models, taking into account a wide range of objective and subjective factors. The assessment methods of social programmes (projects) efficiency are related to the social system's orientation towards social protection and social services of the population and the use of the process approach and the transition to programme-target methods, outlining the main issues and mechanisms for social services and tasks for assessment, determining the basic requirements for efficiency assessment of social programming and the various stages. Considering all these matters, the research offers social programming efficiency assessment model based on "organizational efficiency" approach that covers a number of certain elements: system for resources acquisition, choice of goals, assessment of the impact on the external environment, choice of strategy, following the "what if" principle and the priorities of social activity, arising from the dynamic changes in social environment. Special emphasis is put on the differentiated effect on higher education institutions, depending on the field in which universities carry out teaching and research activities, as well as on the peculiarities of the university business model in the changing environment for development of the higher education institutions**.**

Keywords: Social economy, social development,higher education, science, WoS
JEL Codes: O00, O20, I20, I21, P41

Citation : Terziev, V. (2020). Science as a Tool for Social Development. *Review of Socio-Economic Perspectives, Vol 5(3),* 117-134.

Article Type: Research Article
Application Date: 17.06.2020 **& Admission Date:** 21.08.2020
DOI: 10.19275/RSEP091

---

[1] Full Member of the Russian Academy of Natural History, Professor, Eng., D.Sc. (National Security), D.Sc. (Economics), D.Sc. (Social Activities), Ph.D.
Georgi Rakovski Military Academy, Sofia, Bulgaria
University of Rousse, Rousse, Bulgaria
Kaneff University Hospital, Rousse, Bulgaria
Russian Academy of Natural History, Moscow, Russia
ORCHID ID: 0000-0003-1115-8877
E-mail: terziev@skmat.com

1. Introduction

Over the last years a lot has been said and recorded about "measuring" science, about its quality and criteria for determining its importance and value, i.e. determining its social efficiency. It is an interesting initiative both from a professional and research point of view. The process includes at least two parties: those who create science and those who evaluate it or, to be more precise, who use it. It is highly probable that the attitude of the parties towards the result will differ. In order not to make it seem too primitive and consumerist, we should consider it as a process that is too complicated, both for its reporting and assessment. Historically, the benefits of various scientific discoveries came much later, even after the death of their creators. This presents researchers of this process with a number of complex tasks that are difficult to define, measure and analyze.

Taking into account both the historical factors and the strong dynamics of our current social development, we should look for an appropriate assessment form, as well as a way to reflect this scientific and research process in an appropriate and best possible way. Such process cannot be separated or defined independently, becase it has become integrated into our existence and its accomplishments have become part of our lives.

2. Measuring science as a way to indicate its importance

The challenges of seeking answers to questions in terms of their usefulness, efficiency and effectiveness are related to a definite and accurate knowledge of these processes and their impact on the entire social process in which they take place, or, to be more precise, are part of it.

The impact of science on our development is a process that itself does not need to be proven, because its results are obvious to all.

Perceiving science as something abstract and incomprehensible would rather harm the process of its understanding and evaluating.

Numerous state and public institutions, Ministry of education and science of Bulgaria being one of them, are devoted to this task as part of their obligations. By developing and implementing different models and techniques in this directions there always will be support and opposition. However, in no way should this frighten, offend or discourage any of the parties. Achieving maximum justice is already a strong motivation to keep on going in the direction of objectifying the essential processes related to the scientific and research activities. Moreover, over lifelong existence it has been proven that the progress is related to scientific breakthroughs that are part of human experience.

Very often people perceive things quite pragmatically and are satisfied with the explanation that their present state is acceptable enough. The changes are rather unwanted or frightening because we associate them with ourselves. The academic community is quite conservative in its pointviews and is perceived as self-sufficient. This acceptable way may be relatively good for a certain period of time, but it is by no means acceptable and progressive for the development of these processes.

The term 'process' is complicated enough in the sense we use it, because on the one hand, it is continuous and has a number of characteristic features, complexity and even

contradictions. It should be considered, defined and analyzed by all its participants, but mostly by those who will benefit from it, i.e. the people. Other way it will be just a pseudoscience that will bring satisfaction to a man himself without being useful to others. You will agree that the main benefit in this direction is the applicability of everything that scientists and researchers do. Historically, this has been repeated many times over the years, and in many cases scientific discoveries have been accepted and valued much later. Accepting or denying a certain scientific activity demands its understanding and approval by the society, which is not always an easy and achievable task from any point of view and sometimes impossible for a scientist.

Usually, scientific discoveries, researches or scientific projects are published in specialized publications that are available to a limited number of users who are engaged in this activity or these publications have limited access which in most cases is paid. This additionally complicates the process of their approval. Due to the need of scientific research to be published in databases with reviewed content, i.e. those that contain scientific information of high value and are peer-reviewed, they have become publications with closed or limited access to this information. This is understandable, considering the effort and hard work of respective teams or specific researchers to get feedback and be assessed in an appropriate and acceptable manner.

On the other hand, the scientists` work should reach larger number of people, since it is them who will potentially benefit from scientific achievements. For this reason, the scientists and researchers have no other choice but to constantly present their thesis statements, projects and discoveries on various forums in order to reach the consumer through different online information channels. This explanation sounds pretty simplistic, but it is relatively true. Sometimes one scientific research is presented, promoted and shown at a number of scientific conferences, round tables, symposia and exhibitions, which makes its validation rather a complicated and continuous process. This is especially true for social sciences. The resistance of the scientific community in such cases is very strong, because the search for non-traditional approaches in the validation of research violates the generally accepted slowliness of the process. This “irritates” the scientific community, which is quite introverted and even rigid in its understanding of the promotion of scientific works.

In our opinion, almost all ways of presenting scientific work are acceptable, providing that they ensure satisfactory results and reliable and true feedback and useful information. The relationship between authors (creators) and users needs to be more than just warm and sincere in order to identify omissions, drawbacks or imperfections in a sufficiently accurate and correct manner.

The amendments to the Academic Staff Development Act and the Regulations of its implementation in Bulgaria are aimed at finding answers to these questions, by creating a system of criteria that is measurable for the respective field of higher education and professional field. This system is managed by the National centre for information and documentation at the Ministry of education and science. Whether the quantitative measures embedded in this model can provide the required quality coverage is difficult to say and the answer would rather be no. Nevertheless, this system creates a certain order and visibility of the results, but it is difficult to talk about objectivity. Especially considering that different assessment and acceptability systems and different requirements

take place at different times. Meeting certain up-to-date criteria sometimes leads to the inability of some scientists to provide adequate information, an additional difficulty being the information on paper from older periods, which can not be ignored or denied.

This does not diminish the efforts made in this direction to introduce uniform requirements for habilitation period to obtain academic positions "Associate Professor" and "Professor", as well as academic degree “Doctor” and “Doctor of Science”.

Scientific works are divided in compliance with certain professional fields and several main areas are of particular importance. These include articles and reports published in scientific journals, peer-reviewed and indexed in world-known scientific databases; articles and reports published in non-peer-reviewed journals with scientific review or published in edited collective volumes; citations in monographs and collective volumes with scientific review; citations or reviews in non-peer-reviewed journals with scientific review; supervision of a student who has successfully defended their PhD dissertation; published university or school textbook, etc. Scientific works published in Web of Science and Scopus databases of peer-reviewed literature are of particular value. The requirements for such publications are high and the assessment of the published works is excellent. Naturally, the assessment is a matter of perception of the scientific work by the relevant evaluating (registering) body as one of the main criteria in determining the quality of the scientific activity of the individual and the institution as a whole.

All this is directly connected to various rating systems that take into account certain articles in certain publications and rank the institution according to these indicators, including citations to these scientific reports, articles or communications. Such method seems quite acceptable and adequate as an assessment technique, but the result does not always match the reality. The scientific community of Bulgaria regularly performs such assessment and at the end of each year it presents the results of the previous one. The assessment period is not chosen by chance. The indexing of the relevant publications in the two main databases is a long period, in some cases lasting more than a year. Sometimes there is a chance that part of the publishing activity of some scientists is not correctly and accurately reported. Some universities owe their progress to one or several scientists who have become a team and have established themselves in the scientific community and are therefore free to publish their works in such publications. This to some extent distorts the presented information and leads to quantitative accumulations that do not correspond to the overall assessment of the institution. In some cases, if we exclude these few scientists from the relevant higher education institution or scientific organization, the obtained data will be insignificant.

The “detachment” of research from social development in general is also a major and important issue. The questions we should ask ourselves are: what is this for? When and how will it be useful to us? Will it be useful to us at all? We should exclude purely theoretical developments, which themselves have a different meaning and necessity.

In recent years, the Ministry of education and science in connection with the Implementation of the national policy related to regular monitoring and assessment of research activities (State Gazette, issue 54 dated 29/06/2018) performs an Assessment of the research activities carried out by universities and research organizations and the Research fund.

Assessment is made on the basis of individual cards of each institution that contain: objective information received from international databases and verified by the assessed organizations and universities; financial statement for the funds spent on research projects, under agreements with industrial manufacturers, etc. and those reflecting the exploitation of scientific results, as well as data from the national register of PhD students and doctors of science who has successfully defended their dissertation during the year.

The biggest share in the overall assessment based on the system of criteria and indicators belongs to the Bulgarian academy of sciences (BAS), which objectively reflects the real situation. We should take into account the main purpose and activity of the institution itself, which provides an answer to its defined, leading and dominant position. Regarding the other leading institutions: St. Kliment Ohridski Sofia University, Medical University of Sofia, University of Chemical Technology and Metallurgy of Sofia and Technical University of Sofia together with BAS, they determine almost 2/3 of the total contribution to the overall assessment. The scientific research activity is mainly concentrated in the capital in the largest universities. This practically defines Sofia as a primary and most important centre of all areas of this assessment. Given the uneven territory distribution of the assessed institutions, caused by various reasons, the historical development is also significant. Outside the capital, there are several other research centres with a defined contribution to the overall assessment, located in the cities of Plovdiv, Varna, Ruse, Stara Zagora and Burgas. In fact, even the largest universities outside the capital are located in these cities. The overall assessment lacks a considerable contribution of one of the largest Bulgarian universities – University of national and world economy of Sofia.

The research defines separate scientific areas using criteria and indicators and the same is done in terms of distribution of scientific publications to the respective scientific field by Scopus and Web of Science databases. These databases distribute scientific works based on criteria and indicators that do not always correspond to our assessment system, thus the information is incompatible. This can sometimes distort or change the ranking in scientific fields. In most cases the distribution of scientific works is determined by the journal or the publications of the scientific conference in which they are included. It does not always reflect the essential standpoints of scientific work. However, such change does not affect the overall assessment of the higher education institution. Thus, the ranking by scientific fields includes higher education institutions that do not perform such scientific research in these fields. It is possible for scientists who perform certain scientific activity to conduct a research in other or several scientific areas. This complements and provides more information on the areas of interest of the scientists and researchers of the particular organization.

Quantitative indicators for different scientific areas are quite different in absolute values, thus their direct comparison is impossible and in most cases inaccurate and even incorrect.

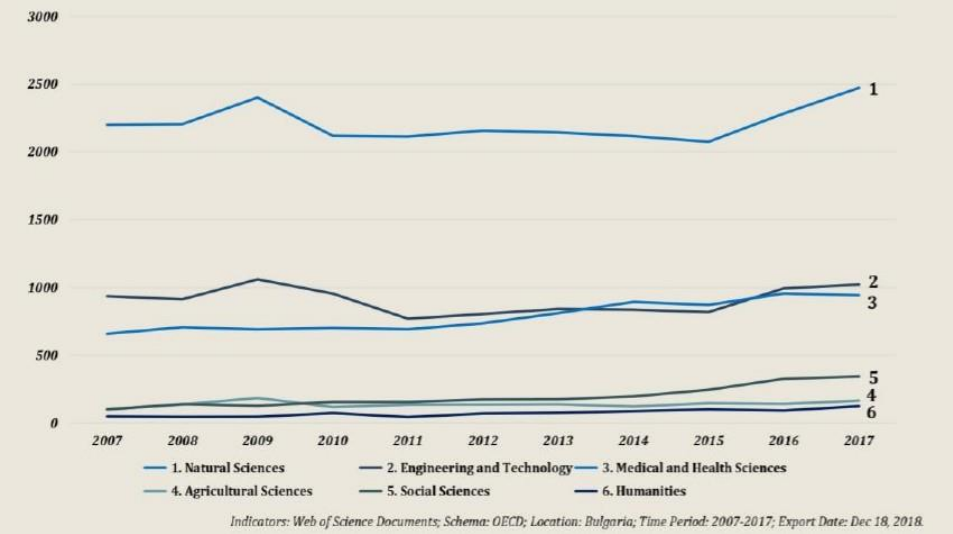
For instance, some universities are still on top of the rankings even though their key areas of research and education differ from the specific area by which they are ranked. Generally speaking, we can conclude that financial resources are being invested in these activities, this way supporting and encouraging them. Detailed analysis helps establish that one or two prominent scientists specialized in the specific area can drastically change the overall results, which to some extent distorts the assessment in the relevant scientific area. Excluding the data from this overall assessment radically changes the ranking of

institutions. An interesting detail is that leading scientists in certain areas form over 65% of the overall results for the institution, sometimes even reaching 90%. This raises the question of whether these institutions could "claim" scientific capacity in this area or whether these exceptions should be presented separately and not be included in the overall assessment.

The relatively poor performance of higher education institutions of economic studies is rather worrying. Only the University of National and World Economy of Sofia is in 7th position after institutions such as the Higher education institution of telecommunications and posts of Sofia, Vasil Levski National Military University of Veliko Tarnovo and Angel Kanchev University of Ruse (Terziev, 2019, pp.347-349; Terziev, 2019a, pp. 263-266).

General tendency in the development of research is based on certain quantitative measures (Fig. 1). We should accept it under certain conditions taking into account the Bulgarian peculiarities and the respective results of the previous years.

Figure 1: Tendency in the research development



Celia Luterbacher from Switzerland expressed an interesting opinion that the international scientific community is guided by one ruthless principle "I publish, therefore I exist". According to her, we pay too much attention to the quantitative results that only take into account number of publications and citations. The authorities of Switzerland prepare a reform aimed to initiate some changes in this direction. "In the last years the quantitative results more often prevail over the qualitative ones, contributing to lower motivation among scientists, not to mention that this approach will eventually reduce the quality of scientific research. All this should involve a change in the national strategy, which takes into account the various disciplinary and institutional requirements, by applying differentiated assessment practices".

While evaluating the current scientific capacity of Bulgaria, the authors of the research report some difficulties in collecting data, the reason being related to incomplete information about publishing activity and citation in the databases used and especially that related to the Bulgarian academy of sciences and the Academy of agricultural sciences. For objectivity of the information and assessment of the respective citation contribution in 2018 the authors used the period from 1985 to 2018. For this purpose, the quotation coefficient in the respective formula is adjusted from 0.5 to 0.05, which also changes the role of publications in the overall assessment, as well as does not allow the comparison of the results from the previous year.

The results of scientific activity monitoring performed by higher education institutions show that the main scientific organizations are concentrated in the capital, which is completely logical, considering that the main scientific infrastructure is also situated there. Higher education institutions engaged in scientific activities in Bulgaria include: Bulgarian academy of sciences, which is the undisputed leader, followed by St. Kliment Ohridski Sofia University, Medical University of Sofia, Technical University of Sofia and the only university outside the capital - Medical University of Plovdiv. Some other universities showing high results are the University of Chemical Technology and Metallurgy of Sofia, Paisiy Hilendarski University of Plovdiv, Agricultural Academy, Dr. Paraskev Stoyanov Medical University of Varna, Thracian University of Stara Zagora and Neofit Rilski Southwestern University of Blagoevgrad.

It is noteworthy that out of total of 52 higher education institutions in the country only 11 meet the acceptable criteria for intensive and qualitative scientific activity, and 19 have a critically low level of their activity.

Practically, there are two main scientific and educational centres already existing in Bulgaria, located in Sofia and Plovdiv, whereas the rest still have a lot of work to do to catch up and there is a large group of universities with really low results. New scientific centres are emerging in the cities of Varna and Stara Zagora, however Varna, Ruse and Burgas can be characterized as changing for the worse.

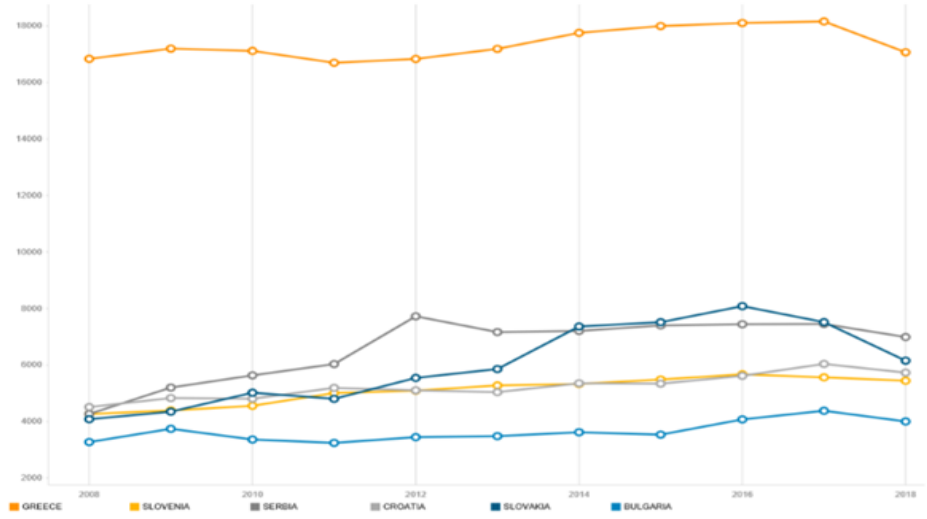
Interpretations of the recommendations of the Annual Report of the Ministry are quite curious. They are divided into five groups, as follows (Terziev, 2020, pp.651-656; Terziev, Lyubcheva and Solovev, 2020a, pp. 865-869):

- The assessment and monitoring of the scientific activity of 2018 shows a serious discrepancy between the achieved results and the reality, which requires a serious reconsideration of the policies for reorganization and consolidation of the scientific potential by concentrating resources in functional associations of higher education institutions and scientific organizations. For example, if activity of 4 research departments focuses on the same scientific area and they are located on the territory of one settlement, they should be reorganized by uniting around one of them, that shows the highest results, and by concentrating the largest financial resource there.
- Universities with a small number of publications in international databases report a large number of defended dissertations for academic degree “Doctor” or “Doctor of Science”. This raises doubts about the quality of those works. The National assessment and accreditation agency should give significantly more

weight to the publications visible in renowned international databases when making decisions on accreditation of master's and doctoral programmes.

- It is advisable to differentiate research universities, which are in the first group of the ranked ones, by introducing new methods for their subsidizing from the state budget and appropriate prioritization in funding through the mechanisms of the national research programmes.
- Extremely high importance in the formula for achieved results evaluating is placed on publications and patents citations. In most cases, the importance of citations is almost ten times greater than that of scientific papers, despite the coefficient used to reduce their importance twice. A large part of the publications belongs to first-rate scientific journals, assessed according to strict criteria by the respective journals /group Q1 publications/. Citation should not be neglected, especially for a smaller scientific community such as that in Bulgaria, but it should not be given such importance. The documents of the assessment agencies in the UK and France, which were presented in 2017, do not take into account the number of citations at all. OECD reports also do not recommend using citation indexes and results when evaluating scientific activity.
- Bulgarian academy of sciences, as well as the Agricultural academy institutes specializing in research predominantly, should be considered separately from the Higher education institutions, which are engaged in various activities. Medical universities are a special group in the ranking due to several factors. Above all, it is the inclusion of most of their academic staff in medical and diagnostic activities, along with teaching and research. This, in turn, leads to constant affiliation of the academic staff with both the university and the medical institution.

Figure 2: Dynamics of scientific results (number of publications in WoS) from 2008 to 2018 of some EU member states and Serbia comparing to Bulgaria.



Bulgaria lags significantly behind Greece (approximately 4 times) and all other countries (from 20 to 50%) when it comes to published scientific works, like documents in WoS. However, while the Bulgarian research staff is more or less on the same level as that of Croatia, compared to other countries it is significantly smaller – 20% (Slovakia) and even twice (Greece, Slovenia), considering the active population in these countries (Fig. 2).

After the introduction of Regulations on the scientific activity monitoring and assessment carried out by universities and research organizations in September 2015, there is stability of the results in Bulgaria, as well as of the publications of the top 10%, compared to the results of 2015. This, however, is insufficient (Fig. 3).

The coefficient of the Normalized Citation Impact from 2008 to 2018 of some EU member states and Serbia comparing to Bulgaria shows that the scientific impact of the results obtained in Bulgaria is above the world average by 15% and according to this indicator Bulgaria is significantly ahead of Croatia, Serbia and Slovakia (Fig. 4).

Figure 3: Dynamics of publications of top 10% from 2008 to 2018 of some EU member states and Serbia comparing to Bulgaria

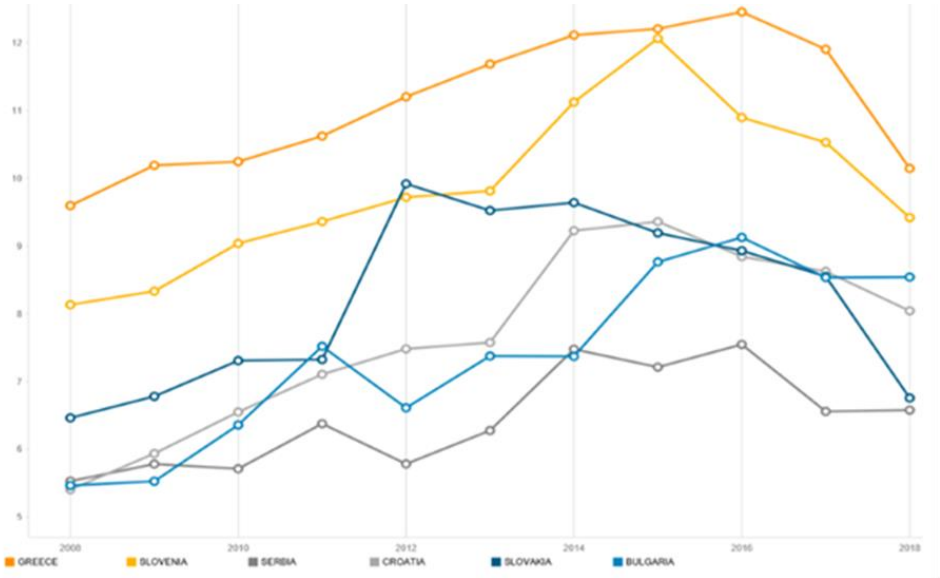
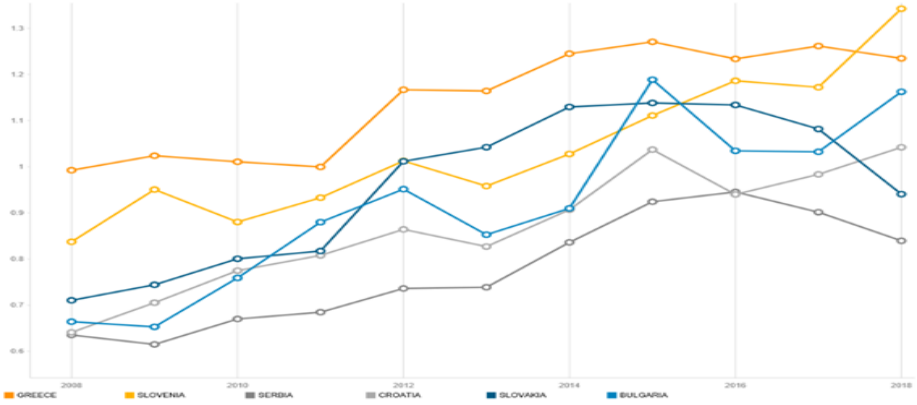


Figure 4: Dynamics of the Normalized Citation Impact from 2008 to 2018 of some EU member states and Serbia comparing to Bulgaria.



In order to be able to compare the scientific activity results carried out in comparable EU member states we can track the results of the employed scientists and researchers as % of the total active population (Table 1).

Table 1: Research staff as % of the active population.

Country / year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
European Union	-	1.55	1.6153	1.6884	:	1.7564	:	1.8453	:	:
Euro area EU 19	-	1.6736	:	1.8187	:	1.8781	:	1.9624	:	:
Belgium	1.8274	1.8614	1.8287	1.9602	:	2.049	:	2.308	:	:
България	0.5734	0.6385	0.6148	0.6302	0.6561	0.6713	0.7701	0.9033	1.0096	:
Czechia	1.4431	1.4549	1.5004	1.599	1.6914	1.7785	1.87	1.9252	1.9111	2.0529
Denmark	2.8846	2.8932	2.9443	2.985	2.9929	3.0157	2.9808	3.0226	2.982	3.13

Germany	:	1.8945	:	2.0653	:	2.1092	:	2.2274	:	:
Estonia	1.436	1.4871	1.5241	1.5235	1.5509	1.5701	1.6191	1.5121	1.4033	:
Ireland	1.4079	1.4989	1.5245	1.6596	1.0443	2.1651	:	2.1059	:	:
Greece	:	:	:	1.4453	:	1.7283	:	2.0266	:	:
Spain	1.5392	1.5528	1.552	1.5202	1.4729	1.4457	1.4591	1.4854	1.5086	:
France	:	:	:	:	:	:	1.9774	:	:	:
Croatia	0.9274	0.9598	0.9866	0.9374	0.925	0.9389	0.8859	0.9307	1.0317	:
Italy	1.4504	1.4633	1.4387	1.4297	1.4671	1.5008	1.4822	1.5586	1.7244	:
Cyprus	0.6412	0.6593	0.6425	0.665	0.6425	0.7052	0.696	0.7073	0.7576	:
Latvia	0.9743	0.8564	0.8872	1.0038	1.0726	1.0473	1.1462	1.1692	1.1524	:
Lithuania	1.2532	1.2322	1.2659	1.541	1.5339	1.5843	1.6934	1.516	1.56	:
Luxembourg	:	2.5326	:	2.594	:	2.2869	:	2.3741	:	:
Hungary	1.2133	1.2702	1.2944	1.3219	1.3244	1.3543	1.2958	1.2544	1.2026	:
Malta	1.006	0.9218	1.0506	1.2119	1.2714	1.1737	1.1672	1.1529	1.12	:
Netherlands	1.3485	1.2036	1.4761	2.0054	2.131	2.119	2.1786	2.142	2.1447	:
Austria	:	2.3355	:	2.585	:	2.7468	:	2.9213	:	:
Poland	0.7139	0.7097	0.769	0.793	0.8174	0.8516	0.8947	0.9229	1.0118	:
Portugal	1.683	1.7154	1.7793	1.831	1.8277	1.9031	1.9484	2.0871	2.0988	:
Romania	0.46	0.44	0.43	0.48	0.48	0.49	0.48	0.49	0.51	:

		72	61	15	22	11	37	05	04	
Slovenia	1.59 09	1.67 77	1.76 72	2.15 91	2.10 51	2.14 87	2.12 44	2.07 99	2.03 89	:
Slovakia	0.88 25	0.94 73	1.04 33	1.07 18	1.07 16	1.02 93	1.06 48	1.05 74	1.21 45	:
Finland	2.97 08	3.00 59	3.03 64	3.06 47	3.00 99	3.01 08	2.95 4	2.90 53	2.76 81	:
Sweden	:	2.42 15	:	2.57 11	:	2.69 81	:	2.74 82	:	:
United Kingdom	:	1.65 5	1.70 64	1.82 84	1.86 28	1.94 76	2.04 93	2.11 17	2.17 44	:
Iceland	3.26 09	2.97 15	:	2.80 23	:	2.80 29	:	3.18 56	3.27 26	3.28
Norway	2.48 34	2.54 77	2.53 28	2.54 39	2.55 35	2.61 22	2.73 46	2.87 59	3.01 85	:
Switzerland	:	:	:	:	2.65 86	:	:	2.70 28	:	:
Montenegro	:	:	:	0.88 55	:	0.89 56	0.89 62	0.89 24	0.82 17	:
FYR Macedonia	0.30 11	0.26 2	0.28 44	0.23 87	0.29 66	:	:	0.45 31	0.46 56	:
Turkey	0.54 63	0.56 87	0.59 7	0.63 75	0.69 9	0.71 94	0.76 08	0.77 6	0.81 39	0.86 53
Russia	1.00 56	0.98 08	0.97 58	0.97 03	0.96 1	:	:	:	:	:
Serbia	:	:	:	:	:	:	0.72	:0.7 8	0.77	0.74
South Korea	1.79 17	1.91 37	2.02 09	2.11 61	:	:	:	:	:	:

Bulgaria is a modest innovator and remains the least performing country in the EU-28 due to its structural underfunding, complicated procedures to access project funding, fragmented funding in various fields, weak science-education-business connection and lack of strategic focus on interventions in this area.

The innovation index of Bulgaria is not only considerably lower than average for the EU (33%), but also decreases rapidly in absolute terms and relative share compared to the EU average from 2011 to 2013 (from 44% to 33%). It is noteworthy that these poor results are significantly affected by the low funding of research and development activities in the public sector as a percentage of GDP, weak innovation activity of small and medium-sized enterprises and by the strong orientation of the research system in Bulgaria to basic science (Table 2). The commercialization of the results is a major weakness of the Bulgarian research system. There are only very limited frameworks to support collaboration between public research organizations, universities and the private sector. Exchange and support systems are not sufficiently developed to facilitate the transfer of knowledge, the creation of university spin-off companies and to attract (venture) capital. Public policies do not promote long-term sustainable partnerships between all parties involved in innovation. The analysis of the results outlines a serious reason for this weakness, especially in terms of cooperation between research organizations and business in Bulgaria. The Bulgarian chamber of commerce and industry publishes official data showing that Bulgarian companies are not prepared to implement innovations independently (only 23% of entrepreneurs have expressed such readiness) or to commission universities and research organizations to develop new products. This lack of collaboration and mutual trust between research organizations and enterprises together with negative experience in commercialization of the research results of scientific organizations and businesses is one of the main reasons for the country's low innovative activity (ranking last in the EU). Not surprisingly, patent activity is also very low. Therefore, special efforts are needed to bring together the interests of research organizations and businesses, as well as to actively support and encourage their collaboration. The analysis of the state of research in Bulgaria carried out by the Ministry of education and science outlines the weaknesses as to the quality of services provided by parties of the public research sector, as well as the potential for development of research and innovation. The main problem in this area is weak cooperation with business, in particular:

- Lack of coordinated actions related to research and innovation;
- Lack of modern scientific and innovative infrastructure; Fragmented institutional environment;
- Low share of funding on a competitive basis and low overall funding rate;
- Unfavourable age profile;
- Insufficient interaction between research organizations and companies.

Table 2: R&D expenditure by field of science and sectors in 2018 (thousand levs)

Field of science	Total	Sectors:			
		Entrepreneurs	Public	Higher education	Non-profit organizations
Total	828 904	596 083	182 841	45 141	4 839
Natural sciences	116 407	16 802	85 262	13 236	1 107
Technical sciences	478 098	436 116	28 592	12 611	779
Medical and health sciences	144 079	132 211	3 061	8 736	71
Agricultural and veterinary sciences	36 062	4 378	30 462	1 046	176
Social sciences	24 671	5 071	12 482	4 818	2 300
Humanities and arts	29 587	1 505	22 982	4 694	406

Note: Research and development (R&D)

There are also some strengths supporting market-oriented change. These include good traditions in the natural sciences, preserved scientific schools and high publishing activity in some areas relevant to emerging technologies (physics, chemistry, materials science, biochemistry and molecular biology, medicine, pharmaceutical and engineering sciences), cultural diversity combined with specific national identity, strong orientation of researchers towards international cooperation, positive attitude of the society towards education and science.

However, these strengths shall be compliant with the objectives and priority areas of the National strategy for implementing the innovative potential of the research system. We need to work on adaptability and sustainability of the potential through a stronger emphasis on market signals and ways to attract private investors.

New and well-equipped research infrastructures are important elements of ecosystems in the field of research and development and innovation. The analysis identifies the following negative trends in the state of research infrastructure:

- obsolete facilities and inefficient exploitation of the existing ones;
- lack of an advanced approach to administrative and financial management of the existing infrastructure in basic organizations;
- lack of professionals and qualified employees to work with the facilities and their users;
- lack of coordination and complementarity of the available modern facilities within one organization or between different organizations;
- lack of equipment concentration and, in some cases, a highly individual approach and duplication of equipment.

Prepared diagnostic review of the research infrastructure and equipment in Bulgaria confirms the lack of sufficient modern infrastructures that meet modern requirements for research and innovation. Out of a total 161 research infrastructures in Bulgaria, 12 are of European importance (7%), 84 are of national importance (52%) and 65 are of regional importance (40%). About 30% of all infrastructure has been in operation for the last 15 years or more, and 70% of infrastructure has attracted between 25,000 and 100,000 euros per year for the last five years.

The lack of sufficient funding in the field of research and innovation **(**Table 3**),** especially in infrastructures outside Sofia, leads to the impossibility to develop potential for smart specialization in Bulgaria. Generally, the diagnostic review identifies the need to support the best-developed infrastructures, with potential in the thematic areas at national and regional level.

Table 3: R&D expenditure by statistical regions and sectors in 2018 (thousand levs)

Field of science	**Total**	**Sectors:**			
		Entrepreneurs	**Public**	**Higher education**	**Non-profit organizations**
Total	828 904	596 083	182 841	45 141	4 839
North and Southeast Bulgaria	155 936	119 110	25 133	11 333	360
Northwestern region	37 437	30 325	6 892	-	-
North Central region	26 612	24 328	365	1 919	-
Northeastern region	49 750	30 837	13 697	-	-

Southeastern region	42 137	33 620	4 179	-	-
Southwest and South Central Bulgaria	672 968	476 973	157 708	33 808	4 479
Southwestern region	603 853	424 479	148 320	28 021	3 033
South Central region	69 115	52 494	9 388	5 787	1 446

Note: Research and development (R&D)

The improvement of the infrastructure will significantly expand the opportunities of Bulgarian scientists to conduct high-quality research at a global level and will support the development of high-tech industry in Bulgaria. The problems identified above can be solved by increasing the participation of Bulgarian scientific organizations in joint European initiatives and infrastructures. In view of the insufficient resources, and as a way to adapt the research capacity to the needs described above, its main objectives include:

- Support for the research development policies described in the National strategy for research development until 2030 by addressing the priorities and reflecting the agenda for the creation of scientific infrastructures;
- Identification of the priorities for sustainable development of scientific infrastructures until 2023, by upgrading the Diagnostic review of scientific Infrastructures and equipment, which revealed gaps, but also the potential for smart specialization in Bulgaria through policies in the field of research and innovation.

3. Conclusions

Due to the extreme complexity of monitoring and assessing the strategic and long-term consequences of social activities within the broad social approach in determining social effectiveness, we shall consider the social effectiveness of accomplished activities in detail. This means the highest efficiency in solving a specific social problem. The assessment of the effectiveness of social processes in this case is reduced to the task of optimizing the social management activity in the process of solving specific social programmes through a programme approach. Therefore, this requires, more than ever, the definition of criteria for social processes effectiveness based on which to implement appropriate assessment methods and technologies.

The introduction of such assessment systems would raise number of questions and critical remarks. The first one is who will make this qualitative assessment and in what way. Currently, the accepted method is the h-index, which takes into account the respective number of references to a particular article and the other, time indicator, used to determine this quantity for the last 5 years. Different systems would show different results because

information databases differ in their completeness and accessibility. Specific systems can be used for various areas of higher education and professional fields, which will provide relatively true and accurate information. Some will say that it is better to have some system than not to have any and they will be absolutely right. The lack of a system of measurable criteria has led to a number of paradoxical differences in assessment levels. I cannot say whether this determines the quality of a candidate for a particular academic position, but it is to some extent a confirmation of the expertise of the relative committee. In this case it is a scientific jury that would evaluate and rank the candidates. Usually the competition in our country is held with only one candidate. For some professional fields this is simply the lack of other candidates, but sometimes it is also impossible to hold the relevant position due to a number of objective circumstances. These circumstances are related to difficulties in the development of the academic staff in recent decades, unattractiveness of the field or lack of research funding. Sometimes the location of the respective higher education institution is unacceptable for the candidates. In other cases, only candidates from the inner circles are tolerated, despite the fact that the number of available candidates from the outside would be large and good enough. In this case, the work of experts would be much more difficult and the competition - greater. More than one candidate would be a potential choice. Another issue of correctness is the subsequent selection by the scientific and faculty council. In many cases, they are quite diverse in terms of their priorities and interests, thus persuasion becomes challenging and is not always associated with objective judgment or right choice. In this case, the question is whether they are competent enough to change the end result, despite the fact that this is within their powers.

And if we consider this as a secondary problem, then the process of searching and finding suitable candidates in this very limited labour market of scientists and researchers becomes a vicious circle. It is not a secret that some universities have been providing source of income for entire families for years. There is nothing wrong with that, as the craft is passed down from generation to generation, but to what extent do the opportunities of our children match our life and scientific interests?! They hardly do, but it is an easy enough option, aided by academic autonomy. Such a study would provide frightening results of closeness and interconnectedness. Particularly interesting results are observed in smaller communities, as the processes there are self-regulated by this factor.

The change we are moving towards requires a certain fairness and accuracy, but we are unlikely to achieve it only by these adjustments in the legislation. It should rather be linked to changes in system management. Very often we talk about mandate, creativity, strategies, etc., and it is generally related to shaping the attitudes of general meetings in a certain way, which in some cases correlates with the norms of morality and law. However, the procedures are legal and not very moral. There is a lot of evidence in this direction all the time.

Not always the democratic rules allow choosing the most capable and competent candidates and sometimes they do not even allow some scientists to express themselves for a number of reasons. This is a general issue mostly applicable to the academic community. The personalities here are numerous and are specialized in different fields. Consolidation is sometimes at the expense of a choice that is related to other circumstances rather than the qualities of the individual. The change in this direction is possible if this choice includes competition based on the most objective criteria.

In the current development of society, science cannot develop on its own, and the existence of science alone is impossible and unthinkable. This requires work in wider teams and cooperation in various areas. It also requires the development of an interdisciplinary approach and the development of scholars in different directions and fields. This does not make the person/scientist a "painkiller", but makes them far more able to meet the dynamics of the requirements of a rapidly changing environment.

Finding such a system of social criteria that would describe and value this social process to the highest extent and as failrly as possible is quite a challenging task, which requires the analysis of a large amount of information and conducting various research to allow the development of such mechanism that on the one hand, meets expectations and, on the other hand, achieves a relatively accurate and valid assessment of these processes.

References

Terziev, V. (2019). "Managing changes in the system of higher education". *23rd International Scientific Conference Knowledge in practice (13-15.12.2019)*, Bansko, Bulgaria, Institute of Knowledge Management, Skopje, 35, 2019, 1, pp. 347-349, ISSN 1857-923X (for e-version) ISSN 2545 - 4439 (for printed version).

Terziev, V. (2019a). "The development of education in Bulgaria*". Proceedings of SOCIOINT 2019- 6th International Conference on Education, Social Sciences and Humanities 24-26 June 2019 - Istanbul, Turkey*, International Organization Center of Academic Research, Istanbul, Turkey, 2019, pp. 263-266, ISBN: 978-605-82433-6-1.

Terziev, V. (2020). "Factors influencing education system". Economic and Social Development (Book of Proceedings), *50th International Scientific Conference on Economic and Social Development Development, 13-14 February 2020, Chelyabinsk*, 2020, pp. 651-656, ISSN 1849-7535.

Terziev, V., Lyubcheva, M. § Solovev, D. (2020a). "The interaction: business- education-investment for development". *Proceedings of INTCESS 2020- 7th International Conference on Education and Social Sciences 20-22 January, 2020 - DUBAI (UAE)*, International Organization Center of Academic Research, Istanbul, Turkey, 2020, pp. 865-869, ISBN: 978-605-82433-8-5.