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Measuring the Impact of Sectoral Investment on Economic Growth in Algeria: An Attempt using the Panel-ARDL Methodology

قياس أثر الاستثمار القطاعي على النمو الاقتصادي في الجزائر: محاولة باستخدام منهجية Panel-ARDL

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Abstract:
This study aims to measure the impact of sectoral investment on economic growth in Algeria from 1996 to 2020 in five sectors: agriculture, petroleum services and operations, industry, construction, and services provided to enterprises. The study employs the Panel Autoregressive Distributed Lag (ARDL) model, leading to the adoption of the Panel Mean Group (PMG) model. The dependent variable is economic growth in each sector, while the independent variables are the gross accumulation of fixed assets and compensation of employees in each sector. The results indicate a long-term positive relationship between the gross accumulation of fixed assets and sectoral economic growth, while an insignificant inverse relationship is observed between economic growth and employee compensation.
Keywords: Sectoral investment; economic growth; Panel ARDL methodology; PMG model; the long run effect.
JEL Classification Codes: C23, M21, O11.

ملخص:
تهدف الدراسة إلى قياس أثر الاستثمار القطاعي على النمو الاقتصادي في الجزائر للفترة (1996-2020) في خمسة قطاعات وهي: الزراعة، الخدمات والأشغال البترولية، الصناعة، البناء والأشغال العمومية، الخدمات المقدمة للمؤسسات من خلال نموذج Panel ARDL، الذي بدوره أفضى إلى الاستعانة بنموذج وسط المجموعة المدمجة (PMG)، أين اعتبر النمو الاقتصادي في كل قطاع كمتغير تابع، في حين تم اتخاذ التراكم الخام للأصول الثابتة وتعويضات الأجراء في كل قطاع على حدى كمتغيرات مستقلة. توصلت النتائج لوجود علاقة موجبة طويلة المدى بين التراكم الخام للأصول الثابتة والنمو الاقتصادي القطاعي في حين سُجلت علاقة عكسية غير معنوية بين هذا الأخير وتعويضات الأجراء.
كلمات مفتاحية: الاستثمار القطاعي، النمو الاقتصادي، منهجية Panel ARDL، نموذج PMG، التأثير طويل المدى.
تصنيفات JEL : C23، M21، O11

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INTRODUCTION:

Economic development and growth play crucial roles in any economy, as they reflect the increase in the production of goods and services over a specific period, typically a year. This process generates new job opportunities, improves the quality of life, fosters economic stability, and enhances a country's international standing, enabling it to address the rapid changes observed in the global arena. Consequently, economic growth becomes the main driving force for comparing and classifying countries as either advanced or developing.

The ability of a country to invest effectively in various sectors using its resources is a fundamental factor in achieving economic growth. In this context, the role of investment, particularly sectoral investment, is crucial in allocating resources efficiently and promoting productive capacities across different domains, ultimately leading to increased economic growth rates.

Algeria, being predominantly a rentier country, is susceptible to oil price shocks dictated by supply and demand dynamics in the global oil market. This situation can result in external debt crises, as experienced in the 1990s, or necessitate the adoption of austerity spending policies. To overcome its dependency on oil and promote economic growth, Algeria consistently pursues investment development plans in various economic sectors that align intending to enhance productivity and achieve economic diversification.

Based on the context presented above, the research problem that arises is to determine the extent of the impact of sectoral investment on economic growth in Algeria. This research problem gives rise to several sub-questions regarding the nature of the impact of sectoral investment on economic growth, the feasibility of measuring this impact, and the long-term effects. Answering these sub-questions leads to the formulation of the following hypotheses:

Hypothesis 1: The impact of sectoral investment on economic growth in Algeria can be measured through the construction of a Panel-ARDL model.

Hypothesis 2: Sectoral investment has a positive impact on economic growth in Algeria.

Hypothesis 3: The impact of sectoral investment on economic growth in Algeria occurs in the long term.

The objective of this paper is to employ an economic measurement approach to interpret the relationships between aggregate economic variables, specifically focusing on measuring the impact of sectoral investment on economic growth in Algeria. To achieve this, a quantitative analytical approach will be adopted, applying the estimation of a Panel-ARDL model.

As a first step toward the objective of this paper, we will review and discuss the most significant previous studies that serve as the foundation for our research. Following that, we will explain the approach employed in this study and identify the variables used, along with their respective sources. Subsequently, we will conduct an estimation and discussion of the results, including dispersion and homogeneity within and between sectors, preliminary tests (such as outliers, cross-sectional dependence, and stationarity), cointegration and estimation of model features using the Panel Autoregressive Distributed Lag approach, and a discussion of the results, both statistically and econometrically.

1- Literature review:

Despite the limited number of studies that have explored the impact of sectoral investment on economic growth, there are varying opinions regarding the nature of this impact. The first perspective suggests that sectoral investment plays a stimulating role in economic growth, as seen in the study conducted by Abdul Khaliq and Ilan Noy in 2007 titled "Foreign Direct Investment and Economic Growth: Empirical Evidence from Sectoral Data in Indonesia." This study investigated the impact of foreign direct investment on economic growth using detailed sectoral data in Indonesia from 1997 to 2006. The findings, analyzed using a panel data model, demonstrated a positive impact of foreign direct investment on economic growth across different sectors.

Similarly, a study by Daniel Francois Meyer and colleagues in 2017 titled "The Impact of Government Expenditure and Sectoral Investment on Economic Growth in South Africa" supports the positive effect of sectoral investment on economic growth. This study examined the impact of government expenditure and sectoral investment on economic growth in South Africa using quarterly time series data from 1995 to 2016. The results, obtained through standard economic methods including VAR, indicated that investment in the financial sector had a positive short-term impact, while investment in the industrial sector had a positive long-term impact on economic growth.

Another study conducted by Jitendra Kumar Sinha in 2017 titled "Contribution of Investment in Economic Growth of Major Sectors: With a Focus on Agriculture and Allied Sector in Bihar" aimed to measure the contribution of investment in major sectors to the economic growth of the state of Bihar in India from 1980 to 2015. The estimations based on the Ordinary Least Squares (OLS) method revealed a strong positive impact of investments in the agriculture and allied sectors compared to the industry and service sectors on economic growth. Additionally, simulation scenarios analyzing the impact of increased public investment in the agriculture and allied sector showed that it led to increased sectoral and overall economic growth rates, emphasizing the desirability of adopting policies to increase sectoral investments in these areas, particularly for ensuring food security.

On the contrary, the second perspective suggests that sectoral investment affect negatively the economic growth, as indicated by the findings of studies conducted by Daniel Francois Meyer and colleagues, as well as the study by Khaliq and Ilan Noy. The former study demonstrated a negative short-term impact of investment in the mining and industry sectors, as well as a negative long-term impact of investment in the financial and mining sectors on economic growth. Meanwhile, the latter study emphasized an inverse relationship between investment in the mining and quarrying sector and economic growth.

2- Methodology:

This study aims to measure the impact of sectoral investment on economic growth in Algeria, drawing on the theoretical foundation of Solow's contribution in 1957. Solow's theory explains economic growth as the combination of production factors to maximize economic profit. The production function, which reflects the relationship between inputs and outputs, is often represented by the Cobb-Douglas function, widely used by economists. It can be expressed as:

$$Y = AK^{\beta_1}L^{\beta_2} \qquad (1)$$

In Equation (1), Y represents the output of the economy, K represents capital input, L represents the total labor force, and A, β_1, and β_2 are parameters of the function. To estimate Equation (1), the double logarithmic transformation is applied to express it in linear form, resulting in:

$$\boldsymbol{lnY_t = A + \beta_1 lnK_t + \beta_2 lnL_t + \varepsilon_t} \tag{2}$$

In Equation (2), $\mathrm{lnY_t}$ represents the natural logarithm of output, $\mathrm{lnK_t}$ represents the natural logarithm of capital input, $\mathrm{lnL_t}$ represents the natural logarithm of the total labor force, and ε_t represents the random error term. The linear logarithmic specifications mean that the estimates of β_1 and β_2 represent elasticities.

For this study, Gross Domestic Product (GDP) is used as a proxy for output (Y), while the gross accumulation of fixed assets (FBCF) approximates capital input (K), and the compensation of employees (RS) represents the total labor force (L) in the five sectors. Hence, Equation (2) is reformulated as:

$$\boldsymbol{lPIB_{it} = A_i + \beta_1 lFBCF_{it} + \beta_2 lRS_{it} + \mu_i + \varepsilon_t} \tag{3}$$

In the equation, $i = 1 \ldots n$, where n represents the number of cross-sectional units equivalent to the five economic sectors. μ_i represents the fixed individual effects. To estimate equation (3), an approach is followed that begins with collecting data on the variables under study. This is followed by studying dispersion and homogeneity within sectors, between sectors. Preliminary tests are then conducted, including exploring outliers, cross-sectional correlation tests, and unit root tests. This is followed by the econometric analysis, which involves co-integration and estimating the distributed lag model as a first step, and conducting model comparison and analyzing the results statistically and descriptively as a second step.

3- Data:

The variables used in this study to measure the impact of sectoral investment on economic growth in Algeria are as follows:

- Gross Domestic Product (GDP) for each sector: GDP represents the total value of goods and services produced within the national economy for final consumption during a specific period (year). It is measured in monetary terms and reflects the market value of all resident and non-resident production within the geographical area. GDP excludes intermediate goods to avoid double counting and does not account for illegal activities, the informal economy, or non-monetized household services. Data for GDP in each sector is sourced from available input-output tables at the national statistical office.
- Gross Fixed Capital Formation (FBCF): FBCF is defined as the value of net additions to the wealth of an economic or national unit during a specific period. It represents the investment in capital goods and related services that contribute to the growth and expansion of the capital stock. FBCF includes new goods, major construction works, and significant repairs that extend the useful life or increase the value of capital assets. Data for FBCF is obtained from the Algerian economic accounting system.

- Compensation of Employees (RS): RS represents the total cash and in-kind payments made by users to their employees. It includes wages, salaries, and actual social security contributions paid by users to social security and similar entities on behalf of workers. It also incorporates direct social security contributions provided to workers, with half of these contributions being imputed as they are not paid to social security but are used to finance direct social services for workers. Data for RS is collected from relevant sources such as official statistical reports.

The dataset used in this study includes observations from five economic sectors (n = 5) over a period of 25 years, spanning from 1996 to 2020 (T = 25). This results in a total of 125 observations (n × T = 5 × 25 = 125) for analysis. The input-output tables at the national statistical office serve as the primary source for obtaining the necessary data.

4- Estimation and Discussion of Results:

4-1 Analysis of Dispersion and Homogeneity: overall, within, and between sectors

To assess the dispersion and homogeneity of the research data, the following table is used:

Table (1): Descriptive Data for Study Variables

Variable		Mean	Standard Deviation	Coefficient of Variation	Lowest Value	Highest Value	Obs.
LPIB	**Overall**	5,833	0,501	8,589	4,693	6,693	N = 125 n = 5 T = 25
	Between Sectors		0,391	6,703	5,324	6,191	
	Within Sectors		0,357	6,120	5,171	6,386	
LFBCF	**Overall**	4,800	0,778	16,208	3,174	6,424	
	Between Sectors		0,640	13,333	4,149	5,600	
	Within Sectors		0,525	10,937	5,623	5,623	
LRS	**Overall**	5,100	0,654	12,823	3,829	6,366	
	Between Sectors		0,640	12,549	4,453	5,951	
	Within Sectors		0,312	6,118	4,476	5,605	

Source: Own construction; data from ONS input/output tables, from 1996 to 2020, Algeria.

The analysis of dispersion and homogeneity based on the data presented in the table reveals valuable insights. In terms of the variable LPIB, the overall coefficient of variation indicates a moderate level of dispersion, with a standard deviation of 5,833 and a mean value of 6,693. When considering the variation between sectors, the LPIB variable exhibits a relatively low level of dispersion, as indicated by the coefficient of variation of 0.391, with a standard deviation of 6,386 and a mean value of 6,191. Similarly, within sectors, the LPIB variable demonstrates a relatively low level of dispersion, with a coefficient of variation of 0.357, a standard deviation of 6,424, and a mean value of 6,386. Shifting the focus to the variable LFBCF, the overall coefficient of variation suggests a moderate level of dispersion, with a coefficient of variation of 0.640, a standard deviation of 4,800, and a mean value of 5,600. When examining the variation between sectors, the LFBCF variable displays a relatively low level of dispersion, with a coefficient of variation of 0.525, a standard deviation of 5,623, and a mean value of 5,623. In contrast, within sectors, the LFBCF variable indicates a moderate level of dispersion, with a coefficient of variation of 0.654, a standard deviation of 6,366, and a mean value of 5,100. Turning to the variable LRS, the overall coefficient of variation points to a moderate level of dispersion, with a coefficient of variation of 0.640, a standard deviation of 5,100, and a mean value of 5,951. When examining the variation between sectors, the LRS variable demonstrates a relatively low level of dispersion, with a coefficient of variation of 0.312, a standard deviation of 5,605, and a mean value of 5,605. Within sectors, the LRS variable exhibits a moderate level of dispersion, with a coefficient of variation of 0.654, a standard deviation of 6,118, and a mean value of 6,386.

These findings provide valuable insights into the dispersion and homogeneity of the variables studied, both within sectors and between sectors, shedding light on the characteristics of the Algerian economy.

As for the homogeneity test of the panel model parameters, we employed the test proposed by M. Hashem Pesaran and Takashi Yamagata in 2008 (Pesaran & Yamagata, 2008, p. 50), which assumes homogeneity among the cross-sections. The test was conducted using Stata 17 software, and the results are presented in Table 2 below:

Table (2): Results of the Homogeneity Test for Slope Parameters According to Pesaran and Yamagata

Test	Calculated Value	p-value
Delta	12.536	0.000
Delta adj.	13.677	0.000

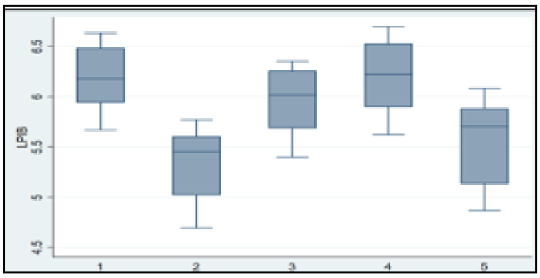
Source: Own construction; data from ONS input/output tables, from 1996 to 2020, Algeria.

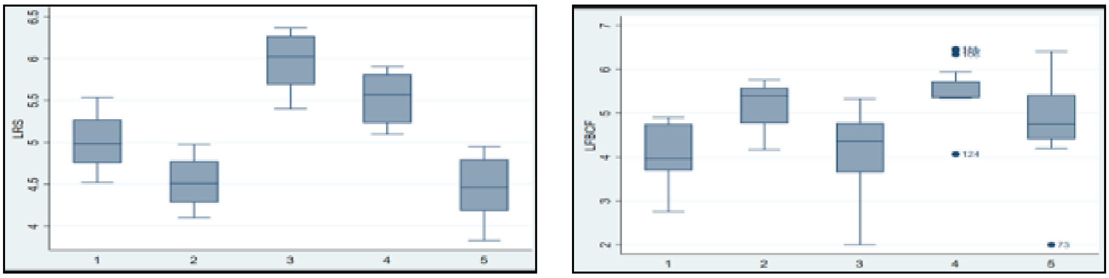
From Table 2, which presents the results of the homogeneity test for slope parameters according to Pesaran and Yamagata, the alternative hypothesis of non-homogeneity among the cross-sections is accepted at a significance level of 5%. This conclusion is supported by the p-values of both the Delta and Delta adj. tests, which are less than 0.005 and equal to 0.000.

4-2 Preliminary Study: Outliers, Cross-Sectional Dependence, Stationarity

The preliminary study conducted focused on three aspects: outliers, cross-sectional dependence, and stationarity. To investigate the presence of outliers in the study variables, the Box plot method was employed. The outputs of this analysis are presented in the figure below:

Fig (1): Box Plot of the Study Variables





Source: Own construction; data from ONS input/output tables, from 1996 to 2020, Algeria.

According to Figure 1, it is evident that there are no outliers in both the LPIB and LRS variables. However, the LFBCF variable exhibited three outliers in the fourth sector, specifically in the construction sector, for the years 2001, 2004, 2006, and 2019, respectively. Additionally, there was one outlier in the fifth sector, corresponding to services provided to enterprises, specifically in the year 2018. To address the presence of these outliers, the Winsorization method was employed. This method transforms extreme values that deviate significantly from the data into values that still lie at the upper end of the distribution. The same approach was used to handle low outliers by adjusting these values to the lowest values in the distribution (Bell & Kokic, 1994, p. 419).

After exploring and addressing the outliers, the next step involved testing the cross-sectional dependence of residuals. This was done to examine whether the residuals are correlated across units (sectors). The presence of correlation can potentially introduce bias in the test results. The null hypothesis assumes cross-sectional independence, where there is no association among the cross-sectional units, while the alternative hypothesis suggests the presence of cross-sectional dependence among the studied variables. To examine the cross-sectional dependence, the CD test proposed by Pesaran in 2015 was utilized. The results of this test are presented in Table 3:

Table (3): Pesaran's cross-sectional dependence test (CD test)

Variable	CD test	p-value
LPIB	15.54	0.000
LFBCF	7.01	0.000
LRS	15.43	0.000

Source: Own construction

Based on the results presented in Table 3, which displays the CD test results, the p-value for each variable (LPIB, LFBCF, LRS) is 0.000, indicating that it is less than the significance level of 0.005. Therefore, the null hypothesis of no cross-sectional dependence is rejected in favor of the alternative hypothesis, suggesting the presence of cross-sectional dependence among the variables in the study at a 5% significance level.

Considering the potential impact of using unstable series on estimation results, it is crucial to ensure the stationary nature of the time series employed in the model. Given the finding of cross-sectional dependence from the CD test, it becomes necessary to address this issue by employing second-generation panel unit-root tests, which are specifically designed to handle cross-sectional associations (Reese & Westerlund, 2016, p. 1). However, it is worth noting that these tests are still in the developmental stage, and widely used software for these tests may have limited availability (Hlouskova & Wagner, 2006). In this study, one of the tests from the second-generation panel unit-root tests, namely the CADF test proposed by Pesaran (2007), will be used. This test builds upon the augmented Dickey-Fuller test and assumes stationarity of the series (Pesaran, 2007, p. 265). The results of this test are presented in Table 4.

Table (4): Results of the CADF test

Level			
Var	$Z[t - bar]$	p-value	Decision
LPIB	1,115	0,868	Non-stationary
LFBCF	-0,598	0,275	Non-stationary
LRS	-2,637	0,004	Stationary at Level (I(0))
First Differences			
D.LPIB	-5,124	0,000	Stationary of First Order (I(1))
D.LFBCF	-5,628	0,000	Stationary of First Order (I(1))

Source: Own construction

Based on the results presented in Table 4, it is evident that both the LPIB and LFBCF series are non-stationary at a 5% significance level. This conclusion is supported by the calculated p-values of 0.868 and 0.275, respectively, which are greater than 0.05, indicating the acceptance of the alternative hypothesis of non-stationarity. However, the first differences of these series, namely D.LPIB and D.LFBCF, exhibit stationarity (alternative hypothesis accepted) with p-values of 0.000 for both series.

On the other hand, the LRS series demonstrates a p-value of 0.004, which is less than 0.05, suggesting stationarity at the level of I(0).

4-3 Co-integration and Distributed Lag Model Estimation

Following the application of unit root tests to panel data, it was established that the studied series exhibit different levels of stationarity, with some being integrated of order one (I(1)), such as LPIB and LFBCF, while others are integrated of order zero (I(0)), such as LRS. This raises the question of whether a long-run equilibrium relationship can be established among these variables. In light of this, the Pedroni test, specifically the test proposed by del Carmen Ramos-Herrera and A. Prats (2020), can be employed. This test assumes the absence of cross-sectional homogeneity (Pedroni, 2004, p. 598), aligning with the results of the Pesaran and Yamagata homogeneity test conducted on the study's data.

The Pedroni test is characterized by not imposing external restrictions on the regressions of cointegration models and focuses solely on the probability of cointegration (Barbieri, 2008, p. 31). However, a limitation of this test is its failure to determine the precise number of cointegration relationships (Neal, 2014, p. 685). Therefore, the null hypothesis assumes the absence of cointegration, while the alternative hypothesis suggests the presence of cointegration among the variables included in the estimated model. The outputs of the Pedroni test are presented in Table 5.

Table (5): Pedroni Test Results

Test	Statistic	p-value	Decision
Phillips-Perron t	-3.926	0.000	Accept alternative hypothesis (presence of Co integration among variables)
Augmented Dickey-Fuller t	-3.512	0.000	

Source: Own construction

The results from Table 5 indicate that both tests accept the alternative hypothesis, suggesting the presence of a cointegration relationship among the study variables at a 5% significance level. This is supported by the p-value of 0.000, which is less than 0.05.
With the confirmation of a cointegration relationship among the study variables, the research focus shifted to estimating the model parameters using the Autoregressive Distributed Lag (ARDL) approach, which yielded the following results:

4-3-1 Estimation of Model Parameters using the Mean Group (MG) method:

To address the issue of bias resulting from parameter estimate heterogeneity in dynamic panel models, Pesaran, Shin, and Smith (1995) proposed the Mean Group (MG) model. This approach provides long-run parameters for the panel model by constructing the long-run average parameters of ARDL models for each sector individually. The results of this approach are summarized in Table 6, which presents the parameter estimation results in the long and short runs using the MG method.

Table (6): Parameter Estimation Results in the Long and Short Runs using the MG Method

Variable	Coefficient	Standard Deviation	p-value
Long Run			
LFBCF	-0,747	1,002	0,456
LRS	2,376	1,681	0,158
Short Run			
Error Correction Term	-0,364	0,142	0,010
D(LFBCF)	-0,024	0,033	0,463
D(LRS)	0,155	0,083	0,061
C	0,398	0,229	0,083

Source: Own construction

4-3-2 Estimation of Model Parameters using the Mean Group (PMG) method:

The Pooled Mean Group (PMG) method is recognized as one of the most effective approaches for estimating economic models based on Panel Data, particularly in cases where there is a similarity in economic patterns among the study sections. This suggests an initial convergence of long-term marginal propensity in the estimated models, as proposed by Pesaran et al. (2001). The PMG method combines and averages the coefficients to provide reliable parameter estimates. In this research, the PMG method was employed, and the parameter estimation results in the long and short runs are presented in Table 7.

Table (7): Parameter Estimation Results in the Long and Short Runs using the PMG Method

Variable	Coefficient	Standard Deviation	p-value
Long Run			
LFBCF	0,709	0,284	0,013
LRS	-0,389	0,557	0,485
Short Run			
Error Correction Term	-0,082	0,035	0,022
D(LFBCF)	0,019	0,031	0,537
D(LRS)	0,317	0,164	0,053
C	0,364	0,123	0,003

Source: Own construction

4-3-3 Estimation of Model Parameters using the Mean Group (DFE) method:

The Dynamic Fixed Effect Estimator (DFE) method, introduced by Pesaran and Smith in 1999, is closely related to the PMG estimator. It imposes restrictions on the regression coefficients and error variances to be equal across all sections in the long run. Additionally, this model assumes the equal speed of adjustment coefficients and short-run coefficients. In this study, the parameter estimates were obtained using the DFE method. The results of the parameter estimation in the long and short runs using the DFE method are presented in the next table (Table 8).

Table (8): Parameter Estimation Results in the Long and Short Runs using the DFE Method

Variable	Coefficient	Standard Deviation	p-value
Long Run			
LFBCF	0,093	0,138	0,500
LRS	0,733	0,293	0,012
Short Run			
Error Correction Term	-0,098	0,050	0,049
D(LFBCF)	0,022	0,014	0,119
D(LRS)	0,204	0,110	0,064
C	0,191	0,071	0,007

Source: Own construction

4-3-4 Model Comparison and Results Analysis

Model comparisons are essential for selecting the most appropriate model and deriving meaningful conclusions from the study. In this research, two comparisons, MG vs PMG and PMG vs DFE, were performed using the Hausman test. The outcomes of the method comparisons are presented in Table 9.

Table (9): Model comparison tests for selecting the accurate estimation method

	Statistical Value	Probability Value	Decision
MG/PMG	0,1367	2,210	PMG
PMG/DFE	1,000	0,000	PMG

Source: Own construction

The Hausman test was used to evaluate the differences in the estimated parameters and determine the suitability of each model. In the comparison between the Mean Group (MG) and PMG models, the p-value was found to be 0.1367, and the test statistic was 2.210. Since the p-value is greater than the significance level of 0.05, the null hypothesis of no significant difference between the models is accepted. Therefore, the MG model is considered superior to the PMG model. Similarly, when comparing the PMG model with the DFE model, the p-value was found to be 1.000, and the test statistic was 0.000. Based on the p-value, which is greater than 0.05, the null hypothesis of no significant difference between the models is accepted. Hence, the PMG model is preferred over the DFE model.

The outputs of the selected PMG model, presented in Table 7, provide valuable insights into the short-term and long-term dynamics of the variables under investigation. In the short run, the error correction coefficient was found to be -0.082, which was statistically significant at a 5% significance level. This suggests that deviations from the long-run equilibrium are corrected at a speed of 8.2%. Additionally, the estimated parameters for the variables in the short run were not statistically significant, except for the constant term, which had a p-value of 0.003.

In the long run, the PMG model showed that the estimated parameter for the logarithm of Gross Fixed Capital Formation (LFBCF) was statistically significant at a 5% significance level, with a p-value of 0.013. However, the estimated parameter for the logarithm of Compensation of Employees (LRS) did not exhibit statistical significance, as its p-value was 0.485.

Overall, the model comparison and analysis of the results indicate that the PMG model is more suitable for this study than the alternative models considered. It provides valuable insights into the relationships and dynamics of the variables under investigation in both the short and long run.

Additionally, Table 7 reveals the following economic insights regarding the PMG method:

- The long-term relationship emphasizes a positive correlation between the Gross Domestic Product (GDP) variable and the gross accumulation of fixed assets. This means that for every 1% increase in the latter, the GDP value increases by 0.709%. However, the sector-specific short-term outputs indicate that the GDP is positively influenced by the gross accumulation of fixed assets in the services and petroleum sectors, while the industrial sector shows a negative influence. The other sectors (agriculture, construction, and services provided to institutions) do not have a significant impact on the GDP. Algeria has made various efforts to promote and upgrade investment to improve and diversify the country's productive capacity, thus stimulating GDP.
- The rise in oil prices at the beginning of the new millennium allowed for the accumulation of financial surpluses, enabling an expansionary fiscal policy. Various programs and initiatives were implemented to support value-added activities, economic development, and infrastructure improvements.
- Efforts were made to establish industrial zones, facilitate investment, and support small and medium-sized enterprises.
- Investment-related legislation was enacted to provide special benefits and incentives for investments in different sectors.
- Measures were taken to promote exports outside the hydrocarbon sector and overcome obstacles faced by exporters.

Despite these efforts, Algeria remains dependent on rentier income from the hydrocarbon sector. The industrial policy and reliance on imports for raw materials have limited the contribution of other sectors to the GDP. Challenges such as outdated technology in agriculture, infrastructure limitations, and a lagging banking sector hinder economic growth. The non-significant relationship between GDP and wage compensation in the long term highlights the economy's dependence on the hydrocarbon sector and the temporary nature of its impact.

Conclusion:

The research examined the impact of investments in five sectors (agriculture, petroleum services and works, industry, construction, and services provided to institutions) on economic growth in Algeria during the period 1996-2020 using the Panel Autoregressive Distributed Lag (Panel-ARDL) model. The results showed that the gross accumulation of fixed assets (representing sectoral investment) has a positive long-term effect on economic growth. This highlights the importance of sectoral investment in stimulating economic growth, despite the obstacles facing the investment climate in Algeria. However, in the short term, the gross accumulation in the services and petroleum services and works sectors, as well as the industrial sector, showed significant positive and negative effects on growth, while the estimated coefficients of the remaining sectors were statistically insignificant. Following the path of these results suggests a single interpretation, which is the close link between rent and the creation of a fragile economy unable to escape the trap of oil prices. Furthermore, vital sectors such as agriculture and industry have not been able to overcome their obstacles.

The results also indicated a statistically insignificant negative relationship between employee compensation and long-term economic growth, while in the short term, employee compensation in the industrial sector was the only variable that showed a statistically significant positive relationship with GDP. This signifies the relative importance of the industrial sector in the Algerian economy, but its dependence on hydrocarbons leads to a direct correlation between employee compensation, economic growth, and short-term oil prices, which diminishes in the long term due to the non-renewable nature of rent.

Based on the aforementioned results, the study proposes the following recommendations:

- The need to adopt policies aimed at expanding economic activities, particularly investment in vital sectors such as industry and agriculture, to enhance economic growth and create new employment opportunities, while ensuring efficient resource allocation instead of injecting large investment amounts for social support.
- Providing facilitation for foreign investments to harness available technology.
- Encouraging and facilitating the establishment of startups through access to financing and real estate, along with tax incentives, especially for productive projects that align with the concept of economic diversification.
- The necessity of implementing comprehensive reforms in the banking sector that finances projects.

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