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The Role of Government Expenditure Types on Gross Domestic Product in Libya using Pairwise Causality Methodology

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دور الانفاق الحكومي على الناتج المحلي الاجمالي في ليبيا باستخدام منهجية السببية الثنائية

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Abstract:
The government plays a pivotal role in maintaining economic stability through expenditure in all its subsidiary activities. The objective of that is to rapid growth of its economy by using its production elements in its sectors for maximization GDP. In addition, it establishes a trade climate leading to the effectiveness of the production elements allocation to produce high quality goods and reflect this on GDP growth and economic prosperity. The study dealt with the role of government expenditure in its various types in GDP during 2000 to 2023. It had based on time series data to find a bilateral causal relationship between developments, current, and extra expenditure and GDP. The study analytical findings revealed that the variables are stationary in the first difference in the Augmented Dickey-Fuller and Phillips–Perron tests. The Johansen cointegration Test also indicated to did not exit cointegration relationships among variables under the study investigation. Pairwise causality Test has explained that there is a unidirectional causality moving from development expenditure towards GDP and a unidirectional causal relation moving from GDP to extra expenditure .The causality results showed also that did not exit causal relationship from other types of expenditure towards GDP. The study recommends intensifying expenditure in development expenditure more than other expenditure types, especially regarding expenditure on agriculture and industry expenditure. This expenditure lead to increasing its productive capacity then stimulates GDP and not relying on oil income as a sole source of income.
Key words: Development expenditure; current expenditure; and extra expenditure; GDP; Pairwise causality; Libya.

الملخص:
تلعب الحكومة دورا محوريا في الحفاظ على الاستقرار الاقتصادي من خلال النفقات في جميع أنشطتها الفرعية. الهدف من ذلك هو تطوير اقتصادها باستخدام عناصر انتاجها في مختلف القطاعات من أجل تعظيم ناتجها المحلي الإجمالي. بالإضافة إلى ذلك، تنشئ مناخ تجاري يؤدي إلى فعالية تخصيص عناصر الإنتاج لإنتاج سلع ذات جودة عالية وينعكس ذلك على الناتج المحلي الإجمالي والازدهار الاقتصادي. تعاملت الدراسة مع دور الإنفاق الحكومي في أنواعها المختلفة في الناتج المحلي الإجمالي من الاعوام 2000 إلى 2023. وقد استندت إلى بيانات السلسلة الزمنية لإيجاد علاقة سببية ثنائية بين الانفاق التنموي والحالي والإضافي والناتج المحلي الإجمالي. كشفت نتائج الدراسة التحليلية أن المتغيرات مستقرة

في الفرق الأول في اختبارات ديكي فلر الموسع وفيليبس بيرون، وأشار اختبار جوهانسن لتكامل المشترك بعدم وجود علاقة تكامل مشترك بين المتغيرات تحت تحقيق الدراسة. أوضح اختبار السببية الزوجية (Pairwise causality test) أن هناك علاقة سببية أحادية الاتجاه تتحرك من نفقات التنمية نحو الناتج المحلي الإجمالي وعلاقة احادية الاتجاه من الناتج المحلي الى الانفاق الاضافي .كما أظهرت نتائج السببية أيضا بعدم ظهور علاقات السببية بين أنواع الأخرى من النفقات نحو الناتج المحلي الإجمالي. وتوصي الدراسة بتكثيف في الانفاق التنموي أكثر من الاتفاقات الاخرى وخاصة فيما يخص الانفاق على قطاعات الزراعة والصناعة. هذا الانفاق يؤدي الى تحفيز الناتج المحلي الاجمالي وعدم الاعتماد على النفط كمصدر وحيد للدخل.
الكلمات المفتاحية: الانفاق التنموي، الانفاق الجاري، الانفاق الإضافي، الناتج المحلي الإجمالي، سببية ثنائية، ليبيا.

Introduction:

The government has a vital impact on ensuring stability and economic growth in the country through many economic tasks Vengedasalam and Madhavan (2013). Most governments in industrialized countries after World War II used large-scale expenditures to develop their economic activity Aldeeghah (2024). This concept is supported by governmental authority through mechanisms and practices to perform central state functions to achieve inclusive and sustainable growth Okunlola et al (2024). Government expenditures have become a broad debate in their relationship with economic growth in theoretical and empirical literature. Discussions revealed that the impact of government expenditure on economic growth is not conclusive, because the impact is different from an active role to a negative impact, while others did not play any role Nyasha and Odhiambo (2019).

The Libyan economy is characterized as other oil-developing countries, which depend on oil resources. It has targeted these oil resources in expenditure on its sectors after the discovery of oil to achieve high-growth rates in economic activities and social services. The various types of expenditures have seen a steady rise since the emergence of oil and have been taken through various economic and social plans. These expenditure using savings from oil resources resulting from rising prices and quantities to turn them into high rates of GDP due to raising productivity efficiency for country sectors. As a result of the high volume of expenditure, it led to an increase in the GDP, which represents the outcome of the economic activity of the state, including the contribution of non-oil economic activities.

Research Problem:

The successive governments of the Libyan state are trying to diversify the sources of income and non-relying on oil as a sole source of income by expanding their economic base and increasing growth rates. In other side, the role of expenditure in previous studies has not resolved controversy about the role of expenditure in gross domestic product (GDP). This study has been in the knowledge of this role in the Libyan situation and it's a question was identified in whether the species of government expenditure was reason for stimulate GDP.

The Study Objectives:

The primary objective of the study is analyzing relationship between government expenditure types and Libyan domestic product; this study analyzes this role by presenting it and builds a metrics model of causality for examination the impact of different types of government expenditure on GDP from 2000 to 2023.

Importance of Study:

Although government expenditure is important for the economy, discussion of this role is still present in the economic literature and is inconclusive. Therefore, this study is considered important in the Libyan economy to know its role during the study period. In addition, it is participating in filling gaps in this aspect and helping researchers to further enrich discussions on these research points. Moreover, it is providing additional information to fiscal policy decision maker.

Previous Studies:

Bose et al (2007) have shown in their study the role of government expenditure in economic growth. The results of the study indicated that public development expenditure has a positive role in GDP. However, current expenditure did not have any effect. In addition, Onifade et al (2020) in their study sought to know the impact of economic growth on government expenditure using ARDL methodology in the period from 1981 to 2017 in Nigeria. The results found there is a positive relationship between government expenditure and economic growth in terms of current expenditure, which has a negative impact. In same time, it was opposite to the result of development expenditure, which has a positive impact but is not statistically significant.

On the other hand, Chu et al (2020) studied the impact of government expenditure on economic growth by using 37 high-income countries and 22 low- and middle-income countries. The OLS method has been used for this purpose. The study concluded that production expenditure is positively linked to high-income and low- and middle-income countries. In addition, Mohamud and Abdulle's (2025) study has discussed the impact of government expenditure and development expenditure on the GDP during

1990-2022 by employing the ARDL methodology. The results of analyses have revealed a bidirectional causality relationship between both capitalization and economic growth. Also, it was there a unidirectional causality relationship from economic growth to foreign direct investment. The study was keen to pay attention to productive sectors and expenditure investments in these sectors.

Over and above that, Shuchen (2024) aimed to investigate the effect of government expenditure level in Ghana on rapid growth. The study strongly suggested that economic expansion was affected by high levels of government expenditure, which represents 0.114% to work ideally to increase economic expansion. Along with this, Nyarko-Asomani et al (2019) has taken care of the development and current expenditure using the ARDL modal method by employing quarterly data on the importance of government expenditure and economic expansion through development expenditure during the period (1990-2015) for the purpose of finding the causal relationship between each other. The study analysis found that in the event of no use of interest, the current expenditure is a catalyst for economic expansion in long-run. In short-run regard to lagged values side, the result showed the development expenditure is not a catalyst for this growth. As for the causal relationship, the causal relationship between them was unidirectional relationship moving from government expenditure to economic expansion. This is requiring the expansion of development expenditure in Ghana.

In Somalia, Osman et al (2025) conducted a study to assess long-run links between the environmental degradation variable and demographic and economic variables. The study revealed that the development expenditure in the infrastructure reduces the damage to the economy. Even more, Odhiambo (2015) used ARDL model to estimate the relationship between government expenditure and economic growth in South Africa. The study findings demonstrated that the variables have a bidirectional causal relationship between them in the short run. While in long-run, it was a unidirectional causal relationship that extended from economic growth towards government expenditure. Besides that, Buthelezi (2023) in South Africa used VECM method during the period 1994-2021 in long-run. The study recommended that the financial decision-making expansion in the short run not be in long-run. It is because in long-run did not expand economic growth in South Africa, where growth declined by 0.009 and 0.30 respectively as a result of financial expenditure during the study period. As for the level of 45 in developing countries, Adam and Bevan (2005) studied the impact of the government's financial deficit on growth. In this context, the study found that there is growth when the financial deficit is reduced.

Wu et al. (2010) conducted Granger's Test using section data of 182 countries covered from 1950 to 2004. The analysis explored that government expenditure stimulates economic growth. All the more, Rahman (2023) examined the relationship between government and economic expansion in the countries of the South Asian Regional Cooperation Association. It employed the OLS method for the date covered from 2011 to 2020. The study concluded that there is a relationship between government expenditure and economic growth in long-run. It indicated that government expenditure play a positive role in gross domestic product, where there is a unilateral relationship between GDP and expansion of government expenditure. In addition, there is a unidirectional relationship between GDP and government expenditure expansion. On the same continent in Asia, Safdari et al (2012) addressed its knowledge after the government expenditure expansion and economic expansion through growth. The study was used (Panel-Vecm) from 1970 to 2009 in 27 Asian countries. The analysis results showed there being a bidirectional relationship between government expenditure and economic growth in Asian developing countries. On the other hand, Hasnual (2016) analyzed the linkage relationship between the expenditure and economic growth using data from 1970 to 2014. The outcomes analysis indicated that government expenditure in Malaysia had a negative return on economic growth in terms of development expenditure.

The Study Methodology:

The study was adopted on the data collected from the Central Libyan Bank's publications, Libyan General Planning Council, as well as Arab Monetary find in examination bilateral causal methodology to exist the relationship causal and their direction among independent variables of development expenditure, current expenditure and extra expenditure and GDP. The presence of this relationship can be found through this equation:

$$GDP = f\ (DE, CE, and\ EE) \ldots. (1)$$

where, GDP refers to the gross domestic Product, DE refers to development expenditure, CE refers to current expenditure, and EE refers to extra expenditure. Based on above relationship, the granger causality relationship will be in the following formula:

$$Y_t = \alpha 1 + \sum_{j=1}^{P} \beta_j \ \Delta Y_{t-j} + \sum_{j=1}^{P} \gamma_j \Delta X_{t-j} + \epsilon_{1t} \quad \ldots..(2)$$

$$X_t = \alpha 2 + \sum_{j=1}^{P} \delta_j \ \Delta Y_{t-j} + \sum_{j=1}^{P} \theta_j \Delta X_{t-j} + \epsilon_{2t} \ \ldots..(3)$$

Results and Discussion:

Unit root tests:

One of the problems which facing the relationship regressions estimation between variables is spurious regressions as a result of uses the unstationary series, which affects the results and not be subtleties. Therefore, it must use the unit root tests to determine whether the time series is stationary or unstationary series before the estimation process. The ADF and PP test is used to detect stationary series in this study. The findings observed that the variables were unstationary at level. Thus, nall hypothesis at level accept and alternative hypothesis reject and the variables became stationary at first difference as showed in table 1.

Table (1): Unit Roots Tests

Variable	ADF Test				PP Test				Decision
	At level		At First difference		At level		At First difference		
	t-Statistic	Prob	t-Statistic	Prob	t-Statistic	Prob	t-Statistic	Prob	
GDP	-1.0539	0.71	-6.2880	0.00	-0.8057	0.79	-6.6540	0.00	I(1)
DE	-2.5558	0.11	-5.8811	0.00	-2.5239	0.12	-5.9534	0.00	I(1)
CE	0.5552	0.98	-3.4426	0.02	0.3343	0.97	-3.4050	0.02	I(1)
EE	-0.2113	0.92	-4.1964	0.00	-0.2113	0.92	-4.1955	0.00	I(1)

EViews 12 outputs

Optimization Lag Selection:

The Akaike Information Criterion (AIC) and Bayesian information Criterion were used to select the suitable lag in small sample Farag et al (2020). Accordingly, Lag 1 was captured to express the optimal Lag in the study sample.

Johansen Cointegration Test:

Numerous economists sought a definition of cointegration, and the beginnings with Granger (1981) and elaborated further by Engle and Granger (1987), Engle and Yoo (1987), Phillips and Ouliaris (1990), Stock and Watson (1988), Phillips (1986 and 1987), and Johansen (1988, 1991, and 1995). Cointegration in the economic models using time series became an important for whether there is a long-run relationship among variables when the stochastic trends do cancel each other out Binh (2013). In this study, Johansen's cointegration method was used to show if there is a long-run relationship or not as well as the number of these relationships. Test outputs according to the value of Trace statistic and the value of Max-Eigen statistic which their values were less than critical value at 5%. This result revealed that there is no cointegration between variables. Therefore the causal relationship under Vecm methodology cannot be used due to there is no cointegration between the variables under study investigation and uses the Causality Pairwise is relied on Var for this purpose.

Table (2): Johansen Cointegration Test

Hypothesized no. of CE(s)	Trace Statistic	critical Value 5%	Max-Eigen Statistic	Critical Value 5%
None	38.5401	47.8561	17.5129	27.5843
At most 1	21.0272	29.7970	11.5621	21.1316
At most 2	9.4651	15.4947	7.9300	14.2646
At most 3	1.5350	3.8414	1.5308	3.8414

Trace and Max-Eigen value test indicate no cointegration eqn (s) at the 0.05 level.

Pairwise causality test results:

The results of pairwise which refer to the causal relationship between couples of variables indicate that the null hypothesis has been rejected and an alternative hypothesis accepted. That meaning that, it provides for the appearance of a causal relationship between the development expenditure and gross domestic product. That is because there was a unidirectional causality moving from development expenditure towards GDP, which its probability value (value p) was 0.056. On the other hand, causal relationships arise in a unidirectional causality moving from GDP to extra expenditure. Regarding current expenditure, it did not have a causal relationship over time towards GDP and vice versa. Therefore, the analysis results revealed the exit of a unidirectional causality relationship moving from development expenditure toward gross domestic product at 0.10. Furthermore, causal relationships arise in a unidirectional causality moving from GDP to extra expenditure. However, this causal relationship is centrist and not strong because of more than 0.05, but it is preliminary indicating its effect in explanation or predicting changes in gross domestic product in the future.

Table (3): Pairwise causality test result

Null Hypothesis:	F-Statistic	Prob.
DE does not Granger Cause GDP	4.08292	0.0569
GDP does not Granger Cause DE	0.02686	0.8715
CE does not Granger Cause GDP	0.48692	0.4933
GDP does not Granger Cause CE	1.11894	0.3028
EE does not Granger Cause GDP	0.49743	0.4888
GDP does not Granger Cause EE	3.75511	0.0669

Eviews12 outputs

Conclusion:

The study attempted to understand the causal relationship between development, current, and extra expenditure to determine its effect on the gross domestic product. The study used unit roots in order to detect the stationary of the variables. This data showed that all the variables under study are stationary in the first difference. The study also found no co-integration among variables. As for the causal relationship, the results have confirmed that there is a unidirectional causal relationship between development expenditure and GDP. This a causal relationship was moving from development expenditure towards GDP at significant 10%. Meanwhile, the results demonstrated GDP cause extra expenditure at 10%. Also, the findings, found out the other expenditures did not have a causal relationship with the gross domestic product in any direction. Therefore, the findings concluding that development expenditure only stimulates GDP compared to the other expenditures.

Recommendations:

The study recommends intensifying expenditure in development expenditure more than other expenditures, especially in productive sectors such as agriculture and industry. This recommendation for increase its productive capacity and reflected that in increases GDP and do not rely on oil income as a sole source of income.

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