

The Nexus between Military Spending, Tax Revenues and Economic Growth in the G5 Sahel Countries

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Abstract

This article aims to examine the nexus between military spending, tax revenues and economic growth in the G5 Sahel countries. To this end, a VAR model was estimated on a panel of five countries over the period 2000 - 2018. The analysis led to three main results. First, economic growth helps finance military spending, while military spending has a negative effect on economic growth. Second, military spending lagged by a period has a positive effect on tax revenues, while tax revenues have no effect on military spending. Third, tax revenues promote economic growth, and in return, economic growth contributes to increased tax revenues. The study therefore suggests the establishment of a good tax policy in the G5 Sahel countries to mobilize more resources to boost economic growth and to finance military spending.

Keywords: Economic growth ; Military spending ; Tax revenues ; G5 Sahel

JEL Classification: F52, H2, H56, O4

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1. Introduction

The upsurge in terrorist activities in the Sahel region has led several countries in sub-Saharan Africa to increase military and security spending. In the G5 Sahel area, several countries have been the scene of terrorist attacks by several jihadist groups. Burkina Faso, Mali and Niger have recorded increasingly violent attacks, with the deaths of soldiers leading to massive displacement of populations. Niger recorded terrorist attacks with 89 soldiers killed in January 2020. In Mali, 24 soldiers were killed in June 2020 in a jihadist attack in the center of the country. In Burkina Faso, at least 50 people, civilians and soldiers, were killed in a series of attacks in May 2020 in the east of the country. The violence reached a worrisome level to the point where a president of the republic of a member country of this zone, namely, Chad (Idriss Deby Itno), was killed in April 2020 during clashes between the Chadian army and the rebel forces that are rampant in the region.

The increase in these terrorist acts generates significant human, macroeconomic and budgetary costs. Covering additional spending while ensuring macroeconomic stability, debt sustainability and maintaining the necessary room for manoeuvring for other spending required for strong and sustainable growth represents a significant challenge for each G5 Sahel country. The share of military spending over all public spending has increased in several G5 Sahel countries. In this context, it is essential for the G5 Sahel countries to mobilize more domestic revenue to achieve their development objective. The main steps in meeting this challenge include strengthening the mobilization of tax revenues. By way of illustration, statistics from the World Development Indicators in 2017 indicate that the military spending of Burkina Faso, Niger and Mali in 2002 were \$42 million, \$20 million and \$49 million, respectively. Fifteen years later, that is, in 2017, these expenses were established at 191 million dollars, 200 million dollars and 461 million dollars, respectively. At the same time, it is also noted that the tax revenues/GDP ratio has grown in these different countries. From 10.86% in 2002 in Burkina Faso, the tax revenue/GDP ratio was established at 15.83% in 2017. For Niger, it was 13.7% in 2002, and this ratio reached 18% in 2015. For Niger Mali, the ratio fell from 11.17% in 2002 to 15.37%. Looking at these figures suggests that the increase in military spending has been accompanied by an increase in the tax revenues-to-GDP ratio. This observation is important and allows us to think of a correlation between tax revenues and military spending. It therefore becomes necessary to explore the contribution of tax revenues to the financing of military spending.

Moreover, since the founding work of Smith (1980), who developed a demand model for military spending, several authors have been interested in the effects of military spending on the economy in general and on growth in particular (D'Agostino *et al.*, 2017; Dunne and Tian, 2016) without reaching a consensual result. The main findings on the determinants of military spending are the subject of debate among the authors. It is therefore necessary and useful to conduct specific case studies to gain a precise understanding of the various determinants of military spending.

The objective of this study is to determine the nexus between military spending, tax revenues and economic growth in the G5 Sahel countries. Specifically, the study aims to clarify the direction of the causality existing between tax revenues as a percentage of GDP and economic growth on the one hand and military spending and economic growth on the other. It is important to conduct such an analysis for two specific reasons. The first reason is that the G5 Sahel countries face increasingly heightened security challenges because of the terrorist groups that are rife in the region, such as Boko Haram in Chad and Niger, Aqmi in Mali and Burkina Faso.

Faced with this threat, it is urgent that the countries of the zone strengthen their security arrangements to ensure the peace of the peaceful populations.

The second reason is that since the fall of the Libyan regime in 2011, several terrorist groups have invaded the Sahel and wreaked havoc in the various countries. Among the Sahel countries, five have formed the G5 Sahel, namely, Burkina Faso, Mali, Mauritania, Niger and Chad). The destabilization of these Sahel countries has repercussions on their economic situation. This situation forces countries to mobilize more public resources to finance security spending and the investments necessary for growth.

This review contributes to the existing literature in two main ways. The first contribution is methodological; we use a VAR model to determine the nature of the relationship between military spending, tax revenues and economic growth in the G5 Sahel countries by using control variables. To our knowledge, this study is the first to examine this topic, namely, the relationship between military spending, tax revenues and economic growth in the G5 Sahel zone. The second contribution is operational and practical. In fact, by studying the relationship between military spending, tax revenues and economic growth, this research makes it possible to document the literature for the case of the G5 Sahel countries and helps to recommend actions for the efficiency of military spending and greater effectiveness in the mobilization of public resources essential for financing their development programs.

This article is organized as follows: in Section 2, we present a review of the literature on the relationship between military spending, tax revenues and economic growth. In Section 3, we present the G5 Sahel. Section 4 is devoted to the methodology. Section 5 presents the analysis of the empirical results obtained. Section 6 addresses the impulse response functions. Section 7 analyses the variance decomposition, and Section 8 presents the conclusion and policy implications.

2. Literature Review

We present the empirical works carried out on the link between military spending, tax revenues and growth in the economic literature.

2.1 Empirical analyses on the link between tax revenues and military spending

Since the founding work of Smith (1980), who developed a demand model for military spending, several authors have been interested in the effects of military spending on the economy in general and on growth in particular (D'Agostino *et al.*, 2017; Dunne and Tian, 2016). Some authors have focused their attention on the effects of military spending on external debt in developing countries. Some empirical work relates military spending to budget variables. From this perspective, Harris (1986) finds that current year military spending in ASEAN countries has a positive correlation with the central government budget of the previous year. Coulomb and Fontanel (2005) document for the case of France over the period 1993-2004 that when the government applies a budget restriction, military spending is that which experiences a greater reduction compared to other types of public expenditure.

Özsoy (2008), based on a VAR approach for the case of Turkey, finds that a shock to the budget deficit as a percentage of gross national product produces an insignificant effect on military spending as a percentage of gross national product, while 'a shock to military spending has a negative impact on the budget deficit. Taha and Loganathan (2008) empirically test the causality between tax revenues and government expenditure in Malaysia over the period 1970-2006 using a VAR model. The results highlight the existence of a long-term relationship

between public expenditure and tax revenues with bidirectional causality between the two variables. The empirical observation of the simultaneous increase in spending as a proportion of GDP and the compulsory tax rate shows that taxation is indeed the only way historically to support the growth of public spending. Blancheton (2012) shows that in 1900, spending represented approximately 14% of GDP in France and levies approximately 10%, but at the start of the 21st century, they were approximately 54% and 44%, respectively. This attests to a positive correlation between public expenditure and public revenue. Antill, Ito and Robinson (2013) argue that the declines in military spending as a percentage of GDP in European countries are due to fiscal austerity and the desire to reduce public debt and the level of the deficit.

Caruso and Di Domizio (2016) study the relationship between US military spending and European sovereign debt on a panel of thirteen European countries. The results show that the sovereign debt burdens of European countries are positively correlated with the military spending of the United States. In a different approach, Arvanitidis *et al.* (2017) show that external debt and fiscal deficit have no significant effect on defense spending in NATO allies. Edward (2017) uses a fiscal indicator called fiscal capacity in a study of military spending in European countries over the period 2007-2016. The author finds that fiscal capacity is a good explanatory indicator of changes in military spending as a percentage of GDP.

2.2 Analysis of the link between military spending and economic growth

2.2.1 Theoretical review

Theoretically, there is no consensus regarding the effect of military spending on economic growth. Thus, several schools of thought have emerged to determine the nature of the relationship between military spending and growth. Among these schools of thought are the neoclassic, Keynesians, institutionalists, Marxists and the theory of international relations. These different theories have made it possible to identify and theorize the channels through which military spending impacts economic growth. These channels can be grouped into three broad categories: demand, supply and security. The first approach is that of neoclassical theory, which relates military spending to economic development through the supply channel. This theory views the state as a rational agent who compares the benefits of security against the opportunity costs of military spending to maximize the public interest.

In contrast, Keynesian and institutional theories are concerned with the effects of military spending on the supply and demand side. Both theories believe that output increases through the Keynesian multiplier effect when the state spends military spending (Dunne and Uye, 2010). According to Marxist theory, by investing in the military domain, countries delay the collapse of the capitalist mode of production, leading to the development of capitalism and avoiding a fall in the rate of profit (Coulomb and Bellais, 2008). Military spending contributes to increasing aggregate demand without increasing aggregate supply, leading firms to reduce their surplus, sell their goods and make profits (Riddle, 1986). The latest theory on international relations states that in the absence of international cooperation and to reduce political tensions, increased military spending helps keep a country secure.

2.2.2 Empirical review

Since the pioneering work of Benoit (1973; 1978), several empirical studies have analysed the causal relationship between military spending and economic growth. Studies show that there are four types of causal relationships between military spending and economic growth, namely, one-way causality of military spending to economic growth, which means military spending influences economic growth; one-way causality from economic growth to military spending,

which means that strong economic growth or a high level of income determines the level of military spending; bidirectional causality between economic growth and military spending; and absence of causality between military spending and economic growth.

From this perspective, Kollias (1997) tests the causality in the sense of Granger between economic growth and military spending in Turkey from 1954 to 1993. The results show that there is no causal relationship between economic growth and military spending. However, later Kollias, Manolas and Paleologou (2004) use Granger's causality test by incorporating cointegration techniques to show that there is a bidirectional causality between military spending and economic growth in Chipre over the period 1964 - 1999.

Lai, Huang and Yang (2005) investigate the causality between military spending and economic growth in China and Taiwan for the period 1953 - 2000. The authors use a VAR model and a threshold effect model. The results show that military spending in China causes economic growth in Granger's sense and that there is a two-way causality between military spending and growth in Taiwan. Pradhan (2010) explores the relationship between military spending, public debt, and economic growth in four Asian countries, namely, China, India, Nepal and Pakistan, from 1988 to 2007. The results of the panel causality test reveal that there is a two-way causality between public debt and economic growth in China and India and a unidirectional causality between military spending and economic growth in China and Nepal.

D'Agostino, Dunne and Pieroni (2012) show that military spending is detrimental to economic growth. Dunne (2012) highlights that military spending has a significant negative effect on growth in the short run and an insignificant effect on growth in the long run. Chen *et al.* (2014) find that a short-run causality running from defense burden to real GDP is found in lower-middle- and high-income countries and that from real GDP to defense burden is found in low-income countries, while bidirectional short-run causality is found in Asia, Europe, Latin America and the Caribbean and the Middle East and North Africa. No causality is found in upper-middle-income, European and Central Asian and Sub-Saharan African countries.

Dunne and Tian (2015) examine the impact of military spending on economic growth using the dynamic panel method. They find that military spending has a negative effect on short-term and long-term growth. Musayev (2015) re-examines the relationship between military spending and economic growth. The authors establish that military spending has a negative effect on economic growth. Droff and Paloyo (2015) show that defense activities exercised in a specific region may alter the region's economic performance.

Desli *et al.* (2017) find no evidence of long- and short-run causality from military spending to economic growth except for developing countries (positive in the long run). However, from economic growth to military spending, they find a positive impact for all groups except the least developed countries. Churchill and Yew (2018) show that military spending slows economic growth in less developed countries more than in developed countries. Kollias and Paleologou (2019) use an autoregressive vector to analyse the causality between military spending, investment spending and economic growth over sixty-five countries spanning the period 1971-2014. Empirical tests highlighted the differences between the three income groups. Zaman (2019) examines the relationship between military spending, business regulation, and economic growth. The results confirm the two-way causality between military spending and economic growth in the G7 countries.

Saba and Ngepah (2019) analyse the causal relationship between military spending and economic growth on a panel of thirty-five African countries over the period 1990 - 2015. The results of the estimates can be summarized as follows: no causal relationship between military spending and growth in seven countries; existence of a one-way causal relationship of military spending to growth in two countries; existence of a one-way causal relationship of growth to military spending in fourteen countries; and existence of a two-way causality between military spending and growth in twelve countries.

2.3 Analysis of the link between tax revenues and economic growth

Empirical work on the relationship between tax revenues and economic growth has yielded three categories of results. The first category of results relates to work, which shows that the relationship is positive. The second category concerns results that establish a negative relationship, and finally, the third category of results supports the nonexistence between the two variables.

Thus, Widmalm (2001), Taha, Nanthakumar and Colombage (2011), Zeng and Du (2003), Saqip *et al.* (2014) and Amri *et al.* (2019) analysed the effects of tax revenues on economic growth using several categories of tax. The results of these studies have shown that tax revenues have a negative effect on economic growth.

Lee and Gordon (2005), Tosun and Abizadeh (2005), Ray *et al.* (2012), Abdiyeva and Baygonusova (2016), Egbunike *et al.* (2018), Amin *et al.* (2018), Aydin and Esen (2019) and Eneche and Stephen (2020) have established that tax revenues promote economic growth. Finally, some studies have highlighted that there is no relationship between tax revenues and economic growth. In this category, we can cite the work of Mendoza *et al.* (1997), Ojede and Yamarik (2012) and Gurdal *et al.* (2020).

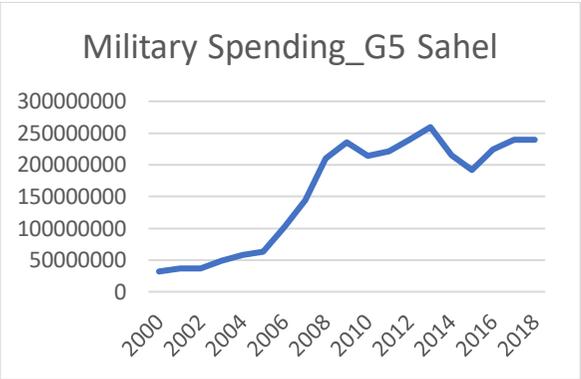
This review shows that there is a relationship between military spending, tax revenues and economic growth in the economic literature. We can also see that very few scientific studies are devoted to African countries in general and those of the G5 Sahel in particular concerning the relationship between military spending, tax revenues and economic growth. It is therefore interesting and useful that this reflection fills this void, especially at these times when terrorist threats are legion in the G5 Sahel countries.

3. Brief presentation of G5 Sahel

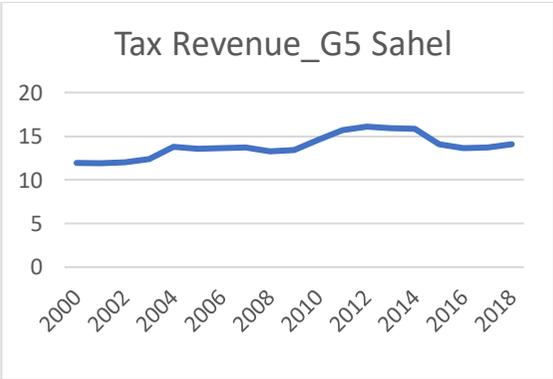
Indeed, driven by a real outpouring of solidarity and a common desire to perpetuate, strengthen and amplify the strong links forged by history, geography and culture and in the face of the resurgence of insecurity following in particular the proliferation of terrorist acts and cross-border organized crime, anxious to find solutions more quickly to boost the development of the Sahel region, five heads of state have courageously decided to unite within an organization by creating the G5 Sahel on February 16, 2014 in Nouakchott in the Islamic Republic of Mauritania. The G5 Sahel includes Burkina Faso, Mali, Mauritania, Niger and Chad.

The G5 Sahel aims, among other things, to guarantee the conditions for development and security in the space of member countries; to provide a strategic framework for intervention to improve the living conditions of the populations; to combine development and security, supported by democracy and good governance in a framework of mutually beneficial regional and international cooperation; and to strengthen peace and security in the G5 Sahel area. In the following lines, we describe the evolution of the key variables of the study.

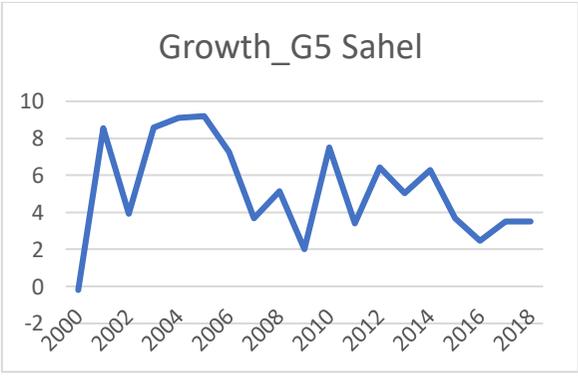
Graph 1: Evolution of military spending



Graph 2: Evolution of tax revenues



Graph 3: Evolution of the growth rate



Source: Author’s compilation, 2022.

The charts show that military spending grew steadily throughout the study period. Tax revenues varied between 10 and 15% of GDP. This shows that tax revenues remain relatively low in the G5 Sahel zone. Economic growth, on the other hand, has had a different development. The growth rate increased from 2000 to 2005 to just under 10% before dropping to just under 5% in 2018. It can be seen graphically that while military spending and tax revenues increase, the growth rate decreases. This finding could reveal a negative relationship between these three variables. To verify this, an appropriate methodology should be adopted.

4. Methodology

4.1 Model specification

The model used in this work is inspired by Aziz and Asadullah (2016) and Walid and Kais (2019), whose theoretical basis is the Cobb–Douglas production function, which includes two major components, namely, labor and capital and other military spending. Indeed, in the standard Cobb–Douglas production function, the state has no role to play. However, the role of government cannot be ignored in promoting economic growth. Therefore, we include the role of government in the theoretical model. Therefore, the Cobb–Douglas production function is written as follows:

$$Y = AL^\alpha K^\beta M^\theta \quad (1)$$

where Y is production, A is the exogenous factor, L is the labor factor, K is the capital factor and M represents the role of the state in the economy through military spending. Here, α , β , θ , respectively represent the share of labor, capital and military spending in production, $\alpha > 0$, $\beta > 0$, but the sign θ is uncertain. Indeed, military spending can have two alternative effects, negative or positive, on production. If military spending reduces public spending in the real sector, it negatively affects economic growth; however, if military spending increases investor confidence (by giving investors security), it positively affects economic growth. For example, if military spending builds investor confidence, then domestic and international investors will invest more because the business environment is secure.

Thus, the analysis of the interaction between military spending, tax revenues and economic growth is carried out using a panel VAR model. The Cobb–Douglas production function materialized by equation (1) can help us explore the links between the three endogenous variables: military spending, tax revenues and economic growth. By transforming the production function of equation (1) into linear form, we obtain:

$$\ln(Y)_{it} = a + \alpha_{1i} \ln(L)_{it} + \beta_{2i} \ln(K)_{it} + \theta_{3i} \ln(M)_{it} + \varepsilon_{it} \quad (2)$$

From equation (2), we deduce that the VAR of order "p" between economic growth, military spending and tax revenues is therefore established as follows:

$$Growth_{it} = \beta_0 + \sum_{j=1}^p \beta_{1,t} Growth_{i,t-k} + \sum_{j=1}^p \beta_{2,t} Military_{i,t-k} + \sum_{j=1}^p \beta_{3,t} TaxRev_{i,t-k} + \varepsilon_{1,t} \quad (3)$$

$$Military_{it} = \theta_0 + \sum_{j=1}^p \theta_{1,t} Military_{i,t-k} + \sum_{j=1}^p \theta_{2,t} Growth_{i,t-k} + \sum_{j=1}^p \theta_{3,t} TaxRev_{i,t-k} + \varepsilon_{2,t} \quad (4)$$

$$TaxRe v_{it} = \alpha_0 + \sum_{j=1}^p \alpha_{1,t} TaxRe v_{i,t-k} + \sum_{j=1}^p \alpha_{2,t} Military_{i,t-k} + \sum_{j=1}^p \alpha_{3,t} Growth_{i,t-k} + \varepsilon_{3i,t} \quad (5)$$

where $Growth_{it}$, $Military_{it}$, and $TaxRe v_{it}$ represent the variables of economic growth, military spending and tax revenues, respectively. i represents the countries, t represents the years, and k represents the optimal lag of endogenous variables. We used control variables to better understand the relationship between military spending, economic growth and tax revenues. To this end, we use trade openness and population size as control variables. Indeed, the economic literature shows that the size of the population and trade openness are determinants of economic growth. In addition, the size of the population may also be a factor influencing military spending in that increasing the size of the population could create problems of insecurity. Military spending is therefore necessary to provide adequate equipment to maintain the security of the population. Trade openness can allow countries to reap tax revenues through foreign trade.

4.2 Econometric estimation methods

Before estimating the model materialized by equations (3; 4; 5) above, it is urgent to first perform the stationarity test on the different variables of the model. Thus, the tests of Levin, Lin and Chu (2002) and Im, Pesaran and Shin (2003) are carried out to study the stationarity of variables. The estimation of the VAR model begins with determining the optimal lag. After having this step, we estimate the VAR model using the optimal lag. The results of the estimations are analysed and we deepen the reflections through the impulse response functions and the analysis of the variance decomposition table.

The data used in this study come from two sources, namely, the World Development Indicators (2019) of the World Bank and the IMF report entitled "Sub-Saharan Africa: Tax revenues Mobilization and Private Investment (2018)". The study covers the five countries constituting the G5 Sahel and covers the period 2000-2018 to take into account the constraints of data availability for all the variables of the study.

5. Empirical results

The results to be presented mainly concern the stationarity tests of the variables used and the various results of the VAR model estimates. We carry out two stationarity tests. Table 1 below presents the results of the unit root tests of Levin, Lin and Chu (LLC) and Im, Pesaran and Shin (IPS). The stationarity tests performed (LLC, IPS) show that all the variables were stationary at the first difference. Conclusively, since the orders of integration of the study variables do not exceed one, it justified the application of the structural modelling of the VAR panel model.

The estimation of the VAR model requires the determination of the optimal lag. For this purpose, we have chosen the Akaike information criterion to determine the optimal lag. The results show that the optimal lag for VAR is 2. Table 2 below presents the results of the estimated VAR model.

Table 1: Panel Unit roots tests for key variables

Variables	LLC		IPS	
	Level	First difference	Level	First difference
Economic Growth	2.01473	-8.23792***	-1.14055	-3.03253***
Military spending	-0.10476	-4.50582***	1.28530	-3.88265***
Tax revenues	1.60521	-6.65939***	-0.55981	-3.63273***

Source: Author's compilation, 2022. Note: *** denote significance at 1% confidence level.

Table 2: Results of Panel VAR model

Dependant and exogenous variables	Economic Growth (Equation 3)	Military spending (Equation 4)	Tax revenues (Equation 5)
Economic growth (-1)	0.186474* (0.0924)	0.057061 (0.3640)	0.042561* (0.0949)
Economic growth (-2)	0.095883 (0.3695)	0.187848*** (0.0022)	-0.007124 (0.7717)
Military spending (-1)	0.199521 (0.2883)	0.883918*** (0.0000)	0.089445** (0.0392)
Military spending (-2)	-0.309358* (0.0862)	0.023319 (0.8195)	-0.073292* (0.0772)
Tax revenues (-1)	1.421068*** (0.0033)	-0.163876 (0.5470)	0.836118*** (0.0000)
Tax revenues (-2)	-0.757189* (0.0980)	-0.280246 (0.2806)	-0.276101*** (0.0090)
Trade openness	-0.062298 (0.7721)	0.303664** (0.0136)	0.084600* (0.0882)
Population size	-0.021192 (0.8593)	0.161604** (0.0181)	0.033524 (0.2234)

Source: Author's computation, 2022. P-values are in parentheses. ***, ** and * denote significance at 1%, 5% and 10% confidence levels respectively.

The results of equation 3 show that economic growth lagged by one period and tax revenues lagged by one period have a positive effect on the economic growth of the G5 Sahel countries. On the other hand, the results show that tax revenues lagged by two periods and military spending lagged by two periods have a negative effect on economic growth. These results show that tax revenues promote economic growth, while military spending hinders economic growth. These results confirm those of D'Agostino, Dunne and Pieroni (2012), Saqip *et al.* (2014), Droff and Paloyo (2015), Churchill and Yew (2018), and Amri *et al.* (2019).

The results of Equation 4 highlight that economic growth lagged by two periods and military spending lagged by one period have a positive and significant effect on military spending. It can therefore be said that in the G5 Sahel zone, previous economic growth makes it possible to finance military spending. Furthermore, the results show that trade openness and population size are determinants of military spending.

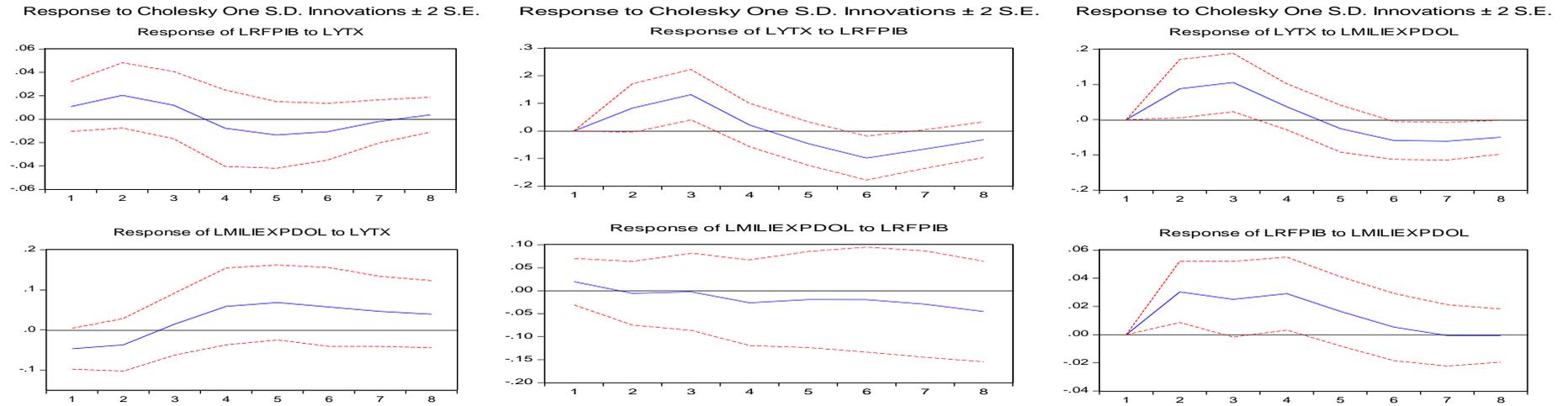
The estimates in Equation 5 show that economic growth lagged by one period, military spending lagged by one period and tax revenues lagged by one period have a positive impact on tax revenues. On the other hand, military spending lagged by two periods and tax revenues lagged by two periods have a negative effect on tax revenues. Notably, economic growth has a

statistically detectable effect on tax revenues. Finally, trade openness promotes increased tax revenues. What to retain from these results? Economic growth helps finance military spending, while military spending has a negative effect on economic growth. Tax revenues promote economic growth, and in return, economic growth contributes to increasing tax revenues. Military spending lagged by one period has a positive effect on tax revenues, while tax revenues have no effect on military spending.

6. Impulse response functions

We present the results of the impulse response functions and subsequently analyse them.

Graph 4: Impulse response functions



Source: Author's computation, 2022.

Analysis of impulse response functions shows that following a shock to the economic growth rate, tax revenues increase and remain positive until the third year. After the third year, they turn negative until the seventh year. Moreover, following a shock to the growth rate, military spending increases over the entire period. They are initially negative in the first two years before turning positive for the remainder of the period.

Following a shock to tax revenues, the reaction of the economic growth rate is instantaneous. It increases sharply during the first three years before decreasing until it becomes negative from the fourth to the eighth year. Military spending declines over the entire period following a shock to tax revenues. The economic growth rate increases initially (first to third year) before decreasing and turning negative following a shock on military spending. Following a shock to military spending, tax revenues increase and remain positive until the eighth year. After interpreting the impulse response functions, it is necessary to examine the decomposition of the variance.

7. Decomposition of the variance

We present the results of the variance decomposition and subsequently analyse them.

Table 3: Results of variance decomposition

Variance decomposition of shocks on Economic growth				
period	S.E	Economic growth	Tax revenues	Military spending
1	0.367900	100.0000	0.000000	0.000000
2	0.389330	90.38550	4.539765	5.074735
3	0.427017	76.44172	13.25130	10.30698
4	0.440853	76.97233	12.67060	10.35707
5	0.443965	75.90502	13.55525	10.53973

Variance decomposition of shocks on Tax revenues				
Period	S.E	Economic growth	Tax revenues	Military spending
1	0.095360	1.275467	98.72453	0.000000
2	0.129811	3.143349	91.40663	5.450021
3	0.142739	3.302805	89.09977	7.597423
4	0.148325	3.331046	85.78577	10.88318
5	0.149904	4.071733	84.05253	11.87574

Variance decomposition of shocks on Military spending				
Period	S.E	Economic growth	Tax revenues	Military spending
1	0.230722	4.124144	0.721560	95.15430
2	0.305814	3.809094	0.445902	95.74500
3	0.376935	2.659492	0.297067	97.04344
4	0.438265	3.767353	0.575903	95.65674
5	0.494494	4.880262	0.602948	94.51679

Source: Author's compilation, 2022.

Indeed, the decomposition of the variance of the forecast error aims to calculate for each innovation its contribution to the variance of the error as a percentage. The variance decomposition indicates that the variance of the forecast error of the economic growth rate is due to 75% to its own innovations, 14% to innovations in tax revenues and 11% to those in military spending. The variance of tax revenues forecast error is 84% due to its own innovations, 12% to innovations in military spending and 4% to those in the growth rate. The variance of the forecast error of military spending is due to 94% to its own innovations, 5% to innovations in the economic growth rate and 1% to those tax revenues.

Ultimately, we can retain from the analysis of the variance decomposition that tax revenues and military spending alone explain approximately 25% of the growth rate in the G5 Sahel countries. Regarding tax revenues, the results show that only 16% of them are explained by military spending and economic growth. Military spending is explained only by 5% by tax revenues and the growth rate.

8. Conclusion and policy implications

The objective of this study was to analyse the relationship between military spending, tax revenues and economic growth in the G5 Sahel countries. To achieve this objective, we estimated a VAR model on a panel of five countries over the period 2000 - 2018. The main results obtained can be broken down into three main points. Economic growth helps finance military spending, while military spending has a negative effect on economic growth. Tax revenues promote economic growth, and in return, economic growth contributes to increased tax revenues. Military spending lagged by one period has a positive effect on tax revenues, while tax revenues have no effect on military spending.

What are the economic implications of these results? These results highlight the need for the establishment of a good fiscal policy in the G5 Sahel countries to mobilize more resources to finance public spending and strengthen economic growth. In a context where foreign aid is becoming increasingly scarce, the states of the zone must show more ingenuity by moving towards innovative financing and by implementing good fiscal policies. The main measures to be implemented could consist of strengthening VAT regimes, rationalizing exemptions, implementing reforms aimed at promoting efficient tax administration through the modernization of administrative procedures and broadening the tax base income tax. Countries must develop new sources of taxation, such as property taxes, to exploit new technologies that could facilitate access to reliable information and convince populations of the need for tax reforms by promoting good governance and fighting against corruption and transparency.

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