Military Spending and Economic Growth: Evidence from the Southern African Development Community

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Abstract

There is still an intense debate about the impact of military spending on economic growth in both developed and developing countries, despite an impressive amount of empirical studies using advanced econometric methods and theoretical advances in growth theory. This paper attempts to investigate the link between military expenditure and economic growth for Southern African Development Community (SADC) countries for the period 1990-2005. The paper employs fixed effects and two-stage least-squares method. The fixed effects estimation is used to avoid unobserved heterogeneity, while the two-stage least-squares is used to account for endogeneity bias. Our results show that, after controlling for possible endogeneity, military spending has no significant impact on economic growth – that military spending does not promote economic growth in the SADC countries.

*Keywords***:** Endogeneity Bias; economic growth; unobserved heterogeneity; Two-Stage Least Squares; Fixed Effects
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1 – Introduction

There is a good deal of empirical literature investigating the impact of military spending on economic growth. However, most of the empirical work has been done for developed countries, and very few studies have been conducted in SADC and Sub Saharan Africa (with Dunne et al, 1995, 2000 and 2010 being an exception). In their recent work (Dunne at al 2010) also noted the lack of empirical work on developing countries, particularly for regions such as Sub Saharan Africa. Nonetheless, the general view is that military spending is not good for the economy. A forceful proponent of this view is Shelton (2002), who wrote "… current levels of military spending in SADC are in excess of legitimate security requirements and reduce the share of scarce public resources available for development spending and poverty alleviation. Moreover excessive military expenditure protect ineffectual regimes at the expense of democratic governance and sustainable development"

Thus the aim of this study is to fill the gap in the literature, by investigating the impact of military spending on economic growth in SADC. This study is justified for two main reasons. First, despite an impressive amount of empirical studies (for developed countries) using advanced econometric methods and theoretical advances in growth theory, there is still a lack of consensus regarding the impact of military spending on economic growth. Secondly, very few studies have been conducted in SADC.

The paper proceeds as follows. In section two we review the existing empirical literature on the effects of military spending on economic growth. Section three then, discusses the methods and describe the dataset used in this paper. Section 4 provides evidence for the link between the military spending on economic growth in SADC. The last section provides some concluding remarks.

2 - Literature review

The casual nexus between total government expenditure and economic growth has been extensively explored in both empirical and theoretical literature. On the empirical front, the results has continued to generate controversies among scholars, with no clear and profound empirical answer as to whether or not government expenditure retard or promotes economic growth. The theoretical basis of this casual nexus can be sketched as far back from the periods of Wagner (1883) to Keynes (1936), and Peacock

and Wiseman (1961). As observed by Okoro (2013) and Pradhan (2010), economic theory has shown how government spending may either be beneficial or detrimental to economic growth.

According to the Keynesian hypothesis, an increase in government spending add to aggregate demand and through the multiplier effect increases output, employment and economic growth (Feridum et al, 2011; Okoro, 2013; Narayan and Singh, 2007; Ju-Haung, 2006). According to Feridum et al. (2011) and Okoro (2013), government expenditure can add to the stock of human capital through education and technical training and have a spill-over effect on civilian research and development. So the Keynesian school of thought support a pro-active government involvement in the economy through augmenting its expenditure (Okoro, 2013; Narayan and Singh, 2007), in addition to money supply in order to promote the demand for goods and services during periods where there is lack of demand and put the unemployed back to work (Chipaumire et al. 2014).

On the other hand, studies based on the neoclassical school of thought view the effect of increased government expenditure as exerting a negative impact of growth prospect of the country (Okoro, 2013). In their studies, Wilkins (2004); Pieroni (2009); Chipaumire et al. (2014), and Korkmaz (2015) postulates that increased government expenditure suggest a lower level of private investment and domestic savings, and lower consumption due to lower aggregate demand. For this reason, increased government expenditure would results in an interest rate hike, which would crowd out the private investment and economic growth being negatively affected (Feridum et al, 2011).

Given the above backdrop, some studies have examined the relationship between government expenditure and economic growth in the context of Keynesian notion - increased government expenditure contributes positively to economic growth. For example, Liu et al (2008) using the United States data for the period 1947-2002 reported that government expenditure contribute positively to economic growth in United State. Implicitly, these results indicate that Keynesian hypothesis exert more influence in the American economy. In a similar study, Ranjan and Sharma (2008) concluded that Keynesian hypothesis was also supported in the Indian economy when using data for the period 1950-2007. These results are supported by Folster and Henrekson (2001) who showed that government expenditure was also positively correlated with economic growth in developed countries during the

period 1970 to 1995. Using Granger causality test, Komain et al (2007) explored the government expenditures - economic growth nexus in Thailand and observed that government expenditures and economic growth were not co-integrated. Implicitly, the result showed a significant positive impact of government spending on economic growth, validating the Keynesian hypothesis.

However, some studies have strongly rejected the proposition that increased government expenditure stimulate economic growth, instead they contend that increased government expenditure may slow down overall performance of the economy (Laudau, 1983; Junko and Vitali, 2008; Usman, 2010; Desmond et al. 2012; Okoro, 2013; Olulu et al. 2014; Chipaumire et al. 2014). In their study, Laudau (1983) investigated the impact of government expenditure on economic growth for a sample of 96 countries. The results confirmed the influence of the neoclassical school of thought's asserting of a negative relationship between the two. In their empirical analysis of government expenditure – economic growth relationship, Junko and Vitali (2008) simulated the neo-classical growth model tailored to capture the peculiar conditions of Azerbaijan. The authors concluded that the neo-classical assertion of a negative correlation between government expenditure and economic growth hold in Azerbaijan.

Researchers hold different views regarding the effect of military spending on economic growth. The views over military-growth nexus can be grouped into three camps: The first camp regard military spending as a condition to pledge for peace, security and social welfare (Duella, 2014; Islam, 2015). This group of scholars has unambiguously adopted the Keynesian notion of a positive association between government expenditure and growth (see for example, Liu et al, (2008); Ranjan and Sharma, 2008; Folster and Henrekson, 2001; Komain et al. 2007; Fredericksen and Looney, 1983; Dunne et al. 1998; Deger, 1986; Sezgin, 1997; Oyinlola, 1993; Chletsos and Kollias, 1995; Lai et al. 2005; Donald and Shuanglin, 1993; Bonoit, 1973, 1978; Aizenman and Glick, 2006; Yildirim et al. 2005; Murdoch et al. 1997; Yidirim et al. 2011). In his seminar work, Bonoit (1973, 1978) found that high military expenditure positively influence economic growth in less developed countries. He attributed the positive results to the spill over effects of such spending, which was significant and likely to affect the entire economy positively.

In their work, Lai et al (2005) used linear models to examine the casual relationship between military spending and economic growth in China. The results showed that military spending in China boosted economic growth during the period 1995-2000. In their work, Donald and Shuanhlin (1993) examined the differential effects of various categories of expenditures on economic growth for a sample of 58 countries, their findings suggest that government expenditures on education and defence have positive effect on economic growth. These results are in line with the work of Ferda (2004) who also reported a positive correlation between military spending and economic growth in Turkey when using multivariate cointegration.

The second camp involves studies that considers increased government spending as wasteful expenditure that influences the economy beyond the resources it consumes, especially when it leads to or facilitates conflicts (Feridum et al. 2011; Mosikari and Matlwa, 2014; Pradhan, 2010). In essence, these studies have found that military expenditure exert a negative impact on economic growth (see Yang et al. 2011; Cappalen et al. 1984; Dunne and Vougas, 1999; Dunne et al. 2002; Abu-Bader and Abu-Qarm, 2003; Shahbaz et al. 2013); Khalid and Mustapha, 2014; Halicioglu, 2004; Yildirim et al. 2005; Dunne and Tian, 2013; Bas, 2005; Rashid and Arif, 2012; Odusola, 1996; Sawhney et al. 2007). For example, Dunne and Tian (2013) applied an exogenous growth model and dynamic panel data using data spanning from 1998-2010 for 106 countries to investigate military spending – economic growth nexus. The results showed that military spending compromised economic growth in both the short run and the long run. Consistent with these findings, Shahbaz et al. (2013) found that military spending and economic growth were negatively correlated in Pakistan.

In their study, Dunne and Vougas (1999) investigated the casual nexus between these two variables and confirmed a negative correlation in South Africa over the period from 1964- 1996. The impact of military spending on economic growth was also investigated in Nigeria using data for the period 1980-2010. Oriavwope, V. and Eshenake (2013) used ECM and found that military spending had a negative impact on growth in Nigeria. These results are in agreement with the finding Odusola (1996) who used simultaneous equations model but failed to report positive results in Nigeria.

The third camp includes studies that have found insignificant association between military expenditure and economic growth. For instance,

Biswas and Ram (1986) reported that military expenditure and economic growth coefficients were insignificant when the authors re-estimated Bonoit's equations using 58 countries for the period 1960 to 1970 and 1970 to 1977. A study by Heo (2010) using vector auto-regression analysis found no causal relationship between the two factors for United States of America. In his previous study, Heo (2000) used many version of Feder-Ram models for the periods 1948 to 1996. The author reported an insignificant effect of military spending on economic growth, reinforcing his recent findings for America.

Huang and Mintz (1990) utilised annual US data for the period 1952 to 1988 to investigate the casual association between military spending and economic growth. The authors estimated a three sector Feder-Ram based military model and applied ridge regression methods to account for multicollinearity issues, yet no significant link was found. In an attempt to concretise their results, Huang and Mintz (1991) extended their previous model and separated military impact into productivity and externality impacts. The authors again found no causal linkages between military spending and economic growth when using the same data and technique. In their study, Alexander (1990) utilised a four sector Feder-Ram model for the period 1974 to 1985. Using cross sectional time series data for nine developed countries, they also found no causal relationship between military spending and economic growth. Another study by Dakurah et al (2001) used error correctional model for 62 countries and reported no significant linkages between military spending and economic growth in any of the included countries.

3 - Data and methodology used

Two main models (i.e. Fixed-effect or Random-effects) may be used to investigate the relationship between military spending and levels of economic growth. The random effect model is used if the country specific effects are assumed to be uncorrelated with the error term, while the fixed effect model relaxes this assumption, by allowing the country specific effects and the error term, to be correlated. Thus the appropriate model depends very much on whether the country specific effects can be treated as fixed or random. We use Hausman test to choose the most appropriate model between Random-effects and Fixed-effects model. Our Hausman test results rejects the random effects model in favour of the fixed effects (the Hausman test results

are reported at the bottom of table 1). Therefore, employ the fixed effects model in assessing the effects of military spending on economic growth. Following many previous studies in this field, military spending will be modelled as a function of economic growth and control variables. The fixed effect model takes the following forms:

$$Econ_{growth_{it}} = \beta_0 + \beta_1\, mil\, exp_{it} + \beta_2 Infl_{it} + \beta_3\, Edu_{it} + \beta_4\, Exp_{it} + \beta_5\, lnPop_{it} + \beta_6\, open_{it} + \mu_{it}$$

Where $Econ\_growth_{it}$ is economic growth rate, $mil\, exp_{it}$ is the military expenditures share in GDP, Edu is education and measured by the Pupil-teacher ratio in secondary education (headcount basis), Exp_{it} is exports as a share of GDP, $lnPop_{it}$ is log value of total population: counts all residents regardless of legal status or citizenship--except for refugees not permanent and $open_{it}$ is the measure of openness (i.e. trade% of GDP).

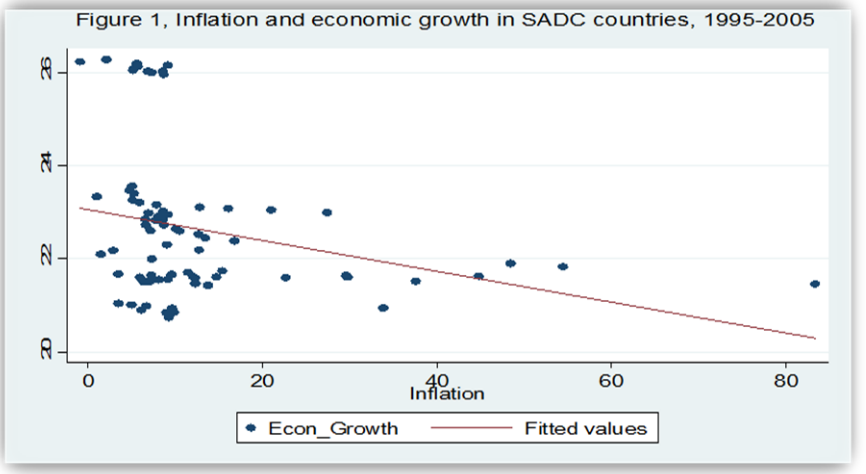
One of the empirical concerns in this field is the possible endogeneity which could arise due reverse causality (economic growth might determine government spending). There is in fact a theory (Wagner's law) which suggest that economic growth stimulates growth in public expenditure. So while we have hypothesised a direct effect stemming from military spending to economic growth, we acknowledge that the reverse is also possible. Our preferred choice of estimator to deal with the possibility of endogeneity is the FE-IV Two Stage Least Square estimator. We account for endogeneity issue by using the lagged value of military spending as an instrument, consistent with the work of Yakovlev (2007).

The data used in this study consists of yearly observations from 1995 to 2005 for South Africa, Botswana, Malawi, Namibia, Lesotho, Swaziland, Mozambique and Tanzania. The other SADC countries were left out due to lack of data. Most of the variables used in this paper is sourced from World Development Indicators of World Bank.

4 - Empirical Analysis

We first present some simple scatter plots, describing the link between inflation rate and economic growth rate as well as military spending and economic growth for the SADC countries. What stands out from figure 1 is that there is a negative linear relationship between economic growth rate

and inflation rate. Figure 2 shows a scatterplot of the relationship between economic growth and military spending, and it seems to mimick the pattern of figure 1. However, while the catter plots provides a quantitative measure of overall relationship between the two variables, it is only suggestive. The subsequent section will empirically investigate the robustness of these catter plots.



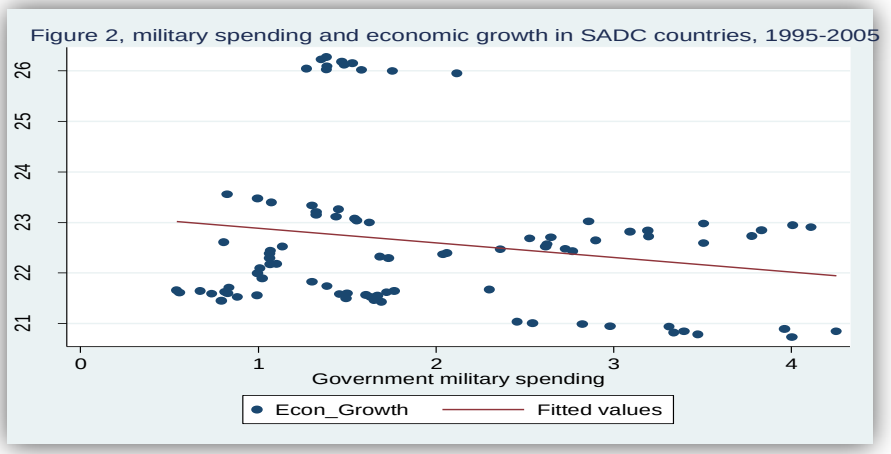


Table 1 reports the results of the fixed effect analysis. Column two of table 3 reports our regression of the economic growth coefficient with government military spending and Inflation. Other control variables are added in stepwise fashion in models 2 to 5 for robustness check. Our variable of interest (government military spending) presents negative and mostly significant estimates on economic growth, consistent with the findings of Yang et al. (2011); Cappalen et al. (1984); Dunne et al. (2002); Abu-Bader and Abu-Qarm (2003); Khalid and Mustapha (2014); Atesoglu (2002); Halicioglu (2004); Yildirim et al. (2005); Dunne and Tian (2013); Bas (2005) Rashid and Arif (2012); Sawhney et al. (2007), and Shahbaz et al. (2013). Perhaps unsurprisingly, inflation rate present negative and mostly significant estimates on economic growth and this result holds up quite well when adding other plausible explanatory variables. Other studies which have found similar result in Africa (for example, Bittencourt et al 2014) argue that low levels of economic activity in the region can be largely attributed to the higher inflation rate of the 1990s.

The effect of education on growth is somewhat ambiguous: in model 2 and 3 of table 3, education present a positive and significant estimates on growth (as suggested by some studies in this field). However, the inclusion of other variables (i.e. population and openness) makes it insignificant. Other explanatory variables (i.e. population and openness) seem to have no effect on economic growth: they are insignificant.

Table 1 Fixed effect estimates of the effects of military spending on economic growth, 1995-2005

Economic Growth	FE(1)	FE(2)	FE(3)	FE(4)	FE(5)
Govt. military spending	-0.106*	-0.111*	-0.099*	-0.099*	-0.073
	[0.046]	[0.043]	[0.045]	[0.045]	[0.041]
Inflation	-0.006***	-0.005**	-0.006**	-0.006*	-0.007
	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]
Education (student teacher ratio)		0.011**	0.0101*	0.01	0.008
		[0.004]	[0.004]	[0.005]	[0.005]
Export			0.002	0.002	-9.20E
			[0.001]	[0.001]	[0.001]
Population				0.004	-0.068
				[0.079]	[0.073]
Openness					0.004
					[0.001]
Time dummies?	Yes	Yes	Yes	Yes	Yes
Country dummies?	Yes	Yes	Yes	Yes	Yes
Hausman test (RE vs. FE)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Poolability test[1], P-val:	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Heteroscedasticity Test[2]	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-sq: within	0.235	0.348	0.382	0.382	0.541

Notes: clustered standard errors are reported in parentheses with ***, **, and *, denoting significance at the 1%, 5%, and 10% levels, respectively.

Table 2 Fixed Effect-IV estimates of the effects of military spending on economic growth, 1995-2005

Economic Growth	FE-IV(1)	FE-IV(2)	FE-IV(3)	FE-IV(4)	FE(5)
Govt. military spending	-0.0064	-0.072	-0.051	-0.058	-0.017
	[0.123]	[0.107]	[0.114]	[0.119]	[0.111]
Inflation	-0.006***	-0.006**	-0.006***	-0.006**	-0.008***
	[0.001]	[0.002]	[0.002]	[0.002]	[0.002]
Education (student teacher ratio)		0.011**	0.010**	0.011**	.008
		[0.004]	[0.004]	[0.005]	[0.004]
Export			0.002	0.002	0.001
			[0.002]	[0.002]	[0.001]
Population				0.021	-0.059
				[0.077]	[0.075]
Openness					0.004***
Lagged Govt. military spending	0.359***	0.403**	0.369**	0.355**	[0.001] 0.351**
	[0.114]	[0.136]	[0.139]	[0.139]	[0.142]
Time dummies?	Yes	Yes	Yes	Yes	Yes
Country dummies?	Yes	Yes	Yes	Yes	Yes
Cragg-Donald Wald F statistic	10	10	10	10	10
Chi-sq(1) P-val=	0.0028	0.0049	0.0070	0.0094	0.0115

Notes: clustered standard errors are reported in parentheses with ***, **, and *, denoting significance at the 1%, 5%, and 10% levels, respectively.

Table 2 accounts for the potential endogeneity of military spending and estimate Two-Stage Least Squares regression. There are some noticeable differences between the fixed effects estimates and the Two Stage Least Squire estimates. Contrary to the fixed effect model, the variable of interest (i.e. military spending), is now statistically insignificant across all models [(FE-IV(1) to FE-IV(5)]. The difference in the estimated coefficients is not really surprising given the fact that military spending is an endogenous to economic growth. The effects of other variables are fairly similar in sign, statistical significance, to the fixed effects estimates. For example, the effect of inflation impacts is still negative and significant (with model FE(5) being an exception). Export and population still positive and insignificant estimates on economic growth. Unlike the fixed effect model, the variable openness is now significant with respect to economic growth.

Conclusion

This paper investigated the empirical relationship between military spending and economic growth for Southern African Development Community (SADC) countries for the period 1995-2005. Two estimation methods were used (i.e. fixed effect and two stage least squares) in an attempt to overcome limitations faced in conventional military spending-economic growth nexus. The results based on the fixed effect model as reported in table 1, suggest that military spending is significant in explaining economic growth. However, we do not consider these results to be very important due to serious endogeneity concerns discussed in the previous section. Using two stage least squares method which controls for the potential endogeneity problem, we find that the military spending is not significant in explaining growth. This suggests as confirmed by many studies in this field (see Biswas and Ram (1986) Alexander (1990), Kinsella (1990), Payne and Ross (1992), Ward et al. (1992), DeRouen (1994), Pieroni (2009b), Dunne et al (2011) and Töngür et al (2014) that increasing military spending does not help in the way of promoting economic growth.

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