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DOES MILITARY KEYNESIANISM HOLD FOR ASIAN COUNTRIES? PANEL COINTEGRATION AND GRANGER CAUSALITY EVIDENCE

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Abstract
This paper inquires the existence of military Keynesianism for Asian region by testing cointegration and causality between defence expenditure and economic growth for time period 1990-2010. Panel unit root tests affirm the stationarity and panel cointegration technique by Pedroni (1999) discovers long run relationship between defence expenditure and economic growth. Panel Granger causality test shows that defence expenditure does not Granger cause economic growth, but reverse causality holds. Military Keynesianism does not hold in this case. The possible reason is pre-dominant expenditure on basic services in these un-developed countries and lack of locally production of advanced military goods.

Keywords: Military Keynesianism, Defence, Economic Growth, Panel Cointegration, Granger Causality.

1. Introduction

Research on defence has been conducting since 1970s. Many researchers conducted researches and examined the relationship between defence expenditures and economic growth. Defence is a public good and each state tries to provide security to its pubic. Due to internal or external threats and conflicts, the share of defence spending increases. In this modern age of nuclear power every state tries to get this power in order to become powerful

and enhances its ability to face its rivals. Defence expenditures influence an economy in both positive and negative ways. A secure environment with peace would be attractive for the local and foreign investors. Defence expenditure increase employment opportunities for the citizens. In attempt to explain these theses, this paper is an effort to scrutinize the relationship of defence expenditures and economic growth for Asian region that is well known for its strategic geography. It is also aimed at finding the direction of causality between the two variables.

2. Literature Review

The research on defence-growth relationship was pioneered by Benoit (1973). He found positive relationship between defence expenditure and economic growth by analyzing the case of least developing countries. Chowdhury (1991) assessed the relationship between economic growth and defence expenditures by subjecting variables of fifty five developing countries to Granger causality tests. Tests suggest that relationship of these two variables cannot be investigated across countries due to differences in socioeconomic structure of each country. This work is superior to others, since it overcame the problems caused by previously used ordinary least square estimations of cross sectional data. Bahmani-Oskooee and Ales (1993) focused the analysis on Pakistan and India with time series data cointegration technique and error correction modeling. They found long run bidirectional relationship for both countries.

Hirnissa et al. (2009) conducted a study on the relationship between defence spending and economic growth for Asian five countries (Malaysia, Singapore, Thailand, Indonesia, and Philippine) for time period 1965 to 2006. Auto Regressive Distributed lags model was estimated for military expenditures and economic growth. The order of integration series is determined by conducting unit root test. The cointegration analysis reflected that three out of five countries had cointegrated variables. Thailand and Indonesia have unidirectional relationship running from economic growth to defence expenditures. While for Malaysia and Philippines there is no meaningful relationship found.

Pardhan (2010) explored the nexus between economic growth and defence spending in five Asian countries for time span of 1988 to 2007. This study explored the nexus between both variables for individual country and for overall panel. The findings suggest that Indonesia, Malaysia, Singapore and Thailand have unidirectional relationship from economic growth to defence spending. There is bidirectional relationship in the case of Philippines.

Dunne and Nikolaidu (2011) carried out research for European Union for the period 1960 to 2007 for 15 EU countries. They used Dunne et al. (2005) growth model that provides panel and time series estimation for all countries. The results, from both from panel and time series analysis, suggest a negative association between defence spending and economic growth.

Considering the current situation of literature, this paper uses panel cointegration technique and Granger causality test on 23 countries from Asian region that is famous for its strategic geography.

3. Theoretical Buildup

3.1 Military Expenditures and its Determinants

International Institute of Strategic Studies (IISS) uses government confidential information and Stockholm International Peace Research Institute (SIPRI) relies on information that is publicly available. Collier and Hoffler (2002) suggest that military spending is motivated according to its security needs and partly by the available financial resources for country. But one more important thing is the domestic and international interaction also determines the defence budget. The country's economic, political and security environment drive military expenditures. These determinants include economic variables (population, income, government expenditures and trade), political factors (democracy and dictatorship) and security environment (internal and external threats).

3.2 Military Keynesianism

John Maynard Keynes suggests that government should devote large share of spending for the defence sector and use in the interest of 'peace and prosperity' instead of 'war and destruction'.[1] This government economic policy is referred as 'military Keynesianism'. He referred that military expenditures increase output through multiplier effect when there is ineffective demand. Military budget should be treated as source of increasing aggregate demand. When aggregate demand is relatively low than supply then an increment in military expenditures can promote capacity utilization, profits, investment and hence economic growth. On the supply-side effects, when a large amount is spend on the maintenance of army it reduces civilian workforce. When the military budget is used for research and development (R&D) it leads to an increase in productivity of civilian sector by generating advanced technology and new infrastructure.

3.3 Beneficial and Detrimental Effects of Defence Expenditures

Without the contribution defence sector, an economy shall be deprived of security and other economic benefits. For instance, Research & development in defence sector can have positive influence on civilian sector through externalities. Increased security ensures stable environment for business and facilitates the foreign investment. Expansion of aggregate demand can increase utilization of idle capital, employment, profits and investment which eventually contributes to economic growth. Military personnel may increase the skill set of population by educating and training them. Such is beneficial for the creation of human capital in developing countries. Alongside benefits, defence expenditures have side effects on economy of a country. For example, defence spending come with the opportunity cost of reducing savings and reallocation of resources of public resources. R&D in defence sector is

[1] For instance, 'Public Works Administration' program of 1930s in the USA.

diverted away from private sector where it may have more appropriate application. Military expenditures being not governed by market forces can lead to distortion in relative prices and can lead to inefficient allocation of meager resources of developing countries. Defence expenditures also come with vested interests of military like rent seeking military industrial complex (MIC), increased arms race and wars. Such outlays can be economically unproductive or at time counter productive. Crowding out can take place because of defence spending reduce availability of investment in education, productive capital and other technical innovations.

4. Testable Proposition

The main proposition set for this research is as follow:

P_A: There exists a long run causal relationship exists between national income and defence expenditure in selected Asian countries.

Beside this, the paper also discovers the direction of causality between the two variables. Panel cointegration test is employed in this research for following model:

$$GDP_{i,t} = \alpha_o + \alpha_1 DEF_{i,t} + \varepsilon_{i,t}$$

Here **GDP** represents economic growth and **DEF** stands for military expenditures. Subscripts **i** and **t** are the indicators of country and time period in years. α_o is the intercept term and α_1 is the slope while $\varepsilon_{i,t}$ is the error term.

5. Data and Methodology

The empirical analysis is based upon the panel data to test the proposition for selected Asian countries. Data on 'military expenditures' (DEF) is obtained from SIPRI (Stockholm International Peace Research Institute) and GDP per capita on US dollars is taken from World Development Indicators (WDI) version of 2011. SIPRI data on military spending includes capital and current expenditures on defence ministers and others government agencies in defence projects, space activities of military and paramilitary forces. The selection of countries is based on the availability of data from Asia. The countries included in this research for analysis are 23 selected Asian countries. The countries are Bangladesh, Brunei Darussalam, Cambodia, China, Indonesia, India, Iran, Israel, Jordan, Japan, Kazakhstan, Kyrgyzstan, Korea, Kuwait, Malaysia, Oman, Pakistan, Philippines, Russia, Saudi Arabia, Thailand, Tajikistan and Yemen. Mostly, these are developing countries but some developed countries are also included. As per SIPRI (2010), China, Russia, Saudi Arabia and India rank among the top 10 defence expenditure. For all estimations the standard version of EVIEWS 7.1 is used.

6. Empirical Results

6.1 Panel Unit Root Tests

In this research, panel unit roots are estimated to verify the stationarity of the series for

meeting the panel data econometric needs. The panel unit root test is high powered and size. It has different tests statistics such as IPS, (Im, et al., 2003) LLC (Levin, et al., 2002) ADF and PP. In this study, these four tests are used out of which LLC, IPS and Maddala and Wu (1999) and Choi (2001) suggested nonparametric, more direct unit root test and they proposed to use MW Fisher- PP and MW Fisher ADF-statistics. The fourth test is Hadri (2000) and resembles the unit root test of KPSS. Null hypothesis of tests is that the panel series has a unit root (non-stationary) other than the Hadri test. Table 1 list the panel unit root test results, the statistics confirms that the two series in their logarithmic form (LGDP and LDEF) are cointegrated of order '1' and can be accorded as I(1) processes.

Table 1: Results of Panel Unit Root Tests

	LGDP	D(LGDP)	LDEF	D(LDEF)
	Individual effects	**Individual effects**	**Individual effects**	**Individual effects**
LLC	-1.4472	-4.0263	1.4108	-8.3041
IPS	2.5553	-5.0219	2.4958	-7.2028
MW Fisher-ADF	24.0414	105.4440	34.6202	139.8553
MW Fisher-PP	25.3762	182.2772	56.4656	317.1850
Hadri	11.6485	6.2547	8.8528	4.8930

Notes:

(i) D represents 1st difference.
(ii) LLC is used for panel unit root test of Levine et al. (2002) and IPS for Im et al. (2003).
(iii) Fisher-ADF and Fisher-PP show the Maddala and Wu (1999). MW Fisher-ADF and MW Fisher-PP panel unit root tests, respectively.
(iv) The null hypothesis of non-stationarity is examined by the LLC, IPS, Fisher-ADF and Fisher-PP.
(v) Hadri is used to test the stationary null hypothesis.
(vi) (***), (**) and (*) signify statistical significance at the 1%, 5% and 10% level, respectively.
(vii) Probabilities for Fisher-type tests were computed using an asymptotic χ^2 distribution, while rest of tests assumes asymptotic normality.

6.2 Panel Cointegration Tests

The cointegration between GDP per capita and DEF is tested by using heterogeous panel cointegration test that is developed by Pedroni (1999). In this test the Cross-sectional interdependence with different individual effects are also allowed to use in this test. Pedroni (1999) suggested two types of residual based tests that are listed in Table 2. In first type, four tests exist as considered standard normal and they are founded by pooling the residuals of regression for 'within group' like Panel v-statistic, panel t-statistics (non-parametric), panel t-statistics (parametric) and panel ρ-statistics. In case of second type, the three tests are standard normal asymptotically and they built for 'between group' by pooling the residuals. These groups are group ρ-statistic (parametric), group t-statistics (non-parametric) and group t-statistics (parametric).[2]

[2] These statistics depend on estimators that simply average the individually estimated coefficients for each member, and individual specific short-run dynamics, individual specific fixed effects and deterministic trends, as well as individual specific slope coefficients are accommodated by each of these tests (Pedroni, 2004).

Table 2: Test Statistics of Pedroni Residual Cointegration Test

1	Panel v-statistic	
2	Panel ρ-statistic	
3	Panel t-statistic (Non-parametric)	
4	Panel t-statistic (parametric)	
5	Group ρ-statistic (parametric)	
6	Group t-statistic (non-parametric)	
7	Group t-statistic (parametric)	

These seven test statistics are to test the null of no cointegration between two variables. Resorting to Monte Carlo simulation experiments, Pedroni (1999, 2004) exhibited that the panel ADF-statistic and group ADF-statistic tests have better small-sample properties than the others, making them more reliable. To test the null of no cointegration between the variables the seven statistics are depicted above. To resort Monte Carlo simulation experiments, Pedroni (1999, 2004) suggested that group ADF-statistic and panel ADF-statistics tests are more reliable than others and they have better small sample properties.

6.3 Panel Cointegration Test Results

There are seven statistics to test the null of no cointegration among the series in panel data presented by Pedroni residual cointegration test. Table 2 depicts all these seven statistics for GDP and DEF cointegration tests. By using 'individual intercept' in Pedroni cointegration test a strong evidence of panel cointegration is revealed that all statistics in line with desired signs (positive panel v statistic and others with negative signs). All statistics are significant at 1% level of significance except 'group ρ-statistic' its significance level is 5%.

Pedroni cointegration test using 'individual intercept', shows a strong evidence of panel cointegration since all seven statistics are with the desired signs (Panel v-statistic positive and rest with negative sign) Group ρ-statistic which has a positive sign contrary to negative sign as per theory of Pedroni cointegration test. Moreover, all statistics are significant mostly at 1% significance of level with the exception of 'group ρ-statistic' which is not significant at any level.

Table 3: Results of Pedroni Residual Cointegration Test

	Statistics of Pedroni Residual Cointegration Test	Individual Intercept
Within Dimension	Panel v-statistic	1.283*
	Panel ρ-statistic	-2.250**
	Panel PP statistic	-3.759***
	Panel ADF statistic	-4.417***
Between Dimension	Group ρ-statistic	0.155
	Group PP statistic	-2.693***
	Group ADF statistic	-2.203**

Note: (***), (**) and (*) signify statistical significance at the 1%, 5% and 10% level, respectively.

Next step is to find the direction of causality is identified between the variables. The results of panel data Granger causality are demonstrated in Table 3. Results of panel data Granger causality are depicted. The causality from LGDP (log of GDP) to LDEF (log of DEF) is significant, while for opposite, it is not. Such conforms to the 'economic growth' led to DEF hypothesis.[3]

6.4 Granger Causality Test

The Granger causality test results suggest that there is positive relationship LGDP (log of GDP) and LDEF (log of DEF). Probability is significant at 1% level. Hence null hypothesis that GDP does not Granger cause DEF, is rejected. Economic Growth does Granger cause defence expenditure. While the results are opposite in case of that DEF does not Granger cause GDP. The probability value is insignificant. We do not reject null hypothesis that LDEF does not Granger cause LGDP.

Table 4: Panel Granger Causality Test Results

Null Hypothesis	F-Statistic	Prob.
LGDP does not Granger Cause LDEF	6.96903	0.0010
LDEF does not Granger Cause LGDP	0.9224	0.3983

Consequently we deduce that economic growth (GDP) has positive relationship with military expenditures. Moreover the causality runs from economic growth to military expenditures and not otherwise. This can be attributed to the fact that most of Asian countries in sample are developing countries and priority in expenditure lies with basic social services. Major share of their national income is likely to be allocated to such services. Defence, though a public good, but is likely to be less prioritized than basic services. Hence, any increase in GDP from current subsistence level, is likely to increase the country's ability to finance defence expenditure. Absence of causality from defence expenditure to national income is attributable to weak transmission mechanism between them. It implies that Research & Development in defence sector is ineffective or non-existent. Military fails to improve human capital and create infrastructure for economic development, stable environment for business and foreign investment. The absence of causality from defence expenditure to economic growth indicates that less technical military goods are produced in these countries, while advanced military

[3] Idea that military expenditures are caused by economic growth is termed as economic growth led DEF.

goods are imported from other countries. This does not allow these countries to economic benefit of indigenous production of military goods.

7. Conclusion

Defence spending is treated as public good and considered a tool of fiscal policy. The results of these tests showed that there is positive relationship between defence expenditures and economic growth. Granger causality test suggested that GDP does Granger cause defence expenditure but defence expenditure does not Granger cause GDP. Here, the direction of causality is unidirectional. The results are paradoxical but suit the set of countries selected for analysis. A plausible explanation for lack of role of defence expenditure in economic growth is found in this empirical work. The theory of military Keynesianism seems to be missing in case of Asian countries. Since the direction of causality does not run from defence expenditure to economic growth. So the multiplier effect also seems absent. In order to make defence expenditure an effective source of economic growth, the need is to support the local production of high-tech military goods. This shall allow for positive externalities increased income, employment, skill up-gradation and R&D to cause GDP to grow. On the other hand the qualitative study of military expenditure can also allow for understanding the absence of causality from defence expenditure to economic growth. Beside military expenditure, engineering sciences should also be invested in to improve the quality of military goods and to reap the benefits of increased knowledge and productivity in defence sector. However, the diversion of resources to military purposes should not be at the cost of civil expenditure that brings about welfare of the society and economic development.

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