International Journal of Development and Conflict
8(2018) 115–125

ARMS TRADE AND ECONOMIC GROWTH NEXUS IN THE POST 9/11 SCENARIO

MUHAMMAD ZUBAIR
Senior Lecturer
Department of Economics,
Institute of Business Management,
Management Korangi Creek,
Karachi-75190,
Pakistan

SHAHIDAWIZARAT
Dean Collage of economics and social development,
Director Research Institute of Business Management
Korangi Creek,
Karachi-75190,
Pakistan

In this paper we have explored the nexus of arms trade with economic growth using a balance panel of 26 high income and upper middle income countries as the whole sample and 19 high income countries and 7 middle income countries as sub samples. Using fixed effect and random effect models after applying the appropriate diagnostic tests, our results give interesting insights. For the whole sample 26 high and upper middle income countries our results show that arms trade has a positive impact on economic growth. But for the sub samples we find that for high income countries the impact of arms trade on growth is positive, while there is no effect on upper middle income countries.

Key words: Economic Growth, Defense, Arms trade, Net exports, fixed effect, Random effect

JEL codes: O30, O38, H50, H56

Introduction

In this study our main concern is to explore whether this trade in arms has a significant impact on economic growth of countries involved in arms trade? Our main focus remains post 9/11 scenario of global arms transfers. Section I explores the evolution of global arms trade in post 9/11 scenario. In Section II we discuss how arms trade is linked with economic growth theoretically and the underlying channels that explain the phenomenon. Section-III

Corresponding author, Email: muhammad.zubair@iobm.edu.pk

illustrates the empirical literature on the topic, Section-IV explains the theoretical and econometric model while Section –V discusses the empirical results followed by the conclusion in Section VI.

Evolution of arms trade in post 9/11 scenario

The 11 September 2001 attacks on the US revitalized the global arms trade which was sinking after the end of the Gulf War. Total arms sales recorded was just $23.6 billion in 1997 (Stohl, Grillot 2009). Due to massive changes in international security landscape the demand for global arms trade climaxed. Global military spending after 9/11 increased by 45 per cent in real terms (5). Countries such as India and Pakistan have become lucrative arms purchasers, in some cases overshadowing purchases by the Middle East (Gilby, 2009). Pakistan despite its animosity with India was far behind India in terms of weapon purchase before 9/11. But after 9/11 Pakistan became the third largest arms importer, as the war theatre shifted to Afghanistan and Pakistan as it became a frontline ally of US and coalition forces. The new arms sales agreements which were the lowest in 1998 increased to $48.7 billion in 2005. In 2006, global arms agreements increased to $55 billion and global arm deliveries were recorded at $34 billion with a rise of 6.2% as compared to the previous year (see Gilby, 2009; Elkanj and Gangopadhyay, 2014). Top arms suppliers US, Russia, Germany France and UK have delivered 80% of total arms exports during 2001-2004, while the contribution of the top five (US, Russia, China, France and Germany) has been recorded at 74% during 2012-16, with global share of arms significantly increasing during this period. (SIPRI, Trends in international Arms Transfers, 2009) (6)

Although the US enjoyed an unchallenged position as the top arms exporter since the end of the cold war, but 9/11 brought a momentous increase in its global share. Putting numbers to the United States' market share, of the nearly $124 billion of arms exported from 1991 through 1995, US share was approximately $63 billion (Gangopadhyay and Elkanj, 2017)**.** This shows that the US arms exports increased by an average of $18 billion per annum during this time period. After 9/11 a drastic upward trend in US arms share has been observed. (SIPRI)

The share of US arms exports in the global market during 2005-09 was 30% which escalated to 33% during 2012-2016. The US delivered its weapons to 70 countries and NATO during 2005-09 which significantly went up to 100 countries in 2012-16. During 2005-09 Asia and Oceania accounted for most of US deliveries as they received 39% of weapons, followed by the Middle East at 36% and Europe at 18 per cent. Saudi Arabia with 13% remained the largest buyer of US weapons during 2012-16. Gangopadhyay and Elkanj (2017) provided a detailed analysis of arms exports and military expenditure for the Middle East and other regions and found the presence of herding elements in the massive expansion of military expenses.

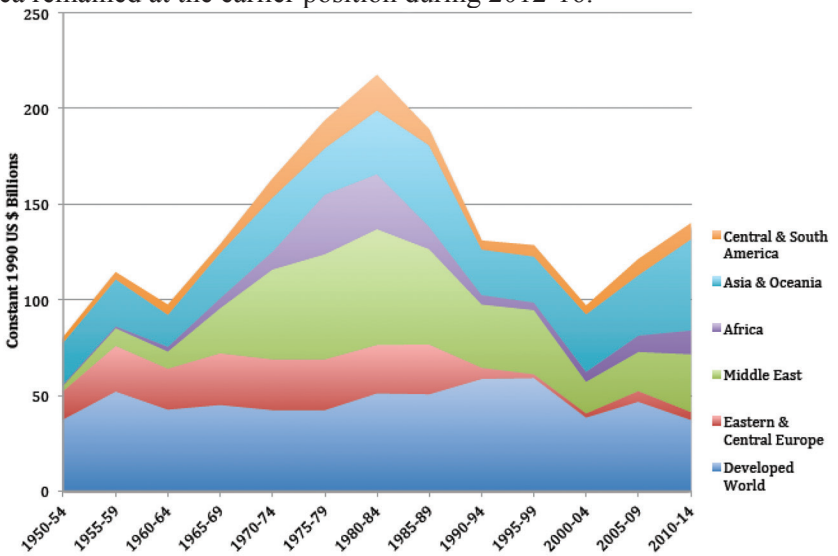
Besides the US other countries are also reaping the rewards of the upturn in global arms sales since 2001. In 2006 Russia increased its total arms agreements to $14.3 billion from $7.3 billion in 2005 (Elkanj and Gangopadhyay, 2014). Russia remained the second largest arms exporter in the world with its market share of 23% during 2005-09 which

continued during 2012-16. While deliveries in 2016 were higher than in 2014 and 2015, the volume remained substantially below the peak years 2011–13 and was more in line with the levels witnessed in 2007–10. (7) During 2012–16 Russia delivered weapons to 50 states with India getting its largest share at 38%.

Germany's arms exports share in global arms market was 11% during 2005-2009, which contracted to 5.6% during 2012-16. Similarly, the share of French arms exports escalated by 30% cent in 2005–2009 in comparison with 2000–2004 while it declined by 5% during 2012-16.

China has improved its position in global arms exports. Before 2012 China was nowhere among the top five arms exporters of the world, while during 2012-16 it became the third largest exporter with its share at 6.2%, higher than France and Germany. As per the SIPRI statistics Chinese arms exports increased by 74 per cent between 2007–11 and 2012–16. In 2007–11 the recipients of Chinese arms exports were 38 countries which rose to 44 during 2012-16 including Pakistan which remained the largest importer during this time.

In terms of arm recipients the composition of the list to five has remained relatively stable in the 9/11 period. According to SIPRI, trends in international arms transfer the bulk of arms imported by top five recipients for the period 2005–2009 escalated by 4% over the period 2000–04. The volume of arms imported by top five importers (India, South Korea, Pakistan, China and Singapore) was 32% of global market during 2005-09 which increased to 34% by the top five (India, Saudi Arabia, UAE, China and Algeria) during 2012-16. The regional comparison of arms transfer gives an interesting insight as per the SIPRI trends, the major arms recipient region during 2005–09 were Asia and Oceania, followed by Europe and the Middle East, Americas and Africa were at the bottom on list. But this order has changed in 2012-16 as Asia and Oceania came first, followed by the Middle East. Europe went down in ranking as the share of the Middle East rose, while the Americas and Africa remained at the earlier position during 2012-16.



Source: (Kempf Jonas, 2016).

Figure 1: Total value of arms imports since 1950, stacked by region

The SIPRI data reveals that arms imported by Asia and the Oceania region increased by 7.7 % between 2007–11 and 2012–16 reaching 43% of global arms market. India remained the largest arms importer in the region after China, while Pakistan which was the 3rd largest importer during 2007-11 came down in regional ranking during 2012-16. Arms imported by Europe declined by 36% during 2007–11 to 2012–16, while the region contributed 11% of total global imports during 2012-16. Arms imported by the Middle Eastern states have increased sharply to 86% between 2007–11 to 2012–16. Of the total arms imported by the region 28% went to Saudi Arabia which emerged as the 1st largest arms importer in the world during 2015. Saudi Arabia was followed by the UAE accounting for 16% of total arms imported by the Middle East, while Turkey received 11% of the regional share.

Arms trade and economic growth: theoretical context

Arms transfers up to the end of the cold war were viewed as a deterministic contributor to the security, super power politics and foreign policy only. But after the cold war the importance of the economic aspect of arms transfer has increased to a great extent. The collapse of the Soviet military threat and the growing importance of international trade in national foreign policies have raised challenges to the previous consensus that the United States should weigh security factors more heavily than economic factors in decisions on arms exports (Benson 1994). For the first time in half a century, arms transfers are no longer viewed through the prism of superpower politics, economics now plays a central role in understanding the motivations and consequences of arms transfers (Anderton and Charles, 1995). Apart from the contribution of Engelbrecht and Hanighen in 1934 who revealed private profit as the major cause behind arms transfers, researchers have paid little attention to the dynamics of arms transfer where mainstream economists contribution was thin. Nearly all the important work on arms trade has been done within peace research, international relations and political science communities, though some times by apostate economists (Smith et el.,1985). After the end of the cold war economics has emerged as a rational motive behind international arms transfers instead of politics and foreign policy. Although much of the empirical literature about the interaction of arms trade with economics has been produced, but researchers of peace economics are way behind in developing a systematic theoretical connection of arms transfers and economic growth. So most of the researchers develop empirical interaction of arms transfers with the economy through numerous channels which theory allows.

Li (1998) illustrates that arms trade can contribute to economic growth through the diffusion of technology in the form of both knowledge spillovers and market spillovers. In addition to the technical expertise, labors skills, managerial abilities and economic culture also explain the nexus of arms trade and growth. In this regard (Pavel, 2004) distinctly explains three channels which might be plausible to develop the interaction of arms transfers with economic growth. First, he states that armament exports in an exporting country can be a proxy for the level of technology which correlates with the Solow residual. Second, an export led rise in the output of a decreasing cost armament industry can have a positive productive effect on the economy. Third, the channel which explains the growth

enhancing effect of arms exports is the revenue-consumption and investment channel as armament exports can stimulate consumption and investment via increase in the revenue generated from the export of arms. Similarly, (Yakovlev, 2007) in addition to the channels discussed above, argues that arms imports may help importing countries through reverse engineering or through the necessary training of armed personnel needed for operating high-tech advanced weapons systems. Moreover, arms imports might cause direct transfer of technology when they take possession of whole or partial manufacturing of military weapons by acquiring the license, etc.

Literature Review

The empirical literature exploring the nexus between defense spending and economic growth although diverse, seems to be structured unsystematically. Most researchers in this area emphasize interaction of economic growth with defense expenditure as a whole instead of the arms component only. Only a few researchers among them HSIC Li (1998), Pavel (2004, 2007) and Dune (2008) have exclusively used arms component of defense expenditure in interaction with economic growth. Using defense spending as a whole might capture arms trade in the sense that arms producing states can allocate their defense spending to produce arms and export them to the international market and allocate their own defense budgets to buy weapon from other countries.

The literature on defense spending and economic growth has mixed findings as some studies suggest that military spending affects economic growth positively, while others report an inverse association between military expenses and economic growth. Those who suggest the growth enhancing effects of military spending argue that military spending stimulates aggregate demand, infrastructure development and spillover effects of technology for civilian use from military research and development, etc. Following this line Benoit (1973, 1978) extended the argument that due to increase in defense expenditures, aggregate demand will go up which may increase the utilization of capital stock (especially in developing countries), consequently the purchasing power, profit rate and investment will increase. So the defense expenditure component of aggregate demand will generate short run multiplier effects as well as long-run rate of economic growth effects. For developing countries Benoit (1973, 78) emphasized the relationship between spending on defense and economic growth via the aggregate demand channel. Fredericksen and Looney (1983) have also explained the effects of defense spending on economic growth separately for both resource rich and resource constrained less developed countries (LDCs). He found that defense expenditures help economic growth in resource-rich less developed countries but not in resource constrained less developed countries.

Those who found the inverse relationship between military spending and economic growth build their argument on the basis of reallocation of resources hypotheses. They argue that huge spending on defense causes the diversion of resources from more productive market ventures to less productive ventures (military) financed by taxes, which may create welfare losses and reduce labor supply (Yakovley 2004). Similarly Mankiw, Romer and Weil (MRW1992) explained this inverse relationship of defense spending in terms

of opportunity cost of resources employed to military buildup. They argued that human capital employed by military services could contribute more productively elsewhere in the economy. There are a number of studies which elaborate the inverse relationship of military expenses and economic growth including Heo (1998) Perkins (2001) and Maizels and Nissanke (1986), etc.

The literature explaining the interaction of arms trade with economic growth appears thin, unstructured and inconclusive. It seems arduous to summarize the literature differing theoretically, diverse in the empirical methods and the coverage of countries. There are a number of studies which find that arms trade upsurge economic growth or decelerates economic growth. But most of these studies lack theoretical justification by examining the defense growth nexus. This gap is bridged by HSIC Li (1998) who used efficiency changes, and technical changes, and Malmquist indices to estimate the effects of arms trade on economic growth. Analyzing the sample of 16 countries (American and European) from 1978-1994 he suggests that the impact of arms trade on economic growth varies across countries. In developing countries the effective use of military technology accelerates economic growth during this period. Hsu & Lee (2011) using Malmquist productivity index for 67 selected countries during the period 2000 to 2005 measures the impact of military technology transfer on economic growth. He revealed that after separating the impact of capital investment from arms imports, the diffusion of military technology has a more positive and substantial impact on economic growth, thereby revealing the presence of externalities between countries.

Summing up, the difference in the impact of arms trade on economic growth between developed and developing countries is due to the efficient use of military technology. Pavel (2004) using balanced panel data for 62 countries (and some sub-samples) estimated the relationship of economic growth with net arm exports. His results suggest that net arms exports have a significant positive effect on economic growth for the entire sample of 62 countries, sub-sample of non-oil countries and the OECD sub-sample. In an attempt to determine the impact of arms export and military spending Pavel (2007) discovered that both military spending and arms export leads to lower economic growth but military spending is less detrimental when a country is a net arms exporter. He argued that arms exports reflect the technological development in exporting countries. So developed countries could experience greater spillover effects of technology which may enhance economic growth. Similarly, in an export led economy net arms exports can also effect growth via the aggregate demand channel (mentioned above) which could affect economic growth. Pavel's contribution seems to have a significant impact in both theoretical and empirical literature of arms trade component of defense spending with its connection to economic growth.

Contrary to that (Dunne 2008) developed the link between arms exports and economic growth for developing countries which gives an interesting insight. His findings reveals that there is little or no evidence for a positive effect of arms exports on economic growth and it is more likely to have a negative effect or insignificant effect. Furthermore, he suggests that reducing arms and military spending need not be costly and can contribute to improved economic performance in developing countries.

Data and Methodology

In the defense economics literature most of the studies on the defense growth nexus have used exogenous growth models but a few have used endogenous models such as Barro (1995). Dunne (2005) suggested that the augmented Solow growth model and endogenous Barro growth model appear more suitable for exploring the defense growth nexus. For a study trying to investigate the relationship between growth and defense as a whole or some component of it, the extended Solow growth model seems more plausible as compared with exogenous and endogenous growth models, as it is empirically more successful, which explains the maximum cross country variation as compared to the others.

Instead of taking the original Solow growth model and adjusting the exogenous variable for arms exports, it is appropriate to borrow the conceptual equation for Solow style regression used by (Pavel 2007).

In the augmented Solow growth model MRW (1992) make the necessary assumptions and derivations and propose the cross-country empirical model that relates output per capita to the factors of production

$$ln(Y/L) = A + \alpha/(1-\alpha-\beta)\, ln(I/Y) - \alpha+\beta/(1-\alpha-\beta)\, ln(n + g + \delta) + \varepsilon \quad (1)$$

Where Y/L is GDP per capita, I/Y is investment in physical capital as a share of GDP, $(n + g + \delta)$ is population growth plus knowledge growth plus rate of depreciation, where $g + \delta = 0.05$ is an educated guess).

After adjusting N_{it} the variable for net arms export which is calculated as total arms export as a share of GDP minus total arms imports as a percentage of GDP the empirical model takes the following form:

$$ln(Y/L)_{it} = A + bN_{it} + \alpha/(1-\alpha-\beta)\, ln(I/Y)\, it - \alpha+\beta/(1-\alpha-\beta)\, ln(n + g + \delta)_{it} + + \varepsilon_{it} \quad (2)$$

Since the panel model poses some estimation and inference problems such as heteroscedasticity, auto correlation and cross correlation in cross section units at the same point in time, we will use the fixed effect and the random effect techniques which deal with these problems. How to opt for an appropriate model between fixed effect and random effect has been tackled by applying the Hausman test.

We use the panel data for 26 high income and upper middle income countries categorized by the World Bank[1] which contains the data of selected variables in this study. The data for arms exports and imports is obtained from SIPRI, which is the most authoritative source of information on conventional arms trade. We have selected high and upper middle income countries which provide information on arms transfer regularly and use statistical techniques of interpolation, extrapolation and trace back method in the case of missing values. The data on all other variables including GDP per capita, savings and population growth has been acquired from the dataset of World Development Indicators (WDI) of the World Bank.

[1.] Upper middle-income economies are those with a GNI per capita between $4,036 and $12,475; high-income economies are those with a GNI per capita of $12,476 or more.

Empirical Findings

The total sample size panel for empirical analysis is 26 but in order to make comparison we break it down to three i.e. the whole sample of 26 comprising high and upper middle income countries, the sub samples of 19 and 7 comprising high income and upper middle income countries respectively. In order to ensure that the equation is not spurious we apply the test for non-stationarity.[2] We opted for the LLC method of homogeneous unit root test for panel models using Eviews 9, the results are shown in Appendix table: 1, 2 and 3. The results indicate that the dependent variable is stationary at first difference in three samples, while the independent variables are stationary at levels in most estimates and at 1st difference in some cases.

After applying the diagnostic tests, the next step is selection of an appropriate panel model among the three types. First is a model with variant coefficients as well as variant intercepts, second one uses similar coefficients but essentially different intercepts and the third model has invariant coefficients and intercepts. In order to select one from the first two we applied F test which suggests skipping the pooled OLS and selecting one among the fixed effect model and the random effect model for all three samples. We then applied the Hausman test which suggested that we apply the random model for the sample of 26 and the sub sample of 7, while a fixed effect model for the sub sample of 19 countries. The results of Hausman test are given in Appendix table.4.

In table I the results for random panel of 26 (whole sample) and 7 (upper middle income countries) are presented. The results for the sample of 26 countries reveals that all the coefficients are highly significant at the 5% level and have positive signs. The value of R2 is low but it may be acceptable for panel model. The coefficients of L/Y are low but $n + g + \delta$ and net arms are 0.13 and 0.39 respectively. This means net arms exports significantly explain per capita GDP of high and upper middle income countries collectively. But the results for the panel of 7 upper middle income countries when separated from the whole sample give an interesting insight.

Table: Random Effect Model

Estimation	**Panel Least Squares**	**Panel Least Squares**
Sample	Entire sample	Upper middle income
Countries	26	7
Constant	9.06(0.00)	8.51(0.00)
Netarms	0.39(0.00)	-0.17(0.45)
I/Y	0.11(0.00)	0.61(0.37)
$n + g + \delta$	0.13(0.00)	0.87(0.00)
R-squared	0.17	0.10
Prob(F-statistic)	0.00	0.00

Dependent variable: ln(GDP per capita)*

2. (Badi H. Baltagi, 2000).

The coefficients of I/Y and (n + g + δ) are positive and significant at the 5% level of significance but the coefficient of net arms is insignificant and has a negative sign. This indicates that for upper middle income countries net arm exports are not significantly associated with GDP per capita. Moreover, the coefficient of saving is 0.61 which is greater than the coefficient of savings in the total sample of high and upper middle income countries.

Table. II: Fixed Effect Model

Estimation	**Panel Least Squares**
Sample	High income
Countries	19
Constant	10.36(0.00)
Netarms	0.72(0.02)
ln(I/Y)	0.18(0.13)
ln(n + g + δ)	0.11(0.00)
R-squared	0.98
Prob (F-statistic)	0.00

Dependent variable: ln(GDP per capita)*

Table II illustrates the results of 19 high income countries using fixed effect model recommended by the Hausman test. The high R2 indicates that the model is significant and all the coefficients are positive and significant at the 5% level. The coefficient of net arms is 0.72 which is highest in all the three samples. The coefficients of I/Y and (n + g + δ) are 0.18 and 0.11 respectively.

Conclusion

Arms trade until the end of the cold war was viewed through the prism of national political influence of a supper power, foreign policy etc., where economic factors were not considered that important. But after the collapse of the USSR and emergence of the US as a leading supplier of arms to the international market, the relative importance of economic factors has increased to a great extent. Now economics is the leading contributor to arms trade superseding other variables like national security, foreign policy and politics. Arms trade contributes to economic growth through numerous channels, including the spillover of military technology to other sectors of the economy, a productive export led growth impact caused by decreasing cost armament industry and upward shifting of aggregate demand due to arms export. Literature on the interaction of arms trade and economic growth seems to be unstructured and narrow in the sense that only a few researchers in the recent past have explored the nexus between arms trade and economic growth and no theoretical or empirical model has been developed which explains this nexus.

In this paper we have explored the nexus between arms trade with economic growth using balance panel of 26 high income and upper middle income countries as the whole sample and 19 high income countries and 7 middle income countries as sub samples. Using fixed effect and random effect models after applying the appropriate diagnostic tests our

results give interesting insights. For the whole sample of 26 high and upper middle income countries our result show that arms trade has a positive impact on economic growth of these countries. But after separating upper middle income countries from high income countries the results suggest that in high income countries the impact of arms trade on growth is positive, while in upper middle income countries there is no effect. So we may conclude that the results are consistent with Yakovlev (2007). Since the study has been carried out in the post 9/11 scenario our results indicate that arms trade after 9/11 had a positive impact on economic growth in high income countries.

References

Anderton, C. H. (1995). *Handbook of Defence Economics.* (K. H. Sandler, Ed.) York: Elsevier Science B. V.

Baltagi, Badi H. and Kao, Chihwa (2000). *Nonstationary Panels, Cointegration in Panels and Dynamic Panels: A Survey*. Center for Policy Research. 136.

Bank, W. (2002-2015). *World databank Indicators* .

Barro, R. J. (1991). Economic Growth in a Cross Section of Countries. *The Quarterly Journal of Economics,* 106 (2), 407-473.

Benoit, E. (1973). Defence and Economic Growth in Developing Countries. *Boston: D. C Heath and Company.*

Benoit, E. (1978). Growth and Defence in developing countries. *Economic Development and Cultural Change*, 34, 176-196.

Benson, S. (1994). National Security and Economic Considerations in US Conventional Arms Transfer Policy. *The Nonproliferation Review*, 1-4.

Dunne, J. P. (2008). *Does High Spending on Arms Reduce Economic Growth?* Oxford: Oxfam

Elkanj, N. and P. Gangopadhyay (2014). Why is the Middle East Burning? An Historical Analysis of Causes of Conflicts from 1963 to 1999, *International Journal of Development and Conflict*, 4, 35-48.

Fredericksen, P. A. (1982). Defense Expenditures and Economic Growth in Developing Countries: Some Further Empirical Evidence. *Journal of Economic Development*, 7, 13-24.

Gangopadhyay, P. & N. Elkanj (2017).*Analytical Peace Economics: The Illusion of War for Peace*. London: Routledge.

Gilby, N. (2009). The No-Nonsense Guide to the Arms Trade. London: The New Internationalist.

Rachel, Grillot. (2009). The International Arms Trade. Cambridge: Polity Press.

Heo, U. (1998). Modeling the Defense-Growth Relationship around the Globe. *Journal of Conflict Resolution*. 42 (5), 637-657

HsiCheng Li, S. M. (1998). Global Transfer of Arms Technology and its Impact on Economic Growth. *Contemporary Economic Policy*, 486-489.

N. Gregory Mankiw, D. Romer and D. Weill. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics,*107 (2), 417-437.

Perkins, D. e. (2001). *Economics of Development.* W W Norton & Co Inc (Np); 5th edition.

Research, S. I. (2002-16). *SIPRI Year book.* Stockholm International Peace Research .

Smith, Ron, Humm, Anthony and Fontanel, Jacques (1985). The economics of exporting arms. *Journal of Peace Research*, 2, 239–247.

Yakovlev, P. (2007). Arms Trade, Military Spending and Economic Growth. *Defence and Peace Economics*. 18 (4), 317-338.

APPENDIX

Table 1: Unit Root Test

Sample: 26
Method: Levin, Lin & Chu

Variables	Type	Results	P-value
ln(Y/P)	FD	-3.44393	0.003
I/Y)	FD	-7.47918	0.000
Netarms	FD	-8.68325	0.000
(n + g + δ)	Level	-4.68796	0.0000

Table: 2

Sample: 19
Method: Levin, Lin & Chu

Variables	Type	Results	P-value
ln(Y/P)	FD	-6.82953	0.000
lnI/Y)	Level	-3.85053	0.0001
Netarms	Level	-4.67541	0.000
(n + g + δ)	Level	-3.21283	0.0007

Table: 3

Sample: 07
Method: Levin, Lin & Chu

Variables	Type	Results	P-value
ln(Y/P)	FD	-3.94499	0.000
I/Y	Level	-3.53202	0.0002
Netarms	2^{nd} DF	-8.46695	0.0000
(n + g + δ)	Level	-3.65691	0.0001

Table: 4

Huasman Test

Cross section	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
26	6.921759	4	0.1401
19	9.941630	4	0.0414
7	0.678900	4	0.9539