

Does High Spending on Arms Reduce Economic Growth? A Review of Research

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Abstract:

This paper considers the link between arms spending and economic growth for developing countries, in particular whether high spending on arms is likely to have a negative effect on economic growth and what benefits that might be gained by reducing it. The literature is complex and difficult to summarize, with studies differing theoretically, in the empirical methods they use, in the coverage of countries and time series, and in their quality and significance. Nevertheless, the paper argues that the empirical analyses suggests that there is little or no evidence for a positive effect on economic growth and that it is more likely to have a negative effect, or at best no significant impact at all. Thus, reducing arms and military spending need not be costly and can contribute to, or at the very least provide the opportunity for, improved economic performance in developing countries.

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1. Introduction

Military spending is an important issue for the international economy. It is an expenditure by governments that has influence beyond the resources it takes up, especially when it leads to or facilitates conflicts. At the same time most countries need some level of security to deal with internal and external threats, but these can certainly have opportunity costs as they can prevent money being used for other purposes that might improve the pace of development. Such issues are particularly important for developing countries, as in the post Cold War world most wars have been internal and have involved the poorest countries and this is unlikely to change.

When governments undertake military spending, they provide wages and salaries and cover other expenses for the armed forces and procure arms for them. Unfortunately the only reliable data that is available is on military spending and so in reviewing the literature we simply have to recognise that arms transfers are an important component of military spending. In developing countries it is very likely that the arms will be imported, particularly any advanced weapon systems, and hence will become a drain on precious reserves of foreign exchange. This suggests that the opportunity cost of military spending is likely to be higher than simply the expenditure, once arms transfer are taken into account.

With the end of the cold war there were considerable reductions in military expenditure, although not consistently across all regions. However, as Table 1 shows in more recent years the declining trend has bottomed out and military expenditures are increasing. This is true across all organisations and income groups. While the lowest income group has seen the highest growth in military spending since 2000, as a share of GDP this remained lower than the other income groups by 2004. While there have been conflicts, with internal conflict being a major concern for the developing world and a few major international conflicts, the major pressure to increase military spending have not been the result of obvious strategic needs, but of internal pressures by vested interests.

Table 1. World and organizational military expenditure estimates, 1996–2005

Figures are in US \$b., at constant (2003) prices and exchange rates. Figures in italics are percentages. Figures do not always add up to totals because of the conventions of rounding.

Organization/ income group ^a	2000	2001	2002	2003	2004	2005	Change 96–05 (%)	Military expenditure 2004	
								per capita	% GDP
<i>Organization</i>									
ASEAN	11.1	11.7	12.4	13.3	13.3	13.1	+8.2	24.3	<i>1.5</i>
CIS	16.4	17.9	19.7	21.1	22.1	24.1	+50.4	89.5	<i>3.4</i>
EU	196	196	199	206	219	212	+11	473.8	<i>1.9</i>
NATO	539	541	585	642	687	706	+34.5	793.9	<i>2.9</i>
NATO Europe	207	207	211	217	224	217	+10.5	416.2	<i>2.0</i>
OECD	622	625	670	727	768	789	+29.6	706.1	<i>2.5</i>
OPEC	37.1	39.6	36.3	38	42	46.7	+72.4	81.5	<i>3.8</i>

Income group (by 2003 gross national income per capita)

Low	24.3	24.6	25.4	25.6	28.3	29.5	+64	12.4	1.9
Lower middle	90.5	99	105	109	114	122	+59	43.4	2.5
Upper middle	42.2	45.2	42.5	43.9	46.7	51	+48	137.3	2.3
High	627	631	678	736	780	799	+29	810.1	2.6

GDP = Gross Domestic Product

^a For the country coverage of the organizations and groups, see appendix 8A, table 8A.1. Some countries are excluded in the per capita figures because of lack of data on population. These countries are: Afghanistan, Brunei, Cuba, Haiti, Iraq, North Korea, Romania, Serbia and Montenegro, Somalia, Turkmenistan and Uzbekistan.

Sources: **Military expenditure:** Appendix 8A.1, **GDP and population:** International Monetary Fund, *International Financial Statistics* database, URL <<http://ifs.apdi.net/imf/logon.aspx>>.

General trends do of course always hide more complex patterns. Some countries have increased military spending because of local insecurity and in some cases due to the encouragement from arms producing companies pushing for arms exports. There has also been continued use of economic arguments to justify security expenditures, or to argue against reductions. Even within the developing country group there is a real heterogeneity of countries, in terms of their stage of development, nature of development, the state of their neighbours, their military burden and the degree of military involvement in the state.

2. Review of Research Issues

Research in this area has to deal with a number of important data availability, measurement, methodology and theoretical issues:

Data Availability and Measurement Problems

It is important to treat the published military expenditure data with care, especially when looking at developing countries. There are numerous problems with the data: definitions, coverage, accuracy etc which make it particularly difficult to use figures for comparison across countries or to aggregate to larger groups. There is also growing evidence that important amounts of security expenditure do not enter the accounts or budgets of developing countries¹. Such problems are also reflected in the fact that different data sources, SIPRI, ACDA, IISS, IMF and World Bank, can give markedly different numbers.².

¹ This can be simply because of the different conventions or attempts to "massage" the figures using mechanisms such as double -bookkeeping, extra budgetary accounts, highly aggregated budget categories, military assistance, and foreign exchange manipulation. In some developing countries, the military has a much wider remit (for example, they are involved in building projects with social outcomes eg building roads, hospitals etc, or take part in what would more normally be considered civilian police duties).

² The problems of collecting military spending data are reflected in the copious footnotes accompanying the SIPRI Yearbook data. See SIPRI (2007) for most recent. The most extreme case was Argentina in 1982 where the IISS military expenditure figure and that published by the IMF differed by 1034%

Such differences are particularly important for cross section analyses of countries, but not so much for time series data. If looking over time, the concern is with the changes rather than the absolute or relative values of variables and as long as the definitions do not change significantly and systematically one can be relatively confident of the analysis. In most cases researchers are left with only the published sources to use and these are at least the products of attempts to achieve consistency.³ There can be large differences in the reliability of data across countries and not all arms transfers necessarily show up in the defence statistics. Developing countries may also differ in the way in which they treat or define military related aid, the fungibility of aid, and the way in which arms sales are financed (Brzoska, 1994).

In an ideal world, we would be able to use military procurement budgets, as this clearly reflects spending on arms transfers, however, such data are generally not available for developing countries, or if they are of questionable reliability. In fact there is some evidence that arms imports may not even be included in military spending figures in many countries, (Omitoogun, 2006).

Theoretical Considerations

Applied work this is usually restricted to economic growth rather than development because of the problems of defining and measuring development⁴. A theoretical model is important for any empirical study but much of economic theory does not have an explicit role for military spending as a distinctive economic activity. However, this has not prevented the development of theoretical analyses as discussed in Dunne & Coulomb (2008). The dominant neoclassical approach sees the state as a rational actor which balances the opportunity costs and security benefits of military spending in order to maximise a well defined national interest reflected in a societal social welfare function. Arms spending can then be seen as a public good and the economic effects on military expenditure will be determined by its opportunity cost, the trade off between it and other spending. Early models of economic growth, which assume exogenous technical change, have been extended, to allow for the effects of changes in education and technology that produce endogenous growth.

The Keynesian and Institutionalist approach sees a proactive state which uses military spending as one aspect of state spending to increase output through multiplier effects in the presence of ineffective aggregate demand. In this way increased military spending can lead

³ Even if data are comparable, the use of the exchange rate to put them into a common currency is not without its problems, as it will not reflect the different relative prices of the categories of military expenditure and the different compositions across countries. The Summers Heston dataset provide data for a cross section of countries which have been adjusted to take account of these problems, but in most cases researchers focus upon standardised data such as the share of military expenditure in GDP or GNP. <http://pwt.econ.upenn.edu/> Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September 2006.

⁴ The former is, of course, only a necessary condition for the latter and the starting point for any such analysis should really be some theoretical understanding of the links between the two (Brauer, 1993). Similarly, it is important to recognise that military spending is only one aspect of militarism in a society and is only a measure of inputs rather than output (Smith, 1983).

to increased capacity utilisation, increased profits and hence increased investment and growth. The Institutionalist approach combines a Keynesian perspective with a focus on the way in which high military spending can lead to industrial inefficiencies and to the development of a powerful interest group composed of individuals, firms and organisations who benefit from defence spending, usually referred to as the military industrial complex (MIC). The MIC increases military expenditure through internal pressure within the state even when there is no threat to justify such expenditures.

Finally, the Marxist approach sees the role of military spending in capitalist development as important though contradictory. There are a number of strands to the approach which differ in their treatment of crisis, the extent to which they see military expenditure as necessary to capitalist development, and the role of the MIC in class struggle. One offshoot of this approach has provided the only theory in which military spending is both important in itself and an integral component of the theoretical analysis, the underconsumptionist approach. This sees military spending as necessary to maintain capitalism and prevent stagnation. Monopolistic companies produce goods and control labour costs leading to inadequate consumption, military spending is a wasteful way –in the sense of not creating any further output, of creating demand to allow companies to sell their goods and realise their profits.

3. How Arms Transfers and Military Spending Influence Economic Growth

In empirical work the fact that there is no agreed theory of growth among economists means that there is no standard framework that military spending can be fitted into. Clearly, in developing countries military spending conflict, economic capacity (education, governance, institutions, natural resources) all interact to influence growth⁵. The theoretical work has allowed the identification of a number of channels through which military spending can impact on the economy. The relative importance and sign of these effects and the overall impact on growth can only be ascertained by empirical analysis.

- **Labour:** An important problem in developing countries is creating adequate skilled and educated labour as the economy develops. Military spending can have both positive and negative effects. The military can train soldiers and conscripts with valuable technical and administrative skills which they take into civilian life. It can also have modernising effect, with organisational skills and modern attitudes tending to break up social rigidities. On the other hand these effects may be insignificant and the military may attract scarce skilled labour and valuable resources away from the civilian industrial sector and place a fetter on growth. The transferability of skills may be limited and the military may be no more, or less, modern than civil institutions. Military spending might also be at the expense of education and training expenditures (Deger, 1985; Nabe, 1983).

⁵ Indeed, many poor countries, even those with civil wars, spend relatively little on the military. In particular many African countries have low military burdens, but there are other obstacles to growth (Collier, 2007).

- **Capital:** Military spending can have positive or negative effects on both savings and investment. It is argued that if increases in military expenditure are funded by taxation, then if these expenditures are reduced in the future savings propensities may increase. In developing countries, however, raising new revenue from taxation can be difficult, thus military expenditure may be funded by increased money supply which may lead to inflation which can reduce savings. A direct impact can result from military expenditure being directly at the expense of education and health, requiring increased private provision and lowering private savings. Again the impact of military expenditure on investment is an empirical question. On the one hand it is hypothesised that it can crowd out investment. On the other hand it can boost demand, output and profits and lead to increased investment (other forms of government expenditure could also have the same impact). It is possible, however, that bottlenecks could prevent any significant positive effect. In addition, the effects of infrastructural investment by the military can be either to benefit industry, or be purely of military value remote and irrelevant to the civilian sector (Smith & Smith, 1980; Deger, 1986).
- **Technology:** Imports of arms can introduce advanced product and process technology to local industry, particularly if offset deals mean that local production takes place through licensing and this could have positive externalities for the rest of industry particularly. The will obviously depend on the degree of development and the existence of an advanced sector, with trained and educated workforce and support industry. On the other hand poor countries may not have the skilled workers and technicians and the offset based companies may use mainly expatriots, having little impact on the local economy and being unsustainable once the order is fulfilled. Alternatively it could create an advanced production sector with little linkage to the rest of the country and dependent on government for support. (Brauer and Dunne, 2006).
- **External relations:** The impact of military expenditure on the Balance of Payments will depend upon whether or not a country produces arms and whether or not it receives military related aid. In most developing countries imports of weapons will place a huge burden on the economy, through using scarce foreign exchange, and will make trade deficits difficult to avoid. This may be offset by military related aid, exports of arms and import substitution, but in general military spending is likely to be a burden on the trade balance. In addition, evidence suggests that military related debt in developing countries is substantial and that the financial burden of earlier arms imports via debt service has grown over time. On the other hand the military may provide security from threats, encourage foreign investment, and have links with foreign powers with an interest in the region that can be beneficial to trade, investment and aid. However, this must be weighed against the possibility of involvement in conflict and the damaging effects multinational investment and aid can have on weak client economies (Brauer & Dunne, 2002, Brzoska 1983).
- **Socio-Political:** Military expenditure may provide the conditions under which development can take place. The military may provide control and discipline of

labour, reduce internal conflict, and be a modernising influence. As discussed above, they can impart discipline on conscripts, making them more suited to industrial labour when they leave the forces, and can provide skills which can be of value in the civil sector. It is, however, possible that the military sector and its technology is capital intensive and so far removed from the rest of the economy as to impart little of value in terms of spin offs. It may also take skilled labour away from the civil sector and military regimes may be conservative, corrupt and inefficient and a fetter on economic development (Scheetz, 2002; Smith & Smith, 1980).

- **Debt:** Military expenditure has been considered as an important variable in explaining the rise of foreign debt in a number of developing countries, suggesting that this has led to reduced economic growth. The relationship between military expenditures and external debt can be of two forms. In general, as a budget item, military expenditure creates the need for funding. If a rise in military expenditure, say, cannot be financed through taxation, it will create a deficit. This may be financed in four different ways: printing money, using foreign exchange reserves, borrowing abroad and borrowing domestically. Each of these methods has some limits and implications, which are widely discussed in the literature⁶. Although there are links between the implications of methods used, as a first approximation, the methods of deficit financing are associated with different macroeconomic imbalances: money printing with inflation; foreign reserve use with the onset of exchange crises; foreign borrowing with an external debt crisis. Debt can also influence the interest rate which may feedback on investment. (Dunne et al , 2004; Brzoska, 1994)
- **Conflicts:** An interesting literature has developed that looks at the natures of conflicts, the extent to which they are encouraged by military expenditure. Clearly the costs of conflict are high and can be made higher through higher military expenditure (IANSA et al 2007);. But it is not that straightforward, as military spending and arms races don't inevitably lead to conflict and it might be that it is the underlying causes of conflict that are driving the observed expenditures. In addition, some of the most damaging and bloody wars have been achieved with relatively little in the way of funds or arms transfers (eg Rwanda) (Collier, 2007; Murdoch and Sandler 2004).
- **Demand:** Clearly military spending in common with any form of government expenditure will have effects on aggregate demand and in situations of less than full employment will lead to increased output, with income multiplier effects and accelerator effects through investment. Developing countries are unlikely to be resource constrained, but given their supply constraints, in terms of physical and human capital, the impact of increased expenditure may be relatively small. It is also open to debate whether military expenditure is the best form of government expenditure to use for expansionary growth (Dunne and Perlo-Freeman, 2003).

⁶ See for a recent example Dunne et al (2003),

- **Arms races:** An arms race is normally considered as a dyadic action-reaction – two countries each increasing their arms as a result of the other. The existence of arms races will mean that military spending will have a more marked effect on neighbours and other countries. Even if increases in military expenditure were to have a positive effect to start with this is unlikely to continue as the expenditure ratchets up. Some literature has emphasised wider form of arms races in cross section and panel –Rosh security web- and alliance effect and regional externalities⁷ (Dunne et al, 2007).
- **Identification:** An important issue in empirical work is the identification problem that results from the fact that we observe military spending and growth changing and both are influenced by security threats. If the economic determinants of growth are constant, but there are variations in the security threat a negative relationship between military expenditure and output will be observed. On the other hand, if the threat is constant but the economic variables are changing a positive relationship between military expenditure and output will be observed. This can be used to explain some country experiences with different combinations of growth and military expenditure. It also suggests caution in interpreting the results of empirical studies (Smith, 2000).

Clearly all of these channels will interact and their influence will vary depending on the countries involved. For example a relatively advanced developing countries, such as one of the Asian ‘tigers’ will have concerns over the industrial impact of their involvement in arms production, the technology and foreign direct investment benefits versus the opportunity cost, while a poorer African economy may be more concerned with the conflict trap they find themselves in.

4. Summarising the Debate: Empirical Results

Once we move beyond a broad stroke theoretical understanding towards an empirical analysis it becomes necessary to be more specific about the questions to be addressed and the way in which they are to be analysed. There are choices to be made many of which will be conditioned on the theoretical perspective adopted and the data availability and there has been some confusion within the literature as a result of not recognising such differences in the nature of studies and that the empirical results are likely to be very sensitive to the measurement and definition of the variables, to the specification of the estimated equations (especially the other variables included), the type of data used and the estimation method. In addition, the theoretical positions discussed above have generally been developed in the analysis of developed countries and applied to developing countries with some adjustments to the empirical model to take account of some of their particular features. This is hardly the best way to undertake such an analysis. The resulting variety of studies does make comparisons rather difficult and explain some of the seemingly contradictory findings. Whether or not the overall impact of military spending on development is positive or

⁷ The security web concept is an attempt to capture the impact of changes in the security environment. This is done by defining a security web, neighbours and other countries that are either allies or present a threat and aggregating their military expenditures to form a security web variable.

negative depends upon the relative magnitudes and signs of these channels and in the absence of any theoretical consensus, this can only be determined empirically.

The debate in the empirical literature on the economic effects of military spending started with the contribution of Benoit (1973, 1978) which purported to show that military expenditure and development went hand in hand. This led to considerable research activity using econometric analysis to overcome the deficiencies, most of which has tended not to support Benoit, but there is still no consensus view. There were two responses to this, one to criticise the approach that Benoit took in looking at a number of countries and arguing that the complexities and specificities of the processes call for more detailed individual country case studies, introducing qualitative information (Ball, 1983; Kaldor, 1991). The second was to argue that Benoit's empirical work was flawed and this led to a plethora of econometric studies.

Some of the earlier contributions employed models that had both Keynesian and neoclassical features, within simultaneous equation systems. This approach emphasised the importance of the interdependence between military spending, growth and the other variables, with the majority of the studies tending to confirm the existence of negative impact of military expenditure on economic development. The studies did vary in their use of data. Some deal with cross section averages, others with time series estimates for individual countries, while others were more comprehensive (Dunne, 1996). Attempts have been made to investigate sample stratifications. More recently, these types of modelling approaches have become rarer, but have not contradicted the earlier findings, with Gavlin (2003) in a cross section study of 64 developing countries using a simultaneous equation models, finding defence has a negative effect on growth and the savings-income ratio, the being greater for middle income countries.

Another response was with empirical studies that used neoclassical single equation growth models, introducing military spending (burden, per capita or absolute value) as the, or one of the, independent variables. Looney and Frederiksen's (1983a) re-examination of Benoit's data in this manner divided the countries into resource constrained and not resource constrained and found the significant relation for military expenditure on growth only held for the resource unconstrained group. It was negative for the resource constrained. Other studies tended to find a positive or insignificant effect of military expenditure on growth, though there were studies that found negative effects (Dunne, 1996). More recently studies have tried to deal with some limitations of the earlier studies, some using extended growth models, including Knight et al (1996) who found that high levels of military spending detract from growth by reducing productive capital formation and distorting resource allocation. More recently Ram (2003) using a large panel of countries found no evidence of crowding out, but clear differences across groups of countries, while for a smaller number Yakovlev (2007) found military expenditure negatively related to economic growth. Given such heterogeneity he argued that care was needed in interpretation

An important concern with the single equation approach was that it explicitly assumed that military expenditure is exogenously determined and that the causality goes from military expenditure to growth, both of which were brought into question by Joerding (1986). Other

studies then investigated the causal links (using statistical definitions of causality referred to as "Granger causality" to distinguish the concept from theoretical causality) between military expenditure and economic growth, with, in general, the studies finding no dominant result. Some recent contributions have also tried to deal with the possibility that the military/growth nexus may be more complicated than has been assumed with non linear relationships and different effects at different levels of expenditure. Given the complexity of such models the studies tend to focus on a small number of countries. Cuaresma et al (2004) estimate threshold regressions show that there is a level dependent effect of military spending on growth i.e. positive externality effect for low levels of military spending, but negative for high, while Pieroni (2008) finds a clear negative effect.

Another concern of researchers was to allow for the opportunity cost of military spending, or the trade off between military spending and other forms of welfare expenditure. While this approach is somewhat problematic, as it suggests that if money was not spent on military spending it would be spent elsewhere and it often does not allow for the fact that it is possible to have more of both with economic growth, there have been some interesting studies, but no consensus. Some early studies found weak evidence of military spending crowding out spending on education and health in developing countries, but others found no evidence of trade offs. More recently, Aslam (2007) considered 59 developing countries and found little evidence of trade offs overall, but with some regional variation.

An alternative to these types of studies was provided by the existence of large country macroeconomic models and other forms of world models, developed for other purposes, but able to be used to look at the impact of changes in military spending. The advantage of such models is that the impact of using military spending for other purposes can be analysed. A pioneering study by Leontief and Duchin (1980) used a world model to consider the effects of disarmament in the major powers and transference of the resources to low income countries, finding it to be positive, though not particularly significant. Cappelen et al (1982) made similar findings and Gleditsch et al (1996) provided a collection of studies, linked into the use of a world model to illustrate the clear benefits of the 'peace dividend'. There are few individual country studies for developing countries using relatively large macromodels for obvious reasons. Such analyses do differ from the usual studies of growth as they are no longer searching for the long run determinants of growth, but considering the short run 'peace dividend' impact, while at the same time allowing for government policy to adjust in a manner which deals with problems of economic adjustment.

While developing countries have limited arms production capabilities, they do have some and many have aspirations to become important arms exporters. At the same time the trade in weapons is hugely important in providing foreign exchange for a limited number of countries, providing a drain on foreign exchange and debt burdens for a lot more, and providing the possibility of developing weapons production for others through offset deals. Brauer (2002) found that a number of formerly developing nations have "graduated" from relatively low levels and sophistication of arms production to relatively high level, coinciding with the continued development of their civilian industrial capabilities. Among the remaining developing nations between 25 and 35 were engaged

in some form of arms production and arms (re)exports by the 1990s. Brauer argues that if anything, the development of indigenous arms industries in developing nations depends crucially on already established civilian capacities and that no one has ever presented a convincing case that arms exports provide net foreign-exchange. Dunne & Brauer (2004) is an edited collection that provides a range of studies on the role of offsets in development. They find virtually no case where offset arrangements have yielded unambiguous net benefits for a country's economic development. As a general rule arms trade offset deals are seen to be more costly than 'off-the-shelf' arms purchases and to create little by way of new or sustainable employment. They do not appear to contribute in any substantive way to general economic development, and with very few exceptions do not result in significant technology transfers, not even within the military sector.

As mentioned, for many countries arms procurement will need foreign exchange and this may well require borrowing. This has led to a number of studies on the effect of military spending has upon debt is clearly an empirical question and a number of studies have investigated it. Early work followed Brzoska (1983) in suggesting that the impact of high external borrowing due to defence on a country's overall growth performance and resource allocation depends on the countries capacity of international borrowing. More recently Brzoska (2004) finds indebtedness due to arms imports had not increased as much during the 90s as it did during the 70s, increased commercialisation means that countries have to pay for weapons (they can no longer rely on military aid) and poor countries are less important as customers. Dunne et al (2004a) find military burden to have a positive effect on the share of external debt in GDP for a panel of 11 small industrialised economies.

The post-Cold war era led to important changes in the nature of conflicts. The end of proxy wars and superpower involvement did not reduce conflict, but did reduce their intensity, and saw a dominance of civil or intra state wars. The nature of wars clearly changed with a blurred distinction between war and organised crime and while local the wars tended to have a transnational connection Kaldor (2006). There were fewer real military battles than in the past, but skirmishes and attacks on civilians. Collier and Hoeffler produced a series of careful and detail empirical studies which looked at the cause of conflict and explanations for their continuation/duration. The results suggested that it was greed (often represented by the proportion of primary commodities in GDP and other such indicators) rather than grievance that explains civil wars. This work led to a lively debate, the result of which was to accept that grievance may be involved in starting conflicts, but that that they are likely to be captured by more economic concerns over time (Collier, 2007).

Another issue of concern has been to understand what determines military spending in developing countries. Whether it is strategic or economic factors –because they feel they need to or because they can afford to. One possibility is that they respond to other countries and engage in arms races. There are a number of studies on arms races, but it is difficult to find compelling empirical evidence of arms races of the Richardsonian action-reaction type between pairs of countries, though there is evidence of some interrelation. This is rather surprising, but linked to the problems of using empirical data to operationalise the models. They are clearly more suited to analyse situations in which

countries are in conflict, such as India-Pakistan and are therefore of limited applicability. But more importantly they have failed to perform well empirically (Dunne & Smith, 2007). Dunne et al (2007) moved beyond dyadic arms races develop the Rosh (1988) idea of a security web, the aggregate military spending of enemies, allies and potential enemies, finding them to be important. More recent literature has recognise that whereas the arms races of the cold war opposed comparable actors, the new conflicts are asymmetrical, between countries with high technology weapons and the others (Dunne et al, 2007).

Previous surveys of the military spending growth literature include Chan (1986), who found a lack of consistency in the results, Ram (1995) who reviewed 29 studies, concluding little evidence of a positive effect of defence outlays on growth, but that it was also difficult to say the evidence supported a negative effect. Dunne (1996) covering 54 studies concluded that military spending had at best no effect on growth and was likely to have a negative effect, certainly that there was no evidence of positive effects and Smith (2000) suggesting the large literature did not indicate any robust empirical regularity, positive or negative, though he thinks there is a small negative effect in the long run, but one that requires considerably more sophistication to find. Smaldone (2006) in his review of Africa considers military spending relationships to be heterogeneous, elusive and complex, but feels that variations can be explained by intervening variables. They can be both positive and negative but are usually not pronounced, although the negative effects tend to be wider and deeper in Africa and most severe in countries experiencing legitimacy/security crisis and economic/budgetary constraints.

Overall, while there is no consensus on the economic effects of military spending the most common finding is that military burden has either no significant effect, or a negative effect on economic growth for developing countries. Summarising the result of our survey of 102 studies on the economic effects of military spending, where case studies refers to single or small groups of countries and the unclear category, implies mixed or insignificant results.

Type	Total No.	%Positive	%Negative	%Unclear
Cross country	62	19	39	42
Case studies	40	20	35	45

Almost 39% of the cross country studies and 35% of the case studies find a negative effect of military spending on growth, with only around 20% finding positive for both types of studies. As Hartley and Sandler (1995) pointed out, if we distinguish between the supply side models and those which have a demand side, there is more consistency in the results. Models allowing for a demand side and hence the possibility of crowding out investment tend to find negative effects, unless there is some reallocation to other forms of government spending, while those with only a supply side find positive, or positive but insignificant, effects. That the supply side models find a positive effect is not a surprise as the model is inherently structured to find such as result (Brauer, 2002). Given this, the fact that over 40% find unclear results could be interpreted as providing further evidence against there being a positive impact of military spending on the economy.

It is also worth noting that the military burden, share of military spending in GDP is relatively low in most developing countries (less than 2% for low income countries) relative to other components of GDP, such as health and education. As a result one might not expect to find a statistically significant effect on the path of national income, when there are so many other influences. Aside from when countries are engaged in conflict one might not expect to find significant impacts of arms transfers and military spending, which makes it interesting that so many do.

This means that there is the potential for developing countries to cut military spending with, at worst, no harm to economic performance and, at best, higher economic growth. The macroeconomic modelling literature that allows evaluations of military spending to other forms of government spending does suggest that there are likely to be economic benefits. These benefits could depend upon sensible economic policies and support of the international community, particularly if they occur after a conflict –as discussed in the next section.

6. Arms Reduction and Development

Having reviewed the available research, there is clearly no consensus, but it is possible to attempt to answer the usual questions that are asked regarding the effects of arms and military spending on development. The first thing to bear in mind is that economic growth is not development, merely one aspect of it that we have available data on. Growth in GDP does not necessarily mean any benefit to the poorer people in a country; it does not necessarily mean an improvement in 'human security'. In general, having a faster growing economy is a good thing, but that does not mean it is all good, particularly for the weaker members of society (Brauer; 1996). It might, however, sensibly be considered a necessary if not a sufficient condition for development as it would tend to make the achievement of other goals easier.

So overall does high arms spending reduce economic growth?

This is not an easy question to answer, there is some evidence that it does, but it is not conclusive. Certainly there can be a positive short run 'Keynesian effect' similar to other forms of government spending, but the literature does suggest that increasing other forms of government spending would be better. It is clear from the previous section that there is little support for Benoit's finding that military spending has a positive effect on economic development and that military spending levels appear to be determined mainly by strategic factors. This suggests that changes in the strategic environment for developing countries can allow a reduction in military expenditure and that it is unlikely to have a negative effect on economic growth in the long run. Whether it has a positive impact will depend upon the effects of changes in military expenditure on the economy and the policies taken to ease problems of adjustment. In this way it can be seen as an investment process with possible

short run costs but with the potential for long run benefits. As with any investment sound planning is required and there are risks Hartley (1993). Individual developing countries will of course have their own particular problems which may limit the potential for cuts, political problems; ongoing civil and regional wars; highly militarised security webs; military regimes; the use of the military for internal repression; ethnic/religious conflicts; the involvement of foreign powers. Recent literature has started to identify nonlinearities in the relationship, suggesting allowance should be made for the threat faced by countries. Arms transfers and military expenditure can readily be seen as having a positive impact when there is high threat. Indeed, ongoing disputes can mean that decreases in military expenditure may be destabilising and actually undermine any process of arms reduction, so there is an important role for the UN and other international organisations to deal with such problems. This will need new approaches to security; the provision of effective international mediation; the promotion of non military solutions to conflicts; the support of democratisation processes.

Thus a more justifiable statement would be that there is little evidence that reducing military spending will have economic costs and if the money saved is used elsewhere it is likely to lead to improved economic performance. The literature on the topic is mixed and has to be interpreted with care and recognizing the problems and limitations of studies. In particular there are important measurement and methodological/theoretical issues. What one can conclude is that there is no compelling evidence that military spending has positive economic effects that could not be achieved through other means at lower cost.

So is there a difference between the impact of military spending on economic growth between low and middle income/development countries?

There is some evidence of a difference, mainly to do with whether there are arms producing capabilities or not and whether they are resource rich or not, but the evidence is limited (Brauer, 1991). Krause (1999) sets out a ladder of the development of arms production and trade –the location of centres of innovation and production, patterns of arms transfers and the diffusion of military technology- in a global structure in 4 tiers:

- First tier suppliers: innovators
- Second tier suppliers: producers and adapters
- Third tier suppliers: reproduce and copy
- Fourth tier recipients: purchasers

The production of arms in developing nations ranges from relatively simple to very sophisticated weaponry, but most of them are found in the last two tiers. The best of them produce good platforms, but as regards weapons, control-systems, and sophisticated sub-systems they are highly import dependent (Brzoska, 1995). This would include countries such as Egypt, Turkey (at the moment), Indonesia, India and Pakistan, Brazil, Argentina, Iraq, Iran, and others. This ladder can be criticised as it suggests that any country wishing to produce arms starts at stage 1 and works its way up until the highest stage is reached. yet, Singapore for example followed a deliberate strategy of servicing naval vessels, and Greece followed a strategy of servicing NATO aircraft, as a means of amassing

knowledge and experience valuable for potential entry into more sophisticated stages of arms production later on. Also, some countries have tried to reach a stage below their capacities (e.g., Israel, South Africa, Egypt, India), and yet others chosen to remain at a stage below their likely capabilities (e.g., Mexico) (Brauer, 2002). Clearly the impact of military spending and arms transfers will have a different effect on the higher rungs of the ladder, but there is little empirical evidence on this. The Appendix reproduces a more detailed Table of developing country producers.

Are there big differences between short and longer term effects?

There are differences and again there are a variety of results, but the expectation is that in the short run Keynesian effects mean positive impact that in the long run can be negative. Though there is variation across countries.

Are there are other important linked variables?

There are and future research should try to deal with this in more detail. It is clearly important whether or not the country is an arms producer and hence has the potential to export. There are a number of countries, for example Uganda and Ghana who make money from using their troops in peacekeeping missions. They certainly make money, but it is unclear how significant it is and the degrees to which troops are hired specifically for these tasks. Also can use troops to undertake civil projects, roads construction etc, but there is an opportunity costs and its not clear this is the best or most efficient way to do it. Another major linked variable is obviously conflict, which is well established as an economic disaster for developing economies. The problem is whether the existence of arms transfers and high military spending increase or reduces the probability of conflict and this is not clear. It could reduce the probability of conflict with neighbours but increase the likelihood of internal conflict (Collier, 2007).

Is there any correlation between social spending and military spending

There are a number of studies that have considered the tradeoff between military and other spending, especially health and education as these are often the easiest to get consistent data on. Of the 6 studies we found on trade offs between military and other government expenditures (mainly education and health), one cross country study of 18 Latin American countries found evidence of trade of, but the results varied across countries, 2 cross country found no evidence, one study of four South American countries found clear trade off and 2 case studies of Turkey found trade offs. So there is some evidence of a trade off, but no consensus (Brauer., 1996; Scheetz, 1992).

Is there any analysis on economic growth relating to countries in an arms race?

There are a number of studies on arms races and while there is little evidence of two countries reacting to each other continually, there is some evidence that the military expenditures of other countries are an important determinant of military spending. Dunne et al (2007) suggest that there is a heterogeneous pattern of determinants of military

spending, such that even when considering two mutually hostile powers, their military burdens will depend on the whole nature of the relationship between them and other countries and events in the region. The policy implications are that focussing too much on apparent rivalries limit arms races may fail to deal with the security problem and wider regional security agreements may be necessary. How such arms races impact on economic growth will depend upon the nature of the defence growth nexus for the countries. From the results this could well be positive in the beginning, but become negative in the longer run, particularly if the arms race continues to escalate.

Whether greater transparency in military spending, and particularly arms procurement, is likely to lead to lower levels of spending or better decisions which have a reduced negative impact on growth?

Transparency is important as it means that regional arms races are less likely and that it is easier to bring international pressure on countries to maintain or reduce military spending. There are clear benefits in reducing arms sales to poorer countries when they are unnecessary given the regional balance of power/expenditure. The problem is the 'hidden' expenditures, inaccuracies and unreliability of the data. Poor data is not always the result of governments and officials provide wrong information on purpose, but simply that the information is not available and the infrastructure not in place to process it. On the other hand, many developing economies have high levels of corruption and these are often tied in to arms transfers, leading to weapon systems being bought that are beyond the security needs of the country, as in South Africa (Dunne and Lamb, 2004). This could be reduced with increased transparency and accountability of exporting countries, as could the possibilities for countries to use aid moneys for arms purchases⁸. Recent attempts have been made for the OECD to recognize some security expenditures as to recognize the need for some military security expenditures (eg on peacekeeping roles) need to be met from aid, but how this should be done is a matter of controversy (Brzoska, 2006).

Is there any link between military expenditure and national debt?

There is some evidence that military expenditure impacts upon national debt. Brzoska (2004) found indebtedness due to arms imports did not increase as much during the 90s as it had during the 70s, with increased commercialisation meaning countries have to pay for weapons, rather than get them as military aid, and the poor countries have become less important as customers. Dunne et al (2004a) find military burden to have a positive effect on the share of external debt in GDP for a panel of 11 small industrialised economies.

What are the constraints on reducing arms transfers and military spending in developing countries?

Institutional structures within developing countries can provide opposition to cuts. While few developing countries have an arms industry of any magnitude, there are

⁸ This is in fact difficult to police as aid can be fungible, meaning it can be given for one thing and used for another and it is difficult to tell that a reallocation has taken place.

bureaucrats/politicians; salesmen/importers; corporate interests, private and state; workers/managers all benefiting from the import of weapons and the maintenance of a strong military group. Their power and resistance is helped by foreign companies with their hard selling techniques and the well known corruption surrounding the arms trade (Ball, 1988). Many developing countries have small arms and munitions production facilities but some have major industrial sector (eg Brazil, Chile, Israel, South Africa, Egypt) and clearly the degree of influence the relevant actors have will vary by their size and importance.

The effects of cuts in military expenditure will be contingent on nature of government and the policy responses. The main effects are likely to be an initial reduction of demand in the economy, which could lead to reduced output and unemployment, though resources will also be freed for alternative uses; demobilisation, which may lead to unemployment and may be destabilising; a reduction in role of the armed forces in the non military sector, which may mean a reduction in any training, infrastructure, national cohesion that this may have provided; reduced imports of arms; which will free scarce foreign exchange but will also lead to a reduction of employment of bureaucrats and of workers involved in the trade. All of these will have an impact on the corporate sector and could lead to the closure of facilities, the demise of companies, and further unemployment. To overcome such problems require some alternative use of released resources to prevent adjustment problems. Obviously in a growing world economy and with international support the adjustments could be quick and painless. In the past the WB/IMF structural adjustment packages tended to prevent this, with their required cuts in public expenditure and their adverse effects on inequality and unemployment often leading to political tensions and social instability. More recently changes in WB and IMF policy have improved things but challenges remain (Dunne, 2006).

7. Conclusions

Military spending is an expenditure by governments that has influence beyond the resources it takes up, especially when it leads to or facilitates conflicts. While countries need some level of security to deal with internal and external threats, these have opportunity costs, as they prevent resources being used for other purposes that might improve the pace of development. Such issues are clearly important for the poorest economies.

While there are problems with data on military expenditure, especially when attempting to make comparisons, all of the available data does suggest that the clear trend reduction in military spending after the end of the Cold War has ended. Military spending, aside from some important regional differences is on the increase and this raises important issues for the developing world. To consider what these issues are likely to be this paper has provided a review of research on the military expenditure-development nexus. As a starting point for a comparison of the empirical studies a survey of the methodological and theoretical issues was undertaken. There are a number of schools of thought but no consensus in these general theories on the impact of military spending on economic growth. Much of the empirical work has focused on Keynesian and neoclassical models and considers a number of

channels by which military spending can effect growth. Whether or not it is positive is seen to be an empirical one.

It is important to recognise the interdependence of the demand and supply side and to consider the determinants of military spending. The results of the empirical studies are mixed but do tend to suggest that in developing countries economic conditions are not the most important determinant of military burden.

The empirical analyses of the economic effects of military spending, including arms transfers, suggests that there is little or no evidence for a positive effect on economic growth and that it is more likely to have a negative effect, or at best no significant impact at all. A range of approaches are used, with the studies finding positive effects (often insignificant ones) generally adopting a single equation estimation approach. Studies which have attempted to develop simultaneous models to allow for a variety of indirect effects have tended to find that military spending has a negative impact on growth. Some studies have investigated the statistical causality of military spending and economic growth but with no dominant result.

Overall, these results suggest that reducing arms and military spending need not be costly and can contribute to, or at the very least provide the opportunity for, improved economic performance in developing countries. There are still problems, however, in countries moving to lower levels of military spending and benefiting. Support is likely to be required at a national and international level, including assistance from the developed world.

In addition, there is not necessarily an automatic improvement in development as a result of arms and military spending reductions, it something that requires good governance, management and support (Brauer, 1990). An early influential study by Smith and Smith (1980) suggested that if there is a relationship between disarmament and development, it may be one that has to be constructed politically, not one that is pre-given by economic forces. It would appear from this survey that their conclusion remains relevant to the modern world.

An interesting observation is that while the evidence from military expenditure to growth is weak (even if the link is negative), the opposite link is very strong: China and India in particular are engaged in an economic arms race of sorts because it is economic growth that without question generates the resources needed to feed the military; Japan managed to become a major military force, despite have a constitutional requirement to keep military spending below 1% of GDP –its economy grew so much that 1% became a lot of resources. The lesson might be that if you want to have any hope of becoming (militarily) strong, invest in the economy. Once states are economically strong, there is too much at stake to risk it in war and they may also gain security from developed economies if they become too important to the world economy to allow them to be invaded. The best way to true security may actually be through economic development.

It seems unfortunate that after 25 years of work or so, the findings of the review should be so hedged. This is partly because of the problems of getting reliable data and possibly a hangover from Cold War debates that in some cases reflected political positions rather than the pursuit of quality research. But it also reflects the fact that military spending and arms transfers while more important than their share of resources might suggest, is still only a small part of any economy and can easily be swamped by other factors. As get more post Cold War data we can hopefully better distinguish the trends in the data and so provide more careful analyses of the contemporary world. Clearly, this is an important and urgent task.

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Appendix

Developing Nations' Arms Producers/Exporters, ca. 1985-1995.

	ACDA (1997)*	Brzoska (1995)*	Rana (1995)*
Afghanistan	1994	Algeria	Argentina
Argentina	all years	Argentina	Bangladesh
Brazil	all years	Bangladesh	Brazil
Cape Verde	1985	Bolivia	Chile
Chile	all years	Brazil	China, PRC
China, PRC	all years	Burkina-Faso	Cuba
Cuba	1985, 1988, 1989	Burma	Dominican Republic
Egypt	all except 1991, 1995	Cameroon	Egypt
Ethiopia	1990	Chile	India
Greece	all years	China, PRC	Iraq
India	all except 1988, 1989, 1992	Columbia	Iran
Indonesia	all except 1986, 1987	Dominican Republic	Libya
Iraq	1985-1990	Egypt	Malaysia
Iran	1991-1995	India	Mexico
Jordan	1986-1989, 1994	Indonesia	Namibia
North Korea	all years	Iraq	Nigeria
Kuwait	1988, 1992	Iran	North Korea
Libya	1985-1992	Ivory Coast	Pakistan
Malaysia	1994, 1995	Libya	Peru
Mali	1989	Malaysia	Philippines
Mexico	all years	Mexico	South Africa
Nicaragua	1992, 1995	Morocco	Saudi Arabia
Nigeria	1986, 1989	Nigeria	Turkey
Oman	1986	North Korea	Venezuela
Pakistan	all years	Pakistan	Yugoslavia
Panama	1992, 1993	Peru	
Philippines	1985, 1986	Philippines	
Saudi Arabia	all except 1990, 1991, 1993	Saudi Arabia	
South Africa	all years	South Africa	
Sudan	1986	Sri Lanka	
Syria	1986, 1992	Sudan	
Thailand	1988, 1989	Syria	
Turkey	all except 1986	Thailand	
Venezuela	1990	Venezuela	
Vietnam	1985, 1987, 1988, 1992		
Yugoslavia	1985-1991		
— Slovenia	1992, 1994, 1995		
Zimbabwe	1994		

For ACDA, "all years," refers to all years from 1985 to 1995; ACDA lists arms exporters; Brzoska lists only African, Asian, Latin American, and Middle Eastern nation, counting Turkey as "European"; Rana only lists producers of "small arms". Countries listed in **bold** typeface appear on all three lists. For simplicity, Brauer designated countries as "developing" when their per capita GNP is estimated as below US\$ 9,700 in 1995, i.e., those countries not classified as "high-income economies" by the World Bank (World Bank, 1997). This excludes arms producers once considered "developing" such as Israel, South Korea, Taiwan,

Singapore, Spain, and Portugal). East-Central and Southeast-Central European nations, i.e., erstwhile satellites and republics of the former Soviet Union that nowadays would appropriately be designated as "developing" are also excluded

Source: Brauer (2002)