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A Note on Defense Budgets and Economic Growth: Developing Countries in the 1980s¹

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Abstract

This paper examines how investment, the military burden, and military expenditures as a share of the central government budget have affected economic growth for a sample of developing countries in the 1980s. Factor analysis and discriminant analysis are used to separate the countries into two samples. The model which we estimate indicates that defense expenditures differ among groups of countries as to how these expenditures affect growth. In the group of countries which are relatively militarized, growth is independent of the defense burden. For the low militarized group it appears that the higher the defense burden the higher the growth. For a few countries within this group, increased shares of the central budget allocated to defense seems to spur growth.

1 Introduction

Real world military expenditures declined from US \$ 1.21 trillion in 1987 to \$ 1.0 trillion in 1991 (U.S. Arms Control and Disarmament Agency, 1994). Although the decline was not so marked for the developing countries (DCs) as a whole, in the majority of DCs real military expenditures declined between 1990 and 1991. In terms of regional military expenditures, the only region to report an increase between 1990 and 1991 was the Middle East. Even within the region however, there was a great diversity: between 1987 and 1991 half the countries increased defense spending (Kuwait's average growth was 100%) and the other half cut defense expenditures. More than likely, these diverse trends are likely to continue in the near future. Depending on the relative impact of defense spending, shifts in resources to and from defense programs are likely to have significant impacts (both

¹ An earlier version of this paper was given at the International Conference on Business and Economic Development in the Middle Eastern and Mediterranean Countries, Malta, May 1992. The views expressed in this note are not necessarily those of the US Government or the Naval Postgraduate School. We would like to thank two anonymous referees for helpful comments on an earlier draft.

positive and negative) on economic performance and democratization. The purpose of this note is to examine how shifts in military expenditures are likely to affect economic growth in DCs.

We employ factor and discriminant analysis to divide the sample of DCs into two groups (high and low militarization). A model of economic growth is estimated using regression analysis to examine the effects of militarization on economic growth.

2 Methodology

There are four commonly used measures of relative defense effort: (a) defense expenditures as a share of Gross National Product (GNP), the "defense burden," (b) defense expenditures as a share of the central government budget, (c) armed forces per capita, and (d) arms imports as a percent of total imports. While these measures roughly divide the developing countries into two groups, the classification is often ambiguous. Morocco for example has a relatively low military burden (approximately six percent) but at the same time over a fifth of the central budget is allocated to defense. Factor analysis can resolve the classification issue to identify the main trends in militarization. The relative scores on each factor provides a means of unambiguously ranking countries in terms of their defense patterns.² The military variables noted above for 1972-79 and 1980-89 and twenty-one other independent variables reflecting economic performance, debt and structural parameters were included in the factor analysis to see if military variables were systematically associated with standard economic indices.³

The final pattern⁴ identified five major factors of militarization: (1) debt and arms imports, (2) economic growth, (3) general public spending and debt, (4) defense spending, and (5) debt servicing. Arms imports were more highly correlated with the patterns of debt and exports (factor 1) than with actual defense expenditure ratios. The military dimension (factor 4) indicated that countries with relatively high shares of defense expenditures in the central government budget

² For a general survey of this method see Rummel (1970). While the results of the factor analysis, the factor scores, the discriminant analysis scores, and most of the regression analysis results are not reported in this note, they can be obtained from the authors upon request.

³ The initial sample of 98 countries chosen for the factor analysis were those classified by the World Bank (1991) as non-high income. Due to missing observations, the sample set was subsequently reduced to 62 countries. Economic variables were also taken from World Bank (1991) and several earlier issues.

⁴ Several preliminary runs suggested that armed forces per capita did not add significantly to the factor patterns and was thus dropped from the analysis. Factors were selected on the basis of their Eigen Value being greater than two.

also experienced high military burdens – the share of defense in the GNP. The country scores on each of the five factors have a mean of zero with a score above zero indicating a higher than average rate for that particular factor. The sample set was split into two groups (above and below zero) and a discriminant analysis (using the same set of independent variables as in the factor analysis) calculated the probability of correct placement in each group.

The majority of countries were correctly classified (probability of 0.90 or higher). Four countries were incorrectly classified. Congo and Algeria were moved from the low to the high militarization group and Nigeria and Portugal were placed from the high to the low militarization group. As expected, the first discriminating variables introduced into the program were military related – the military burden, the military share of the budget, and arms imports as a percent of total imports. However as the program attempted to delineate the two groups, arms import variables were replaced by economic variables.

The two groups of countries (high and low militarization) formed by the discriminant analysis differed in a number of ways:

1. As expected, the high group had larger levels of defense as part of the budget and GNP, and also in terms of arms imports.
2. The high group generally experienced more rapid rates of growth, although the low group had a larger investment growth rate in the 1970s. Part of the faster growth in the high group can be attributed to superior export growth and the resulting ability to sustain import growth. Government consumption was approximately the same for both groups in the 1980s although slightly larger for the high group in the 1970s.
3. Not surprisingly the high group enjoyed a greater share of resources devoted to savings and investment, with the low group devoting a larger porportion of resources claimed by government consumption. Exports accounted for the about the same share of GNP in both groups.
4. Finally, the high group had a slightly larger debt to export ratios although their debt to GNP ratio was similar to the low group by 1989.

The picture which emerges from these comparisons is one whereby the high defense group appears to be more economically dynamic – rates of growth are higher, as are investment and savings rates, together with similar debt servicing burdens. However this does not imply that this group of countries spends more on defense because they can afford the necessary allocation of resources to defense. It suggests that these countries have been able to sustain relatively high rates of economic expansion *despite* relatively high defense burdens.

3 Budgetary Tradeoffs – Cross Section Results

To examine the impact of defense expenditures, a linear model of economic growth between 1980 and 1989 was estimated in the following form:

$$GY = a + bGI + cGYL + dMEY + eMEGE + fMEGEL + \varepsilon \quad (1)$$

where GY is the 1980–89 rate of growth of GNP, GI is the 1980–89 rate of growth in investment, GYL is the 1970–79 rate of growth in GNP, MEY is the average share of defense expenditures in GNP between 1980 and 1989, MEGE and MEGEL is the share of defense expenditures in the central government budget for 1980–89 and 1972–79, respectively, and ε represents the error term with the traditional statistical assumptions. The coefficients are represented by b, c, d, e, and f; the expected sign of the coefficient b and c are expected to be positive; the coefficients for the three military variables cannot a priori be predicted. This type of model which we have used elsewhere (Looney and Frederiksen, 1986) assumes that investment is a key element in economic growth (see Faini, Annez, and Taylor, 1984) and draws from an empirical pattern noted by Nugent (1977) "... for the aggregate growth rates of individual countries to be rather similar from one decade to the next." In explaining the role of momentum in the growth process, Nugent suggested that many of the stabilizing and growth equating mechanisms assumed for the developed countries were often inaccurate in developing countries. Specifically he suggested that (a) the nature of technological selection and change, (b) the process of capital formation, and (c) the way in which human capital and income distribution tends to vary with growth as the primary reasons why disequilibrium tends to be more prevalent in developing countries (see Looney and Frederiksen, 1988). Past growth in GNP (GYL) was included in the model to control for the apparent existence of this phenomena in the two sample groups of countries.

The military burden (MEY) has been included in a number of studies (Benoit, 1983 for example) to account for the impact of defense expenditures on growth. While the assumed impact is often negative, several studies (Frederiksen and Looney, 1983, and Looney, 1988) have found sub-groupings of countries where the military burden has been positively associated with growth. The last two terms (MEGE and MEGEL) reflect the budgetary effects of defense expenditures after investment, momentum and the military burden have been controlled for. Thus, the possible impact of growth of defense funds preempting funds which might have been used in other economic or capital building programs is accounted for.

Equation (1) was initially estimated using linear regression analysis for the entire set of countries as follows:⁵

⁵ ** indicates statistical significance of the estimated coefficient at the 95% level of confidence or higher. Standardized coefficient are reported.

$$GY = 0.64 IG + 0.32 GYL + 0.38 MEY - 0.18 MEGE + 0.07 MEGEL; \quad (2)$$

(7.48)** (3.70)** (2.93)** (-1.63) (0.46)

$$R^2 (\text{adj.}) = 0.67; F = 21.21; \text{dof} = 48$$

The results indicate a consistency with the pattern which emerged from the discriminant analysis. Specifically, investment was the most important factor affecting economic growth during the 1980s; momentum from earlier growth (GYL) was also statistically significant with countries tending to maintain growth patterns from one decade to the next. The estimated coefficient for the military burden was positive and statistically significant indicating that countries with relatively high defense burdens also experienced the most rapid rate of growth. Lastly the estimated coefficients for the budgetary variables do not appear to be statistically significant for developing countries as a whole after accounting for investment, earlier growth momentum, and the defense burden.

Two additional sets of regression equations were estimated in an attempt to identify any trends as the sample set of countries gradually became more militarized. As before, the discriminant scores were used to split the sample into two groups (below zero and above zero).⁶ Initially, equation (1) was estimated for countries with a discriminant score greater than -2.5 . Next equation (1) was estimated for countries whose discriminant score was greater than -2.0 . This process was repeated (by increments of 0.5). At each step, the remaining group was "more militarized." Thus we can see whether, on the one hand, the general patterns identified for the entire sample (equation (2)) can be generalized for individual sub-groupings, or whether on the other hand the variables affecting economic growth change as the sample set becomes more militarized.

The results produced several interesting patterns. Because only a few countries had discriminant scores smaller than -2.5 , the initial regression ($n = 51$) was very similar to that reported above as equation (2). As more and more of the least militarized countries were excluded, the importance of both the military burden variable and the momentum variable in contributing to economic growth declined – eventually the coefficient lost its statistical significance. In other words, for the high militarization group, military expenditures (as a percent of GNP) was not an important determinant of economic growth. Concomitantly, military expenditures as a percent of the central budget (MEGE) became statistically significant but with a negative sign for the estimated coefficient. When the model was estimated by incrementally excluding the high militarized countries, the coefficient for MEGE became positive and statistically different from zero at the 95% and above level.

⁶ The discriminant scores ranged from -5.35 for Lesotho (least militarized) to 17.78 for Syria.

4 Conclusions

Two major conclusions have resulted from our analysis. First, developing countries are not homogeneous in the way defense expenditures impact economic growth. By and large, this supports much of the earlier research in this area. Countries with high defense scores (defined as a discriminant score greater than zero) appear to enjoy strong growth independent of the defense burden. Our results suggest these countries may experience a negative impact on growth from relatively high budgetary shares allocated to the defense sector. Second, it appears that countries with a low defense score tend to grow very little. Within the group, the higher the defense burden the higher the economic growth. For the few countries with extremely low defense scores, increased shares of the central budget allocated to defense seems to have a positive effect on growth.

While the patterns are fairly clear, their explanation is not. While it is tempting to argue that "defense makes sense" based on our results for the entire group, it is clear that the positive connection holds true only for specific and well defined sub-groups. It may be that high defense group is experiencing diminishing returns from defense while the low defense group has not yet reached this point. This type of explanation may be extended in terms of the military's share of the budget: while countries with a high proportion allocated to defense may have enjoyed some stimulus in the short-run, over time the deterioration in economic services and human capital may have offset any positive effects. As defense budgets decline, hopefully further research will throw additional light on the critical issue on the relationship between defense and growth.

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