DEFENSE SPENDING AND ECONOMIC GROWTH: TIME SERIES EVIDENCE ON CAUSALITY FOR THE PHILIPPINES, 1956-82

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INTRODUCTION

In the last ten years, there has been a growing literature examining military expenditures in developing countries. The majority of these studies have focused on whether or not defense spending has had a positive, a negative, or no impact whatsoever on economic growth in developing countries. A number of studies have also examined other dimensions of military spending in developing countries: the economic and noneconomic determinants of military expenditures, the effect of regime changes on policy and economic performance, and the major criteria for developing countries to produce weapons endogenously, to name a few. As will be noted below, the issue of causality direction has recently been raised in the literature: does defense spending prompt economic growth or does economic growth provide the resources which then allow a country to spend on defense?

The purpose of this paper is to test the causality issue between defense spending and economic growth for one developing country — The Republic of the Philippines — using time series data for the period 1956 to 1982. Following a brief review of the literature, a model to test for Granger causality is presented. The results of the test are examined and some conclusions with respect to causality are presented, together with some implications for development policy in the Philippines.

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1. An excellent review of the literature is given in Deger (1986).
REVIEW OF THE LITERATURE

One of the first scholars to suggest that defense spending might have a positive effect on economic growth (instead of the usually assumed negative effect) was Emile Benoit (1972, 1973, 1978). In his major study of 44 countries which included the Philippines, Benoit (1978, p. 275) suggested that defense spending could help economic growth by

(1) feeding, clothing, and housing a number of people who would otherwise have to be fed, housed and clothed by the civilian economy...;
(2) providing education and medical care as well as vocational and technical training...; (3) engaging in a variety of public works — roads, dams, river improvements, airports, communications networks, etc. — that may in part serve civilian uses; and (4) engaging in scientific and technical specialties... which would otherwise have to be performed by civilian personnel.

Benoit also recognized the possible negative effects of defense spending since, in a developing country, military spending represents an important opportunity cost, and, in addition, the government usually exhibits "negligible rates of measurable productivity increases" (Benoit 1972, p. 3).

Benoit discussed the causality issue between defense and growth by noting that "countries with rapid growth might feel better able to indulge themselves in the luxury of elaborate defense programs" (Benoit 1978, p. 275). However, using correlation analysis he concluded that "the direct interaction between growth and defense burdens seems to run primarily from defense burdens to growth rather than vice versa. It seems clear that in the sample countries, higher defense burdens stimulate growth" (Benoit 1978, p. 276).

Using average values between 1950 and 1965, Benoit found in his cross-section analysis statistically significant relations between defense burdens (the independent variable) and economic growth rates (the dependent variable). Such a finding — that military expenditures might be a valuable tool to prompt economic development — obviously could have important policy implications in developing countries.

Until quite recently, however, Benoit's assumption about the direction of causality had not been seriously challenged. Instead, substantial criticism of his work was directed at the "lumping to-
gether” of all developing countries into one homogeneous sample set. For example, Frederiksen and Looney (1983) extended Benoit’s study by hypothesizing that the relationship will be positive for countries which are relatively resource unconstrained and negative for resource constrained countries. After grouping Benoit’s 44 countries using a cluster analysis, his regression model was reestimated for the two groups of countries. The main finding was that in the richer countries “... defense expenditures may play an important and positive role in increasing growth” (Frederiksen and Looney 1983, p. 643). For the poorer countries, the reverse was true. A similar conclusion was found in two later studies which substantially enlarged the sample (Frederiksen and Looney 1985, 1986). In these follow up studies to the Benoit work, the Philippines was generally grouped in the richer set of developing countries where a positive relationship between defense spending and growth was found to exist.

Lim (1983) estimated a Harrod-Domar type growth model using cross-sectional data and found that defense spending in general hurt economic growth. In addition, he estimated his regression model for different regions of the world and found “marked inter-regional differences in the relationship between defense and growth. Economic growth in the African and Western Hemisphere LDC’s in the sample seemed to be adversely affected by defense spending. On the other hand, there is no relationship between defense and growth in the other two groups of LDCs (Asia and Middle East and Southern Europe)” (Lim 1983, p. 379). Lim offered no explanation as to why the hemisphere might affect the relationship between defense and growth.

Smith and Smith (1980) hypothesized that military expenditures might help growth through resource mobilization and the modernization of equipment. However, they found out that the small positive impact was far outweighed by the indirect effect of lower savings rates in the economy. Taylor et al. (1980) found out that increases in military budgets had a negative impact on economic growth for all developing countries and for separate regional groupings. Other studies, which have grouped developing countries to examine the relationship between defense and growth, have been carried out by Dabelko and McCormick (1977), who grouped by form of government, and del Pando (1980), who focused on five South American countries.
An excellent survey of the evidence between defense and growth, as well as of some major problems which still remain, was recently provided by Chan (1985). On the issue of causality, Chan noted that "to tackle questions such as the impact of military spending on economic performance, we need dynamic analysis to determine temporal leads and lags, the reciprocal influences among the variables, and the over-time changes in the empirical parameters" (Chan 1985, p: 407). In one of the first papers to test for causality in a dynamic framework, Joerding (1986, p. 35) used "Granger causality to check the assumed exogeneity of military spending relative to economic growth in previous studies." Using one sample of 15 observations from each of the 57 countries, Joerding (1986, p. 39) concluded that defense expenditures are not strongly exogenous and that "it is reasonable to assume economic growth is an endogenous variable."

While Joerding's work is a significant contribution to the literature, we have two major criticisms. First, all countries are once again "lumped together." This suggests that, if a causal relationship exists between growth and defense, it is the same for all developing countries. Second, given that a causal relationship exists, it would appear reasonable that the time lag between the cause and the effect might be different for different countries. By aggregating the sample, Joerding has assumed a common time lag structure for all countries in the sample (four years on the defense and growth variables). As Chan has noted, "it appears that future research will profit more from discriminating diachronic studies of individual countries. As some analysts have already noted, the search for universal patterns applicable to all places and times is likely to be disappointing (Chan 1985, p. 433).

The following section presents our results of testing for causality and the direction of causality between economic growth and defense spending in the Philippines.

THE MODEL AND RESULTS

In this section we test whether there is any statistical relationship with appropriate time lags between the defense burden, D (defense spending divided by GDP), and the growth rate of real GDP, G, for the period 1956 and 1982. Four cases are possible: D causes G, G causes D, there is feedback between D and G, or
there is no relationship between $D$ and $G$. Annual data on $G$ and $D$ were gathered from the International Monetary Fund and the United Nations, respectively.  

Using the procedure adopted by Joerding and also by Jung (1986), the following two equations were estimated to test for Granger causality:

\begin{align*}
(1) & \quad G = f(G_{1}, G_{2}, D_{1}, D_{2}) \\
(2) & \quad D = f(G_{1}, G_{2}, D_{1}, D_{2})
\end{align*}

where the subscripts \text{-1 and \text{-2 represent values of $D$ and $G$ lagged one and two years. In addition, equations (1) and (2) were reestimated as equations (3) and (4), respectively, using values of $D$ and $G$ lagged from one to four years. An $F$-value was computed to test for statistical significance of the estimated coefficients of the lagged values of $D$ and $G$. The null hypothesis is that the coefficient is equal to zero. If this hypothesis is rejected, there is evidence of a causal relationship between the two variables. The results appear in Table 1. 

<table>
<thead>
<tr>
<th>Equation</th>
<th>Causal relationship</th>
<th>Degrees of freedom</th>
<th>$F$-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>$D$ to $G$</td>
<td>2, 20</td>
<td>0.6224</td>
</tr>
<tr>
<td>(2)</td>
<td>$G$ to $D$</td>
<td>2, 20</td>
<td>4.5414***</td>
</tr>
<tr>
<td>(3)</td>
<td>$D$ to $G$</td>
<td>4, 14</td>
<td>0.6696</td>
</tr>
<tr>
<td>(4)</td>
<td>$G$ to $D$</td>
<td>4, 14</td>
<td>1.9087</td>
</tr>
</tbody>
</table>

***Denotes statistical significance at the 95% level of confidence.

As can be seen, the $F$-statistic is only statistically different from zero in the case of equation (2). These results suggest that, at least for the Philippines, the hypothesis that defense does not lead to economic growth cannot be rejected. Moreover, as indicated by equation (2), there is evidence that, contrary to Benoit's and other economists' assumption, the direction of causality in the Philippines is from economic growth to defense spending with an appropriate lag structure of two years.

SUMMARY AND CONCLUSIONS

Until recently, most economists examining the relationship between defense and growth had assumed that the direction of causality was from defense spending to economic performance. In an initial attempt to examine this assumption, Joerding conducted a Granger causality test for 57 developing countries and concluded that previous studies which assumed the causality direction to be from defense to growth were flawed. This paper suggests that a more appropriate way to test for causality is on a country-by-country basis since the causal relationship and the correct lag specification is most likely different from country to country. Using Philippine data from 1956 to 1982, our results suggest that, for this country at least, causality runs from economic growth to defense spending and not the other way around as had been suggested by Benoit and assumed by many authors writing on the Philippines. A lag structure of two years was found to be the correct specification in the model. For the Philippines, this suggests that, at its level of economic development, a policy of increasing the defense budget to promote growth might be inappropriate. Instead, our results suggest that to promote economic performance these same funds might be better used at the margin in other government programs such as investment in infrastructure programs or other high-yield programs. Obviously, a fruitful area for future research, and one which we are pursuing, is to examine the direction of causality between defense spending and economic performance for a number of other developing countries.
REFERENCES


