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Another Look at Growth and Defense in Less Developed Countries

David Lim
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Introduction

In a recent paper, Benoit claimed that there was sufficient evidence to show that defense spending encouraged the economic growth of 44 less developed countries (LDCs) over the period 1950–65.¹ However, some doubt must be cast on this claim, as the results obtained were not very clear-cut. In view of this doubt, this paper attempts to reexamine the relationship between defense and growth for a bigger group of LDCs (54) over a more recent period (1965–73) within an explicit conceptual framework. The analysis is also carried out at the regional level for 21 African, 13 Western Hemisphere, 11 Asian, and 9 Middle Eastern and southern European LDCs.²

Formulation of Relationship

We begin with the explicit Harrod-Domar capital-centered growth equation in a general form:

$$Y_g = f(IOCR, I/Y), \quad (1)$$

where Y_g is the growth rate of the real GDP, $IOCR$ the incremental output-capital ratio, and I/Y the gross domestic investment to GDP

¹ Emile Benoit, "Growth and Defense in Developing Countries," *Economic Development and Cultural Change* 26 (January 1978): 271–80. See also Emile Benoit, *Defense and Economic Growth in Developing Countries* (Boston: D. C. Heath & Co., 1973).

² *Africa*: Algeria, Botswana, Burundi, Egypt, Ethiopia, Ghana, Kenya, Libya, Malawi, Mauritius, Morocco, Nigeria, Rwanda, Senegal, Sierra Leone, Sudan, Tanzania, Tunisia, Uganda, Zaire, and Zambia; *Western Hemisphere*: Argentina, Barbados, Bolivia, Brazil, Guatemala, Guyana, Honduras, Jamaica, Panama, Paraguay, Peru, Trinidad and Tobago, and Venezuela; *Asia*: Afghanistan, Burma, Hong Kong, India, Malaysia, Nepal, Philippines, Singapore, South Korea, Sri Lanka, and Thailand; *Middle East and southern Europe*: Cyprus, Greece, Iran, Iraq, Israel, Kuwait, Saudi Arabia, Syria, and Turkey. The data are taken from the World Bank, *World Tables 1976* (Baltimore: Johns Hopkins University Press, 1977).

ratio. The traditional argument against defense expenditure is that, for a given surplus of production over consumption, it diverts funds from investment purposes and so hinders the growth process. For a closed Harrod-Domar economy, a higher defense expenditure to GDP ratio (D/Y) means a lower investment ratio (I/Y), and, with a given $IOCR$, must imply a lower growth rate of output (Y_g). The trade-off between defense and investment expenditures is presented, in a general form, as:

$$I/Y = f(D/Y), \quad (2)$$

where I/Y and D/Y are expected to be negatively related.

Foreign capital inflow may enable a country to increase its defense and investment expenditures at the same time. The absence, then, of a negative relationship between I/Y and D/Y may be due to the presence of foreign capital inflow, which enables both investment and defense expenditures to be increased simultaneously. The lack of a negative relationship does not, on its own, show that defense spending does not compete with investment expenditure for scarce domestic funds. In order to isolate the effect of defense spending on economic growth per se, we incorporate foreign capital inflow into our trade-off model to rewrite equation (2) as:

$$I/Y = f(D/Y, F/Y), \quad (3)$$

where F/Y is the foreign capital inflow to GDP ratio. For a given D/Y , the higher F/Y is the higher I/Y will be, so that F/Y and I/Y are hypothesized to be positively related.

The substitution of equation (3) into equation (1) gives us the following estimating equation:

$$Y_g = f(IOCR, D/Y, F/Y), \quad (4)$$

where Y_g is expected to be negatively and positively related to D/Y and F/Y , respectively.

The actual estimating equations used are:

$$Y_g = f(IOCR, D/Y, F/S) \quad (4a)$$

$$Y_g = f(IOCR, D/GE, F/S). \quad (4b)$$

The deficit on current account to gross national saving ratio, F/S , is preferred to F/Y as it brings out more directly the impact that different sources of funds have on investment and defense expenditures. The

defense expenditure to total government current and capital expenditure, D/GE , is used as an alternate to D/Y as it is a more direct measure of the defense effort.

The average annual growth rate of the real GDP for the period 1965–73, Y_g , is calculated by the least-squares regression method. The incremental output-capital ratio, $IOCR$, is for the period 1968–73. Values for D/Y , D/GE , and F/S are obtained by averaging the figures for 1965, 1970, and 1973.

Empirical Results

Equations (4a) and (4b) were estimated, with intercepts, for six different groups of LDCs by ordinary least-squares regression analysis. Both linear and logarithmic functions were obtained, with the latter producing by far the better results. These are given in table 1 and table 2.

There is support for the contention that defense spending is detrimental to economic growth. When the analysis was carried out for the entire sample of 54 LDCs the regression coefficient for D/GE is negative and statistically significant. The adverse effects of defense spending on growth became more apparent when the nine Middle Eastern and southern European countries were excluded from the sample. The regression coefficients of D/Y and D/GE have negative signs and are both significant. When taken with the results obtained for the sample of Middle Eastern and southern European LDCs, where F/S came out with significant and positive coefficients, the results suggest that for the LDCs that are neither Middle Eastern nor southern European there was insufficient foreign capital inflow to offset the adverse effect that a diversion of domestic funds from investment projects had on economic growth.

Our results also show marked interregional differences in the relationship between defense and growth. Economic growth in the African and the Western Hemisphere LDCs 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. The dangers of generalizing about the influence of defense spending on economic growth across countries are, therefore, obvious.

The regression coefficients of $IOCR$ have the expected positive sign and are all statistically significant. This suggests that, for a given investment ratio made possible by a surplus of the sum of local and foreign funds over defense expenditure, a higher productivity of capital tends to produce a higher rate of economic growth.

Our results, therefore, show that defense spending is detrimental to economic growth in LDCs, a conclusion that is diametrically opposite to that reached by Benoit.

TABLE I
LOGARITHMIC CROSS-COUNTRY REGRESSIONS EXPLAINING ECONOMIC GROWTH: EQUATION (4a)

Independent Variables	Total (54 LDCs)	Total less Middle East and Southern Europe (45 LDCs)	Africa (21 LDCs)	Western Hemisphere (13 LDCs)	Asia (11 LDCs)	Middle East and Southern Europe (9 LDCs)
Constant	2.557 (20.952)*	2.555 (17.840)*	2.690 (11.224)*	2.334 (17.221)*	2.481 (5.794)*	2.946 (8.044)*
<i>IOCR</i>	1.408 (8.695)*	1.424 (7.717)*	1.277 (5.372)*	1.930 (5.856)*	1.376 (2.642)**	1.152 (3.497)*
<i>D/Y</i>	-.049 (-1.208)	-.001 (-1.813)**	-.096 (-1.613)	-.138 (-2.324)**	.171 (.856)	-.125 (-1.045)
<i>F/S</i>	.003 (.215)	-.008 (-.525)	-.037 (-1.337)	.011 (.749)	-.020 (-.527)	.069 (3.104)*
\bar{R}^2	.500	.575	.612	.728	.501	.627
<i>F</i> -ratio	25.405*	20.836*	11.534	11.712*	4.352**	5.483**

NOTE—The figures in parentheses are *t*-values.

*Significant at the 1% level.

**Significant at the 5% level.

TABLE 2
LOGARITHMIC CROSS-COUNTRY REGRESSIONS EXPLAINING ECONOMIC GROWTH: EQUATION (4b)

Independent Variables	Total less Middle East and Southern Europe				Middle East and Southern Europe (9 LDCs)
	Total (54 LDCs)	Europe (45 LDCs)	Africa (21 LDCs)	Western Hemisphere (13 LDCs)	
Constant	2.351 (10.580)*	2.269 (14.889)*	2.338 (8.192)*	2.004 (21.253)*	2.519 (13.101)*
<i>IOCR</i>	1.335 (9.176)*	1.314 (8.632)*	1.174 (6.027)*	1.848 (9.279)*	1.145 (3.282)*
<i>D/GE</i>	-.098 (-2.218)**	-.139 (-3.853)*	-.164 (-1.983)**	-.130 (-4.925)*	-.142 (-.937)
<i>F/S</i>	-.001 (-.113)	-.017 (-1.139)	-.041 (-1.516)	-.011 (-.977)	.071 (2.904)**
\bar{R}^2	.607	.626	.637	.882	.613
<i>F</i> -ratio	28.343*	25.537*	12.704*	30.971*	5.431**

NOTE—The figures in parentheses are *t*-values.

*Significant at the 1% level.

**Significant at the 5% level.

Benoit's Formulations and Results

Benoit used the following estimating equations to test the hypothesis that "defense expenditures reduce the resources available for investment and so slow down growth."³

$$Y_g = f(I/Y, D/Y) \quad (5)$$

$$Y_g = f(D/Y, F/Y) \quad (6)$$

$$Y_g = f(I/Y, F/Y) \quad (7)$$

$$Y_g = f(I/Y, D/Y, F/Y), \quad (8)$$

where Y_g is the average annual growth rate of the real nondefense GDP, F/Y the net receipts of bilateral economic aid to GNP ratio, I/Y the investment ratio, and D/Y the defense expenditure to GDP ratio. Support for the hypothesis will be shown by the presence of a significant negative relationship between Y_g and D/Y .

The equations were estimated by linear stepwise regression analysis for a group of 44 LDCs over the period 1950–65. The results are as follows:⁴

$$Y_g = 0.6101 I/Y + 0.5366 D/Y$$

(4.9302)	(4.0718)	(5a)
(0.2644)	(0.1803),	

where $R^2 = .5540$ and $F = 25.4670$;

$$Y_g = 0.3512 D/Y + 0.1222 F/Y$$

(2.4018)	(0.7884)	(6a)
(0.0985)	(0.0106),	

where $R^2 = .3002$ and $F = 8.7958$;

$$Y_g = 0.6961 I/Y + 0.5858 F/Y$$

(6.2086)	(4.6277)	(7a)
(0.3866)	(0.2149),	

where $R^2 = .5886$ and $F = 29.3277$; and

$$Y_g = 0.6612 I/Y + 0.3418 F/Y + 0.2065 D/Y$$

(5.5736)	(2.3003)	(1.3351)	(8a)
(0.3059)	(0.0512)	(0.0176)	

where $R^2 = .6061$ and $F = 20.5190$.

³ Benoit, "Growth and Defense in Developing Countries," p. 271.

⁴ *Ibid.*, p. 274.

The figures in the first row of parentheses are the t -values of the regression coefficients while those in the second row are the contributions of the regression coefficients to the coefficient of determination (R^2) of the estimating equation. The independent variables are presented in the order in which they appeared in the stepwise regression analysis.

The coefficients of D/Y in equations (5a) and (6a) came out positive and statistically significant, which led Benoit to conclude that defense spending stimulated rather than retarded economic growth. However, Benoit's results must be treated with some skepticism as they were obtained with the use of functional relationships that were inconsistent with the hypothesis to be tested and with the use of variables that were incorrectly measured. Benoit did not specify explicitly his framework of analysis. However, from his formulation of the problem it seems that he was implicitly testing the hypothesis, that there is a trade-off between defense expenditure and economic growth, within a Harrod-Domar framework. The hypothesis is that, for a given $IOCR$, a higher D/Y results in a lower I/Y and so a lower Y_g . Therefore, D/Y and I/Y should not appear together as determinants in the same estimating equation. These two variables were included as determinants simultaneously in estimating equations (5) and (8). In the case of equation (5) the regression coefficients of I/Y and D/Y were positive and statistically significant in the estimation. However, it is not possible to interpret the theoretical significance of the result for D/Y within the Harrod-Domar framework. The same problem would arise over the interpretation of the result for equation (8) if the coefficient of D/Y had been positive and significant in the estimation.

The only estimating equation used that was consistent with the a priori case against defense spending is equation (6). However, the positive and significant coefficient obtained for D/Y by using that equation does not show that defense spending did not slow down investment and so the rate of economic growth. F/Y is bilateral economic aid, a significant part of which may find its way into military expenditure programs. When a significant part of defense spending was financed out of bilateral economic aid, then D/Y simply measured the value of the external alternative source of funds and did not reflect the value of the domestic funds diverted from nonmilitary investment. The production of most military equipment with funds from external sources will increase economic growth. However, this is not the argument. The real issue is whether such military expenditure will deter economic growth if it were financed by funds meant for nonmilitary investment programs. Such a displacement effect cannot, unfortunately, be captured by the use of equation (6), in which F/Y is measured as bilateral economic aid.

There is support for the contention that Benoit's D/Y is really F/Y in disguise to a large extent from Benoit's own results. First, it can be seen that I/Y and D/Y came out positive and significant in equation (5a),

and that I/Y and F/Y came out positive and significant in equation (7a). However, when D/Y and F/Y were entered as separate independent variables, in addition to I/Y , in equation (8a), the significance of F/Y dropped off markedly, while D/Y did not come out at all. This suggests that the use of both D/Y and F/Y diffused their separate influences on economic growth, a not unexpected result as D/Y and F/Y measured the same influence to a large extent. Second, when only D/Y and F/Y were used as determinants, in equation (6a), there was a similar dilution of the separate effects of the two variables.

Concluding Remarks

The conclusion by Benoit that defense spending encouraged rather than hindered economic growth in LDCs can be questioned on two counts. First, the estimating equations used were not consistent with the hypothesis that was tested. Second, the measurement of some of the variables used left much to be desired.

With the use of an estimating equation that was derived systematically within an explicit conceptual framework, we obtained results that show that defense spending was detrimental to economic growth. There were, however, important regional differences. The adverse effects that were marked in Africa and the Western Hemisphere were absent in Asia, the Middle East, and southern Europe.

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