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Economic Growth in the 1980s: The Impact of
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Government Expenditures and Third World Economic Growth in the 1980s: The Impact of Defense Expenditures

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ABSTRACT

The purpose of this paper is to examine the possibility of using savings from major reductions in Third World defense spending as stimulus to economic growth. This reorientation of expenditures is particularly significant in light of new World Bank and International Monetary policies directed toward reducing lending to countries with excessive levels of military expenditure. The main findings of the study suggest that reduced military expenditures, unless confined to arms imports, are unlikely in and of themselves to provide much of an impetus for accelerated growth.

RÉSUMÉ

Les pays en développement peuvent-ils stimuler leur croissance économique en utilisant les économies réalisées par les compressions des dépenses militaires ? Une telle réorientation des dépenses prend une importance accrue en regard des nouvelles politiques monétaires internationales et de la Banque mondiale visant à réduire les prêts aux pays dont le niveau de dépenses militaires est excessif. Les données de cette étude suggèrent qu'une réduction des dépenses militaires ne suffit pas en elle-même — à moins qu'elle ne s'applique à la réduction des importations d'armements — pour stimuler la croissance économique.

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INTRODUCTION

During the 1980s there was a slowdown in defense spending and arms imports in many developing countries, especially in the Middle East, and to a lesser extent South Asia and Northern Africa. In large part, reductions in allocations to the military have been brought on by growing fiscal problems, forcing governments to reorder their spending priorities. It is apparent that for the developing world as a whole, countries are examining the potential benefits of reduced allocations to the military. Depending on the relative impact of defense spending, shifts in resources may significantly affect the economic performance of these countries.

The purpose of this paper is to examine the likelihood of major "peace dividends" acting as a stimulus for Third World economic growth. In doing so, the study addresses the following questions:

1. Did defense expenditures and arms imports hinder or aid developing country growth in the 1980s?
2. Were military expenditures and/or arms imports associated with external indebtedness during this period and, if so, in what manner?
3. Did defense expenditures and/or arms imports impact uniformly or vary between groups of countries? If variation occurred by groups, which clusters are relevant in this regard?

The main hypothesis of the study is that developing countries are likely to show considerable variations with regard to the manner in which defense expenditures affect economic growth. In turn, these variations reflect the underlying economic health of developing countries and, thus, their relative ability to minimize potential adverse effects associated with increased defense burdens.

I. LITERATURE SURVEY — THE IMPACT OF DEFENSE EXPENDITURES

A body of conventional wisdom has amassed over the years concerning the causes and consequences of Third World militarization. More often than not in the early literature this wisdom has been anecdotal and biased towards the standard "guns versus butter" analogies. Since the modern defense establishment is a heavy consumer of technical and managerial manpower and foreign exchange, resources that are especially scarce in the Third World, the conventional wisdom is that increased defense burdens should reduce the overall rate of growth (Chan, 1986; Deger and West, 1987).

To test this theory, a rapidly growing body of empirical research has attempted to identify the impact of defense spending on various aspects of economic development and growth. Numerous studies have examined various aspects of the debate. Unfortunately, no consensus has emerged. In the original study, Benoit (1978) found strong evidence to suggest that defense spending encouraged the growth of civilian output per capita in less developed countries.

On the other hand, Rothschild (1977) concluded that increased military expenditures lowered economic growth by reducing exports in 14 OECD countries during 1956-69. In his examination of 54 developing countries for the sample period

1965-73, Lim (1983) found defense spending to be detrimental to economic growth. Deger and Sen (1983), Leontief and Duchin (1983), Faini, Annez and Taylor (1984), Biswas and Ram (1986), and Grobar and Porter (1989) also found evidence refuting the claim that defense spending stimulates economic growth.

In contrast, research examining the economic impact of Third World military expenditure utilizing various sub-groupings of countries (Table 1) has tended to contradict these findings.

Much of this research implicitly argues that, in certain economic situations, by creating a stable environment it is possible that added defense expenditures may stimulate higher rates of investment, technological progress, technology transfer and hence increased overall growth (Wolf, 1981).

This research (Frederiksen and Looney, 1982; Frederiksen and Looney, 1982b; Frederiksen and Looney, 1983; Frederiksen and Looney, 1985; Looney and Frederiksen, 1986; Looney and Frederiksen, 1986a; and Looney and Frederiksen, 1987a) has gone through various stages and levels of sophistication, with the initial studies largely confined to ordinary least squares regression techniques using Benoit's data set for the 1950-65 period. In the original study, Frederiksen and Looney (1982) using this methodology grouped countries on the basis of discriminant analysis with savings and investment used as discriminating variables. Here it was found that countries with relatively high levels of savings and investment experienced positive impacts on growth, while the impact was statistically insignificant for countries experiencing low levels of savings and investment.

A second study (Frederiksen and Looney, 1983) also used Benoit's sample countries, but this time countries fell into groups largely on the basis of their foreign exchange earnings, import elasticity, and productivity of investment. Again, relatively unconstrained countries experienced positive impacts on growth stemming from defense expenditures, while the relatively foreign exchange constrained countries showed a statistically insignificant but negative impact.

Using a later time period, 1965-73, (Frederiksen and Looney, 1985) and again grouping developing countries on the basis of their relative savings and investment, it appears that the relatively unconstrained countries enjoyed a positive impact stemming from defense expenditures. These initial studies examined only the impact of defense expenditures on growth. More recently, analysis in the area has become more sophisticated, utilizing more elaborate statistical devices and/or more subtle country groupings. For example, the studies examining the effects of relative resource constraint represent a more elaborate variant of earlier themes in that they use factor analysis for selecting variables for subsequent discriminant analysis.

As before, analysis produced two groups of Third World countries. This time the grouping reflected total access to foreign resources — exports, external borrowing and the like. Again, countries with abundant foreign exchange derived positive impacts on growth from military expenditures while that group of countries experiencing foreign exchange shortages found growth unaffected by military spending (Looney and Frederiksen, 1986, Looney, 1987).

Dividing Third World countries on the basis of their indigenous production (or lack of) of at least one major weapons system (following Neuman, 1984), it appears that for the 1970-82 period, Third World military producers experienced positive impacts from military expenditures on growth, investment, savings, but declines in

productivity, while non-producers experienced declines in growth and investment (Looney and Frederiksen, 1987a; Looney, 1989a and 1989b).

Groupings of Third World countries on the basis of regime type (military or civilian) also produced similar results with military regimes obtaining positive impacts from military expenditures (Looney, 1988, 1989, 1990). The same pattern emerged (Looney, 1988, 1990a) with countries grouped on the basis of the legitimacy of government (and threat faced by the regime from internal or external sources).

In recent years, analysis has branched into more complex issues, and utilized both time series and simultaneous equation models estimated by two and three stage least squares regression techniques (Looney, 1986, 1987a, 1988c, 1988d). Here, attempts are being made to incorporate the demand for military expenditures along with their impacts in an attempt to determine feedbacks from one to the other. Interestingly enough, the results produced by these techniques tend to confirm the results obtained from simpler, more naive models.

In short, the research summarized above demonstrates a consistent pattern whereby certain groups of Third World countries — usually the more successful economically, stable politically, or those engaged in military production derive positive impacts from military spending. Those countries relatively unsuccessful economically, more politically unstable or lacking a domestic arms industry fail to derive any positive economic impacts from defense expenditures.

Having said this it is important to note that a number of adverse effects stem from defense expenditures. This is true even in those countries experiencing higher overall rates of growth from increased allocations to defense. In particular, countries with an indigenous arms industry may suffer a deterioration in the distribution of income from added defense expenditures (Looney, 1989b). The same may also occur in military regimes as the authorities shift income from urban consumers to industrial groups.

A major limitation to the studies cited above is that by their nature cross-sectional studies are very aggregative, thus making reference to specific countries hazardous at best. One exception is Lebovic and Ishaq's (1987) study of defense spending in the Middle East. Using a pooled time-series, cross-sectional analysis on various groupings of Middle Eastern States, they found that higher military spending tended to suppress economic growth in the non-oil states of the Middle East during the 1973-84 period.

However, while Lebovic and Ishaq drew on time series data, they were not able to incorporate the potential effects of lags between the time defense expenditures occur and the period of maximum economic impact. In this regard Nehama Babin (1989) has noted that incorporating the time variable into analysis can be critical because some relationships that may exist over time disappear in the short run and vice versa. Clearly at the national level, development usually requires a series of changes that occur through systems, which involve organizations, agencies, economic structures and technological change. Consequently (as Babin concludes) it is unjustifiable to assume that a country's defense spending will have an immediate, or even short-term, effect on national economic performance.

Babin's main finding was that while short-run economic impacts of defense expenditure may be nil or even negative, the longer term effect on growth is likely to be positive. Along these lines, Kick and Sharda's (1986) analysis indicated that an

increase in the military manpower ratio does have a significant positive effect on two indicators of development, infrastructure and social welfare. This impact occurs with a fairly long (twelve year) lag. Kick and Sharda also found that the relationship over a 12 year period is positive. Militarization, whether measured by expenditures or size of the military, does contribute to development.

Summing up the research in this area: depending on the economic environment, defense expenditures have a number of channels through which they transmit impacts to the general economy. These include:

1. *Resource Allocation Effects.* Resource allocation effects occur when increases in military expenditures divert or re-allocate resources away from domestic civilian investment, public expenditures on government capital investment and current account expenditures on non-military inputs.
2. *Resource Mobilization Effects.* Increases in military expenditures are expected to influence domestic savings through the following linkages: a reduction in social services, additional taxes, an increase in the social discount rate, and inflation.
3. *Spin-off Effects.* Military expenditure have impacts on economic growth through spin-off effects on human capital (such as may result from military training, education and modernization) and on the productivity of investment (such as provided by technology transfers).
4. *Aggregate Demand Effects.* In an economy with underutilized productive capacity, increased aggregate demand from military expenditures will result in increased output. This leads to a rise in capacity utilization and profit rates, in turn inducing an increase in investment rates thus placing the economy on a higher long-term growth path.
5. *Debt Accumulation Effect.* The debt accumulation effect describes the impact on current performance of debt accumulation attributable to past acquisition of military goods and services from abroad.

II. METHODOLOGY

Given the conflicting nature of impacts of these factors it is not clear *a priori* whether military expenditures will promote or hinder economic growth. The final effect on economic growth is the net outcome of positive and negative impacts conveyed through the various channels. The net outcome is likely to differ across countries and over time.

As a starting point and to get a broad overview of the main patterns characterizing the interrelationship between defense expenditures, arms imports, debt, and economic performance in the 1980s a set¹ of these variables were factor

1. The variables included (in order of listing in Table 1): (1) total external debt as a percentage of exports, 1989; (2) the resource balance as a percentage of GDP, 1989; (3) the share of savings in GDP, 1989; (4) the average share of arms imports in total imports over the period 1989-1989; (5) the average share of arms imports in total imports over the period 1972-1979; (6) the average annual rate of GDP growth during the period 1980-89; (7) the average annual rate of growth in imports, 1980-89; (8) the average annual rate of growth in private consumption, 1980-89; (9) the average annual rate of growth in gross

analyzed (Rummel, 1970). This exercise (Table 1) identified five main trends² in the data:

Table 1
Factor Analysis: Developing Country Patterns
of Military Expenditures, Growth and External Debt

(factor loadings)

Variable	Factor 1 Debt Arms Imports	Factor 2 Growth	Factor 3 Public Spending Debt	Factor 4 Military Spending	Factor 5 Debt Service
Debt/Exports 1989	0.888*	-0.190	0.011	0.063	0.167
Res Bal/GDP 1989	-0.803*	-0.266	0.052	0.034	0.173
Savings /GDP 1989	-0.798*	0.193	-0.013	0.277	0.064
Arms Imp 1980-89	0.775*	0.008	0.056	0.395	0.063
Arms Imp 1972-89	0.771*	0.032	0.138	0.412	0.038
GDP growth 80-89	0.038	0.899*	-0.026	0.246	-0.063
Import growth 80-89	-0.078	0.862*	0.080	0.059	-0.065
Priv Cons 80-89	0.041	0.790*	0.162	0.049	0.157
Investment 80-89	0.052	0.757*	-0.336	0.040	-0.231
Invest /GDP 1989	-0.287	0.547*	-0.078	0.363	-0.106
Govt Cons 80-89	0.186	0.540*	-0.227	0.110	-0.219
Govt Exp/GNP 80-89	-0.158	0.060	0.847*	0.004	-0.063
Govt Exp/GDP 72-79	-0.010	-0.001	0.831*	0.251	-0.079
Debt / GDP 1980	0.383	-0.069	0.687*	0.128	0.267
Debt / GDP 1989	0.489	-0.316	0.629*	0.065	0.210
Exports / GDP 89	-0.469	0.050	0.620*	-0.128	-0.232
Govt Cons/GDP 89	0.134	-0.029	0.556*	-0.261	-0.221
Av Milx / GE 72-79	0.082	0.299	-0.087	0.865*	-0.049
Av Milx / GE 80-89	0.075	0.057	-0.287	0.818*	-0.073
Milx / GNP 80-89	0.077	0.162	0.379	0.802*	-0.046
Milx / GNP 72-79	0.121	0.219	0.336	0.787*	-0.036
Interest/ Exp 80	-0.212	-0.012	-0.025	-0.021	0.900*
Debt Serv /Exp 80	-0.199	-0.044	0.006	0.060	0.877*
Debt Serv /Exp 89	0.436	0.085	0.084	0.108	0.737*
Interest/ Exp 89	0.076	-0.155	-0.089	-0.097	0.710*
Eigen Values	5.470	5.140	3.464	3.299	2.138

Notes: Based on oblique factor rotation (SPSS, 1990).

* = loadings over 0.50.

capital formation, 1980-89; (10) the share of investment in GDP, 1989; (11) the average annual rate of growth in government consumption, 1980-89; (12) the average share of government expenditures in GNP over the period 1980-89; (13) the average share of government expenditures in GNP over the period 1972-89; (14) the percentage of total external debt in GDP in 1980; (15) the percentage of total external debt in GDP in 1989; (16) the share of exports in GDP, 1989; (17) the share of government consumption in GDP, 1989; (18) the average share of military expenditures in the central government budget, 1972-1979; (19) the average share of military expenditures in the central government budget, 1980-89; (20) the average share of military expenditures in GNP 1980-89; (21) the ratio of interest payments on the external debt to exports, 1980; (22) the ratio of debt service payments to exports, 1989; and (23) the ratio of interest payments to exports, 1989.

2. Selected on the basis of having Eigen Values greater than 2.0.

1. *Debt/Arms Imports*. The main trend in the data was represented by the high correlation of arms imports share of total imports and the ratio of total external debt to exports. Several structural variables, the resource balance and the share of savings in Gross Domestic Product (GDP) (1989) were also included in this factor. The resource balance roughly corresponds to the current account in the balance of payments.
2. *Growth*. Here it is apparent that many of the overall measures of macroeconomic growth in the 1980s were highly correlated. High growth was also strongly associated with the share of national resources devoted to investment.
3. *Public Spending/Debt*. The third major dimension in the data is that depicting the close relationship between government expenditures and the overall external debt burden. Also in this factor is the share of exports in GDP, perhaps indicating that countries with a high share of resources allocated to exports are relatively credit worthy.
4. *Military Expenditures*. This factor is comprised largely of the share of defense expenditures in the central government budget and the military burden, (the share of national resources allocated to the military). Interestingly, arms imports as a share of total imports is only weakly correlated with these variables.
5. *Debt Service*. The final factor is comprised of four measures of debt service — interest payments and total debt service as a share of exports in 1980 and 1989.

The individual country factor scores on each of these dimensions (Table 2) have a mean of zero. Thus they provide an index of the relative ranking of countries. As anticipated, the Middle East countries have by far the highest defense burdens (Factor 4), while many of the Latin American countries score relatively high in terms of their debt service burden (Factor 5). The economic success of the East Asian countries is apparent in their scores on Factor 2.

Table 2
Developing Country Rankings:
Military Expenditures, Growth and External Debt

(factor loadings)

Variable	Factor 1 Debt Arms Imports	Factor 2 Growth	Factor 3 Public Spending Debt	Factor 4 Military Spending	Factor 5 Debt
Tanzania	2.10	0.05	0.01	-0.13	0.05
Somalia	5.63	-0.49	0.17	0.88	-0.26
Malawi	0.61	0.28	0.49	-0.85	0.85
Burundi	1.31	0.84	-0.76	-0.42	-0.29
Madagascar	0.93	-0.82	-0.80	-0.24	1.32
Nigeria	-0.70	-2.72	-0.57	0.59	-0.84
Zaire	0.12	-0.10	-0.20	-0.09	0.00
Mali	1.02	0.98	-0.42	-0.20	-0.69
Niger	0.31	-1.32	-0.65	-0.98	0.21
Upper Volta	0.75	0.60	-1.49	-0.26	-1.38

Table 2 (cont)
Developing Country Rankings:
Military Expenditures, Growth and External Debt

(factor loadings)

Variable	Factor 1 Debt Arms Imports	Factor 2 Growth	Factor 3 Public Spending Debt	Factor 4 Military Spending	Factor 5 Debt
Rwanda	0.63	0.38	-1.31	-0.64	-1.14
India	0.50	1.06	-1.14	0.40	-0.29
China	-0.91	2.15	-0.78	2.03	-1.32
Haiti	0.13	-1.24	-1.04	-0.48	-1.35
Kenya	0.11	0.61	0.29	-0.53	0.45
Pakistan	0.67	1.21	-0.42	1.13	-0.13
CAR	0.61	-0.23	-0.35	-0.92	-1.32
Ghana	0.33	0.16	-0.86	-1.18	0.07
Togo	0.16	0.21	1.20	-0.74	-0.41
Zambia	0.25	-1.11	1.44	0.87	0.00
Sri Lanka	0.07	0.84	0.27	-0.97	-0.60
Indonesia	-0.69	0.75	-0.63	0.18	0.00
Mauritania	0.44	-0.50	2.35	1.18	0.32
Bolivia	0.26	-1.10	-0.34	0.25	1.60
Egypt	1.13	0.68	2.40	3.68	0.06
Senegal	0.16	0.29	0.15	-0.69	0.45
Zimbabwe	-0.27	-0.39	0.36	0.48	-1.53
Philippines	-0.36	-0.34	-0.63	-0.09	1.12
Ivory Coast	0.00	-0.43	1.35	-1.12	1.18
Dominican Rep	-0.42	0.27	-0.78	-0.46	-0.23
Morocco	0.16	0.60	0.46	0.72	1.10
Papua	0.04	0.37	1.03	-1.44	-0.61
Honduras	0.20	-0.03	-0.10	-0.44	-0.17
Guatemala	0.05	-1.59	-1.67	-0.15	-1.17
Congo	0.11	-0.15	2.37	-0.06	-0.06
Cameroon	-0.06	0.07	-0.72	-0.57	-0.44
Peru	-0.22	-1.14	-0.57	1.81	0.80
Ecuador	-0.03	-0.46	-0.52	0.58	1.37
Paraguay	-0.34	0.01	-1.12	-0.07	-0.42
El Salvador	0.32	-0.57	-1.31	0.33	-1.19
Colombia	-0.42	0.31	-1.09	-0.54	0.77
Thailand	-0.73	1.74	-0.51	0.38	-0.28
Jamaica	-0.48	0.10	1.42	-1.11	0.00
Tunisia	-0.40	0.29	1.04	-0.58	-0.59
Turkey	-0.11	1.24	-0.22	0.62	1.33
Panama	-0.22	-1.30	1.81	-0.91	-1.16
Chile	-0.76	-0.18	0.18	0.58	1.30
Costa Rica	-0.18	0.72	0.38	-1.34	0.58
Mauritius	-0.60	2.03	0.59	-1.83	-1.09
Mexico	-0.48	-0.29	-0.61	-1.00	2.54
Argentina	-0.12	-1.41	-0.35	0.64	1.74
Malaysia	-1.39	0.72	1.07	0.24	-1.26
Algeria	-0.18	0.26	0.25	-0.04	1.08
Venezuela	-1.05	-0.50	0.13	-0.30	0.94
Brazil	-0.68	0.65	-0.64	-0.71	2.77
Hungary	-1.06	-0.17	1.25	0.92	-0.11
Uruguay	-0.61	-0.97	-0.30	-0.14	0.10
Yugoslavia	-1.80	-0.98	-1.72	3.03	-0.62
Gabon	-0.97	-0.61	1.48	-0.23	-0.92
Trinidad	-1.17	-2.57	0.51	-0.45	-1.73
Portugal	-0.68	1.06	0.65	0.01	-0.28
South Korea					

Source: Derived from analysis in Table 1.

The next step in the analysis was to determine if some of the patterns between defense expenditures and economic growth observed in earlier periods carried over into the 1980s. Specifically, did the net impact of military expenditures produce a positive or neutral effect in countries characterized by relatively few resource constraints and negative in those countries encountering resource shortages?

On the assumption that resource constraints ultimately affect the overall rate of economic growth, our sample of countries was divided into two groups on the basis of their score on Factor 2 — the growth factor. Countries with a factor score less than 0 were classified as low growth (and presumably relatively resource constrained), while those with factor scores greater than 0 were placed in the high growth group (and were presumed to be relatively resource unconstrained). An examination of the means of a number of economic and defense expenditures for each group presents some interesting contrasts (Table 3):

1. Both groups of countries had relatively similar defense burdens (the share of Gross Domestic Product) allocated to the military. The high growth group was marginally lower: 2.6 versus 2.9% during the 1972-79 period, and 2.8 versus 3.0 during the 1980-89 period.
 2. While both groups of countries allocated roughly similar shares of their government budgets to the military in the 1970s, the budget share allocated to defense was considerably lower in the high growth countries (11.4 versus 15.6%) during the 1980s.
 3. In contrast the high growth countries had considerably lower shares of their imports accounted for by arms imports. This figure was about one half for the 1970s (2.5% versus 4.9%), but rose a bit in the 1980s to 3.1% for the high growth countries versus 4.5 for the low growth countries.
 4. Of course in terms of overall income growth the high growth countries did better 5.4 versus 3.8 in the 1970s and 3.7 versus 0.9% in the 1980s. Perhaps of greater significance the high growth countries maintained relatively high rates of investment growth during both periods, but the rate of capital formation in the low growth countries fell from 4.5% per annum in the 1970s to -4.4% in the 1980s.
 5. These growth patterns were also reflected, albeit to a lesser extent in exports, government consumption and private sector consumption. The low growth countries also had a considerable contraction in imports (from 3.7% in the 1970s to -4.0% in the 1980s).
 6. In terms of the relative size of the public sector, the low growth countries had a higher ratio of government expenditures to Gross National Product (GNP) in the 1970s (23.9% versus 21.8%), but this fell to 21.4% in the 1980s, while it increased to 26.6% in the high growth countries.
 7. As might be imagined the high growth countries were able to allocate a relatively high share of their resources to investment, 23.4% versus 15.4% in 1989. While the high growth countries had higher saving rates (18.9% versus 13.3%) the differences were not as great as those associated with investment.
 8. Several diverse patterns characterize the indebtedness of these two groups of countries. One striking fact is that the low growth countries have considerably higher external debt burdens, both in terms of the total
-

Table 3
Country Characteristics:
High and Low Growth Groups

(means)

	Growth Group		
	Low	High	Total
Military Expenditures			
Av Budgetary Share 72-79	12.5	12.9	12.7
Av Budgetary Share 80-89	15.6	11.4	13.4
Av Share of GNP 72-79	2.9	2.6	2.8
Av Share of GNP 80-89	3.0	2.8	2.9
Av Arms Imports/Total Imp 72-79	4.9	2.5	3.6
Av Arms Imports/Total Imp 80-89	4.5	3.1	3.8
Growth In:			
GDP 1980-89	0.9	3.7	2.4
GDP 1970-80	3.8	5.4	4.7
Investment 1989-90	-4.4	3.0	-0.5
Investment 1970-80	4.5	7.1	5.9
Government Consumption 1980-89	0.1	3.8	2.1
Government Consumption 1970-80	6.2	7.3	6.8
Exports 1980-89	-0.3	4.7	2.4
Exports 1970-80	4.3	3.6	3.9
Imports 1980-89	-4.0	1.9	-0.9
Imports 1970-80	3.7	5.6	4.7
Private Consumption 1980-89	1.2	3.4	2.4
Private Consumption 1970-80	3.6	5.2	4.4
Composition of Expenditures			
Av Public Share of GNP 72-79	23.9	21.8	22.4
Av Public Share of GNP 80-89	21.4	26.6	24.2
Govt Consumpt / GDP 1989	12.0	12.8	12.5
Investment / GDP 1989	15.4	23.4	19.7
Savings / GDP 1989	13.3	18.9	16.3
Exports / GDP 1989	24.2	26.5	25.4
Resource Balance / GDP 1989	-2.0	-4.6	-3.4
External Debt			
Total Debt / Exports 1980	171.1	158.7	164.5
Total Debt / Exports 1989	433.8	240.9	331.2
Total Debt / GNP 1980	51.2	41.2	45.9
Total Debt / GNP 1989	101.4	62.2	80.6
Debt Service / Exports 1980	23.0	19.6	21.2
Debt Service / Exports 1989	24.7	26.0	25.4
Interest / Exports 1980	11.7	10.0	10.8
Interest / Exports 1989	11.8	10.8	11.3

Notes: High/Low groups based on the discriminant score in Table 5. Variables are from: World Bank (1982, 1991), Military variables are from the United States Arms Control and Disarmament Agency (1984, 1991).

debt/GNP ratio and the total external debt to export ratio. Furthermore, these gaps widened considerably during the 1980s.

9. Interestingly enough, however, the debt service ratios of the two groups of countries do not reflect this pattern, with the high growth countries actually having the highest ratio of debt service to exports in 1989. These patterns suggest that much of the debt of the low growth countries is concessional and/or of a longer term nature.

On the surface, the two groups of countries seem to have (obviously other than their rate of macro-aggregate growth) their greatest differences with respect to their pattern of debt, especially the ratios of debt to exports and GNP. To assess the extent to which the pattern of debt differentiates high from low growth countries a discriminant analysis was undertaken drawing on the original set of variables from the factor analysis.

In terms of procedure, countries were initially classified as 0 or 1 based on their Factor 2 score. The program then attempted, using a stepwise selection process, to determine the extent to which our set of economic/military variables could correctly classify high and low growth countries.

The results³ of the discriminant analysis again produced several unexpected results (Table 4):

1. As expected the overall rate of Gross Domestic Product during the 1980s was the most significant variable differentiating the two groups. However, the only other growth variable statistically significant (in terms of the F test) in this regard was the rate of growth of exports (which was the seventh and last variable entered in the stepwise procedure).
2. The next most important variable was the share of defense expenditures in the central government budget, followed by the share of investment in GDP, and the resource balance share of GDP.
3. The share of arms imports (1972-79) in total imports was the fifth most important discriminating variable, followed by the two export variables.
4. Interestingly, none of the debt variables were statistically significant in differentiating the high growth from low growth countries.

Our profile of high and low growth countries is, therefore, largely based on relative resource constraints — especially differences in the proportion of resources allocated to investment (domestic resource constraint), and the rate of growth in exports (the external resource constraint). In addition the high growth devote considerably less of their central government budgets to defense as well as allocating a much lower share of their imports to armaments.

On the basis of the seven discriminating variables noted above, all of the countries except Mexico were classified correctly (Table 4). Furthermore the probabilities of correct placement (high or low growth groups) were made with a

3. Variables statistically significant (with Wilk's Lambda in parenthesis) in forming the discriminant function (in order of importance were: (1) GDP growth 1980-89 (0.569); (2) average military expenditures share of the central government budget, 1980-89 (0.467); (3) share of investment in GDP, 1989 (0.400); (4) resource balance share of GDP, 1989 (0.340); (5) average share of arms imports in total imports, 1972-1979 (0.297); (6) exports share of GDP, 1989 (0.285); (7) rate of growth in exports, 1980-89 (0.271).

Table 4

Relative Resource Constraint: 1980-90, Country Groupings

Country	Discriminant Score	Initial Classification		Probability of Group Placement	
		Factor 2 Score	Group	Low	High
Mozambique	-1.79	—	—	0.2	99.8
Ethiopia	5.73	—	—	100.0	0.0
Tanzania	-1.77	0.05	high	0.02	99.8
Somalia	1.60	-0.49	low	99.2	0.8
Bangladesh	-1.25	—	—	1.2	98.8
Malawi	-2.16	0.28	high	0.0	100.0
Nepal	-3.39	—	—	0.0	100.0
Burundi	-1.15	0.85	high	1.7	98.3
Sierra Leone	0.33	—	—	67.3	32.7
Madagascar	1.24	-0.83	low	97.5	2.5
Nigeria	2.93	-2.72	low	100.0	0.0
Uganda	0.60	—	—	83.3	17.0
Zaire	1.85	-0.10	low	99.7	0.3
Mali	-2.85	0.98	high	0.0	100.0
Niger	1.43	-1.33	low	98.6	1.4
Upper Volta	-2.20	0.60	high	0.0	100.0
Rwanda	-0.16	0.38	high	30.1	66.9
India	-1.46	1.06	high	0.6	99.4
China	-3.79	2.15	high	0.0	100.0
Haiti	1.12	-1.24	low	96.4	3.6
Kenya	-0.65	0.61	high	0.3	99.7
Pakistan	-0.48	1.22	high	13.2	86.8
CAR	0.47	-0.23	low	76.9	23.1
Ghana	-0.81	0.16	high	4.9	95.1
Togo	-0.12	0.21	high	32.9	67.1
Zambia	2.55	-1.11	low	100.0	0.0
Sri Lanka	-2.31	0.84	high	0.0	100.0
Indonesia	-2.33	0.75	high	0.0	100.0
Mauritania	2.00	-0.50	low	99.8	0.2
Bolivia	2.42	-1.10	low	99.9	0.1
Egypt	-1.12	0.68	high	1.9	98.1
Senegal	-0.40	0.29	high	16.3	83.7
Zimbabwe	0.57	-0.39	low	81.8	18.2
Philippines	0.71	-0.34	low	87.7	12.3
Ivory Coast	1.45	-0.43	low	98.7	1.3
Dominican Rep	-1.58	0.27	high	4.4	99.6
Morocco	-0.58	0.60	high	10.0	90.0
Papua	-1.88	0.37	high	0.2	99.8
Honduras	0.72	-0.03	low	88.0	12.0
Guatemala	1.97	1.59	low	99.8	0.2
Congo	1.23	-0.15	low	97.4	2.6
Syria	10.38	—	—	100.0	0.0
Cameroon	-0.04	0.07	high	38.9	61.1
Peru	3.02	-1.14	low	100.0	0.0
Ecuador	0.80	-0.46	low	90.3	9.6
Paraguay	-0.42	0.01	high	15.5	84.5
El Salvador	1.65	-0.57	low	99.3	0.6

Table 4 (contd)
Relative Resource Constraint: 1980-90, Country Groupings

Country	Discriminant Score	Initial Classification		Probability of Group Placement	
		Factor 2 Score	Group	Low	High
Colombia	-0.72	0.31	high	6.5	93.5
Thailand	-2.56	1.74	high	0.0	100.0
Jamaica	-0.91	0.10	high	3.6	96.4
Tunisia	-0.88	0.29	high	4.0	96.0
Turkey	-0.92	1.24	high	3.5	96.5
Panama	3.20	-1.30	low	100.0	0.0
Chile	1.15	-0.18	low	96.7	0.3
Costa Rica	-1.68	0.72	high	0.3	99.7
Poland	1.14	—	—	96.6	3.4
Mauritius	-3.63	2.03	high	0.0	100.0
Mexico	-0.23	-0.30	low*	25.2	74.8
Argentina	3.34	-1.42	low	100.0	0.0
Malaysia	-0.66	0.72	high	7.9	92.1
Algeria	-1.48	0.26	high	0.6	99.4
Venezuela	1.87	-0.50	low	99.7	0.3
South Africa	2.14	—	—	99.9	0.1
Brazil	-1.60	0.65	high	0.4	99.6
Hungary	0.67	-0.17	low	86.1	13.9
Uruguay	2.55	-0.97	low	100.0	0.0
Yugoslavia	2.53	-0.98	low	100.0	0.0
Gabon	1.11	-0.61	low	96.3	3.7
Iran	-1.32	—	—	1.0	99.0
Trinidad	3.94	-2.57	low	100.0	0.0
Portugal	-2.94	1.06	high	0.0	100.0
South Korea	-2.62	2.21	high	0.0	100.0
Greece	0.07	—	—	47.0	53.0

Notes: * = Miss-classified from original factor analysis. Discriminant analysis based on variables used in factor analysis. Based on oblique factor rotation (SPSS, 1990a).

high level of confidence. The resulting discriminant scores provide a convenient way of ranking countries in terms of their relative resource constraints (with countries the least resource constrained having the highest negative discriminant score).

The next step in the analysis was to determine whether and to what extent defense expenditures impacted differently in the two groups of countries (now defined in terms of their respective discriminant scores). For this purpose a simple growth model of the form:

$$\text{Growth} = f[\text{Investment, Resource Flows, Military Ex, Arms Imports}]$$

was estimated.

This model is of the Benoit type, whereby growth is largely seen as a function of investment and foreign resource flows. Military expenditures (and in this case arms imports) are then assessed on the margin for their impact on overall economic

expansion. Operationally, the scores from the factor analysis provide good proxies for the debt, military expenditure and arms import variables. That is because of the manner in which they were generated, they only slightly correlated with one another.

The results for the sample as a whole (Table 5) suggest that:

1. After accounting for the effect of investment on growth, both debt and military expenditures contributed to overall economic expansion.
2. On the other hand, arms imports do not appear to have a statistically significant relationship with economic growth in the 1980s.

Table 5
Impact of Defense Expenditures and
Arms Imports on Third World Growth, 1980-1989:
Total Sample of Countries

(standardized coefficients)

Total Sample — Growth (GDPG)

Investment Growth (GDIG)

(1) $GDPG = 0.67 GDIG$
 (6.43)

$r^2(\text{adj}) = 0.432; df = 52; F = 41.3$

Debt/Government Expenditures (FAC3)

(2) $GDPG = 0.78 GDIG + 0.39 FAC3$
 (7.59) (3.10)

$r^2(\text{adj}) = 0.513; df = 51; F = 28.9$

Defense Expenditures (FAC4)

(3) $GDPG = 0.77 GDIG + 0.31 FAC3 + 0.23 FAC4$
 (7.60) (3.10) (2.55)

$r^2(\text{adj}) = 0.560; df = 50; F = 23.5$

Arms Imports (FAC1)

(4) $GDPG = 0.76 GDIG + 0.31 FAC3 + 0.23 FAC4 - 0.08 FAC1$
 (7.62) (3.16) (2.52) (-0.87)

$r^2(\text{adj}) = 0.558; df = 49; F = 17.74$

Notes: Based on ordinary least squares regression (SPSS 1990). $r^2(\text{adj})$ = adjusted coefficient of determination; df = degrees of freedom; F = F statistic; () = t statistic.

To see if these patterns held up in the sub-groupings of countries, two sets of regressions were performed. The first set gradually eliminated the more resource constrained countries (those with the highest discriminant scores). This process was undertaken in stages with seven regressions performed, each successive one with a sample of countries populated with a higher proportion of countries experiencing relatively low resource constraints. The results (Table 6) indicated that:

1. As was the case with the total sample of countries, investment, debt and military expenditures were all statistically significant in contributing to overall expansion.

2. However as more and more of the resource constrained countries were eliminated from the sample, the debt variable ceased to produce a positive impact on growth.
3. Also as the proportion of low resource constrained countries increased, the military expenditure term became more important in contributing to economic growth (as evidenced by the increase in the size of its standardized coefficient).
4. In contrast to the total sample of countries, the arms import variable tended to impact negatively on growth, although its coefficient remained fairly low and it was only marginally significant.

Table 6

**Impact of Defense Expenditures and
Arms Imports on Third World Growth, 1980-1989:
Sequentially Eliminating Resource Constrained Countries**

(standardized coefficients)

Sample Included the Countries With:

Discriminant Score < 2.5

$$(1) \text{ GDPG} = 0.63 \text{ GDIG} + 0.22 \text{ FAC3} + 0.38 \text{ FAC4} - 0.14 \text{ FAC1}$$

(5.89) (2.10) (3.72) (-1.51)

$r^2(\text{adj}) = 0.579; \text{ df} = 43; \text{ F} = 17.18$

Discriminant Score < 1.5

$$(2) \text{ GDPG} = 0.57 \text{ GDIG} + 0.18 \text{ FAC3} + 0.45 \text{ FAC4} - 0.21 \text{ FAC1}$$

(5.01) (1.61) (4.36) (-2.20)

$r^2(\text{adj}) = 0.633; \text{ df} = 37; \text{ F} = 18.70$

Discriminant Score < 1.0

$$(3) \text{ GDPG} = 0.50 \text{ GDIG} - 0.01 \text{ FAC3} + 0.55 \text{ FAC4} - 0.24 \text{ FAC1}$$

(4.57) (-0.01) (5.26) (-2.44)

$r^2(\text{adj}) = 0.671; \text{ df} = 31; \text{ F} = 18.82$

Discriminant Score < 0.5

$$(4) \text{ GDPG} = 0.35 \text{ GDIG} - 0.09 \text{ FAC3} + 0.63 \text{ FAC4} - 0.25 \text{ FAC1}$$

(2.83) (-0.74) (5.61) (-2.47)

$r^2(\text{adj}) = 0.674; \text{ df} = 28; \text{ F} = 17.56$

Discriminant Score < 0

$$(5) \text{ GDPG} = 0.38 \text{ GDIG} - 0.08 \text{ FAC3} + 0.62 \text{ FAC4} - 0.24 \text{ FAC1}$$

(3.02) (-0.68) (5.35) (-2.32)

$r^2(\text{adj}) = 0.679; \text{ df} = 27; \text{ F} = 17.36$

Discriminant Score < -0.5

$$(6) \text{ GDPG} = 0.26 \text{ GDIG} - 0.26 \text{ FAC3} + 0.67 \text{ FAC4} - 0.27 \text{ FAC1}$$

(1.80) (-1.82) (5.33) (-2.51)

$r^2(\text{adj}) = 0.717; \text{ df} = 20; \text{ F} = 16.22$

Discriminant Score < -1.0

$$(7) \text{ GDPG} = 0.39 \text{ GDIG} - 0.14 \text{ FAC3} + 0.57 \text{ FAC4} - 0.27 \text{ FAC1}$$

(1.97) (-0.68) (5.44) (-2.06)

$r^2(\text{adj}) = 0.721; \text{ df} = 13; \text{ F} = 12.01$

Notes: Based on ordinary least squares regression (SPSS 1990). $r^2(\text{adj})$ = adjusted coefficient of determination; df = degrees of freedom; F = F statistic; () = t statistic.

Table 7

**Impact of Defense Expenditures and
Arms Imports on Third World Growth, 1980-1989:
Sequentially Eliminating Resource Unconstrained Countries**

(standardized coefficients)

Sample Included the Countries With:**Discriminant Score > -2.5**

$$(1) \text{ GDPG} = 0.72 \text{ GDIG} + 0.37 \text{ FAC3} + 0.16 \text{ FAC4} + 0.01 \text{ FAC1}$$

(6.21) (3.26) (1.52) (0.08)

$r^2(\text{adj}) = 0.446; \text{df} = 45; \text{F} = 10.87$

Discriminant Score > -2.0

$$(2) \text{ GDPG} = 0.69 \text{ GDIG} + 0.40 \text{ FAC3} + 0.20 \text{ FAC4} + 0.01 \text{ FAC1}$$

(5.81) (3.43) (1.80) (0.08)

$r^2(\text{adj}) = 0.452; \text{df} = 41; \text{F} = 10.30$

Discriminant Score > -1.5

$$(3) \text{ GDPG} = 0.68 \text{ GDIG} + 0.40 \text{ FAC3} + 0.20 \text{ FAC4} + 0.02 \text{ FAC1}$$

(5.33) (3.18) (1.68) (0.18)

$r^2(\text{adj}) = 0.458; \text{df} = 35; \text{F} = 9.24$

Discriminant Score > -1.0

$$(4) \text{ GDPG} = 0.67 \text{ GDIG} + 0.45 \text{ FAC3} + 0.19 \text{ FAC4} + 0.01 \text{ FAC1}$$

(4.74) (3.16) (1.40) (0.05)

$r^2(\text{adj}) = 0.393; \text{df} = 31; \text{F} = 6.67$

Discriminant Score > -0.5

$$(5) \text{ GDPG} = 0.68 \text{ GDIG} + 0.51 \text{ FAC3} + 0.18 \text{ FAC4} + 0.08 \text{ FAC1}$$

(4.06) (3.03) (1.18) (0.54)

$r^2(\text{adj}) = 0.393; \text{df} = 24; \text{F} = 5.53$

Discriminant Score > 0

$$(6) \text{ GDPG} = 0.57 \text{ GDIG} + 0.67 \text{ FAC3} + 0.19 \text{ FAC4} + 0.15 \text{ FAC1}$$

(2.97) (3.54) (1.14) (0.87)

$r^2(\text{adj}) = 0.424; \text{df} = 17; \text{F} = 4.88$

Discriminant Score > 0.5

$$(7) \text{ GDPG} = 0.57 \text{ GDIG} + 0.68 \text{ FAC3} + 0.15 \text{ FAC4} + 0.14 \text{ FAC1}$$

(2.80) (3.50) (0.85) (0.83)

$r^2(\text{adj}) = 0.425; \text{df} = 16; \text{F} = 4.69$

Notes: Based on ordinary least squares regression (SPSS 1990). $r^2(\text{adj})$ = adjusted coefficient of determination; df = degrees of freedom; F = F statistic; () = t statistic.

Looking at clusters of countries obtained by sequentially dropping the least resource constrained countries produced yet another pattern (Table 7):

1. For these countries, the debt variable (Factor 3) remained statistically insignificant throughout the exercise. That is, even though countries were sequentially dropped from the sample base on their relative resource abundance, the growth in investment remained highly significant in affecting the overall rate of economic expansion in the 1980.

2. In contrast to the resource unconstrained countries, debt played an important part in the growth of the resource constrained countries. In fact for countries with a discriminant score greater than zero, the standardized regression coefficient for this variable was greater than that for investment.
3. Again, in contrast to the resource unconstrained countries, defense expenditures were not statistically significant in affecting the overall rate of growth. The same was true for arms imports.

The relationship of arms imports to overall growth is an interesting one. The results found here are somewhat counter-intuitive. That is arms imports appear to retard growth in the relatively resource unconstrained countries (who in any case allocate a much lower proportion of total imports to armaments) but appear neutral in this regard in the case of the resource constrained countries.

While somewhat beyond the scope of this study, part of the explanation for this pattern may be found in the original factor analysis. There it was noted that arms imports were highly correlated with the share of the debt burden (debt to total exports). This pattern suggests that the resource constrained countries have financed a large percentage of their arms imports through increases in external debt. As such these funds may simply augment or add to foreign exchange holdings — this is foreign exchange that would not otherwise be available and therefore of low opportunity cost.

Of course the relationship between arms imports and official debt could also indicate that a significant portion of arms transfers was financed through military assistance programs. Military equipment from the former USSR and its Warsaw Pact allies was generally provided to developing country recipients in the form of loan aid. The end of the Cold War has reduced the availability of military assistance on grant or concessional loan terms. This may well impel erstwhile arms importers in the developing world to recalculate the costs and benefits of military equipment procurements.⁴

CONCLUSION

Conventional wisdom has long posited that heavy outlays on defense divert scarce resources away from directly productive investment (the old guns and butter trade-off) and human capital formation (education, health). While this view makes intuitive sense, it does not necessarily follow that increased military expenditures actually reduce overall economic growth in developing countries as a whole. There is a counter-argument with respect to developing countries that suggests defense expenditures may act as an economic stimulus. They finance heavy industry (armaments); the acquisition of advanced technologies, the provision of employment, and the like. Defense expenditures or a large military establishment may attract investment and thus enhance the country's foreign exchange position. Arguably, defense expenditures may also provide longer term economic benefits

4. I am indebted to an anonymous referee for this point.

through the development of human resource skills (eg. aviation, engineering, chemistry, etc.) which are transferable to the civilian economy.

The results obtained here are consistent with this dual view of defense expenditures. The findings are also consistent with earlier studies for the periods prior to 1980. Roughly the same picture has carried over into the 1980s. During this period, the more abundantly resource endowed countries appear to have derived positive net benefits to growth from increased defense expenditures.

These findings have several implications for the current policy debate taking place in several international agencies, particularly the International Monetary Fund and the World Bank. Both of these institutions are seriously considering reducing lending to countries with excessive levels of defense expenditures (Hewitt, 1991; McNamara, 1991). While this concern is very commendable on purely humanitarian grounds, the above results indicate that reduction in military spending *per se* would probably not result in a major acceleration in overall economic growth, unless military expenditure reductions were focused on arms imports. Obviously one could still justify these tightened lending conditions on non-economic criteria.

For the low growth countries (who apparently have derived no net positive or negative effects from defense expenditures) the critical question is not one of reducing defense expenditure *per se* but the extent to which the so-called "peace dividend" can be: (1) mobilized by the government, and (2) the funds channeled into productive activities. As Richards and Waterbury (1990, p. 361) note:

We may estimate, counterfactually, the returns on alternative uses of the monies devoted to defense, but practically nowhere in the world is there any assurance that reduced defense budgets would result in increased outlay on say, social welfare or infrastructure. Defense outlays are laden with the symbols and sentiments of national pride and survival. People seem prepared to accept disproportionate public investment in defense. They and their leaders find less justification in using equivalent resources to reduce adult illiteracy or line irrigation ditches.

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