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# *Impact of Military Expenditures on Third World Debt*

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## ABSTRACT

*The general purpose of this paper is to determine the main causes of Third World external public debt, and in particular the role military expenditures have played in contributing to that debt. For purposes of analysis, it was found useful to separate developing countries into two groups. The first were classified as largely undynamic and resource constrained, while the second group were dynamic and less constrained by such factors as domestic savings and foreign exchange. Examining each group separately, it was found that military expenditures have significantly contributed to the external debt position of the constrained group of countries, but not those countries with relatively high foreign exchange earning capacity. Given that military expenditures are largely "unproductive", it appears that the resource constrained countries will face particularly severe problems in servicing their external liabilities.*

## RÉSUMÉ

*Cet article vise à identifier les principales causes de l'endettement public externe des pays du Tiers Monde, et plus particulièrement le rôle des dépenses militaires dans cet endettement. L'auteur a jugé bon, pour les fins de l'analyse, de diviser les pays en voie de développement en deux groupes : l'un « stagnant » et limité dans ses ressources, l'autre « dynamique » et moins restreint par des facteurs tels que l'épargne domestique et les réserves en devises étrangères. Après avoir examiné les deux groupes séparément, l'auteur conclut que les dépenses militaires ont grandement contribué à l'endettement externe actuel des pays du premier groupe, mais non à celui des pays du deuxième groupe. Étant donné le caractère largement « improductif » des dépenses militaires, il semble que les pays du premier groupe vont être confrontés à de graves problèmes pour assurer le remboursement de leur dette externe.*

## INTRODUCTION

The debt crisis facing many developing countries has attracted much attention in recent years. In large part, most of the analysis of Third World debt has focused on the

methods used to finance the rapid rate of increase in external debt and the capacity of the developing countries to service the debt.[1]

Few studies,[2] however, have attempted to define the motives for debt accumulation, other than, for example, to point to the obvious need to finance current account deficits due to the oil price shocks. An increasing suspicion among some analysts is that a large proportion of existing Third World debt was contracted for the purpose of financing stepped-up levels of military expenditure, in general, and arms imports, in particular.

It is now well-documented, for example, that with little difficulty Argentina was able to amass $33 billion in incremental debt between 1978 and 1982, about $5 billion of which went to arms purchases. How did this happen? Compared to the traditional contracting terms for foreign and/or public sector loans, international capital flows in the 1970s and early 1980s increasingly came with few strings attached to their use.[3]

It is clear that for most LDCs a large part of the military equipment budget has to be spent on imported armaments. According to SIPRI, weapons imports by LDCs rose from $1,559 million in 1965 to $10,450 million in 1980—all in constant 1975 prices. This trend also coincided with the rapid overall buildup of Third World debt. On the other hand, arms imports declined to $9,551 million in 1983 and $7,519 million in 1984,[4] a period characterized by increased reluctance on the part of international lenders to increase their Third World exposures.

Brzoska[5] provides the only attempt to calculate the extent and contribution of LDC debt attributable to the military. According to his estimates, by the late 1970s, the net transfer of debt would be about twenty to thirty percent less if debt financed weapons imports had been absent.

Weapons purchased with scarce foreign exchange have an obvious allocation cost in terms of reduced resources available for the import of intermediate and investment goods essential for self-sustaining growth. It is, of course, true that a reduction in military imports would not necessarily imply an equivalent increase in investment, for some leakage in terms of consumption or other imports could occur. However, there can be little doubt that lower defense imports would improve the situation in terms of foreign exchange scarcity.[6]

The main purpose of the analysis that follows is to extend Brzoska's analysis by determining the main causes of the overall external debt accumulated by developing countries up to 1982, the extent to which military expenditures contributed to that debt, and which groups of developing countries have had their external debt most affected by

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1. See, for example, BAHRAM NOWZAD and RICHARD C. WILLIAMS, *External Indebtedness of Developing Countries*, Occasional Paper, No. 3, Washington, International Monetary Fund, May 1981; E. BRAU and R. C. WILLIAMS, *Recent Multilateral Debt Restructurings with Official and Bank Creditors*, Occasional Paper, No. 25, Washington, International Monetary Fund, December 1983; and K. BURKE DILLON, *et. al.*, *Recent Developments in External Debt Restructuring*, Occasional Paper No. 40, Washington, International Monetary Fund, October 1985.

2. A notable exception is H. ROBERT HELLER and E. FRENKEL, "Determinants of LDC Indebtedness," *The Columbia Journal of World Business*, Spring 1982, 28-34.

3. Cf. MARTIN SHUBIK and PAUL BRACKEN, "Strategic Purpose and International Economy," *Orbis*, Fall 1983, 567-91 for a detailed account.

4. Figures are from *World Armaments and Disarmament SIPRI Yearbook*: various issues, Philadelphia, Taylor and Frances.

5. MICHAEL BRZOSKA, "The Military-Related External Debt of Third World Countries," *Journal of Peace Research*, 1983, 271-77.

6. SAADET DEGER and RON SMITH, "Military Expenditure and Development: The Economic Linkages," *IDS Bulletin*, October 1985, 52.

military expenditures.[7] Clearly, since military expenditures are most likely "unproductive" in the sense of generating a stream of foreign exchange earnings, the results of this analysis should throw additional light on the debt servicing capacities of the major indebted Third World countries.

## I. METHODOLOGY

Regression analysis was first used to determine the statistical association and significance of several of the major factors which, in addition to military expenditure, have been suggested in the literature as playing a significant role in the expansion of Third World debt.

The first step in the regression analysis was the development of a relatively simple model of Third World debt that could be specified in a form amenable to empirical estimation. The sample used in the construction of the model[8] consists of seventy-seven developing countries. External debt is defined as public external debt owed to non-residents and repayable in foreign currency and having a maturity of over one year.[9] Note that the analysis below is concerned with the volume of external LDC indebtedness rather than the price of that debt, or its opportunity costs (the measure used by Brzoska).

Conceptually, analysis of the volume of debt is much more straightforward than its price because most decisions on debt volume are made in terms of one set of criteria, such as country limits, key macroeconomic sectors and project specifications—factors that tend to be operational.

On the other hand, the price of debt may be affected by a wide spectrum of qualitative factors such as international capital market conditions, prevailing premia and the economic policies of the key currency countries as they affect money markets and regional money supplies. Clearly, those elements are much more difficult to model than factors affecting volume.

In sum, it was felt that Brzoska's opportunity costs estimates based on the price of debt associated with weapons imports would involve too many subjective assumptions to be of use in analyzing accumulated debt. Furthermore, Brzoska only estimated the impact of arms imports on external debt for individual years.

## II. MODEL FORMULATION

In selecting variables responsible for the volume of public external debt accumulated by 1982, it is reasonable as a first step to assume that country size will have a direct relationship both to the amount of external indebtedness and the individual country's capacity to service this debt. Clearly, a large country as measured by GDP will *ceteris paribus* have

7. For Third World military producers, it is even likely that the need for maintenance, servicing, spare parts and capital imports required to sustain indigenous military production causes Third World military producers to consume more foreign exchange than they save or generate in earnings. See RON AYRES, "Arms Production as a Form of Import Substituting Industrialization: The Turkish Case," *World Development*, 1983. In any case, the foreign exchange component of military expenditures has been shown to be considerable. See PETER TEHRAL, "Foreign Exchange Costs of the Indian Military, 1950-72," *Journal of Peace Research*, 1982, 251-59.

8. Economic and debt variables are from *World Development Report 1984*, Washington, The World Bank, 1984. Unless otherwise specified, all data are for 1982.

9. *Ibid.*, p. 280.

more financial and commercial relations with the rest of the world economy, and, therefore, will be more likely to accumulate a large debt volume than a small country. At the same time, due to the diversity of output and resource base, the debt servicing capacity of a large country is apt to be greater than that of a small country (and consequently a larger external debt can be accumulated). In general, we postulate that the larger the LDC economy as measured by its gross domestic product (GDP), the greater its demand for external indebtedness.

Second, a country's external debt should, in general, be related to its general volume of merchandise imports. For LDCs, the volume of merchandise imports often tends to have a direct relationship to the country's GDP, thus providing an additional source of demand for debt. Since in a growing economy a large share of imports will have to be financed, a country's indebtedness will be higher as total imports increase.

Third, an LDC with a greater export volume will be able to service a larger amount of foreign debt. As is well known, export volume is often used by lending institutions as a key indicator of debt service capacity. For practical purposes, it is safe to assume that lenders' willingness to supply debt varies directly with a country's exports. This relationship is particularly important as it relates directly to the export financing of the country. For most developing countries, export financing is done in foreign currency since most of the exports are denominated in foreign currency as well. In short, we would expect a positive relationship between country debt and the volume of merchandise exports.

Fourth, an LDC's overall current account deficit (or surplus) provides the most direct impact on external debt, since obviously the size of the deficit is made possible by external financing. Clearly, the larger the current account deficit, the larger the overall external public debt.

Fifth, international reserve holdings may be another important factor in affecting the volume of a country's external debt. Here the relationship is likely to be more complex. Logically, as a country's reserves increase, its ability to service a growing external debt and, hence, its credit-worthiness should also increase. On the other hand, everything else equal, one might expect that the larger a country's external revenues, the less pressing the need for additional debt to finance imports. Therefore, possession of a large volume of international reserves may result in larger or smaller volumes of external debt.

Finally, three types of governmental expenditures[10]—military, health and education—[11] are introduced as independent variables in the demand for external debt, that is, for political or social reasons these expenditures have a high import component and, therefore, may be major elements in accounting for the volume of external public debt over and above the other demand variables noted above.

Clearly, because of multicollinearity between the independent variables defined above, it is not possible to determine through regression analysis the percent of LDC public external indebtedness stemming from military expenditures. Given this constraint, the analysis below attempts to answer the question of whether military expenditures (after controlling for GDP, imports, reserves, etc.) have significantly contributed to LDC external indebtedness and, if so, what type of environments have been most conducive to external borrowing for the purpose of increasing military expenditures.

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10. Military expenditure data are for 1981 and are taken from U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers 1975-82*, Washington, D.C., ACDA, 1984.

11. Government expenditures on education and health are for 1980 and are taken from RUTH SIVARD, *World Military and Social Expenditures, 1983*, Washington, D.C., World Priorities, 1983.

The next step in the analysis is to isolate the main supply and demand influences on Third World indebtedness by deriving a reduced form equation that is capable of measuring the influence of all independent variables simultaneously.

In the specification,[12] gross domestic product (GDPB) is the principal demand variable, followed by merchandise imports (MTEB), the current account balance (CAB), and the individual public sector expenditures: military expenditures (ME), health (SH) and education (SE).

On the supply side, the main variables are foreign reserves (GIRB) and exports (MTEDB). Notationally:

a) Total debt (PDB) supply = $f_1$ (reserves, exports), and
b) Total debt (PDB) demand = $f_2$ (GDP, imports, current account balance, military expenditures, education expenditures, health expenditures).
c) Total debt supply = total debt demand. Dividing equations (a) and (b) by the equilibrium level of total debt as specified in equation (c), we obtain equation (d)
d) $f_1$ (total debt) = $f_2$ (total debt) expressing equation (d), we can write:
e) $x_1$, $f_1$ (total debt) − $f_2$ (total debt) = 0, or
f) $x_2$, (total debt, GDP, imports, reserves, military expenditures, education expenditures, health expenditures, exports, current account balance, imports) = 0, or
g) PDB = $f_3$ (GDPB(+), MTEB(+), GIRB(−), ME(+), SE(+), SH(+), MTEA(+), CAB(+)) = 0.

This last set of relationships provides the equation to be estimated by the regression analysis performed below.

## III. REGRESSION RESULTS: TOTAL COUNTRY SAMPLE

The regression analysis was performed in a step-wise manner. That is, the variable most significant in affecting external debt was introduced first, followed in the second equation (Table 1) by the variables of next importance in contributing to our understanding of the variation of external debt across Third World countries. The advantage of this procedure is that it allows us to assess the marginal contribution additional variables make to the determination of the external debt positions of our sample countries.

The regression results, beginning with the total sample of seventy-seven developing countries (the sample size on various specifications fluctuates due to missing observations for some of the independent variables), indicated (Table 1) as expected the relative importance of GDP (GDPB) in accounting for the observed patterns of LDC public external debt (PDB). In fact, by itself, fluctuation in GDP accounts for nearly seventy percent of the fluctuations in public external debt (Equation 1, Table 1). International reserves (GIRB) are next in importance and as expected have a negative sign; that is, countries with high levels of reserves are not compelled to accrue external debt.

The current account balance (CAB) is also statistically significant (Equation 3, Table 1) and has the anticipated sign: the larger the current account deficit, the higher the overall level of external indebtedness. These three variables, gross domestic product

12. As developed by Heller and Frenkel, *op. cit.*

Table 1

Determinant of public external debt (1982) total military-non military producers

Standardized Estimates

| Equation | Independent Variables | | | | | | | | Statistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | GDPB | GIRB | CAB | ME | MTEA | MTEB | SH | SE | $r^2$ | F | DF |
| (1) PDB = | 0.83 | | | | | | | | | | |
| | (13.05) | | | | | | | | 0.691 | 170.18 | 77 |
| (2) | 1.07 | −0.44 | | | | | | | | | |
| | (18.58) | (−7.61) | | | | | | | 0.829 | 177.23 | 75 |
| (3) | 0.96 | −0.24 | −0.21 | | | | | | | | |
| | (13.41) | (−2.32) | (−2.31) | | | | | | 0.841 | 116.11 | 69 |
| (4) | 0.95 | −0.27 | −0.23 | 0.07 | | | | | | | |
| | (10.45) | (−2.44) | (1.92) | (0.48) | | | | | 0.851 | 85.69 | 64 |
| (5) | 0.89 | −0.37 | −0.27 | 0.04 | 0.19 | | | | | | |
| | (8.61) | (−2.70) | (−2.12) | (0.30) | (1.22) | | | | 0.854 | 68.01 | 63 |
| (6) | 0.88 | −0.37 | −0.31 | 0.05 | 0.26 | −0.06 | | | | | |
| | (7.51) | (−2.58) | (−1.56) | (0.37) | (0.85) | (−2.58) | | | 0.854 | 55.77 | 63 |
| (7) | 1.16 | −0.13 | −0.34 | | | | −0.29 | | | | |
| | (11.39) | (−1.14) | (−3.42) | | | | (−2.58) | | 0.856 | 96.24 | 69 |
| (8) | 0.68 | −0.30 | −0.19 | | | | | 0.34 | | | |
| | (4.53) | (−2.90) | (−2.18) | | | | | (2.15) | 0.851 | 93.06 | 69 |

Note: Independent variables, GDPB, gross domestic product 1982 (millions of dollars); GIRB, gross international reserves 1982 (millions of dollars); ME, military expenditures 1981 (millions of dollars); MTEA, merchandise exports 1982 (millions of dollars); CAB, current account balance 1982 (millions of dollars); SH, Health expenditures 1980 (millions of dollars); SE, education expenditures 1980 (millions of dollars); PDB public external debt 1982 (millions of dollars).
DF = degrees of freedom; F = F statistic; $r^2$ = correlation coefficient; ( ) = t statistic

(GDPB), international reserves (GIRB), and current account balance (CAB) account for over eighty-four percent of the observed fluctuations in Third World debt.

On the margin, neither military expenditure (ME), exports (MTEA), or imports (MTEB) appear to significantly contribute to the regression equation (as indicated by the low "t" statistics in parenthesis under the estimated coefficients). On the other hand, health expenditures (SH) are statistically significant, with a negative sign, and education expenditures (SE) are statistically significant with a positive sign. Neither variable, however, makes a major improvement in the $r^2$ obtained in Equation 3, Table 1.

On the whole, therefore, it appears that on the margin (after controling for GDP, reserves, and current account deficits) military expenditures have not played a significant role in affecting the external debt accrued by our total sample of less developed countries.

## IV. EXAMINATION OF SUB-GROUPINGS OF COUNTRIES: GENERAL CONSIDERATIONS

While the results above indicated that military expenditures are likely to have played a significant role in contributing to the overall level of external debt accrued by 1982, several accounts[13] exist detailing massive external borrowing by several less developed countries occurring simultaneously with military build-ups. On the other hand, it is quite logical to expect that high levels of military expenditures in countries with poor export prospects face lenders who, because they are fearful of the country's ability to service increased external debt, actually lower their exposures in those economies. If this hypothesis is true, the inconclusive results obtained above may have stemmed from the fact that two opposing forces were at work. More specifically, if, in fact, a large group of credit-worthy countries was increasing their external debt to finance stepped-up defense expenditures, while simultaneously another group of countries was experiencing cutbacks in the availability of external funds due to high existing levels of military expenditure and poor export prospects, the net effect for the total sample might be nil. That is, developments in one group of countries might neutralize the opposite effects taking place in the other group so that statistically no pattern between debt and military expenditures would exist for the sample as a whole.

Several studies[14] have, in fact, indicated that developing countries may lack homogeneity with regard to the impact that defense expenditures have on the overall economic growth of the country. Frederiksen and Looney contend that[15]

> One can argue that under certain circumstances defense spending can help growth while under a different set of circumstances, it can hinder growth. Indeed, both propositions are likely to be true for the same country at different points in time.
>
> On the positive side, defense spending may contribute to the growth of the civilian economy by: 1) feeding, clothing and housing a number of people who would otherwise have to be fed, housed and clothed by

13. See, for example, those in Shubik and Bracken, *op. cit.*

14. See P. C. FREDERIKSEN and R. E. LOONEY, "Defense Expenditures and Economic Growth in Developing Countries: Some Further Empirical Evidence," *Journal of Economic Development*, July 1982, 113-125; P. C. FREDERIKSEN and R. E. LOONEY, "Defense Expenditures and Economic Growth in Developing Countries," *Armed Forces and Society*, Summer 1983, 633-645; P. C. FREDERIKSEN and R. E. LOONEY, "Another Look at Defense Spending and Economic Growth in Developing Countries," *Defense Analysis*, Forthcoming 1985; and P. C. FREDERIKSEN and R. E. LOONEY, "Defense Expenditures and Economic Growth in Developing Countries: A Reply," *Armed Forces and Society*, Winter 1985, 298-301.

15. P. C. FREDERIKSEN and R. E. LOONEY, "Defense Expenditures and Economic Growth in Developing Countries: Some Further Empirical Evidence," *op. cit.*, 117.

> 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, communication 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.

They add that on the negative side:[16]

> There are at least three different types of possible effects. The first, named the "income shift" by Benoit, is that increases in defense expenditures will reduce the civilian GDP and will thus tend to decrease growth proportionately. Second, it is possible that defense spending adversely affects growth since the government sector for the most part exhibits "negligible rates of measurable productivity increases." Finally, growth can suffer since increased spending on defense uses resources which could have been better employed as civilian investment.

Frederiksen and Looney note that while these arguments make intuitive sense, the crucial determinant of the impact of defense expenditures on economic growth is the country's financial resource constraint. According to them, a country which is severely resource constrained (which faces some combination of lagging taxes, reduced private and government savings, reduced borrowing power overseas, export shortfalls, etc.) will probably face budget cuts. In order to maintain defense programs, the high growth development programs will be sacrificed:[17]

> This is likely for two reasons. First, it is usually more politically acceptable to curtail capital investment (on infrastructure, for example) than expenditures on the current account. Second, given that a well-established military establishment already exists, there will be obvious pressure to maintain the status quo. These special interest groups might include high ranking officers, military contractors, and certain political groups. As budgets are reduced, the military share is frozen and the brunt of the deflationary policy is borne by development projects which we assume are relatively productive. In short, defense expenditures are likely to be asymmetric—difficult to cut back but easily expanded. Thus, for resource-constrained countries, we should expect a negative relationship between defense spending and economic growth.

The authors contend that the opposite is likely to hold for countries with a relative abundance of financial resources—an elastic supply of tax revenues, a high inflow of foreign exchange and the like:[18]

> These countries can more easily afford the capital investment programs necessary for economic growth while maintaining or even increasing defense programs.

They conclude that[19]

> If this thesis is correct, one can see why previous authors have failed to find any consistency between economic growth and defense. Using a model based on resource constraints, however, it is easy to see why developing countries with identical levels of defense spending can experience very different growth levels: richer countries are apparently able to invest in development programs while, on the other hand, poorer countries have had to sacrifice these programs to pay for defense.

Since their hypothesized relationship between defense and economic growth depended on financial resource constraints, their sample of developing countries was separated into either a resource constrained or unconstrained group by means of cluster analysis. While a large number of conceivable proxy measures could be used to indicate the relative abundance or scarcity of financial resources, the selection of those used in the cluster

16. *Ibid.*
17. *Ibid.*, 118.
18. *Ibid.*
19. *Ibid.*

analysis was based on the ratios of gross domestic investment to GDP in 1960 and 1978 and the ratios of gross domestic savings to GDP in 1960 and 1978.[20] The cluster analysis produced two distinct groups: one having high levels of savings and investment to GDP, the other having low ratios of savings and investment to GDP.

Linear regression equations were estimated for each group:[21]

> The most striking result, and one that supports our hypothesis, is that the coefficient of the defense variable was positive and statistically significant at the 99 percent level for the richer group. While the coefficient level for the defense variables for the poorer group was negative (as hypothesized) it was not statistically different from zero.

Based on the above-cited results, it makes sense to split our sample of developing countries into groups based on some measure of resource constraint. Presumably, those countries who have either more domestic resources (savings and investment) or more access to foreign capital (everything else equal, such as gross national product) will be able to support a higher level of defense expenditures. On the other hand, those countries with a lower level of domestic resources or less access to international capital (everything else equal) will not have as high a level of defense expenditures.

## V. EXAMINATION OF SUB-GROUPINGS OF COUNTRIES: EMPIRICAL ANALYSIS

Given the necessity to separate our sample of countries into sub-groupings, the question remains as to the best operational method for accomplishing this task. The analysis of Frederiksen and Looney summarized above indicated that a fruitful division of countries for analysis of military expenditures is on the basis of their relative resource constraints.

A number of variables reflect relative resource scarcity in developing countries. These include measures of savings, investment, capital flows, debt servicing, exports, imports and the like. The statistical problem is that many of these measures are highly correlated with each other and, as such, are redundant in providing information as to resource scarcity.

One solution to this problem is to simply pick several variables—savings, exports, for example—and create two groups of countries: one with high savings and exports, the unconstrained group and the other with low savings and exports, the relatively constrained group. This procedure suffers from the fact that selection of variables is somewhat arbitrary. More importantly, some countries are likely to have low rates of savings and high exports or vice versa and thus will be difficult to classify.

In order to make the analysis that follows as objective as possible, a large number of variables reflective of resource scarcity were selected as an initial data set. These independent variables were then factor analyzed. The advantage of factor analysis is that by determining the common variance among the independent variables, it enables the researcher to objectively reduce the number of variables that need to be retained for further analysis.

The factor analysis found out of a sample of thirty-four variables seven major independent measures of resource scarcity. The variables most representative of each trend were: 1) Gross inflow of public loans/exports 1982; 2) total public external debt 1982; 3) gross international reserves 1982; 4) public external debt as a % of GDP 1982; 5) growth

20. Data taken from World Bank, *World Development Report*, Washington, D.C., World Bank, 1980.
21. *Ibid.*

in imports 1970-82; 6) external debt service as a % of GDP 1982; and 7) public external debt as a % of GDP 1970.

The next step in creating sub-groupings of countries based on their relative resource scarcity was to utilize the seven variables above as discriminating variables in a discriminant analysis.[22] Using these seven variables, the discriminant analysis split the countries into two groupings based on their relative attainment of each of the seven variables, that is, the countries were profiled into two composite groups (Table 2) based on their relative resource abundance as reflected in the seven measures of scarcity.

Group I countries, in general, seem to be the poorer, less economically dynamic nations, this group being heavily weighted with African and poorer Latin American countries. The Group II countries consist of several major oil exporters and several of the more dynamic newly industrializing nations, such as Mexico, Greece, India, Korea, Spain, Algeria and Malaysia.

Further insight into the two groups can be gained by examining the means of the variables used in the discriminant analysis (Table 3):

1. Group I countries resorted to a much higher (3.6 times) inflow of external public loans in 1982 relative to their exports that year.
2. On the other hand, the overall level of total public external debt in 1982 averaged nearly four and one half times as much for Group II countries than is the case for Group I countries.
3. The level of international reserves is also much higher for Group II countries—nearly ten times as much as the average for Group I countries.
4. With regard to shares of debt in gross domestic product, however, Group I countries have much higher levels of attainment, averaging nearly twice as much as Group II countries in both 1970 and 1982. The debt service ratio to exports is correspondingly higher for Group I countries.
5. The rate of growth of imports was nearly ten times higher over the 1970-82 period for Group II countries.

In terms of profiles, therefore, Group II countries are considerably larger, more affluent, and less reliant on external debt as a percentage of gross domestic product. They tend to spend relatively large amounts on military activities, but not necessarily significantly greater amounts of their overall budgets.

Given the contrasting economic environments between the two types of countries, it is logical to expect that the determinants of external debt varied considerably between groups.

To test for the role of military expenditures in affecting the external debt position of each sub-group of countries, regressions similar to those performed for the total sample of countries (Table 1) were undertaken.

As anticipated, a much different pattern appears for Group I countries when analyzed separately (Table 4). For this sample of countries, gross domestic product (GDPB) and international reserves (GIRB) account for only fifty percent of the observed fluctuations in total public external debt with international reserves having a positive sign. Adding

22. See *SAS Users Guide, Statistics, 1982 Edition*, Cary, N.C., SAS Institute, 1982, for a description of the program. The sample countries were initially assigned an arbitrary one or zero so that placement could be made into two groups. A three-group division of countries did not produce a clear split between the means of the groups, i.e., there was not a high probability of correct placement for each country in one of these groups.

Table 2

Discriminant analysis total sample countries
based on economic factor analysis high loadings

| Group I | | Group II | |
|---|---|---|---|
| Country | Probability of Correct Placement | Country | Probability of Correct Placement |
| 1. Israel | 69.34 | 1. Greece | 57.78 |
| 2. Honduras | 83.48 | 2. India | 84.91 |
| 3. Cameroon | 60.73 | 3. Nigeria | 89.07 |
| 4. Sudan | 66.47 | 4. Indonesia | 90.67 |
| 5. Costa Rica | 92.64 | 5. Egypt | 68.20 |
| 6. Bolivia | 86.27 | 6. Korea | 89.95 |
| 7. Somalia | 86.46 | 7. Rwanda | 69.08 |
| 8. Tunisia | 68.31 | 8. Turkey | 66.95 |
| 9. Morocco | 73.06 | 9. Spain | 51.89 |
| 10. Guatemala | 54.91 | 10. Venezuela | 80.26 |
| 11. Malawi | 91.40 | 11. Mexico | 99.69 |
| 12. El Salvador | 65.90 | 12. Brazil | 99.02 |
| 13. Mali | 97.12 | 13. Algeria | 76.44 |
| 14. Pakistan | 86.98 | 14. Philippines | 55.78 |
| 15. Paraguay | 60.02 | 15. Libya | 75.69 |
| 16. Ecuador | 56.61 | 16. Colombia | 54.63 |
| 17. Dominican Republic | 74.12 | 17. Thailand | 60.95 |
| 18. Liberia | 94.77 | 18. Malaysia | 65.16 |
| 19. Ivory Coast | 84.42 | 19. Argentina | 66.09 |
| 20. Mauritania | 96.04 | 20. Saudi Arabia | 94.65 |
| 21. Sierra Leone | 86.05 | 21. Kuwait | 81.31 |
| 22. Panama | 94.37 | 22. Syria | 63.95 |
| 23. Chile | 70.09 | 23. Jordan | 50.81 |
| 24. Chad | 87.18 | | |
| 25. Uruguay | 67.87 | | |
| 26. Tanzania | 79.87 | | |
| 27. Uganda | 88.76 | | |
| 28. Ethiopia | 70.24 | | |
| 29. Cen. African Rep. | 76.89 | | |
| 30. Ghana | 78.72 | | |
| 31. Burma | 82.91 | | |
| 32. Sri Lanka | 75.39 | | |
| 33. Jamaica | 90.66 | | |
| 34. Trinidad | 77.62 | | |
| 35. Zambia | 95.88 | | |
| 36. Peru | 71.67 | | |
| 37. Zimbabwe | 85.68 | | |
| 38. Kenya | 86.61 | | |

military expenditure (ME), however, increases the overall correlation coefficient to over eighty-three percent (Equation 3, Table 4) with military expenditures being highly significant.

Imports (MTEB) were also significant when added to the regression equation, as was expenditure on education (SE). As noted above, Group I countries tend to be characterized by relatively low rates of growth in imports, as compared to Group II (1.0 percent vs. 9.5 percent over the 1970-82 period), together with much higher levels of public external

Table 3

Structural and performance differences between Group I and Group II countries

(Means)

| Symbol Variable | Total Sample | Group I | Group II |
|---|---|---|---|
| *Export-External Variables* | | | |
| FEB Share of fuels, minerals in merchandise exports 1982 | 32.4 | 25.2 | 43.6 |
| EI Export instability 1968-71 | 9.1 | 8.1 | 10.8 |
| ZGB Growth in imports 1970-82 | 4.0 | 0.7 | 9.5 |
| EGB Growth in exports 1970-82 | 1.8 | 0.4 | 3.9 |
| EGA Growth in exports 1960-70 | 8.0 | 6.7 | 10.1 |
| EB Share of Exports in GDP 1982 | 25.2 | 23.4 | 28.3 |
| CAA Current account Balance 1970 | −119.1 | −66.9 | −208.6 |
| CAB Current account Balance 1982 | −382.7 | −507.7 | −178.2 |
| OPCEB Share of other primary commodities in exports 1982 | 44.3 | 55.5 | 27.0 |
| IMPFB Share of food imports in merchandise imports 1982 | 14.4 | 15.1 | 13.3 |
| *External Debt Variables* | | | |
| PDA External public debt 1970 | 735.5 | 412.6 | 1 278.4 |
| PDB External public debt 1982 | 6 098.5 | 2 716.2 | 1 178.9 |
| PDPA External public debt as % GDP 1970 | 16.1 | 19.5 | 10.3 |
| PDPB External public debt as % GDP 1982 | 34.8 | 44.1 | 19.3 |
| DSEA External public debt as % exports 1970 | 8.1 | 7.7 | 8.8 |
| DSEB External public debt as % exports 1982 | 14.4 | 15.5 | 12.5 |
| BCIBE Gross inflow of public external debt as % exports 1982 | 0.6 | 0.7 | 0.3 |
| *Fiscal-Savings Variables* | | | |
| AS Average national savings 1970-81 | 17.1 | 11.9 | 25.8 |
| MS Average marginal national survey 1970-81 | 12.6 | 4.3 | 26.3 |
| RTCRYB Government revenues as % GDP 1982 | 20.9 | 20.0 | 22.8 |
| GETYB Government expenditures as % GDP 1982 | 26.3 | 26.8 | 25.4 |
| GDB Government deficits as % of GDP 1982 | −5.0 | −6.2 | −2.9 |
| *Composition of GDP* | | | |
| AB Share of agriculture in GDP 1982 | 23.4 | 27.5 | 16.5 |
| IB Share of industry in GDP 1982 | 30.8 | 25.6 | 39.4 |
| MB Share of manufactures in GDP 1982 | 14.1 | 13.0 | 15.9 |
| SB Share of services in GDP 1982 | 45.8 | 46.9 | 44.0 |
| *Performance Variables* | | | |
| GDPGB Growth in GDP 1970-82 | 4.4 | 3.6 | 5.6 |
| IMFB Inflation 1970-82 | 20.3 | 19.9 | 21.0 |
| GDIGB Growth investment 1978-82 | 5.9 | 3.1 | 10.5 |
| GDIB Share of investment in GDP 1982 | 22.0 | 19.4 | 26.3 |
| ICOR Investment capital output ratio 1968-73 | 3.8 | 4.8 | 2.3 |
| GIRA Gross international reserves 1970 | 298.3 | 113.5 | 600.7 |
| GIRB Gross international reserves 1982 | 2 699.8 | 654.9 | 6 138.8 |
| AGB Growth in agriculture 1970-82 | 2.8 | 2.4 | 3.5 |

borrowing as a percent of exports and GDP. Apparently, these countries are resource constrained in the sense that they rely on public external borrowing as a major source of foreign exchange. The low growth in imports for this group as a whole suggests foreign exchange may be rationed to one extent or another with governments not able to rely on taxes from exports to fund the bulk of their expenditures. In this environment, increased

public external debt may be the only way of maintaining or increasing military (and perhaps educational) expenditures available to governments. The statistical significance of merchandise imports (MTEB) in the debt regressions is consistent with this interpretation, as is the low degree of significance of gross domestic product (GDPB) in the regression equations.

The results for Group II countries are in marked contrast to those for Group I presented above. In the case of the Group II countries (Table 5), military expenditures do not appear to have contributed to the overall accumulation of public external debt. In fact, when regressed with merchandise imports (MTEA) public external debt in 1970 (PDA) and merchandise imports (MTEB), military expenditures take on a negative sign and are statistically significant (Equation 6, Table 5).

The negative sign on merchandise imports (MTEB) may indicate that, in general, this group of countries has not been reliant on public external debt for financing the bulk of its imports. (In fact, their fast rate of growth of imports—9.5 percent per annum over the 1970-82 period—may have been financed largely out of export earnings.) That the export prospects of this group of countries is good is evidenced by the positive sign on merchandise exports (MTEA) in the regression equations, that is, that these countries' export position increases their overall credit-worthiness. The relatively low debt service ratios for this group of countries indicates that, in general, they are relatively resource unconstrained and that increased military expenditures have, in large part, been funded out of expanded government revenues rather than external indebtedness.

To sum up, the use of public external indebtedness to finance military expenditures does not appear to be universal among developing countries. In fact, it is possible that a large group of relatively debt-free (debt as a percent of GDP), resource unconstrained countries (Group II above) have contained military expenditures within the limits imposed by self-financing, rather than risk jeopardizing their overall credit-worthiness.

On the other hand, the bulk of debt accumulated by the other group of LDCs (Group I above), characterized as being relatively undynamic and resource constrained, has stemmed from military expenditures and, presumably, arms imports. Apparently, the perceived need to expand defense expenditures by this group in the face of foreign exchange shortages has resulted in relatively high levels of external indebtedness measured either as a percent of exports or imports obtained for the group as a whole.

## VI. RESULTS: MILITARY PRODUCERS AND NON-MILITARY PRODUCERS

Clearly, the grouping of countries presented above is only one of many possible ways of identifying contrasting environments in which external debt is accumulated and decisions are made as to the financing of military expenditures. Another logical splitting of countries based on differing environments for the purpose of examining the financing of military expenditures is on the basis of the presence or absence of indigenous arms production. One might expect, for example, Third World countries capable of producing at least one major weapons system[23] to have a different level of technical and industrial capabilities than countries without an indigenous arms industry. Furthermore, the linkages between military expenditures and the economy, together with the import component of military equipment

23. For purposes of classification, military producers are defined as those countries currently producing at least one major weapons system. See STEPHANIE NEUMAN, "Third World Military Industries," *International Organization*, Winter 1984, 172-73.

Table 4

Determinants of public external debt (1982) Group I countries

(Standardized Estimates)

| Equation | Independent Variables | | | | | | | | | Statistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GDPB | GIRB | ME | MTEA | MTEB | CAB | PDA | SE | SH | $r^2$ | F | DF |
| (1) PDB = | 0.63 | | | | | | | | | | | |
| | (4.73) | | | | | | | | | 0.377 | 22.41 | 35 |
| (2) | 0.41 | 0.37 | | | | | | | | | | |
| | (2.79) | (2.52) | | | | | | | | 0.495 | 16.13 | 35 |
| (3) | 0.18 | −0.15 | 0.91 | | | | | | | | | |
| | (1.86) | (−1.34) | (7.73) | | | | | | | 0.832 | 47.69 | 32 |
| (4) | 0.07 | −0.42 | 0.80 | 0.48 | | | | | | | | |
| | (0.75) | (−3.38) | (7.62) | (3.45) | | | | | | 0.882 | 52.24 | 32 |
| (5) | 0.08 | −0.40 | 0.55 | 0.10 | 0.59 | | | | | | | |
| | (1.11) | (−3.81) | (5.04) | (0.64) | (3.64) | | | | | 0.921 | 62.71 | 32 |
| (6) | 0.10 | −0.36 | 0.53 | | 0.66 | | | | | | | |
| | (1.40) | (−4.09) | (5.08) | | (5.53) | | | | | 0.920 | 79.96 | 32 |
| (7) | 0.07 | −0.37 | 0.48 | | 0.65 | −0.12 | | | | | | |
| | (1.06) | (−4.28) | (4.64) | | (5.51) | (−1.64) | | | | 0.925 | 66.61 | 32 |
| (8) | 0.10 | −0.36 | 0.52 | | 0.69 | | −0.12 | | | | | |
| | (1.31) | (−4.00) | (4.61) | | (5.47) | | (−0.20) | | | 0.917 | 63.39 | 33 |
| (9) | 0.09 | −0.33 | 0.45 | | 0.56 | | | 0.19 | | | | |
| | (1.36) | (−3.81) | (4.10) | | (4.37) | | | (1.95) | | 0.929 | 71.12 | 32 |
| (10) | 0.10 | −0.36 | 0.54 | | 0.66 | | | | 0.01 | | | |
| | (1.36) | (−3.80) | (4.82) | | (5.38) | | | | (0.08) | 0.920 | 61.71 | 32 |
| (11) | 0.10 | −0.25 | | | 0.74 | | | 0.36 | | | | |
| | (1.31) | (−2.49) | | | (5.12) | | | (3.25) | | 0.886 | 60.08 | 35 |
| (12) | 0.11 | −0.33 | | | 1.00 | | | | 0.11 | | | |
| | (1.32) | (−2.76) | | | (7.75) | | | | (1.02) | 0.852 | 44.55 | 35 |
| (13) | | | 0.89 | | | | | | | | | |
| | | | (11.41) | | | | | | | 0.800 | 130.09 | 34 |

Note: See text for definition of symbols
DF = degrees of freedom
$F_2$ = statistic
$r^2$ = correlation coefficient
( ) = t statistic

Table 5

Determinants of public external debt (1982) Group II countries

(Standardized Estimates)

| Equation | Independent Variables | | | | | | | | | Statistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | GDPB | GIRB | ME | MTEA | PDA | MTEB | CAB | SH | SE | $r^2$ | F | DF |
| (1) PDB = | 0.63 | | | | | | | | | | | |
| | (3.72) | | | | | | | | | 0.401 | 22.37 | 21 |
| (2) | 0.87 | −0.59 | | | | | | | | | | |
| | (6.39) | (−4.32) | | | | | | | | 0.702 | 22.37 | 21 |
| (3) | 0.87 | −0.66 | 0.10 | | | | | | | | | |
| | (6.18) | (−2.70) | (0.43) | | | | | | | 0.717 | 44.37 | 20 |
| (4) | 0.77 | −0.90 | −0.19 | 0.60 | | | | | | | | |
| | (5.58) | (−3.45) | (−0.69) | (1.90) | | | | | | 0.769 | 13.33 | 20 |
| (5) | 0.50 | −0.82 | −0.44 | 0.91 | 0.35 | | | | | | | |
| | (2.97) | (−3.51) | (−1.64) | (2.93) | (2.31) | | | | | 0.829 | 14.63 | 20 |
| (6) | 0.77 | −0.79 | −0.45 | 1.29 | 0.27 | −0.61 | | | | | | |
| | (4.69) | (−4.17) | (−2.08) | (4.55) | (2.14) | (−2.96) | | | | 0.895 | 19.69 | 20 |
| (7) | 1.16 | −0.95 | | | | | 0.38 | | | | | |
| | (6.13) | (−3.37) | | | | | (1.46) | | | 0.733 | 16.52 | 21 |
| (8) | 1.30 | −0.48 | | | | −0.14 | | −0.54 | | | | |
| | (7.36) | (−2.10) | | | | (−0.85) | | (−4.34) | | 0.863 | 26.93 | 21 |
| (9) | 0.62 | −0.95 | | 0.83 | 0.18 | −0.48 | | | 0.21 | | | |
| | (2.00) | (−4.52) | | (2.86) | (1.39) | (−1.90) | | | (0.77) | 0.849 | 14.10 | 21 |

Note: See text for definition of symbols
DF = degrees of freedom
$F_2$ = statistic
$r^2$ = correlation coefficient
( ) = t statistic

associated with the given level of military expenditures should be considerably different for arms and non-arms producers. The ability of a Third World country to produce its own arms is dependent on the following components:[24] 1) Financial resources; 2) level of industrial development; 3) scientific and education potential; and 4) organizational and political abilities.

Limited economic and financial resources explain, at least partially, the difficulties of Third World countries in developing an independent weapons industry. The development of an arms industry, especially a totally independent one, requires very large amounts of financial resources. These are often beyond the abilities of most Third World states. It is well known that even some of the advanced industrial nations such as Britain and France have been compelled to cancel military production plans due to financial difficulties.

In short, we might expect that countries with relatively abundant sources of foreign exchange and domestic savings capable of being appropriated by governments are likely to be the arms producers.

In general, we would imagine the non-arms producers to be much more reliant on imports of military equipment to meet a given level of defense expenditures and, furthermore, given the high cost of sophisticated imported weaponry, we would expect a high proportion of it (everything else equal) to be financed by external debt.

Finally, to the extent that Third World countries produce their own weapons systems, we would expect a lesser relationship to exist between military expenditure and overall public external indebtedness; equipment can be obtained from local sources in addition to imports, with added domestic inputs occurring when the country's credit-worthiness might be placed in jeopardy by additional external borrowing to finance arms acquisitions.

The results for the sample of fifty-six non-arms producing LDCs indicate that, in fact, military expenditures have significantly contributed to public external debt (Table 6). For those countries, military expenditures (ME), together with GDP (GDPB), international reserves (GIRB), exports (MTEA), and the balance of payments deficit on current account (CAB) account for over eighty percent of the observed variance in public external debt. This group of countries has also expanded health (SH) and education (SE) expenditures through increased public external indebtedness (Equations 7, 8, Table 6).

If we can assume that arms producing LDCs are more technically and industrially advanced than the non-arms producing LDCs, the generally low level of technical and industrial sophistication of these countries appears to have resulted in a great need for financing current account deficits through external borrowing, that is the lack of domestic sources of many necessary manufactured items. Merchandise exports (MTEA) are used to establish credit-worthiness for this purpose. Given the shortage of indigenous supplies and personnel, these countries may also be reliant on foreign technicians and inputs to maintain and expand their educational and health programs.

The arms producing LDCs, on the other hand (Table 7), appear to expand external public debt simply in line with their overall financial and commercial relations with the rest of the world. GDP (GDPB) for these countries accounts for eighty percent of the observed fluctuations in external public debt with no other independent variables statistically significant at the ninety-five percent level (although GIRB is significant at the ninety percent level).

24. ILAN PELEG, "Military Production in Third World Countries: A Political Study," in PAT MCGOWAN, ed., *Threats, Weapons and Foreign Policy*, Beverly Hills, CA, Sage Publications, 1980, p. 214.

Table 6

Determinant of public external debt (1982) non military producers

Standardized Estimates

| Equation | Independent Variables | | | | | | | | Statistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | GDPB | GIRB | CAB | ME | MTEA | MTEB | SH | SE | $r^2$ | F | DF |
| (1) PDB = | 0.24 | | | | | | | | | | |
| | (1.88) | | | | | | | | 0.061 | 3.52 | 56 |
| (2) | 1.98 | −1.86 | | | | | | | | | |
| | (7.34) | (−6.87) | | | | | | | 0.509 | 26.95 | 54 |
| (3) | 2.04 | −0.40 | −1.59 | | | | | | | | |
| | (9.31) | (−1.20) | (−5.87) | | | | | | 0.720 | 38.57 | 48 |
| (4) | 1.46 | 0.05 | −2.65 | 1.18 | | | | | | | |
| | (4.73) | (0.14) | (−5.58) | (2.64) | | | | | 0.760 | 34.79 | 44 |
| (5) | 1.21 | −1.68 | −3.41 | 1.02 | 2.86 | | | | | | |
| | (4.00) | (−2.44) | (−6.62) | (2.43) | (2.87) | | | | 0.801 | 30.66 | 43 |
| (6) | 1.15 | 2.44 | −2.61 | 0.70 | 2.31 | 0.91 | | | | | |
| | (3.80) | (−2.65) | −3.17) | (1.44) | (2.12) | (1.24) | | | 0.809 | 26.18 | 43 |
| (7) | 0.91 | −1.05 | −1.17 | | | | | 1.43 | | | |
| | (4.36) | (−4.44) | (−6.24) | | | | | (7.63) | 0.880 | 80.29 | 48 |
| (8) | 1.46 | −1.26 | −0.88 | | | | 0.82 | | | | |
| | (6.06) | (−3.47) | (−2.97) | | | | (3.93) | | 0.793 | 42.08 | 48 |

Note: Independent variables, GDPB, gross domestic product 1982 (millions of dollars); GIRB, gross international reserves 1982 (millions of dollars); ME, military expenditures 1981 (millions of dollars); MTEA, merchandise exports 1982 (millions of dollars); CAB, current account balance 1982 (millions of dollars); SH, Health expenditures 1980 (millions of dollars); SE, education expenditures 1980 (millions of dollars); PDB public external debt 1982 (millions of dollars).
DF = degrees of freedom; F = F statistic; $r^2$ = correlation coefficient; ( ) = t statistic

Table 7

Determinant of public external debt (1982) total military producers

Standardized Estimates

| Equation | Independent Variables | | | | | | | | Statistics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | GDPB | GIRB | CAB | ME | MTEA | MTEB | SH | SE | $r^2$ | F | DF |
| (1) PDB = | 0.89 | | | | | | | | | | |
| | (8.72) | | | | | | | | 0.800 | 76.11 | 20 |
| (2) | 0.92 | −0.16 | | | | | | | | | |
| | (9.23) | (−1.62) | | | | | | | 0.826 | 42.65 | 20 |
| (3) | 1.08 | −0.18 | 0.20 | | | | | | | | |
| | (7.51) | (−1.88) | (1.47) | | | | | | 0.845 | 30.99 | 20 |
| (4) | 1.09 | −0.16 | 0.21 | −0.01 | | | | | | | |
| | (6.96) | (−1.62) | (1.46) | (−0.05) | | | | | 0.861 | 23.32 | 19 |
| (5) | 1.04 | −0.20 | 0.22 | −0.01 | 0.11 | | | | | | |
| | (6.14) | (−1.83) | (1.46) | (−0.10) | (0.91) | | | | 0.869 | 18.59 | 19 |
| (6) | 0.95 | −0.18 | 0.14 | 0.04 | 0.40 | −0.30 | | | | | |
| | (5.26) | (−1.71) | (0.92) | (0.32) | (1.47) | (−1.18) | | | 0.881 | 16.16 | 19 |
| (7) | 1.08 | −0.12 | | | | | −0.20 | | | | |
| | (5.96) | (−1.22) | | | | | (0.58) | | 0.829 | 27.51 | 20 |
| (8) | 0.78 | −0.17 | | | | | | 0.16 | | | |
| | (2.86) | (−1.65) | | | | | | (0.58) | 0.829 | 27.51 | 20 |

Note: Independent variables, GDPB, gross domestic product 1982 (millions of dollars); GIRB, gross international reserves 1982 (millions of dollars); ME, military expenditures 1981 (millions of dollars); MTEA, merchandise exports 1982 (millions of dollars); CAB, current account balance 1982 (millions of dollars); SH, Health expenditures 1980 (millions of dollars); SE, education expenditures 1980 (millions of dollars); PDB public external debt 1982 (millions of dollars).
DF = degrees of freedom; F = F statistic; $r^2$ = correlation coefficient; ( ) = t statistic

Table 8

Structural, performance and defense expenditure differences Third World military, non-military producers

(Means)

| Symbol Variable | Arms Producers | Non-Producers | Total Sample |
|---|---|---|---|
| *External — Balance of Payments* | | | |
| RBB Resource balance 1982 | −5.1 | −12.2 | −10.2 |
| ZGA Growth in imports, 1960-70 | 5.4 | 6.0 | 5.8 |
| ZGB Growth in imports, 1970-82 | 5.7 | 3.8 | 4.3 |
| EGA Growth in exports, 1960-70 | 5.7 | 9.6 | 8.5 |
| EGB Growth in exports, 1970-82 | 5.0 | −0.3 | 1.1 |
| CAA Current account balance 1970 | −353.5 | −22.0 | −127.7 |
| CAB Current account balance 1982 | −2 964.8 | 837.8 | −340.5 |
| *External Debt* | | | |
| PDA External public debt 1970 | 1 670.7 | 240.2 | 620.5 |
| PDB External public debt 1982 | 13 299.1 | 1 941.3 | 4 960.5 |
| PDP External public debt % GDP, 1970 | 15.5 | 39.9 | 33.3 |
| PDPB External public debt % GDP, 1980 | 26.9 | 4.7 | 37.8 |
| PBCB Public external borrowing commitments 1982 | 3 798.7 | 377.0 | 510.3 |
| PBCBE Public external borrowing commitments | 1.0 | 0.5 | 0.7 |
| ECNIB Net inflow of publicly guaranteed external capital | 1 582.2 | 173.2 | 547.7 |
| *Fiscal-Savings* | | | |
| AS Average national savings, 1970-81 | 20.2 | 15.4 | 16.7 |
| MS Average marginal savings, 1970-81 | 19.7 | 9.9 | 12.5 |
| PCB Government consumption % GDP, 1982 | — | — | — |
| GDIB Gross domestic investment % GDP, 1982 | 14.0 | 17.2 | 16.2 |
| *Composition of GDP* | | | |
| AB Share of agriculture in GDP, 1982 | 17.4 | 28.1 | 25.1 |
| MB Share of manufacturing in GDP, 1982 | 18.8 | 10.8 | 13.1 |
| EB Share of exports in GDP, 1982 | 30.0 | 26.7 | 27.6 |
| *Defense Expenditures* | | | |
| ME Military expenditures 1981 | 1 863.7 | 1 013.1 | 1 247.0 |
| AF Armed Forces 1981 | 240.7 | 71.1 | 116.5 |
| MEY Military expenditure share of GDP 1981 | 4.0 | 5.8 | 5.4 |
| MEP Military expenditure per capita | 112.1 | 158.4 | 145.7 |
| *Performance Variables* | | | |
| EI Export instability index, 1967-71 | 8.6 | 10.8 | 10.2 |
| GDPGA Growth in GDP, 1960-1970 | 5.8 | 5.4 | 5.5 |
| GDPGB Growth in GDP, 1970-80 | 5.5 | 3.9 | 4.3 |
| Gross international reserves, 1970 | 536.4 | 141.9 | 253.2 |
| Gross international reserves, 1982 | 3 869.9 | 1 495.6 | 2 148.5 |
| Per capita income | 1 862.3 | 1 886.6 | 1 879.9 |
| *Size Variables* | | | |
| Area | 1 280.2 | 502.8 | 695.0 |
| Gross Domestic Product, 1982 | 59 203.2 | 10 387.5 | 23 981.8 |
| Population, 1982 | 73.2 | 11.3 | 26.6 |

These countries must be relatively industrially and technically more diversified, with a number of options for domestic vs. external inputs into their industrial and military complexes. No general pattern, therefore, exists between military, health, or educational expenditures and overall external debt.

An examination of the means of various indicators of economic performance (Table 8), external debt and structural composition of the arms and non-arms producers throws additional light on the regression results presented above. In general, the arms producers can be characterized as possessing much higher levels of domestic savings, less export instability, superior export performance, higher external debt but a much lower debt burden (as a percent of GDP), and higher capital inflows than the non-arms producing countries.

In fact, in a recent study Looney and Frederiksen,[25] using discriminant analysis, indicated that a nearly perfect classification of Latin American arms producers and non-arms producers could be made using only debt and import-export indicators as discriminating variables. That study also demonstrated that military and size variables were not capable of discriminating between arms producers and non-producers. Interestingly enough, debt and external variables and their relative magnitudes are nearly identical to those used to discriminate between Group I and Group II countries above, with producers very similar to Group II countries and non-producers, in general, profiling in a manner similar to Group I.

Apparently, it is not arms production (or non-arms production *per se*) that determines the extent to which military expenditures impact on Third World debt, but instead the general ability of these countries to generate diversified sources of foreign exchange, (thus maintaining high growth rates in imports) that ultimately determine the degree of independence of increased military expenditures on external public indebtedness.

## CONCLUSIONS

The main question posed at the beginning of this paper was whether or not military expenditures have contributed to Third World public external debt. In general, the results presented above indicate that the answer is no, but that for certain LDCs it is likely that a high percent of the external public debt accumulated by 1982 was the result of expanded military expenditures in the 1970s.

What is the best characterization of LDCs who have relied on public external indebtedness to finance military expenditures? Two possible country types were identified—undynamic resource constrained countries (Group I above) and countries that did not have an indigenous arms industry. Based on the regression results, it appears that the resource constrained LDCs best characterize Third World countries whose external public debt has been used in large part to fund increased military spending. Interestingly enough, the non-arms producing LDCs as a whole have this pattern given the high debt service ratios which characterize the group. This fact, together with the generally "unproductive" nature of military expenditures, make it unlikely that this group of countries as a whole will be in a position to significantly expand military expenditures in the near future. At best, this group of countries will be lucky to be able to service their existing public debt.

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25. ROBERT LOONEY and P. C. FREDERIKSEN, "Profiles of Latin American Arms Producers," *International Organizations*, forthcoming.