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How Resilient Are Military Expenditures in the Context of Fund-Supported Programs?

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Abstract

This paper examines how military spending has been affected by Fund-supported programs. It looks at the changes in military expenditure as a share of gross domestic product (MIL/GDP) and of total expenditure (MIL/EX) for two subsamples of Fund-supported programs, broadly divided into fiscal tightening and fiscal accommodating. Under fiscal tightening, the evidence suggests that MIL/GDP decreases during Fund-supported programs, but that MIL/EX increases, revealing resilience to budgetary adjustments. Under fiscal accommodation, as total government expenditure tends to increase, so does military expenditure; however, the ratio MIL/EX declines, as fewer additional resources are allocated to the military.

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Summary

This paper examines, from the limited data available, how Fund-supported programs affect military spending and assesses how military expenditures have been, or can be expected to be, resilient to adjustments in overall expenditure.

The paper begins with a review of trends in military spending in the developing countries over the last two decades and highlights the uneven distribution of this spending across regions and even across countries within regions. It then discusses data problems inherent in estimating military outlays that render research in this area particularly difficult.

Next the paper develops a conceptual framework that will serve as a blue print for the subsequent empirical study. It emphasizes the choices faced by the authorities both in the absence and in the presence of a Fund-supported program, as well as the importance of determining whether expenditure restraint is the essence of the Fund-supported adjustment programs being considered, that is, whether the programs constrain or accommodate expenditure. Objective variables may affect the productivity of military spending and the subsequent level of outlays. The paper proposes an empirical methodology that consists in looking at the changes, before and during Fund-supported programs, in military expenditure as a share of gross domestic product and as a share of total expenditure for an overall sample and then for two subsamples, broadly divided into fiscal-tightening and fiscal-accommodating Fund-supported programs.

The evidence suggests that, under fiscal tightening, the ratio of military expenditure to GDP decreases during Fund-supported programs, but that military expenditure's share in overall expenditure increases, revealing resilience to necessary budgetary adjustments. For countries engaged in fiscal accommodation, as total government expenditure tends to increase during Fund-supported programs, the evidence indicates that military expenditure also increases. The data show conclusively, however, that, in this case, most countries show declines in the ratio of military to total expenditures. Hence, in an environment of fiscal accommodation, a smaller proportion of additional resources is allocated to the military than to other sectors, in contrast to the results under fiscal tightening.

The final section of the paper focuses on fiscal tightening and tries to establish links between specific characteristics of countries and their observed military spending, including the resiliency of this spending. The main, albeit weak, conclusion is that if a country's ratio of military expenditure to total expenditure or to GDP is below average during the pre-program period, its military spending is likely to exhibit resilience.

I. Introduction

Developing countries have more than quintupled their military spending in real terms since the 1960s, almost tripling their share of worldwide military spending. These developments have often significantly affected both their balance of payments and the government budget, and possibly their rate of economic growth. 1/ To the extent that Fund-supported adjustment programs have stressed the control and rationalization of government expenditure or cutbacks in government outlays, military spending is a potentially important policy issue. Even though the Fund has rarely mandated specific actions in this area, government authorities can be expected to review all categories of public expenditures during a Fund-supported stabilization program. The main objective of this paper is to examine, from the limited data available, how total military spending has been affected by Fund-supported programs and to assess when military expenditures have been, or could be expected to be, resilient to adjustments in overall expenditure.

One must initially consider that expenditure restraint is not necessarily the central aspect of all Fund-supported adjustment programs. While all programs may stress the importance of efficient and productive government expenditure, and some the need for cutbacks in expenditure, other programs may provide for sometimes significant increases in government outlays. This is particularly likely to be true of programs that emphasize economic rehabilitation owing to increased domestic or external resources. The structure of this paper will of necessity reflect this duality.

The effect of fiscal policy adjustment on military spending is likely to reflect, in addition to the constraints on the availability of resources, objective and subjective considerations related to security requirements and social preferences, as well as broader and more complex political, strategic, and indirect economic considerations that could pressure governments to maintain allocations to the military sector. For example, a country that is under intense border threat and faces, in addition, political instability may find it virtually impossible to reduce military spending and may be forced to cut its budget in other areas.

Section II first reviews overall military spending trends in the developing countries over the last two decades, and highlights the uneven distribution across regions and even across countries within regions. It then discusses a number of data problems that are inherent to military outlays and that render research in this area particularly difficult.

1/ See Lebovic and Ishaq (1987).

Section III develops a conceptual framework that will serve as a blueprint for the subsequent empirical study. It emphasizes the choices faced by the authorities in the absence and presence of a Fund-supported program, and whether the program constrains or accommodates expenditure. It also stresses how objective variables may affect the productivity of, and subsequently the level of outlays on, military spending. Other factors that may also affect the potential for adjustments in military spending are also discussed. An empirical methodology is suggested that consists, in particular, in looking at the changes, before and during a Fund-supported program, in military expenditure as a share of gross domestic product (MIL/GDP) and as a share of total expenditure (MIL/EX) for an overall sample and then for two subsamples of Fund-supported programs, broadly divided into fiscal tightening and fiscal accommodating.

Under fiscal tightening, the evidence suggests that countries' MIL/GDP decreases during Fund-supported programs, but that MIL/EX increases, revealing resilience to the budgetary adjustments that need to be made. For those countries experiencing fiscal accommodation, as total government expenditure tends to increase during Fund-supported programs, the evidence indicates that military expenditure also increases. However, the data show rather conclusively that a higher proportion of countries also show declines in the ratio of MIL/EX. Hence, in an environment of fiscal accommodation, a smaller proportion of additional resources is allocated to the military sector than to other sectors, in contrast with the results obtained under fiscal tightening.

The latter part of Section III focuses on fiscal tightening and tries to establish links between specific characteristics of countries and their observed military spending, including their resiliency. The main, albeit weak, result that emerges, is that if a country has a below average pre-program period level of MIL/EX (or MIL/GDP), its military spending is likely to exhibit resilience. This result does not contradict the theoretical model, which generally predicts that resilience will be inversely related to the objective variables that explain a high initial level of military expenditure before the Fund-supported program. Attempts to relate this lesser resilience to each individual characteristic that explains higher military expenditure turn out to be rather inconclusive; in particular, a lack of resilience does not appear to be related to levels of urbanization or GDP per capita that are higher than the sample average.

II. Military Spending in Developing Countries

1. Trends in military spending

Military spending in developing countries has increased substantially in real terms over the past three decades. Spending surged in the 1960s and then again in the 1970s. 1/ Military spending in developing countries during 1960-86 grew on average almost three times as fast as in the industrial countries and quintupled in real terms during the period (Table 1). Developing countries now account for a much larger proportion of worldwide military spending. Their share of military spending in 1986 was almost three times as great as in 1960 (see Table 2).

It has been suggested that this rise in developing country military expenditures can be partly explained by the increase in external conflicts in developing regions, the amount of protection necessary for the domestic ruling elites, the influence of the military in the political realm, and the increase in the cost and maintenance of weapon systems and the armed forces. 2/ Also contributing to the explanation is the near tripling of the number of independent states in the developing world since the 1950s. Many of these countries, and especially those in Africa, lacked military establishments at the time of independence. As each new country allocated resources to create an armed force, military spending for developing countries surged. The decline in military grants to developing countries that began in the late 1960s could also help explain this rise in recorded military spending. To the extent that military aid went previously unrecorded in the budgets of recipient countries, the cessation of aid forced these countries not only to finance their own military operations but also to more clearly reflect these expenditures in their budgets.

The growth in military spending by developing countries has been distributed unevenly both across regions and in countries within regions. Table 3 displays regional differences in the growth of military spending. 3/ The jump in Middle East expenditures in nominal terms during 1970-75 is striking; spending increased by 152 percent, outpacing the average rate of growth in developing country military spending by 112 percentage points. However, in 1975-85, the rate of growth of military spending of Middle Eastern countries dropped off sharply to less than 10 percent, while most other developing country regions outpaced the average developing country rate of growth in military spending. Whereas developing country military spending

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1/ See Sivard (1987).

2/ See Ball (1986).

3/ The figures for world average percent change in real military spending given in Table 3 differ somewhat from those reported in Table 1, reflecting different data sources.

Table 1. Percentage Change in Real Military Expenditures 1/

Years	World	Industrial Countries	Developing Countries
1960-65	22.0	19.9	50.0
1965-70	24.2	20.5	63.9
1970-75	9.2	2.2	64.4
1975-80	13.0	12.4	15.5
1980-85	24.5	22.0	36.6
1960-86	139.1	107.5	562.5

Source: Sivard (1987), p. 42.

1/ Percentage changes are based on data expressed in 1984 prices and in general converted to dollars at three-year average exchange rates (1982-84).

Table 2. Military Expenditures in Developing Countries as a Percentage of World Military Expenditure 1/

Year	Percentage of World Total
1960	7.0
1965	8.6
1970	11.3
1975	17.0
1980	17.4
1985	19.1
1986	19.3

Source: Sivard (1987), p. 42.

1/ Percentages are based on data in 1984 prices and in general converted to dollars at three-year average exchange rates (1982-84).

Table 3. Percentage Change in Real Military Spending by Region, 1965-85 1/

	1965-70	1970-75	1975-80	1980-85
World	20.6	11.6	10.1	17.4
Developed economies	17.1	5.6	9.6	19.0
Europe	14.1	18.7	8.1	7.4
North America	22.4	-15.4	9.7	42.2
Developing economies	48.9	40.5	11.9	11.3
Africa	79.2	25.5	38.8	-5.6
East Asia	49.3	13.8	16.5	15.3
Latin America	34.3	40.8	25.6	15.7
Middle East	95.6 2/	152.1	8.6	8.4
Oceania	10.2	-3.1	16.7	28.6
South Asia	-1.5	32.4	27.8	49.3

Source: United States Arms Control and Disarmament Agency (1988).

1/ Percentage changes are based on data in U.S. dollars. Note that for 1965-70 data are in 1973 prices and converted from local currencies to U.S. dollars by 1973 exchange rates. Data for 1970-75 are in constant 1978 U.S. dollars and are converted from local currencies by 1978 exchange rates. The data for 1975-85 are in constant 1984 prices and converted from local currencies to U.S. dollars based on 1984 exchange rates.

2/ For 1965-70 data are for OPEC countries rather than the Middle East region.

increased by 12 percent over this period, spending in Africa increased by 39 percent, in East Asia by 17 percent, and in Latin America by 26 percent.

Even within regions, military spending has not been evenly distributed among countries. Africa is especially characterized by uneven spending patterns across countries. For the continent as a whole, military expenditures increased in real terms by less than 50 percent on average between 1965 and 1980, but rose by some 300 percent in a subset of 14 African countries. 1/ For several of these countries (Algeria, Libya, Gabon, and Tunisia), earnings from oil exports provided additional resources that were allocated to the military; for others (Morocco, Zimbabwe, South Africa, Ethiopia, and Tunisia), internal or external threats or conflicts resulted in greater military spending. 2/

2. Data sources and problems

The preceding discussion of trends in military spending is based on several sources of military data often criticized for their unreliability and inconsistency. Because we will use these data sources in Section III to analyze how military spending is affected by Fund-supported adjustment programs, it is appropriate to review some of these criticisms. 3/

Researchers have expressed skepticism about military data published by governments because they suspect that national governments have reason to hide the true figures. For example, foreign governments may interpret the news of another country's increase in military spending as an act of aggression while the country's citizens may protest that government resources should be allocated to social policy programs. 4/ Researchers have tended to rely on data published by the following organizations: United States Arms Control and Disarmament Agency (ACDA), the Stockholm International Peace Research Institute (SIPRI), the International Institute for Strategic Studies (IISS), and the Fund (in its Government Finance Statistics (GFS)). Even though these organizations attempt to be reliable, the data they provide can be only as reliable as those released to them by national governments.

1/ See Ball (1986).

2/ Ibid.

3/ They have been widely discussed in the literature. See, in particular, Ball (1984a) for detailed insight into the problems that plague military spending data.

4/ For an extensive discussion of why countries would have an incentive to manipulate their military spending figures, see Brzoska (1981).

In the analysis of Section III we utilize three of the four sources of data: ACDA, GFS, and SIPRI. By using various data sets, we were able to verify the sensitivity of qualitative results and judgments as regards the effect on military expenditure of data set variations. Note, however, that each source has slightly different definitions of military expenditure, and produces the data in slightly different formats, which one should keep in mind when reviewing the empirical results. Appendix I provides detailed descriptions on the various definitions of military expenditure.

The ACDA and SIPRI collect data from the individual country's ministry of defense and are therefore unable to impose any cross-country consistency on how military expenditure is defined. GFS data are based on a standardized reporting format to which all countries are supposed to adhere. Other explanations for the differences among these data sources are related to timing procedures (whether the data are recorded on a fiscal or calendar year basis), deflation methods, and currency conversion methods. 1/

Again, all data sources have one problem in common: reported military expenditures may not represent the true expenditures. Nicole Ball has identified five reasons for the discrepancy. 2/

a. Double bookkeeping. Governments may keep two sets of budget accounts, one for internal purposes, the other for external purposes.

b. Extrabudgetary accounts. Military spending is funded by sources that are omitted from the national government budgets, as are the outlays they finance.

c. Highly aggregated budget categories, including for military spending. Military-related outlays can be easily hidden in other budget categories and may not be traceable.

d. Military assistance. Particularly when military budgets are highly aggregated, military aid to and from foreign governments is not necessarily reported in expenditure and financing accounts.

e. Foreign exchange manipulation. A portion of foreign exchange that is earned by a country through exporting is not reported in the budget. These funds can then be used to purchase goods, such as military items, that would go unreported.

Conclusive evidence on the frequency and importance of any of these methods of underreporting military expenditure is difficult to obtain; it would be even more difficult to attempt to correct the published data

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1/ See Brzoska (1981).

2/ See Ball (1984a); where possible, she provides specific examples to substantiate her claims.

on the basis of such evidence. However, one should bear these issues in mind when analyzing the data; they clearly limit the reliability of any empirical results.

III. Characterizing Military Expenditures During Fund-Supported Programs

1. Introduction

Fund-supported stabilization programs in the form of stand-by arrangements or extended Fund facilities primarily focus on achieving medium-term balance of payments viability. To the extent that nonsustainable external current account deficits tend to reflect fiscal imbalances, they generally involve reducing the government's budget deficit, often through expenditure restraint, given limits on the feasibility and desirability of increased taxes.

Even though stabilizing fiscal policy, including expenditure restraint, is central to many Fund-supported adjustment programs, it is not central to all. Particularly when a country has experienced disequilibria for long periods of time, as well as a greatly overvalued exchange rate and the quasi-disappearance of foreign financing, a forced and disorderly adjustment of government expenditures may have occurred long before the Fund's involvement. In such cases, Fund-supported adjustment programs are likely to emphasize adjusting relative prices, restructuring production, and rehabilitating the administrative and economic infrastructure, which, in addition to promoting domestic activity, will spur new foreign investment from bilateral, multilateral, and private sources. Under such catalytic programs, both government expenditure and the deficit could temporarily rise, largely reflecting the greater availability of foreign financing, but also possibly additional domestic resources.

If, however, governments must restrain spending to achieve balance of payments objectives, there is unlikely to be any obvious economically, socially, and politically optimal way of implementing such a policy. Limiting capital, rather than current, expenditure is often expedient but could prove detrimental to long-term growth. On the other hand, some current expenditures may be more "productive" than many capital projects, particularly if (in the case of maintenance expenditures) curtailment today could contribute to the future deterioration of the economic infrastructure.

The above discussion underscores how difficult it is to evaluate the impact of Fund-supported programs on government military spending. Indeed, evaluating the implications of Fund-supported programs for public expenditure in general is a complicated issue likely to involve a broad range of considerations and particular circumstances. Yet, we seek to explore the question one step further; to the extent that Fund-supported adjustment policies affect government spending, how have they

influenced military spending? In the following section, a formal conceptual framework is developed to guide to the subsequent empirical analysis.

2. A conceptual framework

We will assume that, in the short run, the government can be viewed as having a preference ordering between "security," y_1, "other public services," y_2, and "burden on private sector," occasioned by inflationary finance or crowding-out, for which the size of domestic (bank and nonbank) financing, D_d, is a reasonable proxy. 1/ This preference ordering results in a utility function

$$U(y_1, y_2, D_d) \tag{1}$$

with the following partial derivatives: $U_1 > 0$, $U_2 > 0$, $U_3 < 0$; an increase in D_d is viewed as bad, and hence lessens welfare.

A complex interaction of political, economic, and strategic considerations is likely to contribute to the amount a country chooses to spend on the military. All interact with each other at the national, regional, and global levels. They may include such factors as the perceived or actual domestic or external security risk, 2/ the nature of the political regime (military or quasi-military rule vs. civilian government, repressive vs. liberal), 3/ the existence of a local arms industry, the existence and degree of regional conflicts or insecurity, and adherence to a global power bloc. The level of development might be a factor, to the extent that increased per capita wealth may require greater protection from external and domestic threats.

The degree of urbanization may also be a factor. The protection requirements of a country appear to be directly related to the level of infrastructural development associated with large cities. Urbanization also contributes to a country's potential for external and domestic conflict, and hence to protection needs, both because it introduces greater complexity in individual's interactions and because it renders

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1/ Foreign financing is assumed to be largely determined exogenously and hence not a direct object of choice for the government (it does not mean, however, that it is independent of the macroeconomic policies pursued by the government). That assumption appears reasonable for many developing countries. Nevertheless, for those with easier access to international financial markets, external debt strategy may be a genuine choice. In this case, foreign financing D_f, in addition to D_d, could enter (1) with a negative sign, to reflect the burden of the external debt, particularly on future generations.

2/ See Lebovic and Ishaq's efforts to develop a "security needs index" (Lebovic and Ishaq (1988)).

3/ Some empirical studies have, however, questioned whether the political regime, per se, exerts a definite influence on military spending. See Tannahil (1975), McKinlay and Cohan (1975), and Maizels and Nissanke (1986).

existing inequalities between socioeconomic groups more transparent and visible.

For the purpose of the model we assume that "security", y_1, will depend for any given level of defense expenditure undertaken, x_1, on a vector of such variables, $\underline{S}$, which are defined as negatively related to y_1, ceteris paribus. For example, other things being equal, more defense expenditures, x_1, yield higher security, y_1, but for a given level of defense expenditures, the security obtained depends negatively on the extent of a security threat, the level of income per head, the degree of urbanization, etc. 1/

Assuming for simplicity a one-to-one correspondence between "other public services," y_2, as it appears in the utility function (1) and actual expenditure, x_2, on such goods, the relationships (2.a)-(2.c) are postulated

$$y_1 = f(\underset{(+)}{x_1}, \underset{(-)}{\underline{S}},) \tag{2.a}$$

$$y_2 = x_2 \tag{2.b}$$

$$x_1 + x_2 = R + D_f + D_d \tag{2.c}$$

Expression (2.a) can be viewed as a "production function"; the signs of partial derivatives (indicated in parenthesis) imply that, other things being equal, more defense expenditures, x_1, yield higher security, y_1, but that for a given level of defense expenditures, the security obtained depends negatively on the variables in $\underline{S}$. Expression (2.c) is the government budget constraint where revenue, $\bar{R}$, and foreign financing, D_f, are for the moment assumed to be exogenous.

In the <u>absence of a Fund-supported program</u>, the variables x_1, x_2, and D_d can be viewed as endogenously determined, in that they are objects of policy choice. After y_1 and y_2 in (1) are replaced by their expression from (2.a)-(2.b), utility maximization subject to (2.c) is postulated to yield a set of expenditure functions such as 2/

$$x_1 = x_1^{*} (\underset{(+)}{\underline{S}}, \underset{(+)}{R+D_f}) \tag{3.a}$$

1/ See Maizels and Nissanke (1986).

2/ A specific example that yields demand functions with the properties postulated below can be worked out using the following functional forms for U() and f(): $U = y_1^{\alpha}\, y_2^{\beta}\, (H-D_d)^{\gamma}$; $f = [\text{Max}\ \{0, (x_1 - \underline{S})\}]^{\theta}$ where α, β, γ, θ are elasticity parameters, H is a constant, and $\underline{S}$ is here taken to be a scalar variable. Note that the production function f embodies the notion that given a positive $\underline{S}$, a "core" amount of defense expenditures are needed to produce a minimum level of security.

$$x_2 = x_2^* \underset{(-)}{(\underline{S},} \underset{(+)}{R+D_f)} \tag{3.b}$$

and a domestic financing choice function

$$D_d = D_d^* \underset{(+)}{(\underline{S},} \underset{(-)}{R+D_f)} \tag{3.c}$$

implying, given (2.c), an aggregate expenditure function

$$x = x_1 + x_2 = R + D_f + D_d^* (\underline{S}, R+D_f) \tag{3.d}$$

Again, the signs of partial derivatives are indicated in parentheses; note, in particular, that (a) higher values of $\underline{S}$, imply both an increase in military and total expenditure, but a decline in other government spending; and (b) higher revenue and/or foreign financing should lessen the demand for domestic financing. However, aggregate government expenditure demand should be positively related to $R + D_f$;

i.e., $1 + \frac{\partial D_d^*}{\partial R+d_f} > 0$.

The government's expenditure choice decision in the presence of a Fund-supported program is often affected by the fact that domestic financing D_d (especially, but not exclusively, in the form of domestic bank resources) is nc longer a choice variable, but rather exogenously constrained at some binding level $\bar{D}_d < D_d^*$ (). 1/ In this case, utility maximization along the lines detailed earlier, yields

$$x_1 = x_1 \underset{(+)}{(\underline{S},} \underset{(+)}{R+D_f+ \bar{D}_d)} \tag{4.a}$$

$$x_2 = x \underset{(-)}{(\underline{S},} \underset{(+)}{R+D_f + \bar{D}_d)} \tag{4.b}$$

1/ There is relatively good evidence that Fund-supported programs tend systematically to reduce domestic financing of the government deficit, even if one compares behavior before versus during a Fund-supported program; see, for instance, Kelly (1982). The relevant comparison is, however, what would have happened? Observations that indicate an increase in domestic financing under a Fund-supported program could nevertheless reflect a constrained behavior in the sense of (4.a)-(4.d).

$$D_d = \bar{D}_d \tag{4.c}$$

$$x = x_1 + x_2 = R + D_f + \bar{D}_d \tag{4.d}$$

Note that the system (4.a)-(4.d) can always be approximated around the unconstrained case (3.a)-(3.d) to find, in particular

$$x_1 = x_1^* (\underline{S}, \quad R+D_f) - \frac{\partial x_1}{\partial \bar{D}_d} [D_d^*() - \bar{D}_d] \tag{5.a}$$

$$x = R + D_f + D_d^* (\underline{S}, \quad R+D_f) - [D_d^*() - \bar{D}_d] \tag{5.b}$$

The above re-writing of constrained demand functions in the presence of a Fund-supported program clearly illustrates the link between the two "regimes": total expenditure will be reduced by the full difference between $D_d^*()$ and $\bar{D}_d$, but the impact of defense expenditure will depend on the size of the partial derivative $\partial x_1/\partial \bar{D}_d$, which is a measure of how defense expenditures would share in the adjustment imposed by $\bar{D}_d < D^*()$.

The above discussion implicitly assumes that developments in revenue and foreign financing can be viewed as independent of whether a Fund-supported program is or is not in effect. Clearly, they are often not independent. Even as a share of GDP, government revenue could tend to increase systematically under a Fund-supported adjustment program either because of specific revenue mobilization efforts or because of the positive effect that macroeconomic policies pursued in the context of the program could have on government revenue. Perhaps, more important, and as indicated earlier, foreign financing availability could be strongly correlated with the implementation of a Fund-supported adjustment program, particularly catalytic programs that stress economic rehabilitation. This would relieve the constraint on expenditures imposed by $\bar{D}_d < D_d^*()$ in (5.a)-(5.b) in the sense that $R + D_f$ in (5) would actually turn out to be larger than in (3), and allow total and military expenditure, to expand; at the limit, the effect of these additional nondomestic financing resources could be dominant.

The conceptual framework described here suggests that both the structure of government expenditure functions and their stability are likely to be critically affected not only by whether or not a Fund-supported program is in effect, but also by the nature of this program, particularly its implications for government revenue and external resources. Thus, simple econometric specifications are not likely to perform well, while with more complex ones, the limited number of time series/cross-section observations becomes a problem. Accordingly, we propose an alternative methodological approach in Section III.3, which nevertheless follows the spirit of the above conceptual framework.

One might also add that other characteristics of military expenditures may make them less susceptible to sudden changes, particularly within the relatively short duration of a Fund-supported program. Military expenditures involve acquisition of new and relatively expensive weapons systems and technologies as well as the training of new personnel. Both activities may require a long period of implementation. Military supply pipelines, especially when they are in the form of purchases from one of the major national suppliers of arms, are often quite long. Training schedules may be very complex and prolonged, for technical and political reasons. This particularly applies to the more advanced technologies or forms of equipment that are either highly complicated to operate or that are politically sensitive. Once committed to such expenditures, countries may find it difficult to reverse decisions, even in the context of a Fund-supported program. Finally, developing countries are often not in a position to dictate either the terms or timing of military purchases. As a result, there is often a mistiming of events (e.g., the emergence of a current account deficit and the arrival of a large military package).

In any analysis of resilience, these factors particular to the military sector may need to be considered in understanding the observed results, recognizing however that other non-military outlays are also subject to factors that limit a government's flexibility for adjustment.

3. The empirical methodology

Using the complete sample of countries for which data are available, we first investigate how a Fund-supported adjustment program may have affected the share of overall military expenditure in GDP (MIL/GDP) and in overall expenditure (MIL/EX). In terms of the earlier conceptual framework, it amounts to analyzing the behavior of x_1 and x_1/x as provided from (5.a) and (5.b) versus (3.a) and (3.d), where the variables x_1, x_2, D_d, R, and D_f must now be interpreted as a share of GDP. As previously indicated, we use three different data sources, ACDA, GFS, and SIPRI, to check for consistency among the different data sources as well as to address the problem of limited country coverage of some sources. We also examine the percentage change in armed forces during Fund-supported programs. 1/ The results confirm the need to

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1/ Ideally, we would like to investigate how fiscal policy changes during Fund-supported programs translated into changes in a number of disaggregated variables, such as the level and structure of wages and salaries, in addition to the number of military personnel, purchases of locally produced versus imported military equipment, pure consumption outlays versus durable goods expenditure, etc. Unfortunately, the lack of disaggregated data on military spending in developing countries precludes such a detailed analysis and has forced us to adopt an aggregate level picture.

distinguish between cases of fiscal tightening versus fiscal accommodation, as anticipated earlier; fiscal tightening will be defined as coinciding with a decrease of total expenditure as a share of GDP, and fiscal accommodation with an increase.

Next, we reconsider in more detail the behavior of MIL/GDP, MIL/EX, and the percentage change in armed forces in each of the two subsamples of Fund-supported programs. The term "resilience" is introduced to describe a situation in which despite budgetary expenditure restraint, the share of military expenditure in total expenditure, MIL/EX, actually increased during the Fund-supported program. Again, in terms of the conceptual framework introduced earlier, this will occur when the adjustment coefficient $\partial x_1/\partial \bar{D}_d$ in (5.a) is sufficiently small; this implies that x_1 is close to the unconstrained level $\tilde{x}_1()$, and accordingly, that x_1/x will tend to rise.

Finally, the discussion will specifically focus on those countries that experienced fiscal tightening during Fund-supported programs to see if resilience can be related to some of the variables, or proxies to them, identified in the formal framework as likely to be key determinants of military spending in the first place. Formally, we investigate whether the size of the adjustment coefficient $\partial x_1/\partial \bar{D}_d$ in (5.a) can be systematically related to variables that explain defense expenditures themselves. Thus, we seek to formulate a profile of characteristics that could assist in clarifying the resilience of military expenditure in specific countries. In particular, we try to establish whether, relative to the sample average levels, resilient countries tend: (a) to have higher pre-program levels of MIL/GDP and MIL/EX; (b) to have higher per capita GDP; (c) to be more highly urbanized; and (d) to have a larger percentage of its population in the military. The explanatory variable (a) could be viewed as synthetic for all others, while the variable (d) could be viewed as a proxy to the index of security risk indicated earlier, for which no comprehensive satisfactory time series data could be found (and which, in any case, may not be amenable to objective quantification).

a. Data preparation

The first task in preparing the military data for analysis is to determine for which calendar years a country was involved with a Fund-supported program, so that program periods can be established for each country. This is not entirely straightforward because many stand-by arrangements and extended Fund facilities did not coincide with the calendar year, sometimes succeeded one another in the same calendar year, became ineffective, or were canceled at some point in the year. Nevertheless, we have attempted to establish for each country the time

periods during which a Fund-supported program was in effect. 1/ Appendix II contains a list of the countries and the associated program calendar year coverage. This approach, however, has an inherent problem; we only recognize as ending those programs that either formally expired or were formally canceled. Yet some programs simply became ineffective, with the result that not all purchases were made. If programs became ineffective because of nonperformance (over performance) with programs' targets, which may include fiscal targets, one runs the risk of understating (overstating) the intended Fund-supported program impact in these countries.

To characterize the possible effects of a Fund-supported program on military spending, we compare data for the period before the program was implemented and their average value for the years during the program for each country. 2/ The pre-program period has been defined in two different ways: first, as the calendar year before the Fund-supported program was implemented; second, as an average of the three years before the Fund-supported program was implemented. Averaging should smooth out any temporary fluctuations in spending unique to a particular year. 3/

The above methodology for analyzing the data has some drawbacks and, possibly, distortionary effects that must be addressed at the outset:

(1) As indicated above, the duration of Fund-supported programs varies greatly across countries. Although a program may become ineffective or be canceled at any time, stand-by arrangements are designed to last from less than one year to over two years, and extended

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1/ There is necessarily some arbitrariness in establishing the calendar years of program coverage. The following "rules" were followed:

(a) If a program became effective in a month after July, consider it as belonging to the next calendar year.

(b) If a program (one year) is split evenly over two calendar years, consider it as belonging to the first year.

(c) If a program (one year) is split over two calendar years, consider it as belonging to the year in which it existed for the longest time.

(d) If a program extended for more than a year, consider it as belonging to the next calendar year as well only if it extends more than five months in the second year.

(e) If we know that a program was formally canceled, then we acknowledge this.

2/ As suggested by the data of Appendix II, for most countries it is rather easy to define a specific and rather continuous period of involvement with Fund-supported programs.

3/ For example, in financing major pieces of military equipment, funds may be appropriated and spent in a single year.

Fund facilities are designed to last three years. Therefore, a cross-country comparison of averages over the so-called Fund-supported program period must be viewed with caution, since for every country, a different time period and a different sequence of programs may be involved.

(2) Examining military data for the periods before and during the Fund-supported program may not accurately reflect the program's effect on a country's longer-term spending patterns.

(3) Analyzing the data as described above also obscures trends in military spending that might help explain how it changes before and during a program period. For example, this methodology obscures whether military spending was increasing for a prolonged period before the implementation of the Fund-supported program. Also, information on trends in overall government expenditure, as well as cycles and trends in GDP, is ignored.

(4) As previously discussed, one must consider the unreliability and inconsistency of the data sources for military expenditure when viewing the results.

b. Overall behavior

To provide an overall picture of the effect of a Fund-supported program on military spending, Table 4, Part I compares data on trends in military spending, before and during the program period, as a share of GDP, as a share of total expenditure, and as the percentage change in the size of armed forces. The original sample of countries included all those that had either a stand-by arrangement or an extended Fund facility during 1978-84, regardless of the fiscal policy stance they adopted in the context of the program. In the top panel (A.), pre-program is defined as equal to the calendar year before the Fund-supported program was implemented. In the bottom panel (B.), pre-program is defined as the average of the three years prior to implementation.

In the top panel, the ACDA and GFS data reveal that slightly more countries experienced a decrease in MIL/GDP during their program period than experienced an increase in MIL/GDP. The SIPRI data, however, indicate that more countries experienced an increased or stable than a decreased MIL/GDP. These results are consistent with those displayed in the lower panel of the table under the alternative definition of pre-program period.

The indicator MIL/EX reveals less consistent results with regard to data sources and pre-program period definition. When the pre-program period is defined as one year, the following results are obtained: the ACDA data suggest that more countries experienced a decrease in MIL/EX than experienced an increased or steady ratio combined. In contrast, the GFS data indicate that as many countries experienced a decline in MIL/EX as experienced increased or steady ratios. Finally, the SIPRI

Table 4. Military Indicators Before Versus During Fund-Supported Program Periods

I. All Countries

A. Pre-Program Year = One Year

	Total Number of Countries	During Fund-Supported Program Percent of Countries Exhibiting	
		Decrease	Increase 1/
Military spending/GDP			
ACDA	56	52	48
Fund (GFS)	43	54	46
SIPRI	51	39	61
Military spending/total expenditure			
ACDA	56	57	43
Fund (GFS)	42	50	50
SIPRI	44	48	52
Percentage change in armed forces	56	34	66

B. Pre-Program Year = Three Years

	Total Number of Countries	During Fund-Supported Program Percent of Countries Exhibiting	
		Decrease	Increase 1/
Military spending/GDP			
ACDA	57	53	47
Fund (GFS)	42	57	43
SIPRI	53	40	60
Military spending/total expenditure			
ACDA	57	65	35
Fund (GFS)	43	63	37
SIPRI	44	55	45
Percentage change in armed forces	58	36	64

Source: See Appendix I.

1/ Increase also includes those countries in which there was no change.

Table 4. Military Indicators Before Versus During Fund-Supported Program Periods (continued)

II. Fiscal Tightening

A. Pre-Program Year = One Year

	Total Number of Countries	During Fund-Supported Program Percent of Countries Exhibiting	
		Decrease	Increase 1/
Military spending/GDP			
ACDA	23	66	34
Fund (GFS)	17	76	24
SIPRI	19	53	47
Military spending/total expenditure			
ACDA	23	43	57
Fund (GFS)	18	28	72
SIPRI	18	33	67
Percentage change in armed forces	23	26	74

B. Pre-Program Year = Three Years

	Total Number of Countries	During Fund-Supported Program Percent of Countries Exhibiting	
		Decrease	Increase 1/
Military spending/GDP			
ACDA	22	73	27
Fund (GFS)	14	79	21
SIPRI	19	47	53
Military spending/total expenditure			
ACDA	22	58	42
Fund (GFS)	16	44	56
SIPRI	16	25	75
Percentage change in armed forces	22	23	77

Source: See Appendix I.

1/ Increase also includes those countries in which there was no change.

Table 4. Military Indicators Before Versus During Fund-Supported Program Periods (concluded)

III. Fiscal Accommodation

A. Pre-Program Year = One Year

	Total Number of Countries	During Fund-Supported Program Percent of Countries Exhibiting	
		Decrease	Increase 1/
Military spending/GDP			
ACDA	33	43	57
Fund (GFS)	25	40	60
SIPRI	32	31	69
Military spending/total expenditure			
ACDA	33	67	33
Fund (GFS)	24	67	33
SIPRI	26	58	42
Percentage change in armed forces	33	39	61

B. Pre-Program Year = Three Years

	Total Number of Countries	During Fund-Supported Program Percent of Countries Exhibiting	
		Decrease	Increase 1/
Military spending/GDP			
ACDA	35	40	60
Fund (GFS)	27	44	56
SIPRI	34	35	65
Military spending/total expenditure			
ACDA	35	69	31
Fund (GFS)	26	73	27
SIPRI	28	71	29
Percentage change in armed forces	36	44	56

Source: See Appendix I.

1/ Increase also includes those countries in which there was no change.

data indicate that more countries experienced an increased or steady ratio than a decrease. When the pre-program period is defined as a three-year average, the results from all three data sources indicate that more countries exhibited a decrease in MIL/EX over the program period than exhibited an increased or a stable ratio.

For the indicator percentage change in armed forces, the results uniformly indicate that more countries exhibited either a constant or increasing rate of change than a decreasing one.

c. Fiscal tightening and fiscal accommodation

Although the preceding description provides an overview of how military spending in developing countries has been affected by Fund-supported programs, it has not taken account of the diversity of fiscal policy stances among Fund-supported programs. This may explain the very mixed and ambiguous results obtained so far. As suggested in the conceptual framework described earlier, when the rehabilitation and restructuring aspects of the Fund-supported program are overriding and likely to be accompanied by larger domestic revenue and, especially, external resources, the constraints imposed on government expenditure through the binding constraint on domestic financing are likely to be relaxed and possibly offset. Because changes in overall government expenditure patterns are reflected in military spending, it is natural to examine the data in a way that highlights the different fiscal policy stances of programs. Therefore, we split the sample of countries into those that exhibited what we refer to as fiscal tightening and those that exhibited fiscal accommodation during the program years. Fiscal tightening is associated with a decrease in the ratio of total government expenditure to GDP during the program period as compared with the pre-program period, whereas fiscal accommodation is associated with an increase. 1/

Based on the above criterion, 26 out of 60 countries for which data on total government expenditure as a share of GDP were available experienced fiscal tightening during their respective Fund-supported programs while 34 experienced fiscal accommodation when pre-program is defined as the year prior to implementation. When pre-program is defined as a three-year average, 23 out of the 60 countries experienced fiscal tightening while 37 experienced fiscal accommodation.

Consider first the military spending data for those countries identified as having experienced fiscal tightening. Table 4, Part II describes the military indicators in this environment of overall budget restraint. If the pre-program period is defined as one year, all three

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1/ Fiscal tightening or accommodation was based on the GFS data, when available, for total expenditure as a share of GDP, and on the ACDA data for total expenditure as a share of GNP when GFS data were not available.

data sources indicate that a higher proportion of countries exhibited a decrease in MIL/GDP. When the pre-program period is defined as a three-year average, the ACDA and GFS data confirm these results whereas the results from the SIPRI data are reversed. In general, when expenditures as a percent of GDP are tightened, military spending appears vulnerable to such tightening as well.

As detailed earlier, in this environment of overall budget restraint, the indicator MIL/EX can be interpreted as reflecting the budget allocation choice the authorities make when a tightening of expenditure is necessary. Military spending reveals resilience if, in relative terms, it escapes the budgetary cutbacks that affect other categories of expenditures.

To a certain extent, the data confirm this resilience. As noted in the top panel of Table 4, Part II, when pre-program is defined as the one year prior to program implementation, all data sources indicate that a larger proportion of countries exhibited higher or stable MIL/EX. For example, the GFS data indicate that 72 percent of the countries exhibit resilience in military spending, while the ACDA and SIPRI data indicate that 57 percent and 67 percent, respectively, of the countries exhibit resilience.

When the pre-program period is defined as a three-year average, these strong results are confirmed by two of the data sources yet contradicted by one. The GFS and SIPRI data indicate that 56 percent and 75 percent, respectively, of countries exhibited resilience in military spending during Fund-supported programs. The ACDA data, however, suggest that a higher percentage of countries, 57 percent, decreased military spending as a share of total expenditure during Fund-supported programs.

The indicator percentage change in armed forces also lends some support to the notion of resilience. In Table 4, Part II, both pre-program definitions indicate that a significantly greater proportion of countries experienced a sustained or an increased rate of growth in armed forces during Fund-supported programs. This is especially noteworthy given that these countries all experienced fiscal restraint, and a majority also experienced a decrease in the MIL/GDP ratio during the Fund-supported program period. 1/

1/ Of course, we should resist the temptation to establish any causal relationship. Many factors contributed to the observed trend in military spending and, presumably, in the armed forces over the past decade. Hence, to the extent that the number of Fund-supported programs has grown rapidly since 1980 at the same time that trends in military expenditures in all developing countries accelerated, a spurious correlation may have been established.

Data describing the effect of Fund-supported programs on military spending for those countries that experience fiscal accommodation during the program years are displayed in Table 4, Part III. As we discussed earlier, these are countries in which total government expenditure as a share of GDP increased during Fund-supported programs. In terms of the conceptual framework described in Section II.2, the presumption is that higher resources $R + D_f$ have tended to offset the impact of the constraint on domestic financing, with the result that overall expenditure and, probably, military expenditure, could expand. Accordingly, one would expect to see a rise in MIL/GDP; however, in terms of the budget allocation choice there is no reason to expect that MIL/EX will move in any particular direction. Indeed, although military spending as a share of the total may resist the magnitude of expenditure adjustments imposed in other sectors during times of expenditure restraint, when the budget constraint is loosened it is not clear whether military spending as a share of total expenditure would experience a disproportionate increase or decrease.

The results for countries displaying fiscal accommodation during the Fund-supported program are consistent across the two definitions of the preprogram period. For the indicator MIL/GDP, all three data sources confirm that a larger proportion of countries displayed an increasing or stable ratio during Fund-supported programs.

In terms of the budget allocation choice regarding military spending made by the authorities in these countries, the data show conclusively that, in a higher proportion of countries, the MIL/EX ratio declined during Fund-supported programs. This suggests that, in an environment of fiscal accommodation, fewer additional resources are allocated to the military sector than to other sectors. This is in direct contrast to the evidence derived from those countries that have experienced fiscal tightening. Hence, when budgets are tightened, military spending as a share of total expenditure for a majority of countries is protected relative to other sectors. However, when additional resources become available, the military sector does not benefit more than other sectors. One possible explanation for this relates to the nature of additional resources obtained under fiscal accommodation; to the extent that they consist of project- or expenditure-tied external assistance, the expenditures that they finance are not, generally, military in nature. Admittedly, some amendments would need to be introduced to the conceptual framework detailed earlier to reflect this nonfungibility of resources.

The percentage change in armed forces during Fund-supported programs for this group of countries also shows that a higher proportion of countries experience an increase in, or stable rates of, growth. As mentioned above, this result also occurs for those countries characterized as experiencing fiscal tightening, but for the group of countries considered here, the behavior is consistent with the observation that military expenditure in general increases as a percentage of GDP.

To summarize the major findings of this section, we observe that a majority of countries exhibit an increase in MIL/EX and a decrease in MIL/GDP during periods of fiscal restraint, and a decrease in MIL/EX and an increase in MIL/GDP during periods of fiscal accommodation.

d. Focus on fiscal tightening

So far, we have discussed the diverse patterns of military spending among Fund-supported program countries without focusing on specific explanatory variables, except to emphasize the importance of the fiscal policy stance adopted under the program. The following set of exercises attempts to establish links between specific characteristics of countries and their observed military spending, concentrating on those countries that have experienced fiscal tightening during Fund-supported program years.

As indicated in Section III.2, a number of variables can explain why one country is likely to spend relatively more than another on defense, as measured, for instance, by MIL/GDP and MIL/EX. These same variables should play a role in determining why countries react differently to adjusting their military expenditures under Fund-supported programs, and, in particular, why some countries display greater resilience. Not all these variables can easily be quantified and, even for those that can, data are not always readily available, as in the case of the security risk index referred to earlier. Accordingly, a first exercise consists in establishing whether countries that display above average shares of military expenditures in total expenditures prior to a Fund-supported program, compared with the sample mean for all countries, tend to exhibit resilience or, on the contrary, greater flexibility when expenditure constraints become more effective in the context of Fund-supported programs. With reference to the formal framework of Section 2, this exercise may be viewed as testing whether the size of the adjustment coefficient $\partial x_1/\partial \bar{D}_d$ is negatively or positively related to the set of variables, $\underline{S}$, that generally tends to explain higher military spending. 1/

1/ Before focusing on the statistical analysis, and referring now to the specific example of footnote 2 of page 11, we should note that $\partial x_1()/\partial \bar{D}_d$ would in that example be a constant independent of the variable $\underline{S}$ as long as the parameter $\underline{\theta}$ itself is a constant. However, should θ increase with $\underline{S}$, $\partial x_1()/\partial \bar{D}_d$ would be positively related to the variable $\underline{S}$. This means that the likelihood of resiliency would be inversely related to $\underline{S}$, and thus to the level of military expenditure prevailing before the Fund-supported program since (5.a) and (5.b) suggest that the smaller $\partial x_1()/\partial \bar{D}_d$, the closer would x_1 be to its unconstrained level.

Turning to the empirical evidence, we calculate the average pre-program value of MIL/EX over the entire sample of countries for each of three data sources using both pre-program definitions. We then compute the pre-program year MIL/EX for each country in which fiscal restraint occurred during the Fund-supported program, and rank the countries according to whether they are above or below the sample average. In subsection e. we shall look at how many countries in each group exhibited resilience during a Fund-supported program in the sense that MIL/EX increased.

The results of this exercise, reported in Tables 5 and 6, are somewhat ambiguous, varying over pre-program period definition as well as data sources. Where the pre-program level of MIL/EX is greater than the sample average for all countries, the results indicate that during Fund-supported programs almost an equal number of countries exhibited increases in this ratio--that is, resilience--as exhibited decreases. (When pre-program is defined as a three-year average, slightly more countries experienced an increase in MIL/EX during the Fund-supported program.)

For the countries in which the relative pre-program level of MIL/EX is below the sample average, the results of this exercise are somewhat more informative. When the pre-program period is equal to one year, all data sources indicate that a majority of countries experience an increase in MIL/EX--that is, resilience. However, when the pre-program period is equal to an average of three years, only the SIPRI data confirm this result. The ACDA data suggest that more countries exhibit a decrease, while the GFS data are split evenly between increases and decreases in MIL/EX.

The result that emerges, albeit weak, is that if a country has a below average pre-program-period level of MIL/EX, its military spending is likely to exhibit resilience. We also explored how the behavior of MIL/EX during Fund-supported programs relates to the pre-program level of MIL/GDP relative to the sample average. The results are quite similar to those presented above and are displayed in Tables 7 and 8.

e. A closer look at resilience

Based on the results of the previous section, we were able to conclude tentatively that countries with below average pre-program MIL/EX or MIL/GDP relative to other countries are likely to exhibit resilience during a period of fiscal tightening. One may go a step further and determine whether the country specific characteristics that would explain higher military expenditure could also, individually, explain the lesser resilience predicted theoretically, or the opposite.

Tables 9 and 10 list those countries that have exhibited resilience in military spending during Fund-supported programs, defining the pre-

Table 5. Relationship Between Pre-Program Level of Military/Expenditure Relative to Sample Average and Behavior of Military/Expenditure During Fund-Supported Programs (With Fiscal Restraint)

(Pre-program = One-year average)

Data Source	Pre-Program Level of Military/Expenditure Above Sample Average			Pre-Program Level of Military/Expenditure Below Sample Average		
		Behavior of military/ expenditure during Fund-supported program			Behavior of military/ expenditure during Fund-supported program	
	No. of observations	Increase (resilience)	Decrease	No. of observations	Increase (resilience)	Decrease
ACDA	10	5	5	14	8	6
Fund (GFS)	8	4	4	10	9	1
SIPRI	7	3	4	11	9	2

Source: See Appendix I.

Table 6. Relationship Between Pre-Program Level of Military/Expenditure Relative to Sample Average and Behavior of Military/Expenditure During Fund-Supported Programs (With Fiscal Restraint)

(Pre-program = Three-year average)

Data Source	Pre-Program Level of Military/Expenditure Above Sample Average			Pre-Program Level of Military/Expenditure Below Sample Average		
		Behavior of military/ expenditure during Fund-supported program			Behavior of military/ expenditure during Fund-supported program	
	No. of observations	Increase (resilience)	Decrease	No. of observations	Increase (resilience)	Decrease
ACDA	9	5	4	13	4	9
Fund (GFS)	5	3	2	10	5	5
SIPRI	6	4	2	10	8	2

Source: See Appendix I.

Table 7. Relationship Between Pre-Program Level of Military/GDP Relative to Sample Average and Behavior of Military/Expenditure During Fund-Supported Programs (With Fiscal Restraint)

(Pre-program = One-year average)

Data Source	Pre-Program Level of Military/GDP Above Sample Average			Pre-Program Level of Military/GDP Below Sample Average		
		Behavior of military/ expenditure during Fund-supported program			Behavior of military/ expenditure during Fund-supported program	
	No. of observations	Increase (resilience)	Decrease	No. of observations	Increase (resilience)	Decrease
ACDA	13	6	7	11	7	4
Fund (GFS)	8	4	4	9	8	1
SIPRI	7	3	4	10	8	2

Source: See Appendix I.

Table 8. Relationship Between Pre-Program Level of Military/GDP Relative to Sample Average and Behavior of Military/Expenditure During Fund-Supported Programs (With Fiscal Restraint)

(Pre-program = Three year average)

Data Source	Pre-Program Level of Military/GDP Above Sample Average			Pre-Program Level of Military/GDP Below Sample Average		
		Behavior of military/ expenditure during Fund-supported program			Behavior of military/ expenditure during Fund-supported program	
	No. of observations	Increase (resilience)	Decrease	No. of observations	Increase (resilience)	Decrease
ACDA	10	5	5	12	4	8
Fund (GFS)	4	2	2	11	6	5
SIPRI	3	1	2	13	10	3

Source: See Appendix I.

Table 9.a. Resilient Countries: Pre-Program Levels Relative to Sample Average

(Pre-program period = One year)

	Source	Military/Expenditure Before (1)	Military/Expenditure During (2)	Pre-Program Relative Levels: Military/expenditure relative to sample average (3)	Pre-Program Relative Levels: Military/GDP relative to sample average (4)
Barbados	ACDA 1/	2.5	2.9	0.18	0.23
	GFS 1/	2.5	2.8	0.22	0.30
Chile	ACDA 1/	12.5	12.7	0.90	1.21
	GFS	12.5	12.7	1.07	1.41
China	ACDA	37.3	40.3	2.68	2.96
Costa Rica	ACDA	2.7	2.8	0.19	0.20
	GFS	2.7	2.8	0.23	0.25
	SIPRI	2.8	3.1	0.19	0.21
Ecuador	GFS	10.7	11.9	0.91	0.60
	SIPRI	10.7	12.9	0.74	0.51
Gabon	ACDA	1.9	6.7	0.14	0.31
Ghana	GFS	5.1	5.1	0.43	0.38
Mauritius	ACDA	0.5	1.0	0.04	0.06
	GFS	0.5	1.0	0.05	0.07
	SIPRI	0.7	1.1	0.05	0.06
Pakistan	ACDA	23.6	26.6	1.69	1.41
	GFS	23.6	26.6	2.01	1.92
	SIPRI	26.6	29.2	1.85	1.40
Romania	ACDA	10.9	17.6	0.78	1.21
	GFS	3.8	4.9	0.32	0.61
	SIPRI	3.8	4.9	0.26	0.51
Sierra Leone	GFS	2.7	4.2	0.23	0.30
	SIPRI	3.2	4.6	0.22	0.27
Somalia	ACDA	17.0	21.5	1.22	1.89
Sri Lanka	ACDA	3.2	4.0	0.23	0.37
	GFS	1.8	2.0	0.15	0.26
	SIPRI	3.3	4.1	0.23	0.39
Tanzania	ACDA	9.2	12.2	0.66	0.73
	GFS	9.2	11.9	0.78	1.01
	SIPRI	13.8	21.0	0.96	1.16
Togo	SIPRI	4.0	6.6	0.28	0.71
Uganda	ACDA	19.1	21.4	1.37	0.28
	GFS	19.1	21.4	1.62	...
	SIPRI	25.4	30.6	1.76	...
Yugoslavia	ACDA	45.3	48.9	3.25	1.21
	GFS	45.3	48.9	3.86	1.71
	SIPRI	46.3	48.4	3.21	1.43
Zambia	SIPRI	6.8	9.4	2.37	0.83

Source: For military/expenditure and military/GDP, see Appendix I.

1/ ACDA, United States Arms Control and Disarmament Agency; SIPRI, Stockholm International Peace Research Institute; and GFS, the Fund's Government Finance Statistics.

Table 9.b. Resilient Countries: Pre-Program Levels Relative to Sample Average

(Pre-program period = Three years)

	Pre-Program Relative Levels		
	Armed/population relative to sample average (1)	Urban population as a percentage of total relative to sample average (2)	Per capita income relative to sample average (3)
Barbados	0.73	1.14	2.58
Chile	1.90	2.34	1.82
China	...	0.57	0.29
Costa Rica	0.52	1.25	2.0
Ecuador	0.79	1.28	1.18
Gabon	0.75	0.99	4.18
Ghana	0.33	1.01	0.47
Mauritius	--	1.47	1.14
Pakistan	1.07	0.81	0.30
Romania	1.82	1.36	2.05
Sierra Leone	0.17	0.63	0.29
Somalia	2.63	0.84	...
Sri Lanka	0.17	0.75	0.25
Tanzania	0.54	0.31	0.30
Togo	0.39	0.54	0.40
Uganda	0.09	0.27	0.35
Yugoslavia	2.19	1.20	2.60
Zambia	0.71	1.15	0.63

Sources: For armed/population see Appendix I. Urban population as a percentage of total population is from the World Bank's World Tables, Vol. II. GNP per capita data are from World Bank Atlas, 1980; both of these variables are for 1978 rather than the pre-program period as defined elsewhere.

Table 10.a. Resilient Countries: Pre-Program Levels Relative to Sample Average

(Pre-program period = Three years)

	Source	Military/Expenditure Before (1)	Military/Expenditure During (2)	Pre-Program Relative Levels: Military/expenditure relative to sample average (3)	Pre-Program Relative Levels: Military/GDP relative to sample average (4)
China	ACDA 1/	37.7	40.3	2.67	3.26
Dominican Republic	SIPRI 1/	10.5	11.2	0.72	0.48
Ecuador	GFS 1/	11.2	11.9	0.95	0.63
	SIPRI	11.2	11.9	0.82	0.55
Gabon	ACDA	1.7	6.7	0.12	0.24
Haiti	ACDA	6.5	8.7	0.46	0.36
	SIPRI	7.1	7.6	0.49	0.38
Côte d'Ivoire	GFS	3.5	3.5	0.30	0.44
	SIPRI	3.5	3.5	0.24	0.34
Mauritius	ACDA	0.5	1.0	0.04	0.05
	GFS	0.5	1.0	0.04	0.07
	SIPRI	0.6	1.1	0.04	0.06
Pakistan	ACDA	23.2	26.6	1.65	1.41
	GFS	23.2	26.6	1.98	1.98
	SIPRI	26.1	29.2	1.78	1.43
Romania	ACDA	10.4	17.6	0.74	1.25
	GFS	3.9	4.9	0.33	0.71
	SIPRI	3.9	4.9	0.27	0.58
Sierra Leone	GFS	3.3	4.2	0.28	0.33
	SIPRI	3.6	4.6	0.25	0.27
Somalia	ACDA	19.2	21.5	1.36	1.50
Togo	SIPRI	4.5	6.6	0.31	0.74
Uganda	ACDA	20.0	21.4	1.42	1.66
	GFS	20.0	21.4	1.70	0.88
	SIPRI	22.7	30.6	1.56	0.60
Yugoslavia	ACDA	44.2	48.9	3.13	1.22
	GFS	45.1	48.4	3.77	1.81
	SIPRI	45.1	48.4	3.08	1.50
Zambia	GFS	6.8	9.4	...	...
	SIPRI	6.8	9.4	0.47	0.85

Source: For military/expenditure and military/GDP see Appendix I.

1/ ACDA, United States Arms Control and Disarmament Agency; SIPRI, Stockholm International Peace Research Institute; and GFS, the Fund's Government Finance Statistics.

Table 10.b. Resilient Countries: Pre-Program Levels Relative to Sample Average

(Pre-program period = Three years)

	Pre-Program Relative Levels		
	Armed/population relative to sample average (1)	Urban population as a percentage of total relative to sample average (2)	Per capita income relative to sample average (3)
China	...	0.57	0.29
Dominican Republic	0.85	1.12	1.44
Ecuador	0.81	1.18	1.28
Gabon	0.64	0.99	4.18
Haiti	0.27	0.78	0.30
Côte d'Ivoire	0.16	1.08	1.18
Mauritius	0.07	1.47	1.14
Pakistan	1.24	0.81	0.30
Romania	1.91	1.36	2.05
Sierra Leone	0.14	0.63	0.29
Somalia	2.80	0.84	...
Togo	0.36	0.54	0.40
Uganda	0.18	0.27	0.35
Yugoslavia	2.32	1.20	2.60
Zambia	0.67	1.15	0.63

Sources: For armed/population see Appendix I. Urban population as a percentage of total population is from the World Bank's World Tables, Vol. II. GNP per capita data are from World Bank Atlas, 1980; both of these variables are for 1978 rather than the pre-program period as defined elsewhere.

program period as equal to one-year and a three-year average, respectively. 1/ Again, in line with our discussion on the determinants of military spending and given the availability of data, the following limited sample of pre-program period variables are considered for each country exhibiting resilience in military spending and are compared with the sample average for all countries: armed forces as a percentage of total population, urban population as a percentage of total, and per capita GNP. For the reasons already indicated, military expenditure is expected to be positively related to each one of these variables.

In Tables 9 and 10, columns 1 and 2 report values of MIL/EX before and during program periods for each country. They quantify the extent to which MIL/EX has actually increased and therefore how resilient military spending in each of these countries actually was. MIL/EX and MIL/GDP relative to (i.e., as a ratio of) sample averages in columns 3 and 4 reveal what was previously suggested about the relationship between resilience and each of these variables. In Table 9.a (where the program period equals one year), the pooling of the three data sources yields 38 observations. Of the 38 observations, 25 indicate values of MIL/EX below their respective sample average while 13 are above. In Table 10.a (where the pre-program period equals a three-year average), the pooling of data sources yields 29 observations. Of the 29, 18 indicate a value of MIL/EX below average and 11 above. With regard to MIL/GDP, in Table 9.a, pooling the three data sources yields 36 observations. Of the 36 observations, 23 are below their respective sample average while 13 are above. In Table 10.a, pooling the three data sources yields 29 observations. In this case, 19 observations are below their sample average while only 10 are above. These results seem to confirm that countries exhibiting resilience are dominated by below average MIL/EX and MIL/GDP before a Fund-supported program.

As displayed in Table 9.b, for the variable armed forces as a percentage of population, of the 17 available observations of resilient countries, 12 are below the sample average. This result is confirmed in Table 10.b; of the 14 observations, 10 are below the average. The data support the claim that countries with resilient military expenditure are characterized as having a below average level of armed forces as a percentage of the total population.

1/ Because of the scarcity of data, all countries that exhibited resilience based on any data source available were included in this subsample.

The variables--urban population as a percentage of total population and GNP per capita--yield particularly mixed results. For both variables, approximately half of the available observations lie above the sample average and half below, irrespective of program period definition.

IV. Concluding Remarks

The strongest results of this study relate to the evidence that military spending tends to exhibit resilience under Fund-supported programs that emphasize fiscal tightening, particularly in cases where pre-program period levels of expenditure are below average. In Fund-supported programs displaying fiscal accommodation, the evidence suggests that the nonmilitary sector tends to be given priority in the allocation of additional resources. However, both the limited availability of data and their uncertain quality mean that the above conclusions must be interpreted with great caution. To go beyond the broad conclusions reached in this paper, specific country case studies would need to be undertaken. Such studies could consider disaggregated expenditure and foreign financing data and take into account the particular domestic and external political and strategic environment faced by these countries.

Data Sources

1. Military expenditure data

In Section III.3 of this study, we use three sources of military expenditure data: 1/

(1) United States Arms Control and Disarmament Agency (ACDA); 2/

(2) Stockholm International Peace Research Institute (SIPRI); 3/ and

(3) International Monetary Fund, Government Finance Statistics (GFS) 4/

Each source uses a different definition of military expenditure and therefore the data are not directly comparable. ACDA and SIPRI definitions of military expenditure are different but both are largely based on the NATO definition. The NATO definition includes the following: 5/

(a) civilian-type expenditures of each NATO defense ministry are excluded and military-type expenditures of other ministries are included;

(b) grant military assistance is included in the expenditures of the donor country; and

(c) purchases of military equipment for credit are included at the time the debt is incurred, and not at the time of payment.

For countries not belonging to NATO, the ACDA data are based on the expenditure of each country's ministry of defense. If these data include expenditures on internal security, then an attempt is made to eliminate these expenditures. However, ministry of defense data could also include expenditures on flood control, space research, civil defense, stockpiling of industrial materials, pensions, and medical services. The SIPRI data for non-NATO countries do not include any adjustments for the discrepancy in the definitions as they are in the ACDA data.

1/ For an excellent survey and evaluation of military expenditure data and issues see Ball (1984b).
2/ 1986.
3/ 1986.
4/ 1986.
5/ United States Arms Control and Disarmament Agency (1986), p. 156.

The Fund's definition of military expenditure is detailed but based on the NATO definition as well. Member countries are asked to calculate their defense outlays using Fund categories as a guideline. The Fund data are considered to be the most reliable, and are often used by ACDA and SIPRI as a basis for estimates.

2. Other data

Gross Domestic Product (GDP): International Monetary Fund, Government Finance Statistics.

Armed Forces: United States Arms Control and Disarmament Agency (1986).

Program Coverage

International Monetary Fund Calendar Year Program Coverage for Sample of Developing Countries During 1978-84

(Programs include stand-by arrangements and extended Fund facilities)

Country	Years of Program Coverage
Argentina	1983
Bangladesh	1980, 1981, 1982, 1983
Barbados	1983, 1984
Bolivia	1980
Brazil	1983, 1984
Burma	1978, 1981
Central African Republic	1980, 1981, 1983, 1984
Chile	1983
China	1981
Congo	1979
Costa Rica	1980, 1981, 1982, 1983, 1984
Côte d'Ivoire	1981, 1982, 1983, 1984
Cyprus	1980
Dominica	1981, 1982, 1983, 1984
Dominican Republic	1983, 1984
Ecuador	1983
Egypt	1979
El Salvador	1980, 1982
Equatorial Guinea	1980
Ethiopia	1981, 1982
Gabon	1978, 1980, 1981, 1982
Gambia, The	1982, 1984
Ghana	1979, 1983
Grenada	1981, 1984
Guatemala	1981, 1984
Guinea	1983
Guinea-Bissau	1984
Guyana	1979, 1980, 1981, 1982, 1983
Haiti	1979, 1980, 1981, 1983
Honduras	1979, 1980, 1981, 1983
Hungary	1983, 1984
India	1982, 1983, 1984
Jamaica	1978, 1979, 1980, 1981, 1982, 1983, 1984
Kenya	1980, 1981, 1982, 1983
Korea	1980, 1981, 1983, 1984
Lao People's Democratic Republic	1981
Liberia	1981, 1982, 1983, 1984

International Monetary Fund Calendar Year Program Coverage for Sample of Developing Countries During 1978-84 (concluded)

(Programs include stand-by arrangements and extended Fund facilities)

Country	Years of Program Coverage
Madagascar	1980, 1981, 1982, 1983
Malawi	1980, 1981, 1982, 1983, 1984
Mali	1982, 1984
Mauritania	1980, 1981
Mauritius	1980, 1981, 1982, 1983, 1984
Mexico	1982, 1983, 1984
Morocco	1981, 1982, 1984
Niger	1984
Pakistan	1981, 1982, 1983
Panama	1978, 1979, 1980, 1981, 1982, 1983, 1984
Peru	1979, 1980, 1982, 1983, 1984
Philippines	1979, 1980, 1981, 1983, 1984
Portugal	1978, 1984
Romania	1981, 1982, 1983, 1984
Senegal	1981, 1982, 1983, 1984
Sierra Leone	1980, 1981, 1984
Solomon Islands	1981, 1983
Somalia	1980, 1981, 1982, 1983
South Africa	1983
Sri Lanka	1979, 1980, 1981, 1984
Sudan	1979, 1980, 1981, 1982, 1983, 1984
Tanzania	1981, 1982
Thailand	1981, 1982, 1983
Togo	1979, 1980, 1981, 1982, 1983, 1984
Turkey	1978, 1979, 1980, 1981, 1982, 1983, 1984
Uganda	1980, 1981, 1983, 1984
Uruguay	1980, 1981, 1983
Western Samoa	1983, 1984
Yugoslavia	1980, 1981, 1982, 1983, 1984
Zaïre	1980, 1981, 1982, 1983, 1984
Zambia	1978, 1979, 1981, 1982, 1983, 1984
Zimbabwe	1981, 1983, 1984

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