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Budgetary Consequences of Defense Expenditures in Pakistan: Short-Run Impacts and Long-Run Adjustments*

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In the last twenty years, there has been a growing interest in quantifying the 'guns versus butter' tradeoff facing developing countries. This article examines Pakistan's military expenditures between 1973 and 1986 and estimates both a short-run impact model and long-run adjustment model to measure how changes in the defense burden, the deficit, and government debt have affected budget allocations to economic services programs and administrative/social programs. In addition, we investigate whether defense budgets have been increased or maintained either at the expense of economic and social programs in general or merely confined to one or two specific programs. Military expenditure patterns are analyzed to see whether or not they were responsible for across-the-board cuts in long-term infrastructure programs. Our analysis indicates that the deficit, the debt service, and the military burden are often interrelated in such a complex manner that the impact of any specific program is difficult to predict. In the short run, most infrastructure programs increased as the military burden declined. The opposite was generally true for social programs such as social security, welfare, and housing. Changes in the defense budget appear to have only a transitory effect on the share of government expenditures allocated toward infrastructure. The long-run model suggests that social programs have just as high a priority as economic services. When the military burden increases, the government is willing to take some resources from infrastructure programs and lets the deficit grow to finance social programs. Our results also suggest a long run pattern of adjustment in social programs but not infrastructure programs—a counter-intuitive result given Pakistan's severe infrastructure constraints.

1. Introduction

Toward the end of 1988, a deteriorating resource situation in Pakistan resulted in a financial crisis. The budget deficit had reached 8.5% of Gross Domestic Product (GDP), inflation accelerated, and the current account deficit had doubled to 4.3% of Gross National Product (GNP). In addition, the external debt service ratio was approximately 28% of export earnings and foreign exchange reserves were cut in half to USD 438 million, an amount equal to under three weeks of imports (World Bank, 1991). This deteriorating economic situation forced the government of Pakistan to enter into several agreements with the International Monetary Fund (IMF), the World Bank, the Asian Development Bank, and several bilateral donors to implement a medium-term adjust-

ment and structural reform program aimed at restoring resource balances to sustainable levels and improving the economy's efficiency.

In large part, Pakistan's fiscal problems can be attributed to two basic constraints: a narrow tax base and the majority of current expenditures budgeted to military expenditures and debt-servicing, programs which have steadily grown over time. Jointly, these two programs account for over 81% of the 1990/91 budget. The Annual Development Plan often must be revised downward following cuts in foreign aid and local resources (Economist Intelligence Unit, 1991).

This article examines Pakistan's military expenditures between 1973 and 1986 and presents short-run impact and long-run adjustment models to measure how changes in the defense burden have affected budget allocations to (a) economic services programs (including infrastructure and transportation) and administrative/social programs. In addition, we are interested in

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whether defense budgets have been increased or maintained either at the expense of economic and social programs in general or confined to one specific area. Finally, we examine military expenditure patterns to see if they were responsible (if at all) for across-the-board cuts in long-term infrastructure programs such as transport, communications, and energy programs, or whether the reductions were concentrated in any specific program.

2. Review of the Literature

In the last twenty years, interest has focused on the 'guns versus butter' tradeoff facing developing countries. Researchers have tried to quantify the determinants of government programs and the tradeoffs between the programs. Much of the recent work has focused on education and defense, since these represent the two largest budget categories for most countries.

Heller & Cheasty (1983) examined data on 27 middle-income countries¹ and measured changes in education expenditures when budgets were cut between 1965 and 1978. Education expenditures averaged approximately 16% of central government expenditures. While they had expected to find that education was fairly elastic with respect to central budget changes, they found instead 'resilience' in education expenditures. The authors attributed this inelasticity to high political, social, and economic priorities afforded education. However, they pointed out that just examining simple educational expenditure GDP ratios tended to mask the ways individual countries handled inflation and budget cuts. Enrollments expanded (especially in secondary and tertiary levels) concomitant with a sharp drop in expenditure per student, and recently completed capital projects were significantly underfinanced. The authors did find a high priority placed on primary education – larger enrollments were accompanied by increased real expenditures per student.

In the same year, Hicks & Kubisch (1983) noted that little was known about (a) how governments increase or decrease public

sector expenditures, or (b) whether some sectors are more vulnerable than others in turbulent economic conditions. In a short run austerity framework, they isolated 32 countries (excluding Pakistan) where total real government expenditures had declined in more than one year between 1972 and 1980. They calculated real percentage changes for each sector and for all government expenditures. The two measures were compared to measure the 'vulnerability' of the sector. On average, total government expenditures declined 13% while social sectors and defense and administration declined 5% and 8% respectively, i.e. were relatively protected. The productive sectors (agriculture, mining, forestry, fishing, etc.) and infrastructure programs were much more vulnerable and were cut 15 and 20% respectively. Hicks & Kubisch concluded that program cuts are not 'across-the-board'; well-protected programs appear to be those which are politically sensitive in terms of jobs. Furthermore, they suggested that countries forgo future consumption for present consumption by either abolishing or reducing subsidies to long-term infrastructure projects.

Deger (1985) used data on 50 countries to examine the tradeoff between education and defense. Using a simultaneous equation model, she estimated that if the allocation to defense were cut by 15% (approximately USD 13 billion), there would be an increase of 2.9% (approximately USD 4.5 billion) in the allocation to education. She also described some of the specific human resource projects which could likely be obtained with the reduction in defense. Looney (1986) examined several Latin American countries and estimated a model (using regression analysis) where non-defense sectors as a percent of central government expenditures (CGE) depend on the allocation to defense and also the ratio of CGE/GNP. He noted that changes in non-defense were not *just* a function of changes in defense, but also the size of the budget in relation to the country's GNP. Looney found a negative tradeoff between defense and other government expenditures for one group of countries and a positive tradeoff for another group of coun-

tries. He explained the latter result – simultaneous increases in both defense and social programs – as a result of either the civilian sector increasing allocations to defense to keep them out of power, or because large capital expenditures in the military (often financed by the US) are immune to short-term cutbacks. He also suggests that ‘. . . defense and social programs may rise together because both are supported by relatively powerful constituencies’ (p. 98).

In 1988, Harris et al. (1988) built on the earlier work by Hicks & Kubisch and tested for the existence (and strength) of a tradeoff between defense and education or health. Their results did not support the conventional view of a tradeoff. Countries with high defense expenditures did not routinely exhibit low education/health expenditures (and vice versa). In addition, defense was no less vulnerable to budget cuts, nor more likely to gain from budget increases than education and health. When the central budget expands, defense expenditures increase at the same rate as education expenditures in lower income countries; in middle income countries, health expenditures rose more rapidly than defense or education.

While the main focus of Hess & Mullman (1988) was on the determinants of military expenditures, they also examined the defense/education tradeoff. They found no evidence of any substitution between public education and the military. While Pakistan was included in the study, the authors were cautious about the results, since the study was based on data for 1982 and 1983 only. They did not examine the vulnerability of defense as budgets decline, or discuss funding sources except for GNP and net foreign aid.

In one of the few studies which examined instances where the budget has both increased and decreased, De Masi & Lorie (1989) examined the effect of fiscal tightening and fiscal accommodation under IMF-supported programs in developing countries. They found that under fiscal-tightening conditions, the proportion of military spending to GDP decreased, but the proportion of military expenditures to total government expenditures increased,

suggesting that ‘military expenditures tend to be “resilient” to the budgetary adjustments that needed to be made’ (p. 132). On the other hand, under fiscal accommodation by the Fund, as total government expenditures increase, the resources allocated to defense decline.

Hewitt (1991a) examined defense trends, compared military expenditures, and discussed the impact of defense expenditures on development for 125 developing countries between 1972 and 1988. In addition, he analyzed the budgetary tradeoff between military, social and development expenditures for a smaller sample of 51 countries between 1975 and 1987. He found that central government expenditures as a proportion of GDP rose to accommodate higher interest costs; at the same time, military expenditures and expenditures on economic services were reduced by 23% and 17% respectively. At the same time, expenditures on social services were insulated – remaining the same or increasing in 35 of the countries examined. Hewitt concluded from this study and an econometric study of the determinants of military expenditures (1991b) that the elasticity of military expenditures with respect to the central government budget was 0.75. In addition, foreign financial assistance seems to be a major determinant of military expenditures and the central budget expands to accommodate the higher defense spending.

3. *Extended Models of Program Shares*

This section describes two extended models developed to help explain program share. The first model tests for short-run impacts on program shares, while the second model tests for long-run adjustments in program share. The short-run impact model and the long-run adjustment model are both estimated for Pakistan using *IMF* data for the period 1973 to 1986.²

3.1 *Short-Run Model*

Our short-run model extends the Hicks/Kubisch type short-run austerity models by including two financial variables. While a change in program might reflect a direct

Table I. Short-Run Model Results, Economic Budgetary Categories, Pakistan 1973-86

Budget Category	Standardized Regression Coefficients			R ²
	DEFCIT _{t-1}	MILEXP _t	GOVDEBT _t	
Total Economic Services	0.14	-1.12**	-0.32*	0.73
Agriculture	1.05**	0.30**	-0.15*	0.97
Mining	0.19	-0.81**	-0.36	0.42
Other Economic Services	-0.64**	-0.76**	-0.02	0.73
Transportation/Communications	0.21	-0.75**	0.41*	0.80
Transportation	0.64**	-0.13	0.59**	0.78
Communications	-0.14	-1.01**	-0.68**	0.42
Roads	0.52*	-0.19	0.48*	0.45
Railroads	0.62**	-0.02	0.52**	0.80
Energy	0.33**	0.11	-0.86**	0.87
Other Expenditures	0.10	-0.59	-0.18	0.32

* Significant at the 5% level; ** significant at the 1% level

tradeoff with another program – per the Hicks/Kubisch approach – the change may instead reflect either the government's willingness to increase the deficit to fund the program or an increased level of government borrowing from abroad. Thus, an apparent tradeoff might in fact be spurious and reflect the willingness of the government to fund one program and not the other. Our short-run impact model describes shares allocated to different programs and includes sectoral priorities as well as the government deficit and government debt.

Operationally, the model has been estimated in linear form as follows:

$$(1) \text{ SHARE}_{i,t} = a\text{DEFCIT}_{t-1} + b\text{MILEXP}_t + c\text{GOVDEBT}_t + \epsilon$$

where $\text{SHARE}_{i,t}$ is the share of i th program in time period t , DEFCIT_{t-1} is the government deficit lagged one year,³ MILEXP_t is defense expenditures as percent of total government expenditures (the military burden) in year t , GOVDEBT_t is the government debt as a percent of the GDP in year t , and ϵ is the error term. The military burden variable has been included to represent the guns versus butter analogy as described in the Hicks/Kubisch type model. While the amount going to various programs other than defense could explain sectoral priorities, the military budget (both in size and growth) is in our opinion the most

significant variable affecting sectoral priorities.

The hypothesized signs of the estimated coefficients in the short-run impact model are either positive or negative. For example, the deficit could be increased to fund a program depending on the program's priority. Similarly, the government could increase the debt to finance a particular program. On the other hand, a higher debt might discourage the government from committing additional expenditures to a particular program.

Equation (1) was estimated for Pakistan for the period 1973 to 1986 for all economic budgetary categories (Table I) and all administrative/social budgetary categories (Table II).⁴ The results produced several distinct impact patterns. Total economic services were adversely affected by both military expenditures and government debt, but were not impacted by the government's fiscal position. However, there was great diversity when the various economic services were examined separately. The shares going to agriculture and the military were complementary, whereas the shares to mining and other economic services declined as the military budget grew. While increases in the government debt retarded all the economic service categories, the estimated coefficient was statistically significant for only agriculture. The share to agriculture was also positively associated with the size of the

Table II. Short-Run Model Results, Administrative/Social Budgetary Categories, Pakistan 1973–86

Budget Category	Standardized Regression Coefficients			R ²
	DEFCIT _{t-1}	MILEXP _t	GOVDEBT _t	
Public Services	0.90**	0.59**	-0.18	0.68
Total Education	-0.68*	-0.10	-0.06*	0.10
Primary/Secondary Education	-0.63*	-0.26	-0.15	0.57
Tertiary Education	-1.07**	-0.12	-0.10	0.77
Other Education	0.56**	0.16	0.12	0.51
Health	0.91**	-0.08	-0.57**	0.88
Hospitals	-0.40	-0.36	-0.26	0.29
Clinics	-0.61*	-0.32	-0.21	0.32
Other Health	0.89**	0.01	-0.44*	0.79
Social Security/Welfare	-0.95**	0.31	0.30	0.80
Social Security	0.65	0.87*	0.22	0.39
Welfare	-0.95**	0.31	0.30	0.80
Housing	0.86**	0.54**	0.39*	0.75
Recreation/Religious Activity	0.09	0.73*	-0.29	0.31

* Significant at the 5% level; ** significant at the 1% level

deficit. Of the infrastructure programs, only communications seems to have been adversely affected by the military budget. With the exception of communications and energy, infrastructure programs seems to have expanded through government indebtedness. Transportation programs (roads and railroads) and energy expanded as the deficit increased.

In general, the results from Table I indicate a possible conflict in government priorities. On the one hand, economic activities generally have been a lower priority than military expenditures. On the other hand, the government appeared willing to offset this bias – especially against infrastructure programs – by increasing its overall debt burden.

A much different pattern emerged with the administrative/social budget categories (Table II). Education and health programs were not affected by the military burden. However, public services, social security/welfare, and recreation/religious program shares rose with the defense budget. The government did not increase its debt to fund education nor has the debt burden resulted in austerity cuts in the schools. There is some evidence to suggest a low priority afforded education since education and the deficit are negatively associated. Austerity

stemming from larger deficits has been concentrated in educational programs (especially tertiary). By and large, health received a high budget priority although this was largely limited to ‘other health’ – expenditures not associated with hospitals or clinics. One of the government’s responses to rising debt burdens was to constrain allocations to the health sector.

The administrative/social sectors appear to fall under a different set of budgetary rules than the economic sectors, particularly infrastructure. While the economic activities clearly have a lower priority than the military, several of the social sectors appear to be complementary to defense – their allocations expanding and contracting with similar changes in defense. The government does not appear to be willing to accrue significantly higher levels of debt to maintain the shares of these sectors.

3.2 Long-Run Model

While the results obtained above are interesting, the long-run budgetary adjustments stemming from a change in the deficit or military burden may also be considered. This section expands the Hess/Mullman model and presents a model which includes the long-run adjustments to program shares.

The short-run model considered the im-

Table III. Long-Run Model Results, Economic Budgetary Categories, Pakistan 1973-86

Budget Category	Standardized Regression Coefficients			R^2
	SHARE _{<i>t-1</i>}	DEFCIT _{<i>t</i>}	MILEXP _{<i>t</i>}	
Total Economic Services	0.49**	0.29**	-0.78**	0.78
Agriculture	0.87*	0.08	0.32	0.73
Mining	0.39	0.21	-0.60	0.21
Other Economic Services	-0.03	-0.64*	-0.60**	0.76
Transportation/Communications	-0.12	0.23	-0.98**	0.61
Transportation	-0.22	0.86*	-0.54	0.44
Communications	1.04*	0.46	-0.35	0.56
Roads	-0.12	0.63**	-0.51*	0.51
Railroads	-0.44	0.99**	-0.54*	0.80
Energy	0.03	0.23	0.35*	0.44
Other Expenditures	-0.03	0.21	-0.49	0.52

* Significant at the 5% level; ** significant at the 1% level

mediate impact on a program as the deficit or military burden changed. As was seen, the share rose or fell depending on the type of program. In the long run, it is possible that the government may look to entirely different programs to absorb the impact of the change in the deficit or military expenditures. For example, the government may find it easier to cut from an education program in the short-run but from an infrastructure program in the long-run. While the immediate short-run impact is destabilizing, the medium or long-run goal is to restore optimal budget composition. In addition, it is likely that this attempt to restore the optimal budget composition cannot be completed in one year. Thus we hypothesize that budget allocations to a particular program in Pakistan adjust over time to bridge the gap between what the country considers optimal and the level which exists at any point in time. Obviously the factors which determine the optimal level will vary from program to program. For infrastructure programs the level may be based on economic activity, while for education it may be an international comparison of literacy for example.

Operationally, these factors can be included by estimating a Koyck (1954) distributed lag model, which involves introducing the lagged value of the respective budgetary share as an independent variable.

The long-run adjustment model is estimated in the following form:

$$(2) \text{ SHARE}_{i,t} = a\text{SHARE}_{i,t-1} + b\text{DEFCIT}_t + c\text{MILEXP}_t + \epsilon$$

In this form, the share allocated to a particular program in time period t depends on the amount allocated in the previous time period ($t-1$). The allocation in period t indicates the speed at which the government wants to bridge the gap between actual and the long-run desired program composition. The speed at which the gap closes also depends on the budget process, budgetary constraints and the pre-emption of funds by the military. In this structural form, as the government deficit increases for example, the effect on budgetary share will have an immediate impact and also an impact distributed over time. Thus the effect of reduced resource availability is not only year-to-year but may be spread out and 'decays' over time.

Equation (2) was estimated for the same budget categories as the short-run model and the results appear as Tables III and IV. While the patterns are not as clear for this model as for the short-run model, several trends stand out. For most of the economic budget categories the estimated coefficient for SHARE_{*t-1*} was not statistically significant, indicating that at least for Pakistan most of the program adjustment takes place

Table IV. Long-Run Model Results, Administrative/Social Budgetary Categories, Pakistan 1973-86

Budget Category	Standardized Regression Coefficients			R ²
	SHARE _{t-1}	DEFCIT _t	MILEXP _t	
Public Services	0.54*	0.36	0.39*	0.75
Total Education	0.65	-0.26	0.17	0.09
Primary/Secondary Education	0.98*	-0.03	-0.04	0.45
Tertiary Education	0.57**	-0.52**	-0.06	0.96
Other Education	-0.70**	0.71**	-0.26	0.73
Health	0.74**	0.30	0.09	0.52
Hospitals	0.18	-0.33	-0.29	
Clinics	-0.06	-0.73**	-0.13	0.48
Other Health	0.67*	0.30	0.07	0.46
Social Security/Welfare	0.65**	-0.48**	0.42**	0.91
Social Security	1.09**	0.04	0.70*	0.27
Welfare	0.66**	-0.46**	0.33*	0.88
Housing	-0.13	0.99**	0.11	0.80
Recreation/Religious Activity	-0.19	-0.63*	0.69**	0.70

* Significant at the 5% level; ** significant at the 1% level

in the short run and not the long run. The opposite was true only for total economic services and agriculture. For the economic budgetary categories except energy, the results suggest a strong tradeoff between defense expenditures and program share. For total economic services, transportation, roads and railroads, the negative effect of a larger military burden was partially offset by a willingness to run a higher deficit to fund the program. Most programs in Pakistan (especially infrastructure) have a much lower priority than defense, but the government apparently is unwilling to further reduce allocations to these programs as part of a general austerity program.

The pattern for the administrative and social expenditure programs (Table IV) is quite different. Since the estimated coefficient for the lagged SHARE variable was statistically significant for many of the programs, we conclude that adjustment to changes in the deficit or military burden does take place over the longer-run period. This indicates that the government of Pakistan is concerned about restoring some sense of balance in social programs. This is particularly striking, as one would have expected this to be the case for infrastructure programs (which are stretched out over time) rather than social programs. The mili-

tary burden has little impact on program share. If significant, program share was complementary to the military burden – a result also obtained in the short-run model. In addition, the results suggest that the government is unwilling to run higher deficits to fund these programs. In fact, the opposite tended to be true, administrative and budgetary programs were somewhat vulnerable over time to larger deficits.

4. Conclusions

Despite an annual growth rate of 6.5% during the 1980s, the economy of Pakistan showed a number of structural problems. These included a weak public resource position, high consumption expenditures (particularly in defense) which resulted in excessive deficits, and a growing debt service burden stemming from large amounts of external borrowing.

This article has presented a short-run impact model and also a longer-run adjustment model. The analysis has indicated that the deficit, the debt service, and the military burden are often interrelated in a complex manner, such that their impact on any specific government program is difficult to predict. In the short run, most infrastructure programs increased as the military burden

declined. However, the opposite seemed to be true for social programs (social security, welfare, and housing). Changes in the defense budget appear to have only a transitory effect on the share of government expenditures allocated towards physical capital formation. Instead, the willingness (and ability) of the government to borrow largely determines the share of the nation's resources to infrastructure investments.

Our adjustment model suggests that social programs have just as high a priority (or even higher) than economic services. When the military burden increases, the government is willing to take the resources from infrastructure programs. Instead of canceling social programs the government appears willing to let the deficit grow. In addition, our results suggest a long-run pattern of adjustment in social programs but not in infrastructure programs – a counter-intuitive result which warrants further research in light of Pakistan's severe infrastructure constraints.

NOTES

1. Eighteen countries were from Latin America and nine (including Pakistan) were from elsewhere.
2. The period for which consistent data are available. Budgetary data are from IMF, *Government Finance Statistics Yearbook* (various issues); economic and debt data are from IMF, *International Financial Statistics Yearbook* (1990).
3. The deficit is lagged to one year, since we assume that the current deficit (in year t) will not be known with enough certainty to affect current expenditures.
4. Only the standardized regression coefficients have been reported. The t -statistics are available from the authors upon request.

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