Arms Races
In the Third World:
Argentina and Brazil

PETER C. FREDERIKSEN
ROBERT E. LOONEY
Naval Postgraduate School

M ilitary expenditures have more than doubled in the past decade in Latin America, from $9.2 billion in 1973 to nearly $20 billion in 1983.[1] Concomitant with this large increase, there has been a growing interest among economists, political scientists, and other scholars (1) to explain the militarization of the region as a whole,[2] and (2) to search for variables to explain levels of defense spending within individual countries. This latter thrust has focused on factors such as economic conditions, population, size of the country, rivalries, and arms buildup.

The purpose of this article is to examine whether a significant part of Argentina's military budget over a 22-year span can be attributed to an arms race with Brazil. Multiple regression equations are estimated for the period 1961 to 1982 that take into account Brazil's military spending levels, changes in political regimes within Argentina, and also the availability of economic resources allocated to the government. In terms of the arms race between the two countries, our results indicate that the rivalry existed until some time in the mid-1970s. Since then, however,

its importance has faded, and other factors have become more important determinants of defense spending in Argentina.

There are several reasons why Argentina and Brazil have been chosen for this study. First, the two countries have long been recognized as rivals, a situation representing a classic arms race in the Third World.[3] Second, the arms race is conducive to analysis since it involves only two players and thus is relatively "simple." Third, recent data published by the World Bank on budget allocations for all central government functions from 1961 to 1982[4] permit an in-depth study of Argentina's military expenditure patterns. Finally, a recent paper by Selcher has suggested that Argentina and Brazil have gradually moved away from a relationship of "wary rivalry" toward one of "friendly competition."[5] If this is true, one would expect a given growth in Brazil's military budget to result in different reactions in Argentina's military spending habits, possibly leading to economic cooperation. Consequently, Argentine military expenditure patterns will be scrutinized for the period as a whole to test for any general patterns of military spending and also for three subperiods (1961–72, 1961–75, and 1974–82) to coincide with both regime changes in Argentina and increases in economic cooperation between the two countries.

As Selcher noted, much of the early rivalry arose because Argentina saw Brazil emerging as the leading nation in Latin America.[6] Further, internal divisions and serious problems of economic development contributed to Argentina's feeling of inferiority. The rise of nationalism in the country in the early 1970s—combined with trade disputes, border problems, and regime changes, among other things—pushed Argentina into an arms race with Brazil.

Although Selcher's purpose was to forecast the direction and quality of Brazilian and Argentine relationships for the late 1980s, he cited many specific cases of recent close cooperation between the two nations. For instance,

- In 1976, Oscar Camilion was chosen as ambassador to Brazil;
- In 1979, the Itaipu Dam settlement occurred;
- In 1982, "Latinamericanization" (or introspection) of foreign policy took place as a result of the Malvinas crisis; and
- In 1983, the Beagle Channel dispute with Chile was settled.[7]

Other factors that played a role included the general demilitarization of the country after 1980, the Foreign Ministry's stronger role in policy, domestic political liberalization, and a more friendly posture toward all neighboring states.

Determinants of Military Spending

There are many reasons why a country spends for defense. Hill has suggested that arms races, military alliances, status and status discrepancies in international systems, military aid, and the size of the country are a few of the major factors.[8] Westing has pointed to positive correlations between defense expenditures and factors such as population, land area, and gross national product.[9] For the United States, Griffin et al. has suggested that "military outlays (as a percentage of GNP) do appear to be employed as a counter-cyclical fiscal instrument by the state."[10]

Canadian defense expenditures have been examined by Treddenick. He concluded that military spending "may be significantly influenced by domestic economic imperatives which are independent of any security considerations."[11] Maizels and Nissanke have suggested that a country's political framework, level of military activity, and economic linkages will all influence defense outlays;[12] the relative importance of each factor will be determined by the state's national, regional, and global conflicts. After studying defense spending in Indonesia, Malaysia, the Philippines, Singapore, and Thailand, Harris concluded that "economic forces do exert at least a moderate influence on defense expenditure."[13]

In their study of Latin American military expenditure patterns, O'Leary and Coplin have suggested seven factors that influence defense spending: economic conditions in the country, the role of the armed services in nonmilitary affairs, internal security needs, reactions to arms purchases by neighbors, budget allocations of service branches in rival states, internal political support, and the age and condition of existing military equipment.[14] While admitting the difficulty in quantifying many of the measures, they felt that gross domestic product was an accurate measure of a state's economic condition. The military's role in nonmilitary affairs was quantified by the use of a dummy variable, and an index was developed for internal defense needs based on the number of riots, deaths from domestic violence, and political protests. A Markov chain process was used to test whether arms purchases by one country "led to a reaction by another nation to increase its acquisitions."[15] A similar technique was used to examine whether budget allocations of service branches in rival states affected defense allocations within any one country. (The final two factors were not quantified.)

O'Leary and Coplin failed to observe any strong relationship between military spending levels and such components as GDP, the nonmilitary role of the armed forces, the need for a security force, or domestic

violence levels. On the other hand, they did observe some evidence of arms races in certain Latin American countries, especially where they involved certain sophisticated weapons. Further, budget levels of rival service branches acted as a sort of "reference point" for budgets in other countries.

In an earlier paper we tested for the impact of economic variables in determining military spending levels in 10 Latin American countries.[16] Unlike the findings here, we found that economic variables (such as GDP, government revenue, or government expenditures) were correlated with levels of defense spending. In addition, the level of defense spending in the previous year was a good predictor of that for the next year. While there appears to be no generalized relationship across Latin American countries, economic variables should not be dismissed when trying to explain military expenditure patterns.

Building on these earlier works, the model presented below describes Argentina's military spending levels between 1961 and 1982, taking into account Brazil's military expenditure levels to test for an arms race. The model also incorporates regime changes and general resource allocations to the government sector.

The Model and Empirical Results

As noted, Argentina was selected for study since, from many reports, it has been involved in an arms race with Brazil, and also since it seems that the race has now abated. The model used to test for the impact of Brazil's spending patterns on Argentina's military spending levels is as follows:

$$ARGMILX = f (BRAZMILX, GEY, DUMF),$$

where ARGMILX and BRAZMILX represent Argentina's and Brazil's military spending levels, respectively, and where GEY is a ratio of government expenditures to GDP, reflecting the level of resources available to the government for all uses. The effect of different political regimes in Argentina[17] is represented by a dummy variable, DUMF.

Since 1961 there have been four different regimes: two civilian ones in 1961–65 and 1973–75 and two military ones in 1966–72 and 1976–82. A simple civilian/military dichotomy is inappropriate because there is little evidence to suggest all civilian and military regimes behave alike. The dummy variable scheme used in this model follows Grindle[18] and our earlier work,[19] in which both the first civilian and military regimes

were assigned a value of 1 since only minor differences appeared between them. The second civilian regime (the Peronists) was assigned a value of zero; it was least likely to reduce other expenditures as defense increased. The second military regime (the budget-authoritarians) was assigned a value of 2.

The inclusion of DUMF in the model tests for a change in Argentina's military expenditures for an *given* level of GEY as the regimes change—that is, it tests for a significant change in the intercept. Alternatively, as the regimes change, significant alterations in defense spending could occur with *changes* in GEY—that is, the marginal propensity to spend on military programs is altered. To test for this effect, an additional dummy variable DUMFX (DUMF times GEY) is included in the model.

The coefficient of BRAZMILX is hypothesized to be positive if an arms race exists. The sign of the coefficient for GEY is also expected to be positive; as the nation's output expands, so will government expenditures. The signs of the coefficients for the dummy variables will be positive if military regimes spend more on defense than do their civilian counterparts.

Table 1

Estimated Regression Equations, Argentine Military Expenditures, 1961–82

Period	Independent Variables				R²	F	DW
	BRAZMILX	GEY	DUMF	DUMFX			
1961–82	(−0.67)	(−1.11)			.01	0.71	1.17
	(0.96)	(−0.75)	(2.38)**		.28	1.98	1.37
	(1.01)	(−1.21)		(2.17)**			
1961–72	(3.14)**				.52	9.88	1.70
	(4.55)***	(6.22)***			.95	75.58	2.43
	(4.19)***	(5.22)***	(0.02)		.95	37.73	2.43
1961–75	(3.56)***		(5.99)***		.77	16.65	1.72
	(4.37)***	(3.83)***	(9.13)***		.93	38.41	2.16
	(5.11)***	(3.77)***		(12.09)***	.96	68.34	2.31
1974–82	(−1.68)	(−2.06)*			.42	2.16	2.28
	(−2.14)*	(−2.52)*	(2.65)*		.66	2.02	2.33
	(−2.13)*	(−2.72)*		(2.55)*			

Notes: *t*-statistics in parentheses; * indicates statistical significance of the coefficient at the 90 percent level, ** at the 95 percent level, and *** at the 99 percent level.

The results, which appear in table 1,[20] have been reported for four periods—the entire time span (1961–82), the first military and civilian regimes (1961–72), the Peronists (1961–75), and, finally, 1974–82—to test for the impact of increased cooperation between the two countries. The results for the whole period suggest no arms race existed between Argentina and Brazil since the estimated coefficients are not statistically significant. On the other hand, the estimated coefficients for DUMF and DUMFX are positive and statistically significant, suggesting political change was the main force behind changes in Argentina's military spending levels.

A different picture emerges when one examines the subperiods. The arms race between Argentina and Brazil is apparent during the period 1961–72. The coefficients of BRAZMILX in each form of the model are positive and statistically significant. In addition, as the government expenditures to GDP ratio (GEY) increased, there was a significant increase in military spending in Argentina. Although a military regime came into power in 1966, it appears that budget priorities remained unaltered—the coefficient for DUMF is statistically insignificant in this period. Fifty-two percent of the variability in Argentina's military spending can be explained by changes in Brazil's military budget. If GEY is included, the proportion rises to 95 percent.

If the period is extended to include the Peronists (1961–75), the results are broadly similar to those just reported. However, the regime change also contributed to changes in military spending. The R^2 value is more than 90 percent with the inclusion of BRAZMILX, GEY, and DUMF or DUMFX.

As noted, the relationship between the two countries gradually changed in the mid-1970s from one of rivalry to one of cooperation and exchanges between them. To examine whether this had any effect on military spending in Argentina, equations were re-estimated for the period 1974–82. The results support Selcher's hypothesis that the arms race had gradually abated between the two countries. Although the sign of the estimated coefficient for BRAZMILX is negative, only tentative conclusions can be drawn from the data, given the small time period under consideration. There is some evidence that there was a period of general demilitarization since the estimated coefficient for GEY was negative: as government expenditures grew relative to GDP, a smaller part was allocated to defense. Once again, this tends to support Selcher's observations. On the other hand, it appears that any impetus to increase the military's share of Argentina's resources originated from changes in the regime.

Summary and Conclusions

Earlier studies have focused on the role that economic factors and regime changes play in determining military expenditure levels in Latin America and, in particular, Argentina. This paper has extended these analyses by testing to see whether (1) an arms race existed between Argentina and Brazil during the 1960s and early 1970s, and (2) this race had diminished after relations between the two countries improved starting in the mid-1970s. Our results confirm that an arms race did exist between Argentina and Brazil during the time in question; additionally, they suggest that such an arms race can go on for long periods of time and that variations in military budgets from year to year can be explained by an arms-race model.

Based on this case study for Argentina and Brazil, it seems that increases in economic cooperation and exchanges between rivals can be an extremely powerful impetus to halt an arms race. In the face of an existing arms race, little can be done to stop the escalation except to increase cooperation and mutual understanding between the involved countries. Our results suggest also that political priorities in Argentina have become more important in determining military spending levels than in reacting to defense budgets in Brazil. A fruitful area for future research might be to test for other arms races both within and outside Latin America. Another area might be a further disaggregation to test whether service branches emulate one another in rival situations.

Notes

1. Augusto Varas, *Militarization and the International Arms Race in Latin America* (Boulder, Colo.: Westview Press, 1985), table 2, p. 40.

2. Ibid.; see also Henry Dietz and Karl Schmitt, "Militarization in Latin America: For What? And Why?" *Inter-American Economic Affairs* 38 (1984): pp. 44-64.

3. Michael K. O'Leary and William D. Coplin, *Quantitative Techniques in Foreign Policy Analysis and Forecasting* (New York: Praeger Publishers, 1975).

4. World Bank, *Argentina: Economic Memorandum*, vol. 2, *Statistical Appendix* (Washington, D.C.: World Bank, 1985).

5. Wayne A. Selcher, "Brazilian-Argentine Relations in the 1980s: From Wary Rivalry to Friendly Competition," *Journal of Interamerican Studies and World Affairs* 27 (1985): pp. 25-53.

6. Ibid., p. 28.

7. Ibid., pp. 28-31.

8. K. Hill, "Domestic Politics, International Linkages, and Military Expenditures," *Studies in Comparative International Development* 13 (1978): p. 53.

9. A. H. Westing, "Military Expenditures and their Reduction," *Bulletin of Peace Proposals* 9 (1978): pp. 24-29.

10. L. J. Griffin, M. Wallace, and J. Devine, "The Political Economy of Military Spending: Evidence from the United States," *Cambridge Journal of Economics* 6 (1982): pp. 1-14.

11. J. M. Treddenick, "The Arms Race and Military Keynesianism," *Canadian Public Policy* 11 (1985): p. 77.

12. A. Maizels and M. Nissanke, "The Determinants of Military Expenditures in Developing Countries," *World Development* 14 (1986): pp. 1125-1140.

13. G. Harris, "The Determinants of Defence Expenditure in the ASEAN Region," *Journal of Peace Research* 23 (1986): pp. 41-49.

14. O'Leary and Coplin, *Quantitative Techniques in Foreign Policy*, p. 114.

15. Ibid., p. 123.

16. Robert E. Looney and P. C. Frederiksen, "Economic Determinants of Latin American Defense Expenditures," *Armed Forces & Society* 14, 3 (Spring 1988).

17. Robert E. Looney and P. C. Frederiksen, "Consequences of Military and Civilian Rule in Argentina: An Analysis of Central Government Budgetary Tradeoffs, 1961–82," *Comparative Political Studies* 20 (1987): pp. 34-46.

18. M. Grindle, "Civil-Military Relations and Budgetary Politics in Latin America" (Working Paper, Harvard Institute for International Development, 1986).

19. Looney and Frederiksen, "Consequences of Military and Civilian Rule."

20. Only the t-values have been reported in table 1. A table on estimated coefficients can be obtained from the authors on request.

PETER C. FREDERIKSEN is an associate professor of economics in the Defense Resources Management Education Center, Naval Postgraduate School, Monterey, Calif. He has authored more than 30 articles on defense economics, economic development, and industrial organization.

ROBERT E. LOONEY, professor of economics in the Department of National Security Affairs, Naval Postgraduate School, Monterey, Calif., has written 14 books and numerous articles. His interests include economic development and defense expenditures in Third World countries.