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ECONOMIC ENVIRONMENTS CONDUCIVE TO INDIGENOUS THIRD WORLD ARMS PRODUCTION

ROBERT E. LOONEY

I INTRODUCTION

Despite the heated debate over the presumed high opportunity cost associated with domestic production of armaments in Third World countries, remarkably little empirical attention has been devoted to the economic sources of national military industrial capabilities. The literature is increasing rapidly, however, with a number of relatively recent studies (Vayrynen, 1983; Katz, 1984, 1986; Brzoska and Ohlson, 1986; Evans, 1986; Deger and Sen, 1985; Wulf, 1985; Tuomi and Vayrynen, 1982; Wulfetal, 1980; Harkavy, 1975; and Peleg, 1980) examining political and power relationships associated with Third World arms production. Few studies have, however, examined the economic conditions conducive to arms production in the Third World, and the relative importance of economic considerations in the establishment of these industries.

Recently, Stephanie Neuman (1984) has raised the question of "why for example do some states produce arms while others do not?" (Neuman, 1984, p. 181). Neuman is, in fact, one of the few researchers who have attempted to determine the critical characteristics that set Third World arms producers apart from those countries who have not developed a domestic arms industry[1].

Her general hypothesis and regression results indicate (Neuman, 1984, p. 173) that:

> What emerges within the Third World from these data is a hierarchically shaped arms production system based largely on factors of scale. In each region, the largest defense producers are generally those countries with the biggest militaries and GNPs which dwarf quantitatively, if not always qualitatively, the capabilities of their smaller, poorer neighbors.

Clearly, however, Neuman's results and conclusions apply only in a general sort of way, given numerous smaller countries – Ecuador, Peru, Chile and Dominican Republic, for example – whose arms industries would not be anticipated in the light of their small economic size and relatively limited level of military expenditures.

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1. Arms producers as defined by Neuman and used here are those countries producing at least one major weapon system (Neuman, 1984, pp. 172-73).

The purpose of this paper is to determine whether the possession of a limited number of economic characteristics is necessary and sufficient to predict with a high degree of probability whether or not a Third World country is likely to possess a domestic arms industry. More specifically, is there a unique set of economic characteristics that set apart the Third World arms producers from the non-producers?

The main findings of the analysis[2] below are that the critical, if not necessarily sufficient, condition for Third World production (and non-production) can be identified. Contrary to the conventional wisdom as to the factors facilitating arms production, neither the magnitude of the nation's military expenditures nor its economic size play a major role in delineating producers from non-producers. Instead, producers and non-producers can be differentiated on the basis of a multidimensional set of factors, largely economic. Here, the economic factors critical to arms production are essentially those involving access to foreign exchange. However, the precise manner in which foreign exchange facilitates arms production tends to vary from region to region, with external public debt relatively more important in Latin America.

II METHODOLOGY

The data set used for the analysis contained a variety of economic, demographic, and political indicators for ninety-six developing countries[3]. Of these, twenty-eight were classified as military producers by Neuman (1984, p. 173), i.e. producers of at least one major weapons system in the 1979-80 period. Due to missing observations for several countries in the economic-military data base, most of the analysis dealt with forty-nine countries, nineteen which produce arms and thirty which do not.

To determine the extent to which economic variables could correctly classify arms producers and non-producers, several sets of variables were first examined to see if their mean values for the producer and non-producer countries were significantly different. The variables selected were representative of broad, structural performance, and defense-related differences between developing countries:

1. External balance of payments variables;
2. External debt variables;
3. Fiscal savings variables;
4. Composition of gross domestic product variables;
5. Defense variables;
6. Performance variables and
7. Size variables.

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2. The time frame for the analysis undertaken below is 1980. This period roughly coincides with Neuman's classification scheme (1979/80). This period was also selected because it came at the end of a decade of rapidly increased Third World borrowing in external markets. It is clear that external financial markets changed fundamentally after the *de facto* Mexican default in 1982. Also this period marks the end of the world-wide boom in exports and imports. The period of analysis therefore captures the culmination of developments in external markets that may have affected Third World arms production. Because of the drying up of external capital transfers to developing countries after 1982, and the slowing down of exports from this group of countries, the analysis below suggests that the forces affecting the creation of indigenous arms industries were even more important in the mid to latter 1980s. Hence the conclusions drawn from this analysis are likely to continue to hold through the 1980s.

3. Economic and social variables are taken from World Bank (1982, 1983, 1984). Military expenditures and defense-related variables are from United States Arms Control and Disarmament Agency (1984).

An examination of the means (Table 1) of the arms and non-arms producers indicates that:

1. As noted by Neuman, arms producers do in fact tend to have larger geographic areas, higher gross domestic products, larger populations, armed forces and military expenditures.
2. Interestingly enough, the arms and non-arms producers have nearly the same per capita incomes.
3. Arms producers tend to have less export instability, a stronger growth in imports, a higher percentage of exports in GDP and, in recent years, a better export performance.
4. The arms producers, due to their larger size, have undoubtedly accumulated higher volumes of external indebtedness, but lower overall debt burdens (in terms of debt as a percent of GDP) than the non-producers.
5. The savings performance of the arms producers is distinctly superior to that of the non-producers.
6. The arms producers, as might be expected, tend to have a much higher share of manufactures in GDP than the non-arms producers.
7. Although having larger armies and levels of military expenditures than their non-arms counterparts, the producing countries tend to devote less to defense as a share of GNP, or on a per capita basis.
8. While the overall economic performance of the arms and the non-arms producers are fairly similar (with the arms producers experiencing higher overall rates of growth) the level of international reserves accumulated by the defense producers considerably outweighed that of the non-arms producers.

In short, the arms producers are larger, more open to external trade, have more external debt, higher savings, and had more dynamic import and export performances than the non-producing countries.

Given these diverse differences between arms and non-arms producing countries, it seems likely that no one single underlying factor has been necessary and sufficient for the establishment of an indigenous arms industry in the Third World. Instead, the factors associated with arms production are likely to be multidimensional.

One analytical approach capable of identifying which combination of the factors described above is necessary and sufficient for predicting indigenous arms production in the Third World is multiple discriminant analysis (MDA).[4]

Numerous applications of MDA to identification problems based on profile data have been made. In past research, MDA has been used primarily as a method of studying profile relationships among several groups and for classifying individual entities into groups (Klett, 1972; and Jones, 1980). This paper, however, makes use of a specific aspect of MDA which is frequently ignored; that is, its ability to provide the best statistical basis (in a least squares sense) for computing estimates of the specific probabilities of a Third World country achieving the status of arms producer.[5]

4. See Tables 2 and 3 in the text for a listing of the producers and non producers included in the discriminant analysis.

5. The program used for the analysis below was from the Statistical Analysis System (1982) statistical package. See *SAS User's Guide: Statistics*, 1982 Edition.

TABLE 1
STRUCTURAL, PERFORMANCE AND DEFENSE EXPENDITURE DIFFERENCES:
THIRD WORLD MILITARY/NON-MILITARY PRODUCERS

(means)

Symbol/Variable	Arms Producers	Non-producers
EXTERNAL/BALANCE OF PAYMENTS		
RBB Resource balance	–4.7	–11.6
ZGA Growth in imports 1960-70	5.4	6.0
ZGB Growth in imports 1970-80	5.8	3.2
EGA Growth in exports 1960-70	5.7	9.6
EGB Growth in exports 1970-80	4.9	–0.7
CA Current account balance	–2,593	791.5
EXTERNAL DEBT		
PDB Outstanding external debt	11,987	154.8
PDPB Debt as share of GDP	18.2	35.1
PBCB External borrowing commitment	2975.4	381.6
ECNIB Net inflow of public capital	1463.9	98.7
FISCAL/SAVINGS (%GDP)		
AS Average national savings	20.7	15.2
MS Average marginal savings	19.5	8.6
PCB Government consumption	16.7	14.5
GDIB Gross domestic investment	14.8	17.3
COMPOSITION OF GDP		
AG Share of agriculture	18.5	29.4
MAN Share of Manufacturing	18.1	10.2
EB Share of Exports	32.8	24.9
DEFENSE EXPENDITURES		
ME Military expenditures	1,597.9	936.7
AF Armed forces	220.3	68.3
MEY ME share of GNP	4.1	5.5
MEP ME per capita	110.5	147.2
PERFORMANCE VARIABLES		
EI Export instability (1967/71)	8.6	10.8
GDPGA GDP Growth, 1960-70	5.8	5.4
GDPGB GDP Growth, 1970-80	5.2	3.7
GIR Gross international Reserves	476.3	122.6
YP Per capita income	1,749.6	1,795.0
SIZE VARIABLES		
AREA Area	1,280.2	502.8
GDP Gross Domestic Product	47,835.9	9,529.8
POP Population	67.9	10.9

Note: Unless otherwise specified, figures are average values for the 1970-80 period.

III RESULTS

To determine the relative importance of these broad factors in differentiating the producing countries from those not possessing an indigenous arms industry, a step-wise discriminant analysis was performed using the variables in Table 1 as independent discriminating variables. Seven variables (based on the F statistic) were found to be statistically significant in differentiating producers from non-producers.

As might be anticipated (Tables 2 and 3), total military expenditures (ME) was the variable most significant in differentiating arms from non-arms producers.

Following military expenditures in order of importance were: (1) public external debt, (2) the net inflow of public capital, (3) the government's external borrowing commitment, (4) gross international reserves, (5) area, and (6) the current account in the balance of payments.

Contrary to Neuman's analysis, variables such as gross national product, population and armed forces were not statistically significant for the purpose of differentiating arms from non-arms producers. Furthermore, by itself total military expenditures provided little discriminating power between arms and non-arms producers. Using this variable,

TABLE 2
DISCRIMINANT ANALYSIS: RESULTS FOR THE ARMS PRODUCERS

(probability of correct classification)

	Discriminating Variables			
Arms Producer	I ME	II ME PDB ECNIB PBCB	III ME PDB ECNIB PBCB	GIR AREA CA
Israel	64.9	68.4	99.3	
India	58.7	94.8	100.0	
Nigeria	53.0	88.2	100.0	
Indonesia	55.3	99.9	100.0	
South Korea	64.9	94.7	99.9	
Singapore	46.3*	45.9*	100.0	
Pakistan	43.8*	85.6	100.0	
Venezuela	46.3*	69.3	100.0	
Mexico	42.9*	100.0	100.0	
Brazil	50.2	100.0	100.0	
Philippines	46.1*	62.9	96.3	
Ecuador	44.1*	23.1*	46.2*	
Colombia	42.9*	83.4	97.1	
Thailand	47.5*	72.8	100.0	
Malaysia	48.4*	86.3	53.8	
Dominican Rep	47.1*	32.9*	43.7*	
Chile	47.2*	56.8	96.1	
Argentina	59.4	32.7*	34.9*	
Peru	48.2	93.6	98.4	

Note: See Table 1 for the definition of the variables used in the discriminant analysis.
* indicates misclassification, i.e., a producer country was classified as a non-producer.

TABLE 3
DISCRIMINANT ANALYSIS: RESULTS FOR THE NON-ARMS PRODUCERS

(probability of correct classification)

	Discriminating Variables			
Country	I ME	II ME PDB ECNIB PBCB	III ME PDB ECNIB PBCB	GIR AREA CA
Cameroon	55.6	88.2	100.0	
Sudan	52.1	82.9	100.0	
Costa Rica	54.9	91.9	99.0	
Bolivia	52.8	89.7	99.9	
Togo	54.7	93.7	99.3	
Tunisia	56.1	89.0	99.7	
Rwanda	52.9	88.3	100.0	
Guatemala	53.2	91.8	99.9	
Malawi	52.7	93.8	100.0	
El Salvador	53.0	86.0	98.0	
Turkey	41.8*	66.2	67.2	
Paraguay	55.8	85.1	99.3	
Algeria	46.7*	60.9	100.0	
Libya	53.1	93.0	90.3	
Ivory Coast	52.9	70.1	99.9	
Mauritania	54.8	88.0	100.0	
Congo	54.1	91.9	100.0	
Sierra Leone	54.2	90.4	96.5	
Panama	54.1	76.2	97.3	
Uruguay	53.0	88.3	90.8	
Madagascar	53.5	90.1	100.0	
Ethiopia	54.8	92.7	100.0	
CAR	53.0	90.0	98.4	
Ghana	53.9	92.7	99.9	
Zaire	55.1	91.5	100.0	
Jamaica	54.2	94.8	99.3	
Zimbabwe	56.3	79.3	98.5	
Kuwait	53.1	85.2	92.0	
Kenya	52.9	88.1	99.3	
Jordan	51.4	89.8	93.3	

Note: See Table 1 for the definition of the variables used in the discriminant analysis.
* indicates misclassification, i.e., a non-producer country was classified as a producer.

eleven of the nineteen arms producers were classified incorrectly, as were two of the thirty non-arms producers. The overall probability of correct placement was also very low for most countries in each group.

A clear improvement in delineation between the groups is made adding the next three variables–public external debt (PDB), the net flow of public capital (ECNIB), and the external borrowing commitments of the public sector (PBCB). These four variables were capable of correctly (and with a high degree of probability) classifying all of the non-producers.

Four of the producing countries were still incorrectly classified, however. Furthermore the degree of probability with which producing countries were correctly classified was much lower than that obtained for the non-producers. Clearly a limited number of discriminating variables are far superior at predicting the conditions under which Third World arms production is unlikely to occur, than at identifying the countries in which arms production has actually been established.

Increasing the number of discriminating variables to eight raises the overall average probability of correct classification of countries as non-arms producers to over 98 percent, while at the same time increasing the average probability of correctly classifying the producing countries to well over 90 percent. However, in the environment defined by these eight variables, three countries – Ecuador, Dominican Republic and Argentina – are classified as non-arms producers.

With regard to the non-producers, all received a high probability of correct placement except for Turkey. Neuman classified Turkey as a non-producer based on the fact that the country did not produce a major weapon system. However, it is clear (Ayres, 1983) that the country does have a large indigenous arms industry. Based on its overall level of industrial development and expertise, Turkey may be something of a gray area, given Neuman's classification scheme.

A number of political variables were added to the data set to see if further discrimination between arms and non-arms producers could be obtained. The results were not, however, improved over those obtained using the eight economic variables.

Obviously, the only thing Equador, Argentina and the Dominican Republic have in common is their geographic location. Are the conditions conducive to arms production different in Latin America from the rest of the world? To test this hypothesis, our sample of developing countries was split into a Latin American and a non-Latin American grouping. As with the total sample, a step-wise discriminant analysis was performed on each geographic group to determine those variables that were statistically significant in delineating producers from non-producers.

RESULTS: NON-LATIN AMERICAN COUNTRIES

The non-Latin American sample countries consist of twenty-eight non-producers and eleven producers (Table 4).

As was done for the total sample of countries (Tables 2 and 3), several discriminant functions were formed for the non-Latin American countries by increasing the number of independent variables in the analysis:

1. By itself, ECNIB correctly classifies (Table 4) all but two producers and two non-producers.
2. Adding the current account balance (CA) results in a correct placement of all producing countries (and with an average probability of correct placement at over 95 percent). Two non-producers, Turkey and Morocco, were, however, incorrectly classified.
3. Utilizing all five statistically significant variables in the discriminant function markedly improved the results with only Egypt (with probability of correct placement 69.4), Turkey (with a probability of correct placement of 74.3), and Morocco (with a probability of correct placement of 79.1), falling outside the sharply delineated groupings of producers and non-producers.

TABLE 4
DISCRIMINANT ANALYSIS OF NON-LATIN AMERICAN COUNTRIES

(probability of correct classification)

	Discriminating Variables			
	I ECNIB	II ECNIB CA	III ECNIB CA PBCB	 GIR EGB
ARMS PRODUCERS				
Israel	75.3	100.0	100.0	
India	99.8	100.0	100.0	
Nigeria	93.7	99.9	100.0	
Indonesia	100.0	100.0	100.0	
Egypt	95.4	91.4	95.7	
South Korea	99.3	100.0	100.0	
Singapore	5.7*	97.3	100.0	
Pakistan	19.4*	100.0	100.0	
Philippines	97.4	87.0	94.6	
Thailand	82.9	95.6	99.0	
Malaysia	100.0	100.0	100.0	
NON-PRODUCERS				
Cameroon	100.0	100.0	100.0	
Sudan	96.7	97.0	100.0	
Somalia	97.3	99.9	100.0	
Togo	99.9	99.9	100.0	
Tunisia	94.9	100.0	100.0	
Morocco	10.7*	27.3*	82.7	
Rwanda	99.9	100.0	100.0	
Malawi	99.5	100.0	100.0	
Turkey	2.7*	45.3	69.2	
Algeria	100.0	100.0	100.0	
Libya	99.1	100.0	100.0	
Ivory Coast	50.7	97.2	100.0	
Mauritania	99.2	99.9	100.0	
Sierra Leone	99.6	100.0	100.0	
Chad	99.9	100.0	100.0	
Madagascar	97.0	99.9	100.0	
Tanzania	98.1	99.8	100.0	
Uganda	99.9	100.0	100.0	
Ethiopia	98.9	99.9	100.0	
CAR	99.9	99.9	100.0	
Ghana	99.3	100.0	100.0	
Burma	92.7	99.1	100.0	
Zaire	99.5	99.9	100.0	
Zambia	98.0	100.0	100.0	
Saudi Arabia	99.7	99.9	100.0	
Kenya	97.4	99.9	100.0	
Syria	98.5	99.9	100.0	
Jordan	97.3	99.1	100.0	

In general, however, whether a non-Latin-American country is a producer or a non-producer of arms depends largely on the volume of recent inflows of public and publicly guaranteed external capital. For the most part, the non-Latin-American countries not experiencing large and relatively recent inflows of external capital are not capable, regardless of their size or level of industrial sophistication, of either justifying or sustaining the on-going production of at least one major weapons system.

Interestingly enough, military expenditures *per se* play no role whatsoever in determining whether a non-Latin-American country will possess an indigenous arms industry.

An examination of the means of the discriminating and related variables for the non-Latin-American producers and non-producers confirms the high level of capital inflows and foreign exchange earnings associated with the producers, and the relatively low level of external inflows and export earnings associated with the non-producers. Even though the growth in producing countries greatly exceeded that of the non-producers during 1970-80, producers' current account deficits were significantly higher than the non-producers'.

RESULTS: LATIN AMERICAN COUNTRIES

For the Latin American countries as a group, a completely different picture emerges. For this group of countries, export growth (Table 5) between 1960 and 1970 (EGA) was the most important variable in differentiating between producing and non-producing countries. This was followed by: (1) the total public external debt accrued as of 1980 (PDB), and (2) the growth of imports 1960-70 (ZGA).

Note that the variables statistically significant in discriminating Latin American arms from non-arms producers are different from those for the non-Latin-American countries.

The results for the Latin American sample indicate that:

1. Using only export growth in the 1960s (EGA), all but four countries are correctly classified. This increases to all but one when the public external debt outstanding in 1980 is added to the discriminant function.
2. Latin American arms producers and non-arms producers can be correctly classified (with an average probability of correct placement of over 98 percent for both) with only three variables – export and import growth, 1960-70 (EGA and ZGA) and the accumulated public external debt in 1980 (PDB).
3. More significantly, a sharp delineation takes place between producers and non-producers with 99.3 the lowest probability of correct placement.

Looking at the means of the discriminating variables (Table 5), the Latin American producers achieved lower growth in exports and imports in the 1960s than did the non-producers, although the producers' external public debt was significantly higher by the beginning of the 1980s.

From these results it appears that arms production in Latin America is largely the result of import-substitution policies accompanied undoubtedly by high levels of protectionism in the 1960s. The industries survived in the 1970s largely due to rapid increases in foreign external borrowing.

In sum, there is a sharp contrast between the environment in which Latin American arms production takes place and the conditions in which it is present in the rest of the world:

TABLE 5
DISCRIMINANT ANALYSIS OF LATIN AMERICAN ARMS, NON-ARMS PRODUCERS

(probability of correct classification)

	Discriminating Variables		
	I EGA	II EGA PDB	III EGA PDB ZGA
ARMS PRODUCERS			
Venezuela	96.1	99.7	100.0
Mexico	78.1	100.0	100.0
Brazil	41.8*	100.0	100.0
Ecuador	85.4	62.9	99.6
Colombia	87.4	99.3	100.0
Dominican Rep	90.7	99.9	100.0
Chile	97.2	100.0	100.0
Argentina	71.8	99.9	100.0
Peru	91.4	98.3	100.0
NON-PRODUCERS			
Nicaragua	98.5	100.0	100.0
Honduras	99.4	100.0	100.0
Costa Rica	98.1	100.0	100.0
Bolivia	98.3	100.0	100.0
Guatemala	97.6	100.0	100.0
El Salvador	74.8	99.1	99.9
Paraguay	60.2	97.0	99.3
Panama	99.0	100.0	100.0
Uruguay	14.5*	40.2*	99.4
Jamaica	49.8*	95.6	100.0
Trinidad	49.8*	94.1	99.9

MEANS

Variable	**Producer**	**Non-producer**
EGA	2.2	7.4
PDB	14,417.3	1,036.7
ZGA	5.4	7.0

DISCRIMINATING STATISTICS

	F statistic	**Wilk's Lambda**
EGA	19.7	0.46
PDB	15.4	0.26
ZGA	4.1	0.19

1. The conditions facilitating Latin American arms production seem to have been established largely in the 1960s, and involved the creation, through export growth and external borrowing, of a high import capacity. Presumably, this import capacity was necessary to facilitate the high level of technology transfer, capital equipment, and so on needed to establish an indigenous arms industry.
2. It should be noted that the only new Latin American arms producers between 1969-70 and 1979-80 were Mexico, Ecuador, and Venezuela, all of which were oil exporters whose access to foreign exchange was enhanced during the period.
3. The non-Latin-American arms producers appear to be highly dependent on a steady infusion of public externally borrowed funds. Overall export and import performance does not appear to be critical in the establishment or maintenance of an indigenous arms industry. Instead, the ability to finance existing current account deficits though publicly guaranteed loans appears critical. It follows that the non-Latin-American arms industries may be less viable than those in Latin America.
4. Interestingly enough, for both the Latin American and non-Latin-American countries, economic size, per capita income, military capabilities or associated economies of scale in production do not appear to be either necessary or sufficient conditions for undertaking indigenous arms production. Instead, access to foreign exchange presumably required to facilitate imported inputs–both technical and material–for actual arms production appears to be the main factor determining whether arms production will be established and viable over time.
5. Foreign exchange availability by and of itself is a multi-dimensional factor, and not associated with one specific index such as export growth or inflows of externally borrowed funds.
6. The above findings are consistent with and reinforce those obtained by Ayres (1983, p. 814). In his analysis of the stages typically associated with domestic arms production, the first several are heavily foreign exchange intensive:

   a) Arms are imported, but are serviced and maintained domestically;
   b) A license to produce arms is acquired and production facilities are built requiring huge technical and personnel assistance from the supplier;
   c) Production starts and to begin with involves local assembly of imported sub-assemblies;
   d) The sub-assemblies are assembled locally from imported components and sometimes re-exported to the licenser;
   e) Components are manufactured locally from imported raw materials;
   f) Local production of raw materials, and
   g) Complete, indigenous production including design, raw materials and manufacture.

Ayres (1984) notes, however, that even those LDC's such as India which have been pursuing military self-sufficiency for many years have not reached stages f and g.

IV CONCLUSIONS AND IMPLICATIONS

The major finding of this study is that economic rather than strategic/political variables were, at least during the 1970s, the crucial determinants of whether arms production was undertaken by a developing country. However, contrary to casual analysis it is apparent that the economic factors with intuitive appeal – GNP, population, size of the industrial sector, and so on – were not critical during this period for the creation or maintenance of a viable arms industry in the Third World.

Perhaps the major finding of the analysis above was that access to relatively large amounts of foreign exchange tends to be the key element associated with arms production in the Third World. Having said this, it is clear that relatively abundant foreign exchange inflows are not necessarily an indispensable and sufficient condition for the establishment and survival of Third World arms industries. The fact that Kuwait and Algeria, countries with relatively abundant supplies of foreign exchange in the 1970s, were not producers of arms clearly suggests that while foreign exchange may greatly facilitate arms production, it does not guarantee that production will actually take place. Similarly, the periodic foreign exchange shortages experienced by India, the Philippines and the Dominican Republic during the 1970s suggest that other extenuating circumstances may from time to time assume a more important role than foreign exchange in determining whether arms industries will continue to survive (India and the Dominican Republic) or be established (the Philippines).

More fundamentally, given the nature of the data (i.e. the lack of time series figures on the identity of producers and non-producers, together with the lack of information on production levels) it is impossible to determine conclusively whether relative access to foreign exchange is a necessary condition for the establishment or the survival of a domestic arms industry. Still, the results presented above do strongly suggest that if countries desiring to produce arms have relatively poor access to foreign exchange, they are unlikely to be able to justify either the creation or maintenance of indigenous arms production.

The relative importance of foreign exchange in affecting Third World arms production probably stems from the fact that Third World arms producers are not yet completely self-sufficient in either the technical or material inputs required for arms production. Instead, the establishment of an indigenous arms industry places high and continuous demands on a country's foreign exchange reserves (Brzoska, 1983). Terhal (1982, pp. 251-259) estimates that in the late 1960s, military claims on foreign exchange in India were nearly half of India's civil imports of machinery and equipment. Given the fact that few of the existing Third World arms producers are likely to develop completely integrated arms industries in the near future, we can expect relative access to foreign exchange to continue playing, at least in the foreseeable future, a major role in determining the patterns of arms production in this part of the world.

One of Neuman's (1984, pp. 172-73) major concerns was the rapid expansion of Third World arms producers–from 5 in 1950 up to 21 in 1969-70 and 26 by 1979-80. What are the prospects that this trend towards an increasing number of Third World arms producers will continue?

The results of the discriminant analysis suggest that there should be no new Latin American arms producers in the foreseeable future. Given the poor export prospects for most of the non-producers together with their high levels of external debt, it is extremely unlikely that any of these countries will have sufficient surpluses of foreign exchange to allocate toward the development of an indigenous arms industry.

The situation is somewhat less apparent for the non-Latin-American countries, since for this group of countries continuous access to publicly guaranteed external capital inflows appears to be critical for the establishment and survival of a domestic arms industry. Clearly, if the major First World arms producers wanted to restrict the spread of new indigenous production to this area of the world, denial of credits at past levels might be an effective policy. Given the fungibility of money and credit, however, the scope for action in this area may be somewhat limited.

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