FORCES DRIVING THIRD WORLD MILITARY INDUSTRIALIZATION:
INTERESTS AND PASSIONS

David Kinsella

Department of Political Science
University of Missouri-Columbia

polsdtk@mizzou1.missouri.edu

FORCES DRIVING THIRD WORLD MILITARY INDUSTRIALIZATION: INTERESTS AND PASSIONS

Abstract

Third World states are driven to pursue programs of military industrialization by both their interests and their passions. Interests are defined in instrumental terms, and I examine their importance in explaining the behavior of leading Third World arms producers. An analysis of time-series cross-section data for five countries from 1970 to 1990 suggests that domestic arms production has been motivated by regional conflict as well as a desire to diminish the potential leverage exercised by foreign arms suppliers. Opportunities for increased domestic arms production are provided by capital investment and, obviously, existing arms manufacturing capacity. But instrumentally defined interests (and opportunities to pursue them) provide only a partial explanation of military industrialization. Arms production in the Third World is also driven by states' passions, by their quest to become modern nation-states. These passions are hard to define in instrumental terms. They have developed through exposure to the global military culture, and this exposure may account for some of the residual variance in military industrialization that remains unexplained by state interests.

FORCES DRIVING THIRD WORLD MILITARY INDUSTRIALIZATION:
INTERESTS AND PASSIONS

> The belief that interest could be considered a dominant motive for human behavior caused considerable intellectual excitement: at last a realistic basis for a viable social order had been discovered. But a world governed by interest offered not only an escape from excessively demanding models of states that "have never been seen or have been known to exist"; it was perceived to have a number of specific assets of its own. The most general of these assets was *predictability.*
>
> Albert O. Hirschman
> *The Passions and the Interests*

Since the end of the cold war, it has not taken long for the congratulatory back-slapping to give way to hand-ringing. Military downsizing appears to be proceeding fairly quickly in the East and the West with the dissipation of political disputes dividing them. But the Third World has emerged anew as a source of considerable concern among would-be architects of a new world order. Weapons proliferation -- and most especially, the proliferation of arms production capacity -- is quite high on the list of post-cold war threats to international stability. To what extent has military industrialization in the Third World been driven by perceived interests, and to what extent, therefore, is it predictable?

The post-Renaissance philosophers, to whom Hirschman (1977) traces the original defense of *le doux commerce*, would probably approve of the prominent role that interests play in modern social scientific inquiry. They would probably *not* be impressed by our accomplishments in predicting human behavior, however, and less impressed still by our ability to predict the behavior of human collectivities. They might even suggest that we have gone too far in explicating human behavior as a function of inter-ests, defined primarily in instrumental terms, and that it may be time to bring passions back in.

That at least will be my claim. It is not new, even among economists, whose insights we appropriate for so many of our interest-based analyses of political behavior. Perusal of the works of Hirschman, Amartya Sen, Thomas Schelling, and others attests to the fact that economic theorists are not nearly as enamored of the rational-choice perspective as we sometimes assume. But my argument rests less on their theoretical insights about human motivation, and more on the limited predictability of behavior conceived mainly in instrumental terms. The behavior I analyze is that of Third World states, in particular their quest for indigenous arms production capacity.

Assessing the relative contributions of instrumental and noninstrumental forces driving Third World military industrialization is a daunting task, one I do not presume to fully undertake here. Despite a sizeable literature on Third World militarization, we possess relatively little systematic understanding of the political, economic, and sociological dynamics surrounding it. They are not hard to identify in the abstract. It is just that there have been very few empirical investigations (qualitative or quantitative) which attempt to establish the validity of these so frequently identified dynamics. Only once that is

accomplished can we proceed to inquire whether the forces driving military industrialization derive from instrumental or noninstrumental motivations, and whether residual explanations are in order.[1]

My investigation consists of three parts. First, I discuss the forces which motivate and allow Third World states to engage in military industrialization. Next, I describe my empirical analysis of Third World arms production and present statistical results for five countries from 1971 to 1990: Brazil, India, Israel, South Africa, and South Korea. My results lend considerable support to much of what the literature has to say about the forces promoting military industrialization. Finally, I consider what has been left out. My conclusion is that, in focusing on the *interests* which provide instrumental motivations for military industrialization, we miss a big part of the picture. Noninstrumental motivations may actually account for a large share of residual variation in Third World arms production. I speculate that such *passions* derive in large measure from sociological dynamics in the international system, and in particular the degree to which these states were exposed to the military culture of the cold war.

MILITARY INDUSTRIALIZATION IN THE THIRD WORLD

Determinants of Third World military industrialization could be sorted any number of ways for purposes of discussion: political, economic, and sociocultural; domestic, regional, and systemic; motivating and constraining; and so on. Here I try to distinguish the degree of instrumentality involved -- i.e., interests versus passions.

Interests

The next section will draw out more precisely the distinction between interests and passions. For the moment, it will suffice to say that by "interests" I mean those forces which motivate state behavior designed to protect or enhance its material well-being. Since well-being may not always result from such pursuits, this definition is meant to include interests that derive from misperception, miscalculation, false consciousness, or other lapses of reason. What the definition excludes are the sorts of motivations that do not derive from relatively concrete behavioral goals. Following Hirschman (1986, 35), although the pursuit of interests "can cover -- to the point of tautology -- all of human action[,] it will more usefully designate a specific manner or *style* of conduct, known variously as 'rational' or as 'instrumental' action."[2]

The interests of Third World states are not substantially different from the interests of states in general. They arm because they perceive threats to their national security. Advanced weaponry is prized whether those threats are to be countered with defensive or aggressive foreign policy postures.[3] Overt military conflict represents a particularly acute threat to national security, and thus accentuates the demand for weaponry. But if warfare is sporadic, it may not provide much of an impetus for military industrialization if the immediate demand for arms can be met by existing stocks and transfers. The state's involvement in an enduring rivalry, i.e., a prolonged period of interstate hostility punctuated by overt militarized disputes (Goertz and Diehl 1993), is more likely to provide an impetus for the development of an indigenous arms industry.

Warfare constitutes perhaps the most obvious challenge to the state's interests, but the threshold of violence certainly need not be crossed for a state to perceive threats to its national security. Arms racing is the behavioral manifestation of this mutual threat perception, and has been studied on several fronts. Most scholarly effort in this area has sought to demonstrate the presence of action-reaction dynamics in rival states' overall defense budgeting, but some have also observed racing patterns in arms importation (e.g., Mintz 1986; Kinsella 1994). There have been few attempts to depict military industrialization per se as an action-reaction process, since the distribution of significant arms production capacity in the Third World has been relatively scattered to this point. Leading Third World arms producers are less motivated by rivals' weapons manufacturing than they are by the entire range of arms procurement activity, including imports. But as arms production capacity diffuses, we may increasingly witness racing dynamics at the level of indigenous arms production.

Actual or potential threats to national security are exacerbated when states find themselves dependent on others for defense. States that have been subject to weapons embargoes, especially during wartime, bristle most at the thought of lasting arms dependence. For Katz (1984b, 4-5), "[t]he most important factor driving LDCs to produce arms can be summarized quite easily: autonomy, that is, freedom of action in the domestic and international spheres." Autonomy is enhanced by an indigenous arms production capacity, particularly the capacity to initiate or expand domestic arms production in a pinch, as well as the ability to maintain existing systems. Full self-sufficiency is a viable option for very few states; Third World states in particular can only hope to pursue it in degrees. For arms importers, autonomy is enhanced by a diversified supplier portfolio, since the availability of alternative weapons sources diminishes the leverage of any single source. That is, self-sufficiency and source diversification can be seen as complementary procurement strategies (Catrina 1988). Limited arms-production capacity provides a strong motivation to diversify import sources. When external suppliers are few -- due to formal embargoes or de facto isolation -- the state is inclined to embark on military industrialization.

That national security concerns provide the central impetus for the development of an indigenous arms production capacity is a reasonable, if hasty, conclusion. But there is another motive for arms production: "[f]rom an economic point of view it has a number of attractive features because it tackles some of the structural obstacles to development" (Kennedy 1974, 301; see also Benoit 1973). The pursuit of "military-led industrialization" is recognized far more explicitly in the academic literature than it is by Third World statesmen, not surprisingly.[4] Production of killing machines would seem to demand something other than an economic rationale. Still, many analysts do agree that part of what drives military industrialization in the Third World is the belief that arms production will promote development in adjacent sectors of the national economy. Of course, state leaders may be wrong -- and much of the literature endeavors to show them the errors of their ways -- but they do appear to be so motivated.[5]

Whatever the political or economic motivations for military industrialization, interests do not guarantee outcomes. Nor do they guarantee that the means for achieving those outcomes will be employed at all. Some Third World states desire an indigenous arms-production capacity, for any number of reasons, but are presented with few opportunities to develop one.[6] Weapons production rests on some minimally required capital and human resource base. "While defense industrialization

may introduce new products, processes, and industries into developing economies, no Third World country can hope to support arms production if it does not already possess a reasonably strong, diversified industrial sector" (Ball 1988, 358; see also Brauer 1991). Further, the manufacturing infra-structure necessary to anchor transferred arms production technology may not be sufficient to support indigenous weapons development or even adaptation. That requires a commitment by the state to promote military research and development, not to mention a fairly developed scientific and engineering community (Katz 1986b; McLaurin 1989).[7]

Krause (1992, chapter 1) has detailed several phases in the evolution of the arms production and transfer system, phases which have repeated in three waves since the mid-15th century: (1) revolutionary military-technological change; (2) development of military-technological gaps between states; (3) rise in demand for arms and arms-producing techniques; (4) military-technological diffusion; and (5) solidification of the arms-production hierarchy. The fourth phase of technological diffusion has facilitated the development of arms-production capacities in today's Third World -- generically, the "third tier." The mechanism for diffusion is competition among arms suppliers. In a buyer's market, hopeful military industrializers have the "leverage to get production facilities and knowledge as part of their major arms purchases" (Buzan 1987, 46; see also Bitzinger 1994; Louscher and Schwarz 1989).[8] In this context, then, a diversified arms supply portfolio would seem to be more conducive to military industrialization. While supplier competition enhances autonomy and provides less motivation for the pursuit of self-sufficiency, it does provide more opportunity for technology acquisition and the development of arms production capacity.

Passions

The interests driving military industrialization are, by my definition, instrumental. In fact, there are degrees of instrumentality involved, and interests simply cluster toward the instrumental as opposed to the noninstrumental end of the continuum. Arms production for purposes of outfitting the military for warfare is fairly recognizable as goal-seeking behavior. Arms production for purposes of diminishing the leverage of foreign arms suppliers is perhaps less so. Therefore, I turn my attention away from interests cognizant that identifying the instrumental and noninstrumental forces driving military indus-trialization entails moving along a continuum rather than jumping from one category to another. There will be no confusion as to which direction I am moving.

Interests blend into passions. Interests imply preference orderings: a well-armed military over a poorly armed one; self-sufficient procurement over import dependence; military-led industrialization over underdevelopment. It may even be possible to combine these simple dichotomies into a single preference ordering. But when passions enter in, that task becomes immensely more complicated. Passions motivate behavior for its own sake. Where action is even partly noninstrumental, outcomes are hard to order because they are only vaguely conceived: "an important component of the activities thus undertaken is best described not as labor or work, but as *striving* -- a term that precisely intimates the lack of a reliable relation between effort and result" (Hirschman 1984, 91).[9]

The distinction between interests and passions is the distinction between preferences and *metapreferences*, which in turn leads to a distinction between instrumental choice and noninstrumental

choice. In drawing our attention to the importance of noninstrumental choice in economic life -- i.e., choice which takes into account such things as sympathy and commitment -- Sen (1977, 336) observes:

> A person thus may be "rational" in the limited sense of revealing no inconsistencies in his choice behavior, but if he has no use for these distinctions between quite different concepts, he must be a bit of a fool. The *purely* economic man is indeed close to being a social moron. Economic theory has been much preoccupied with this rational fool decked in the glory of his *one* all-purpose preference ordering.

Here is where *homo economicus* meets *homo sociologicus*. For if passion-driven behavior cannot be reduced to interest-driven behavior, we must ask: where do passions (or metapreferences) come from? The answer is: from the sociocultural context. The dominant practices and conventions which constitute social and cultural institutions become sources of utility for those who conform. They give value to behavior qua behavior.[10]

Many analysts have questioned whether military industrialization does in fact promote the interests of Third World states. Not only have these states armed themselves to levels grossly exceeding their security needs, undermining their security in the process, but they often acquire military hardware that they can scarcely operate or maintain (Kaldor 1981; Wulf 1979). Nor does indigenous arms production necessarily promote autonomy. Third World producers continue to rely on foreign suppliers for more advanced systems and technologies, which affords the latter continued leverage over their use (including resale). In fact, military industrialization may usher in new forms of arms dependence (Schwarz 1987; Baek et al. 1989).[11] Lastly, researchers have challenged the notion that military industrialization effectively promotes wider industrial development (e.g., Ball 1988).

It would be convenient to chalk all this up to misperception, miscalculation, or even bouts of irrationality on the part of Third World leaders. It would also be wrong. The militarization of the Third World, with its attendant dysfunctions, is simply too regularized and systematic to be seen as an aberration. This is not to deny that the assessment or pursuit of interests may be perverted in one way or another. To be sure, state behavior is sometimes, perhaps often, irrational; but it is also *non*rational -- and the difference between the two is huge. The latter is the focus of the constructivist or institutionalist perspective, an approach inspired by the work of sociologists. According to this view, military industrialization in the Third World is not simply the product of autonomous, calculated (or miscalculated) behavior undertaken by state leaders. Never mind the national security threats, the arms embargoes, or the promises of industrial development: Third World states develop indigenous arms-production capacities because "it's the right thing to do." That is what it means to be a modern, independent nation-state.

Why is military industrialization the right thing to do? Suchman and Eyre (1992, 149-150) suggest that we look to the "metonymical iconography of the global cultural order." Similarly, Kaldor (1981, 144) contends that "the possession of weapons systems allows for an ordering of international military relations, conferring political influence, merely through perceptions about military power." Participation in this weapons *system* thus provides "a form of international legitimacy for Third World

governments." The agents of socialization (or acculturation) can be found in the training of Third World military elites -- first by their colonial authorities, and then by both sides in the East-West competition -- as well as in the international arms trade (Mullins 1987, chapter 2; Kaldor 1981, chapter 5). The effects of socialization are manifest in *technologism*, or the "symbolic valuation of advanced over alternative technology" which comes from exposure to modern weaponry (Wendt and Barnett 1993, 339). Advanced weaponry -- and the capacity to produce it -- is coveted not only for its destructive efficiency, but also for its "*symbolic* throw weight" (Suchman and Eyre 1992, 154).[12]

Critics of this view, at least the methodological individualists among them, smell reification. And it is indeed the case that proponents are often remiss in detailing the causal mechanisms at work. But if the rational choice perspective can take ontological refuge in actors' interests, then surely constructivists can point to their passions. While arms production is a means by which Third World states pursue their interests, international society's newest aspirants have also found that military industrialization is a worthy endeavor in and of itself.[13]

The Conceptual Framework

Consider, by way of summary, Figure 1. Whether our focus is on interests or passions, to explain state behavior we must be attentive to both the actors and their environments. A rational choice approach tends to highlight interests. The actor's preferences are consistently ordered and each is associated with a particular utility should that outcome be achieved. Achievement depends on the opportunities available to the actor, and a judicious assessment of these opportunities yields probabilities that each preferred outcome will in fact materialize. Actors take into account both their preferences (utilities) and their opportunities (probabilities) in determining that course of action which best promotes their interests (maximizes expected utility).

[Figure 1 about here]

Constructivists have not been able to deny, at least not credibly, that these sorts of processes operate in the social world. Instead, they suggest that there is much more to it. They want to know where interests come from -- i.e., how they are socially constructed. While the extremes of the constructivist movement continue to demand a sociocultural explanation for even the most transparent of state interests, other more moderate elements concede -- as Hirschman, Sen, and other economic theorists have long maintained -- that they do not seek to overthrow the rational choice framework, but rather that they are interested in introducing a bit more, well, realism. States, like people, pursue their interests *and* their passions. That is, in addition to preferences, actors have metapreferences. When our attention is drawn to metapreferences, the actor's environment becomes important not so much as a source of opportunities for action, and thus outcomes, but more as a source of what is valued in action itself. Societies and cultures are the ultimate source of this value.[14]

The social and cultural forces behind Third World military industrialization should not be conceived of as uniform and constant. Otherwise they contribute little to our understanding of a process which has proceeded unevenly across time and space, even within the Third World. It is not hard to understand the reluctance to introduce such nuance into constructivist accounts: society and

culture are formidable empirical constructs. And even if we bracket its sociocultural foundations, and look merely for existential evidence of passion-driven behavior, empirical research is thwarted at every turn. As Suchman and Eyre (1992, 151) explain,

> locating empirical evidence of nonrational decision making poses a significant methodological problem, particularly for investigators employing case-study techniques. According to institutional theory, military procurement reflects an essentially ritualistic belief in modern weaponry as a distinguishing emblem of the modern nation; unfortunately, since rational military planning is another such emblem..., these nonrational motives are unlikely to receive formal acknowledgment.

The upshot is that tendered explanations defer to state interests when they are found -- or when they are reconstructed, in however tortured fashion. In the absence of evidence to the contrary, it is customary proceed *as if* states are rational (Bueno de Mesquita 1989). That is not unreasonable. Indeed, it makes more sense than proceeding as if they are systematically nonrational. Yet even where the evidence might suggest the parallel impact of nonrational processes, researchers are inclined to give causal priority to rational ones (Green and Shapiro 1994, 36-37). In empirical analyses (qualitative and quantitative) designed to explain variance, that share which might be accounted for by *both* rational and nonrational processes is attributed solely to the former. That often leaves precious little residual to be explained by the latter, so the search for causal forces ceases.

EMPIRICAL ANALYSIS

Although the search for passions underlying state behavior is somewhat disadvantaged by the sway of the rational choice paradigm, there are no obvious alternatives to interpreting empirical evidence. My quantitative analysis examines whether and to what extent military industrialization in five countries has been driven by the pursuit of state interests. Passions do not figure into my empirical model, so interests receive the benefit of any doubt stemming from the non-orthogonality of these two motivating forces. I will return to passions, however, when I consider what might account for the variance which remains in Third World military industrialization even after state interests have done their explanatory work.[15]

Data and Measurement

My sample consists of five countries -- Brazil, India, Israel, South Africa, and South Korea -- observed from 1970 to 1990. In analyzing the behavior of these leading Third World arms producers, I restrict my empirical domain to states at similar levels of defense-industrial development. To the extent that generalizable patterns of Third World military industrialization exist at all, these states are most likely to exhibit them. Yet the time-series analysis also allows for case-specific idiosyncrasies.[16]

    Military Industrialization. Military industrialization is, of course, my dependent variable, and

it is measured in terms of domestic arms production. Data come from the Stockholm International Peace Research Institute. I use two alternative indicators: constant-dollar values of major weapons production (see Anthony 1993, Table 17.1) and the number of ongoing production programs. I compile the latter from Brzoska and Ohlson's (1986) *Arms Production in the Third World* (Appendix 2) and subsequent issues of the *SIPRI Yearbook*. Production programs are tallied annually for their duration, and without regard to the number, type, or caliber of the weapons produced in any given year. These figures are measures of aggregate arms production activity and not the volume and/or military effectiveness of what is being produced. This is in contrast to the dollar-value figures, which do purport to take into account the volume and military "market value" of total output (see Anthony 1993: 368-369). SIPRI documents both licensed and indigenous arms production in the Third World, and my analysis treats these both separately and together -- the latter referred to simply as "domestic" production.[17] The dependent variable is therefore measured in six ways: domestic, indigenous, and licensed production, each in terms of dollar-valued output and ongoing programs.

     National Security Interests. Explanatory variables include measures of regional conflict and armament levels, the primary threats to states' perceived national security interests. Regional conflict is operationalized using an updated version of the World Event/Interaction Survey (Tomlinson 1993). It represents the annual sum of all conflictual events which target the state in question, weighted using Goldstein's (1992) scheme. Regional armament level is measured as the total annual defense spending (in constant dollars) of other major states in the region. These data are compiled from multiple volumes of the *SIPRI Yearbook*.[18]

     Since Third World states seek to minimize the policy leverage available to foreign arms suppliers, the empirical model also includes arms import dependence as an explanatory variable. The variable does not indicate the extent to which a state must rely on imports for its *total* defense needs (i.e., the opposite of self-sufficiency). Rather, it measures to what degree a state depends on just a few suppliers for its import needs. I use Catrina's (1988) indicator of arms import dependence:

$$\left(\frac{t_1}{T}\right)^2 \% \left(\frac{t_2}{T}\right)^2 \% \ ... \ \% \left(\frac{t_n}{T}\right)^2$$

where t is the amount of arms imported from each of n suppliers, and T is the amount imported from all n suppliers. Each ratio is squared, summed, and multiplied by 100. The index thus ranges between 0 and 100, with higher values indicating more concentrated arms-import portfolios and lower values indicating more diversified ones. I construct the measure using the arms-trade registers appearing in Brzoska and Ohlson (1987), *Arms Transfers to the Third World 1971-85*, supplemented by those appearing in subsequent issues of the *SIPRI Yearbook*. Arms transfer programs are tallied in the same way as arms production programs: t and T represent numbers of transfer programs underway, not numbers of weapons transferred or their dollar value. Note that this variable serves a dual purpose. If states are *motivated* to develop a domestic arms-production capacity to minimize supplier leverage, then the parameter estimate will be positive. If states derive more *opportunities* to develop this capacity under conditions of supplier competition, then the estimate will be negative.

     Economic Interests. Here my explanatory variables are measures of manufacturing output and capital investment (both public and private). Manufacturing data come from the UN Industrial

Development Organization's *Industrial Statistics Yearbook*, and represent the constant-dollar value of total manufacturing output. This variable too may shed light on two hypotheses: i.e., that states embark on military industrialization in order to further wider industrial development, or that growth in the state's industrial infrastructure facilitates the establishment of a domestic arms-production capacity. The predicted relationship is positive in both cases, so the parameter estimate cannot distinguish the relative merits of the two propositions. I defer to a more thorough follow-up investigation the matter of precise causal dynamics.

Significant manufacturing output implies that the state and/or private industry have been investing in plant and equipment, but I include fixed capital investment as a separate regressor to account for situations in which the defense industry actually leads industrialization in adjacent sectors. Again, if state leaders have pursued policies of military-led industrialization, manufacturing output is not entirely appropriate as an "explanatory" variable. The impact of capital investment on arms production capacity would be direct rather than mediated through its impact on the manufacturing infrastructure. Fixed investment is measured as the constant-dollar value of both public and private investment. Data are from the International Monetary Fund, and are reported in its annual *International Financial Statistics*.[19]

Analysis and Results

To recap, my empirical model treats Third World arms production (measured six ways) as a function of regional conflict, regional armament levels, arms import dependence, manufacturing output, and fixed capital investment. These variables are most closely related to what I have termed the "interests" driving Third World military industrialization. I conducted my analyses using time-series cross-section (TSCS) data for the five countries from 1970-1990. The TSCS design overcomes the degrees-of-freedom problem I would confront in analyzing the five time series separately, but it does assume that the effects of each of the independent variables are the same for each of the five countries. At this point, there is no reason to question that assumption, but spatial consistency -- along with temporal consistency, assumed by time-series models generally -- might be the subject for further investigation.

TSCS data are also notorious for yielding "misbehaved" residuals when models are estimated using Ordinary Least Squares. Therefore, I begin with an analysis of the variance in the OLS residuals. Results appear in Table 1. The first two columns of the table report F statistics from a two-factor analysis of variance; they test for "individual effects" and "time effects" on arms production, once the effects of the five independent variables have been accounted for.[20] That is, aside from information about states' security and economic interests, does the identity of an individual state or a particular time period tell us something about the observed level of arms production? All six TSCS residual series exhibit evidence of individual effects. The statistically significant F ratios for individual effects (column 1) suggest that the identity of the country does in fact tell us something about its level of arms produc-tion. Time effects are significant as well (column 2), except for indigenous arms production. This contemporaneous correlation between the residuals for individual countries at time t implies "cross-sectional heteroskedasticity," and requires correction in order to generate robust estimates of parameter standard errors (parameter estimates themselves are accurate). Likelihood ratio tests (column 3)

indicate that the TSCS residuals also display "panel heteroskedasticity," i.e., differing variances among the individual countries. This too violates OLS assumptions and must be corrected.

[Table 1 about here]

Each of these dimensions of the complicated TSCS error process can be handled. As for the individual effects, it is an easy matter to estimate a "fixed effects" model, either by including dummy variables for individual countries or by re-expressing the series as deviations from means for each country. I opt for the latter, but they are functionally equivalent.[21] Contemporaneous correlation and panel heteroskedasticity require adjustments to the OLS covariance matrix. Beck and Katz (1995, n.d.) have proposed such an adjustment, which uses OLS estimates of contemporaneous covariances, and demonstrate the superiority of OLS with panel-corrected standard errors (PCSEs) vis-à-vis alternative Generalized Least Squares estimators. I adopt their approach here. Beck and Katz (n.d.) also suggest explicitly modeling the dynamics in TSCS data, by including the lagged dependent variable as a regressor, rather than treating serially correlation as a "nuisance" to be purged by transforming the data. Again, I follow their lead.[22]

Table 2 reports the estimated effects of the independent variables on arms production as measured by output in constant dollars. All but manufacturing output show significant relationships to Third World militarization, but not consistently: effects sometimes depend on whether domestic, indigenous, or licensed production is the dependent variable. Not surprisingly, arms production during the previous year is consistently related to current production; so is current fixed capital investment. Investment and manufacturing are highly correlated, which probably accounts for the statistical significance of one but not the other.[23] The most consistent of the empirical results, then, are those which reflect the *opportunities* that Third World states have to embark upon or expand programs of military industrialization, capital stock and existing arms production capacity.

[Table 2 about here]

Empirical support for the forces *motivating* military industrialization is spotty. Only indigenous arms production increases with the level of regional conflict involving the producer. That is the relationship we expect, but, curiously, it does not hold when licensed production is analyzed or when indigenous and licensed production are taken together. Indigenous arms production also increases with arms import dependence, as does domestic production generally. Recall that the level of arms import dependence -- or diversification, its inverse -- may affect military industrialization in two ways. Depen-dence provides the motivation for domestic arms production as a means of diminishing supplier leverage. Diversification, and the accompanying competition among suppliers, provides opportunity for the acquisition of production technology necessary for the development of military-industrial capacity. The positive relationship between indigenous production and arms dependence suggests that here motivation dominates opportunity. Where opportunity is expected to have its biggest impact, in licensed production, import dependence does not have a significant positive effect. But the effect is not

negative, as it would be if import diversification was providing states with opportunities for arms production under license. Finally, it is interesting to note that neither domestic nor indigenous arms production are related to regional armament levels; and that licensed production is related to regional armament, but in a way precisely opposite that hypothesized. A post hoc explanation for the second result might be that extra-regional arms producers are wary of fanning the flames of local arms races by licensing local production of their hardware. Still, further analysis is called for before we accept such an explanation for this otherwise counter-intuitive finding.

[Table 3 about here]

Table 3 warrants little comment. These are estimates of the effects of the independent variables on arms production measured as numbers of ongoing programs. Aside from the positive effect of the number of production programs during the previous year, no other independent variable exhibits the hypothesized relationship to current arms production. Indeed, manufacturing output is negatively related to domestic (and specifically indigenous) arms production, a finding which defies any but the most tortured explanation. Although it has been argued that arms production might be intended to enhance the development of non-military industrial sectors, it seems implausible that states use arms production as a counter-cyclical tool. Arms production, especially in the Third World, lacks flexibility to be manipulated in response to downturns in manufacturing. If we were to assume that the negative correlation is really saying something about the reverse causal relationship -- that domestic arms production saps the manufacturing capacity of Third World states -- this finding might be taken to confirm certain suspicions voiced in the literature. But our confidence in this conclusion would be enhanced by a more explicitly causal analysis. In short, modeling arms production programs yields few empirical insights and confirms none of our theoretical expectations. Production programs may be too crude an indicator of Third World military industrialization, or they may accurately tap another dimension of the process, but one which is unrelated to the forces highlighted here.

CONCLUSION: BRINGING PASSIONS BACK IN

My empirical investigation has generated modest support for the notion that national security interests drive the process of military industrialization in the Third World. When measured in terms of dollar-valued output, indigenous arms production has increased with regional conflict. Furthermore, since it also increases with arms transfer dependence, arms production appears to reflect a desire to diminish the potential leverage exercised by arms suppliers. On the economic side, although capital investment drives military industrialization, my investigation has yielded no evidence that manufacturing capacity has a direct impact on arms production. However, it is probably wise to reserve final judgment until the complex relationship between investment, manufacturing, and arms production is more carefully modeled. This would also allow for a more confident assessment of any feedback effect that arms production may have on manufacturing.

Although the empirical analysis has focused on motivations for military industrialization which

are, by and large, instrumental, these may not tell the whole story. For part of what remains, we might want to return to those individual effects that were subtracted out of the data in order to produce reliable estimates of the more generalizable interest-based process. The persistence of individual effects suggests that these behavioral processes operate within country- or region-specific contexts. While these five arms producers may be influenced by a similar set of motivations and opportunities, we are alerted to the variation in their basic orientations toward military industrialization. Exploring those contexts could lead to an empirical confirmation of the sociocultural processes identified by construct-ivist accounts, and thus to a better grasp of the passions driving Third World arms production. That is not a task for this particular investigation, but the residuals from OLS regressions using TSCS data not purged individual effects offer some hints. Table 4 reports their average levels, computed separately for each of the five arms producers. They are an indication of the extent to which each state's arms production is above or below the level predicted by its specific international security environment and domestic industrial capacity.[24] The residuals suggest that military industrialization in India and Israel has proceeded farther than what we would otherwise expect, while the opposite is the case for Brazil, South Africa, and South Korea.

[Table 4 about here]

What has been left out of my model? A constructivist account would highlight rather different forces. It might, for instance, point out that the states of India and Israel inhabit regions that became arenas for cold war competition. The major powers penetrated their local security complexes (Buzan 1991) and in doing so intensified both states' exposure to the global military culture. The Soviet Union and the United States came to value the security of India and Israel, respectively, giving the latter some degree of leverage in relations with their patrons (Bercovitch 1991). In short, Cold War competition served as a socializing mechanism for India and Israel, and at the same time provided them with opportunities to achieve their aspirations as modern nation-states. Among the (symbolically) necessary accessories was a domestic arms production capacity. Both India and Israel have relied heavily, but by no means solely, on their superpower patrons for this dimension of "self-realization" (e.g., Mintz and Steinberg 1989; OTA 1991, chapter 10).[25]

Alternative explanations may be possible, but I am hard pressed to locate them in these states' regional security environments or industrial capacities -- they have been accounted for.[26] Whatever best explains this residual arms production, I suspect that it will entail bringing passions back in. But even for those thoroughly convinced of the importance of noninstrumental forces driving Third World militarization, empirical validation must confront two methodological challenges. The first involves recognizing that if global military culture explains everything, it explains nothing. Third World states have been exposed to this culture in varying degrees, and accounting for the nature and extent of this exposure is the most appropriate way to explain the residual variance in military industrialization.

The focus for purposes of empirical analysis should perhaps be less on the content of global culture itself -- its "metonymical iconography" -- and more on the means through which it is transmitted. The cold war was one such mechanism, but there have been others. Many have documented the significance of colonial heritage, for instance, and certain remnants of colonialism remained in post-

colonial relations between metropolitan and peripheral states (e.g., Mullins 1987, chapter 2). Newly independent entities became, in reality, "quasi-states" -- their sovereignty secure in international law and practice, but lacking effective governing capacities (Jackson 1990). Given this shortage of "empirical statehood," no wonder Third World leaders have turned to international society for clues about what it takes to be a modern nation-state. Patron-client relations, whether rooted in colonialism or cold-war competition, thus represent a promising locus for systematic investigation. Useful empirical referents include patron-client arms shipments, military assistance and training programs, and defense technology transfers.

This leads to the second major challenge for empirical research: distinguishing the sources of states' passions from the opportunities to pursue them. The passions driving military industrialization have been shaped by the exposure to global military culture which accompanies patron-client relations. But patron-client relations have also provided the opportunity for client states to pursue their passions; and, what is more, they have provided them the opportunity to pursue their interests. Clearly, examining patron-client relations is not sufficient to demonstrate the importance of passion-driven behavior. At minimum, it would seem necessary to show that patron-client relations, in providing opportunities for the pursuit of passions, explain variance in arms production unaccounted for by the sum total of arms-production opportunities available to client states. If patron-client relations do not tell us something extra about military industrialization, then they are no more than an indication of interest-driven behavior. Passions are either irrelevant or the global military culture which fosters them is transmitted to Third World states through other mechanisms.[27]

A considerable empirical effort is required to complete the story of military industrialization. This investigation, while offering some support for a model of Third World arms production as interest-driven behavior, also points to the limits of a rational choice framework. For purposes of explanation, rational processes have been given the customary head start, and still there remain nonrandom patterns in Third World military industrialization. A constructivist framework may well account for those residual patterns. But proponents, particularly the post-positivists among them, are sometimes reluctant to enter the race: explaining variance is not what they're about (e.g., Walker 1989). It would unfortunate indeed if epistemology prevented constructivism from rising to the empirical challenge.

NOTES

1. The literature is not devoid of empirical analyses. Most are single or comparative case studies employing qualitative methodologies, though they are often accompanied by a wealth of quantitative data. They tend to be descriptive, and are designed as such. Interestingly, many contributors to the literature eschew quantitative analysis because they are wary of the caliber of the available numerical data, yet such data are used to inform their qualitative analyses. The implication would seem to be that noisy data are best employed for descriptive purposes and should not be subject to rigorous statistical analysis. Of course, precisely the opposite is true.

2. See also Sen (1977, 322-323). Elsewhere, Sen (1985) notes that in game theory the behavioral assumption of "goal-priority" is subsumed under the more general concept of rationality. Of course, he further suggests that there is a large of measure of ambiguity to the notion of rationality, and that the fashion in which it is typically employed in economic theory is too restrictive, thereby precluding the effective analysis of the many other motivations driving economic behavior (see, for example, Sen 1987). Although my agreement will become apparent in the next section, I prefer to hold on to a rather restrictive conception of interests (and rationality).

3. Ayoob (1991) discusses the security threats faced by Third World states, and especially the extent to which the Third World security context is unique. He highlights in particular the domestic sources of insecurity -- rooted in challenges to state legitimacy -- which I do not take up here. See also Ayoob (1995).

4. If the literature on the determinants of military industrialization generally suffers from a lack of systematic empirical analysis, the same most certainly cannot be said about the literature on its consequences. Good research (qualitative and quantitative) abounds on the socio-economic impact of security expenditures broadly defined, and military industrialization more specifically, even if its contributors agree on few conclusions. See Neuman (1994) for a recent review of the literature.

5. Ball (1988) provides the most thoroughgoing critique of the view that the military -- its manpower, organization, production priorities, etc. -- constitutes an efficient means by which to promote economic development in the Third World. For a discussion of the tensions inherent in military-industrial programs specifically, see also Conca (1992).

6. The distinction between "willingness" and "opportunity" is usefully elaborated by Starr (1978). Generally, willingness designates those factors which influence an actor choices and decisions, while opportunity designates those environmental forces which structure or constrain choices and decisions. See also Most and Starr (1989, chapter 2). In practice, willingness and opportunity are often associated with levels of analysis (nation-state and international system, respectively), although the two organizing frameworks are not, strictly speaking, equivalent. See, for example, Brzoska and Pearson's (1994) discussion of the factors affecting global arms supply.

7. Barnett (1992) offers probably the best account of the relationship between state building and military industrialization in his study of Egypt and Israel. In particular, he highlights the means by which the state seeks to restructure its relationship with domestic society in order to shift the costs of defense toward the latter. See also Väyrynen (1992, chapter 5) on Brazil.

8. Note that Krause's (1992) fifth phase, during which the arms-production hierarchy is (re)established, suggests that there will always be a third tier, even if its membership changes at the margin. See, for example, Rosh (1990, 72), who argues that "[a] military production hierarchy still exists, but Third World states with relatively large and diversified economies and the requisite political motivation have at least penetrated it." Thus, while many defense analysts attribute the inability of third-tier arms manufacturers to produce at the technological frontier to the current rapid advance in military technology, stratification in the global arms production and transfer system does not appear to derive uniquely from today's so-called "military technical revolution" (e.g., Carus 1994). On the position of Third World military industries in arms-production hierarchy, see also Steinberg (1989), Ross (1988), and Neuman (1984).

9. Weber had similar insights about human behavior. As Hall (1993, 47) notes: "Bluntly, Protestants invented a new world of rationality for irrational reasons. These people were driven for religious reasons, by a concept of calling, and not in any way by an appreciation of the material benefit that their conduct would bring; they did not know what the new world would be, nor did they intend to create it."

10. Note that institutions are not some mysterious structural force pushing and shoving helpless actors into predestined patterns of behavior, but rather a source of utility for calculating (if not always knowledgeable) agents. Grafstein (1992) provides an extremely careful and thorough discussion of related issues, theoretical and ontological. For Grafstein, institutional constraints operate because the benefits of others' conformity to institutional regularities are "stochastically dependent" on one's own conformity (see especially chapter 4). See also Elster (1989) and, as regards international relations specifically, Wendt (1992).

11. But see Ross (1988), who adds an important qualification to this claim. Ross suggests that a real potential exists for enhanced autonomy when Third World states shift from arms importation, a relationship of static dependency, to arms production, which entails dynamic, if dependent, relation-ships. See also Steinberg (1989).

12. See also Giddens (1985, 254) on the constant reproduction of the system: "As the possessor of the means of waging industrialized war, in a global context of the continuing application of science to the advancement of military technology, the state participates in and furthers a generalized process of militarization within the world system as a whole." For Kaldor (1981, 27) and others, the advancement of military technology has actually had degenerative effects: arsenals have become "costly, elaborate, and less and less functional." At the same time, they possess "a certain grandeur, a certain ability to instill social awe" (28). Kaldor considers them largely "baroque."

13. Again, stretching the notion of instrumental action could accommodate, as interest-driven behavior, military industrialization in pursuit of "upward social mobility." Although it remains an empirical question whether such a nebulous goal is explicitly recognized in Third World military-industrial policy, I will gladly concede on the semantic point in return for an appreciation of the substantive one.

14. Few passions (even carnal ones) are purely self-gratifying. States, like people, pursue passions which are "approved" by their (international) society and culture. When these are not approved, they are usually called perversions.

15. See, for example, Green and Shapiro (1994), who challenge veracity of empirical results generated by rational choice analyses, but do not critique the theoretical or philosophical foundations of the rational choice paradigm. But they do conclude that there should be "a clearer distinction between rational action and other modes of behavior, and [that] empirical tests would be more convincing and informative if they were designed to probe the limits of what rational choice can explain" (203).

16. Ultimately, of course, one should consult the case-study material for the most nuanced treatments of military industrialization in these and other Third World countries. Especially useful country studies appear in Väyrynen (1992), OTA (1991), Sanders (1990), Baek et al. (1989), Brzoska and Ohlson (1986), and Katz (1984a, 1986a). These sources contain a wealth of historical and descriptive information, as well as compelling analyses of the subtleties and anomalies in the military-industrialization processes of specific states.

17. Anthony (1993) reports missing values for Israel (licensed) and South Korea (indigenous and licensed) for the first few years of the period analyzed. I assume zero production in those years, which is reasonable given the adjacent figures in the table and in light of the information reported in SIPRI's arms production registers (Brzoska and Ohlson 1986). Note also that the time series for indigenous arms production programs (and thus domestic programs) is incomplete since SIPRI has not released data for programs initiated since 1985; only licensed programs are consistently documented in the *SIPRI Yearbook*. Anthony's (1993) dollar-value figures after 1985 are based in part on program data not publicly available.

18. Major regional actors are, for Brazil: Argentina and Chile; for India: Pakistan and China; for Israel: Egypt, Syria, Jordan, and Iraq; for South Africa: Angola and Mozambique; and for South Korea: North Korea, China, and Japan.

19. I convert both the manufacturing and investment series from national currency units to constant dollars using the IMF's implicit GDP deflators and 1987 exchange rates.

20. Specifically, the F ratios test the joint statistical significance of the additional variance explained (1) by dummy variables for each country (individual effects), and (2) by dummy variables for each year (time effects).

21. This is a "fixed effects" model because the individual effect is treated as a fixed but unknown constant which varies only across individuals. An alternative, a "random effects" model, treats the individual effect as a random but unknown variable. Estimation involves decomposing the error term into its individual-effect and noise components and re-estimating the model with data transformed using that structure. In a random effects model, parameter estimates will remain biased and inconsistent if those individual effects are correlated with one or more of the regressors. These issues are discussed by Hausman (1978, 1261-1264) and Hausman and Taylor (1981). In the absence of knowledge about the individual effects, I have elected the safer (if cruder) fixed effects model. For comprehensive discussions of TSCS models in political science, see Sayrs (1989) and Stimson (1985).

22. Beck and Katz (1995) compare their OLS-PCSE approach to Parks GLS; Beck and Katz (n.d.) compare OLS-PCSE to Kmenta's "cross-sectionally heteroskedastic and timewise autocorrelated" (CHTA) model. The latter is familiar to political scientists as Stimson's (1985) GLS-ARMA model. In addition to the nonrandomness revealed by the analysis of variance results reported in Table 1, Durbin-Watson tests reveal first-order autocorrelation in the OLS residuals.

23. In other analyses, I substituted advanced manufacturing for total manufacturing, but with results not different from those reported in Table 2 (and Table 3). Advanced manufacturing consists of output in those sectors identified as most relevant to the development of a domestic arms production capacity: industrial and other chemicals, iron and steel, non-ferrous metals, metal products, electrical and non-electrical machinery, transportation equipment, and scientific and professional equipment. Kennedy (1974, 296-300) identified most of these sectors as indicators of "potential defense capacity." See also Brauer (1991) and Wulf (1983).

24. The models are specified exactly as those which generated the results appearing in Tables 2 and 3, except that they include a common constant. A constant was not necessary in the fixed effects models since the transformed series had means of zero.

25. There is one obvious weaknesses in this interpretation. The Korean peninsula too was penetrated by the cold war competition, yet the residuals in Table 4 indicate that South Korean military industrialization has generally been less than expected given its security environment and industrial capacity. One explanation for this anomaly might be found in the direct US military presence in South Korea, which does seem to have held at bay the perceived need for military industrialization, at least until the American commitment came under suspicion after the abandonment of South Vietnam (Moon 1986). The impact of the American presence was perhaps analogous to that of "overlay," which Buzan (1991, 219-220) argues occurs when "one or more external powers move directly into the local [security] complex with the effect of suppressing the indigenous security dynamic."

26. I have dismissed one plausible alternative: that military industrialization is a nonlinear -- specifically, an exponential -- function of regional conflict. That is, the Middle East and South Asia have been racked by more interstate violence than the other regions, and therefore Israel and India may have been more sensitive than the other states to incremental increases in regional conflict. To take into

account the possibility that incremental changes in conflict have affected the *rate* of growth in arms production, I computed the residuals from a model using the natural logarithm of regional conflict as an independent variable. Their mean levels remain relatively unchanged from those appearing in Table 4.

27. If patron-client relations do tell us something extra, then we have evidence that: (1) patron-client relations provide exposure to global military culture whereby client states develop passions for military industrialization; (2) that they provide unique opportunities for the pursuit of passions; and/or (3) that they provide unique opportunities for the pursuit of interests. Thus, given the third possibility, we are but one step closer to empirical validation of the significance of passion-driven behavior.

REFERENCES

Anthony, Ian. 1993. "The 'Third Tier' Countries: Production of Major Weapons." In *Arms Industry Limited*, ed. Herbert Wulf. New York: Oxford University Press.

Arms Control and Disarmament Agency. annual. *World Military Expenditures and Arms Transfers*. Washington: US Government Printing Office.

Ayoob, Mohammed. 1991. "The Security Problematic of the Third World." *World Politics* 43: 257-283.

Ayoob, Mohammed. 1995. *The Third World Security Predicament: State Making, Regional Conflict, and the International System*. Boulder, CO: Lynne Rienner.

Baek, Kwang-il, Ronald D. McLaurin, and Chung-in Moon, editors . 199. *The Dilemma of Third World Defense Industries: Supplier Control or Recipient Autonomy?* Boulder, CO: Westview.

Ball, Nicole. 1988. *Security and Economy in the Third World*. Princeton: Princeton University Press.

Barnett, Michael N. 1992. *Confronting the Costs of War: Military Power, State, and Society in Egypt and Israel*. Princeton: Princeton University Press.

Beck, Nathaniel and Jonathan N. Katz. 1995. "What To Do (and Not To Do) with Time-Series Cross-Section Data." *American Political Science Review* 89: 634-647.

Beck, Nathaniel and Jonathan N. Katz. N.d. "Nuisance vs. Substance: Specifying and Estimating Time-Series–Cross-Section Models." *Political Analysis*. Forthcoming.

Benoit, Emile. 1973. *Defense and Growth in Developing Countries*. Lexington, MA: Lexington Books.

Bercovitch, Jacob. 1991. "Superpowers and Client States: Analysing Relations and Patterns of Influence." In *Superpowers and Client States in the Middle East: The Imbalance of Influence*, ed. Moshe Efrat and Jacob Bercovitch. London: Routledge.

Bitzinger, Richard A. 1994. "The Globalization of the Arms Industry: The Next Proliferation Challenge." *International Security* 19: 170-198.

Brauer, Jurgen. 1991. "Arms Production in Developing Nations: The Relation to Industrial Structure, Industrial Diversification, and Human Capital Formation." *Defence Economics* 2: 165-175.

Brzoska, Michael and Frederic S. Pearson. 1994. "Developments in the Global Supply of Arms: Opportunity and Motivation." *Annals of the American Academy of Political and Social Science* 535: 58-72.

Brzoska, Michael and Thomas Ohlson. 1987. *Arms Transfers to the Third World, 1971-85*. New York: Oxford University Press.

Brzoska, Michael and Thomas Ohlson, editors. 1986. *Arms Production in the Third World*. London: Taylor and Francis.

Bueno de Mesquita, Bruce. 1989. "The Contribution of Expected-Utility Theory to the Study of International Conflict." In *Handbook of War Studies*, ed. Manus I. Midlarsky. Ann Arbor: University of Michigan Press.

Buzan, Barry. 1987. *An Introduction to Strategic Studies: Military Technology and International Relations*. London: Macmillan.

Buzan, Barry. 1991. *People, States, and Fear, second edition: An Agenda for International*

Security Studies in the Post-Cold War Era. Boulder, CO: Lynne Rienner.

Carus, W. Seth. 1994. "Military Technology and the Arms Trade: Changes and Their Impact." *Annals of the American Academy of Political and Social Science* 535: 163-174.

Catrina, Christian. 1988. *Arms Transfers and Dependence*. New York: Taylor and Francis.

Conca, Ken. 1992. "Third World Military Industrialization and the Evolving Security System." In *The Highest Stakes: The Economic Foundations of the Next Security System,* Wayne Sandholtz et al. New York: Oxford University Press.

Elster, Jon. 1989. *The Cement of Society: A Study of Social Order*. Cambridge: Cambridge University Press.

Giddens, Anthony. 1985. *The Nation-State and Violence: Volume Two of A Contemporary Critique of Historical Materialism*. Berkeley: University of California Press.

Goertz, Gary and Paul F. Diehl. 1993. "Enduring Rivalries: Theoretical Constructs and Empirical Patterns." *International Studies Quarterly* 37: 147-171.

Goldstein, Joshua S. 1992. "A Conflict-Cooperation Scale for WEIS Events Data." *Journal of Conflict Resolution* 36: 369-385.

Grafstein, Robert. 1992. *Institutional Realism: Social and Political Constraints on Rational Actors*. New Haven: Yale University Press.

Green, Donald P. and Ian Shapiro. 1994. *Pathologies of Rational Choice Theory: A Critique of Applications in Political Science*. New Haven: Yale University Press.

Hall, John A. 1993. "Ideas and the Social Sciences." In *Ideas and Foreign Policy: Beliefs, Institutions, and Political Change*, ed. Judith Goldstein and Robert O. Keohane. Ithaca, NY: Cornell University Press.

Hausman, J.A. 1978. "Specification Tests in Econometrics." *Econometrica* 46: 1251-1271.

Hausman, Jerry A. and William E. Taylor. 1981. "Panel Data and Unobservable Individual Effects." *Econometrica* 49: 1377-1398.

Hirschman, Albert O. 1977. *The Passions and the Interests: Political Arguments for Capitalism before Its Triumph*. Princeton: Princeton University Press.

Hirschman, Albert O. 1984. "Against Parsimony: Three Easy Ways of Complicating Some Categories of Economic Discourse." *American Economic Review* 74: 89-96.

Hirschman, Albert O. 1986. *Rival Views of Market Society and Other Recent Essays*. Cambridge: Harvard University Press.

Industrial Development Organization, United Nations. annual. *Industrial Statistics Yearbook, Volume I: General Industrial Statistics*. New York: United Nations.

International Monetary Fund. annual. *International Financial Statistics*. Washington: International Monetary Fund.

Jackson, Robert H. 1990. *Quasi-states: Sovereignty, International Relations, and the Third World*. Cambridge: Cambridge University Press.

Kaldor, Mary. 1981. *The Baroque Arsenal*. New York: Hill and Wang.

Katz, James Everett, editor. 1984a. *Arms Production in Developing Countries: An Analysis of Decision Making*. Lexington, MA: Lexington Books.

Katz, James Everett. 1984b. "Understanding Arms Production in Developing Countries." In *Arms*

Production in Developing Countries: An Analysis of Decision Making, ed. James Everett Katz. Lexington, MA: Lexington Books.

Katz, James Everett, editor. 1986a. *The Implications of Third World Military Industrialization: Sowing the Serpents' Teeth.* Lexington, MA: Lexington Books.

Katz, James Everett. 1986b. "Factors Affecting Military Scientific Research in the Third World." In *The Implications of Third World Military Industrialization: Sowing the Serpents' Teeth*, ed. James Everett Katz. Lexington, MA: Lexington Books.

Kennedy, Gavin. 1974. *The Military in the Third World*. New York: Charles Scribner's Sons.

Kinsella, David. 1994. "Conflict in Context: Arms Transfers and Third World Rivalry During the Cold War." *American Journal of Political Science* 38: 557-581.

Krause, Keith. 1992. *Arms and the State: Patterns of Military Production and Trade*. Cambridge: Cambridge University Press.

Louscher, David J. and Anne Naylor Schwarz. 1989. "Patterns of Third World Military Technology Acquisition." In *The Dilemma of Third World Defense Industries: Supplier Control or Recipient Autonomy?*, ed. Kwang-il Baek, Ronald D. McLaurin, and Chung-in Moon. Boulder, CO: Westview.

McLaurin, Ronald D. 1989. "Technology Acquisition: A Case Study of the Supply Side." In *The Dilemma of Third World Defense Industries: Supplier Control or Recipient Autonomy?*, ed. Kwang-il Baek, Ronald D. McLaurin, and Chung-in Moon. Boulder, CO: Westview.

Mintz, Alex. 1986. "Arms Imports as an Action-Reaction Process: An Empirical Test of Six Pairs of Developing Nations." *International Interactions* 12: 229-243.

Mintz, Alex and Gerald Steinberg. 1989. "Coping with Supplier Control: The Israeli Experience." In *The Dilemma of Third World Defense Industries: Supplier Control or Recipient Autonomy?*, ed. Kwang-il Baek, Ronald D. McLaurin, and Chung-in Moon. Boulder, CO: Westview.

Moon, Chung-in. 1986. "South Korea: Between Security and Vulnerability." In *The Implications of Third World Military Industrialization: Sowing the Serpents' Teeth*, ed. James Everett Katz. Lexington, MA: Lexington Books.

Most, Benjamin A. and Harvey Starr. 1989. *Inquiry, Logic and International Politics*. Columbia, SC: University of South Carolina Press.

Mullins, A.F., Jr. 1987. *Born Arming: Development and Military Power in New States*. Stanford: Stanford University Press.

Neuman, Stephanie G. 1984. "International Stratification and Third World Military Industries." *International Organization* 38: 167-197.

Neuman, Stephanie G. 1994. "Arms Transfers, Military Assistance, and Defense Industries: Socioeconomic Burden or Opportunity?" *Annals of the American Academy of Political and Social Science* 535: 91-109.

Office of Technology Assessment, U.S. Congress. 1991. *Global Arms Trade: Commerce in Advanced Military Technology and Weapons*. Washington: U.S. Government Printing Office.

Rosh, Robert M. 1990. "Third World Arms Production and the Evolving Interstate System." *Journal of Conflict Resolution* 34: 57-73.

Ross, Andrew L. 1988. "Arms Acquisition and National Security: The Irony of Military Strength." In

National Security in the Third World, ed. Edward Azar and Chung-In Moon. Aldershot: Edward Elgar.

Sanders, Ralph. 1990. *Arms Industries: New Suppliers and Regional Security.* Washington: National Defense University Press.

Sayrs, Lois W. 1989. *Pooled Time Series Analysis*. Sage University Paper series on Quantitative Applications in the Social Sciences, 07-070. Beverly Hills: Sage.

Schwarz, Anne Naylor. 1987. "Arms Transfers and the Development of Second-Level Arms Industries." In *Marketing Security Assistance: New Perspectives on Arms Sales*, ed. David J. Louscher and Michael D. Salomone. Lexington, MA: Lexington Books.-130.

Sen, Amartya. 1977. "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory." *Philosophy and Public Affairs* 6: 317-344.

Sen, Amartya. 1985. "Goals, Commitment, and Identity." *Journal of Law, Economics, and Organization* 1: 341-355.

Sen, Amartya. 1987. *On Ethics and Economics*. Oxford: Blackwell.

Starr, Harvey. 1978. "'Opportunity' and 'Willingness' as Ordering Concepts in the Study of War." *International Interactions* 4: 363-387.

Steinberg, Gerald M. 1989. "Technological Transfer and the Future of the Center-Periphery System: A Realist Perspective." *Jerusalem Journal of International Relations* 11: 96-117.

Stimson, James A. 1985. "Regression in Space and Time: A Statistical Essay." *American Journal of Political Science* 29: 914-947.

Stockholm International Peace Research Institute. annual. *SIPRI Yearbook: World Armaments and Disarmament*. New York: Oxford University Press.

Suchman, Mark C. and Dana P. Eyre. 1992. "Military Procurement as Rational Myth: Notes on the Social Construction of Weapons Proliferation." *Sociological Forum* 7: 137-161.

Tomlinson, Rodney G. 1993. "World Event/Interaction Survey Coding Manual, 6th Revision." United States Naval Academy, typescript.

Väyrynen, Raimo. 1992. *Military Industrialization and Economic Development: Theory and Historical Case Studies*. Aldershot: Dartmouth Publishing Company.

Walker, R.B.J. 1989. "History and Structure in the Theory of International Relations." *Millennium: Journal of International Studies* 18: 163-183.

Wendt, Alexander. 1992. "Anarchy is What States Make of It: The Social Construction of Power Politics." *International Organization* 46: 395-421.

Wendt, Alexander and Michael Barnett. 1993. "Dependent State Formation and Third World Militarization." *Review of International Studies* 19: 321-347.

Wulf, Herbert. 1979. "Dependent Militarism in the Periphery and Possible Alternative Concepts." In *Arms Transfers in the Modern World*, ed. Stephanie G. Neuman and Robert E. Harkavy. New York: Praeger.

Wulf, Herbert. 1983. "Developing Countries." In *The Structure of the Defense Industry: An International Survey*, ed. Nicole Ball and Milton Leitenberg. New York: St. Martin's.

Figure 1   Conceptual Framework

	Interests	*Passions*
Actor	Preferences	Metapreferences
Environment	Opportunities	Society Culture

Table 1   Diagnostics for OLS Residuals from TSCS Regressions

Production Equation	Individual Effects $F_{4,80}$ (p)	Time Effects $F_{20,80}$ (p)	Differing Variances P^2_4 (p)
Domestic			
Output	12.81 (.00)	2.03 (.01)	38.10 (.00)
Programs	29.49 (.00)	13.99 (.00)	44.46 (.00)
Indigenous			
Output	13.22 (.00)	2.57 (.00)	44.36 (.00)
Programs	12.69 (.00)	11.04 (.00)	34.90 (.00)
Licensed			
Output	5.47 (.00)	0.57 (.92)	49.45 (.00)
Programs	16.87 (.00)	1.01 (.47)	86.44 (.00)

Note: F ratios are for two-factor analysis of variance tests conducted on the OLS residuals from TSCS regressions (1970-1990). P^2 statistics are for likelihood ratio tests.

Table 2   Regression Estimates for Arms Production Output in Five Countries, 1971-1990

Production Equation

	Domestic	Indigenous	Licensed
Arms Production$_{t-1}$	0.582** (0.092)	0.547** (0.100)	0.703** (0.010)
Regional Conflict	0.127 (0.079)	0.133** (0.068)	-0.003 (0.027)
Regional Armament	-1.625 (2.450)	0.135 (2.217)	-1.332** (0.573)
Arms Import Dependence	4.399** (1.905)	3.494** (1.593)	0.986 (0.620)
Manufacturing Output	-0.118 (0.288)	0.100 (0.190)	-0.175 (0.145)
Fixed Investment	12.364** (2.747)	6.792** (2.120)	4.865** (1.190)
d.f.	94	94	94
R^2	.62	.53	.69
Serial Corr.[a]	.02	-.01	.18
Contemp. Corr.[b]	.23	.27	.20

Note: Numbers in parentheses are panel corrected standard errors. Data are deviations from cross-section means, so models do not include a constant.

[a] Coefficient on once-lagged residual series from Lagrange Multiplier test.
[b] Average contemporaneous correlation between residuals for paired cross sections.

** significant at the .05 level   * significant at the .10 level

Table 3   Regression Estimates for Arms Production Programs in Five Countries, 1971-1990

Production Equation

	Domestic	Indigenous	Licensed
Arms Production$_{t-1}$	0.890** (0.103)	0.899** (0.100)	0.801** (0.087)
Regional Conflict	-0.002 (0.002)	-0.002 (0.002)	-0.0001 (0.0004)
Regional Armament	-0.082 (0.082)	-0.081 (0.083)	-0.002 (0.010)
Arms Import Dependence	0.012 (0.034)	0.007 (0.031)	0.004 (0.010)
Manufacturing Output	-0.010* (0.006)	-0.010** (0.005)	0.0001 (0.002)
Fixed Investment	-0.006 (0.048)	-0.007 (0.033)	0.015 (0.024)
d.f.	94	94	94
R^2	.71	.72	.75
Serial Corr.	.15	.23	.23
Contemp. Corr.	.56	.54	.15

Note: Numbers in parentheses are panel corrected standard errors. Data are deviations from cross-section means, so models do not include a constant.

[a] Coefficient on once-lagged residual series from Lagrange Multiplier test.
[b] Average contemporaneous correlation between residuals for paired cross sections.

** significant at the .05 level   * significant at the .10 level

Table 4   Means of OLS Residuals for Each Cross-section

	Production Equation		
	Domestic	Indigenous	Licensed
Brazil			
Output	-19.70	-12.00	-8.53
Programs	0.41	0.46	0.01
India			
Output	57.92	41.37	20.61
Programs	0.41	-0.02	0.22
Israel			
Output	32.70	25.99	9.18
Programs	0.47	0.54	-0.10
South Africa			
Output	-6.78	1.03	-6.48
Programs	-0.94	-0.54	-0.29
South Korea			
Output	-64.15	-56.39	-14.78
Programs	-0.35	-0.44	0.16

Note: Residual means for each cross section are from OLS regressions using untransformed TSCS data (1971-1990). Independent variables are the same as those shown in Tables 2 and 3, but also include a constant.

Table 5   Regression Estimates for Arms Production Residuals

	Production Equation					
	Domestic		Indigenous		Licensed	
	Output	Programs	Output	Programs	Output	Programs
Transfers	0.034	0.036	0.013	-0.005	0.023**	0.022*
	(0.027)	(0.035)	(0.022)	(0.022)	(0.010)	(0.011)
Constant	-25.633	-0.556	-10.082	-0.152	-17.238	-0.334
	(30.460)	(0.664)	(24.630)	(0.585)	(10.854)	(0.217)
R^2	.02	.01	.00	.00	.05	.03
D-W	2.26	1.83	2.26	1.68	2.03	2.02

Note: Residuals are from regressions using untransformed TSCS data (1971-1990). Models generating those residuals use same independent variables shown in Tables 2 and 3, but also include a constant. Residuals from arms production *output* models are regressed on a constant plus *total arms transfers in dollar values*. Residuals from arms production *program* models are regressed on a constant plus *superpower arms transfer programs.*

** significant at the .05 level   * significant at the .10 level