SECURITY, INFLUENCE, AND NUCLEAR WEAPONS: THE CASE OF ARGENTINA AND BRAZIL

by

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The world is fast approaching what Albert Wohlstetter has called a "Damoclean overhang" of countries whose peaceful nuclear programs will bring them within hours of making atomic bombs.[1] International safeguards against proliferation as presently constituted or projected will not obviate this danger, according to most observers.[2] Once at the nuclear threshold, even the slightest impulse might easily carry a country the final step to becoming a nuclear-weapons state, and a growing body of literature reveals quite clearly that Argentina and Brazil are in the vanguard of the near-nuclear states.[3] This reality becomes a matter of some concern when placed against the backdrop of their historic rivalry for regional hegemony, the growing disparities in their national strengths, and Brazil's aspiration for great power status.

This article will review the roots of regional competition between Argentina and Brazil as an introduction to the current power imbalance between them. With this foundation, we will then discuss the nuclear capabilities of both states with a greater appreciation of the danger that one or both countries will exercise a nuclear option in the near future. Next, we will proceed to a brief summary of deterrence theory as a means for identifying the advantages and limitations of nuclear weapons in guaranteeing national security and regional influence. Finally, we will examine certain characteristics in the subject countries, especially Argentina, which argue *against* the introduction of nuclear weapons and which, if recognized beforehand, might outweigh other factors militating in favor of nuclear weapons.

THE FOUNDATIONS OF COMPETITION

Although in some respects the antagonisms between Argentina and Brazil are products of the parochial prejudices and petty rivalries which still characterize modern nation-states, there are also real grounds for competition. Argentina and Brazil were formed by dissimilar colonial experiences, speak different languages, adhere to contrasting cultural norms, and, for most of their republican histories, have been locked in a geopolitical struggle for control or influence over the territory separating their heartlands. Territorial competition in the area dates from the earlier Spanish and Portuguese expansionism which clashed in the region.

After each gained independence, the two states continued the conflict from 1825 to 1828 for control over the Banda Oriental, which finally became the independent buffer state of Uruguay. In the 1850's, Brazil intervened directly in Argentina to help topple the Rosa Administration, which had checked Brazilian foreign initiatives. Then, after joining together with Uruguay between

1865 and 1870 in the War of the Triple Alliance, which crushed Paraguay as a regional power, Argentina and Brazil became involved in competition for influence in that debilitated buffer state. Finally, in the Chaco War of 1932-35 between Paraguay and Bolivia, Argentina and Brazil supported opposing sides in a contest for control of a territory of strategic and (presumed) economic importance.[4]

Throughout the 19th century, competition derived primarily from Argentina's determination to keep the transportation channels transiting these buffer states open to commerce reaching Buenos Aires from the interior of the continent. This objective clashed with Brazilian territorial expansionism, which in many other frontier regions to the west and north had extended the national borders on the basis of *uti possidetis* (possession is nine-tenths of the law). In the case of Uruguay and portions of Paraguay, the land was especially attractive to Brazilian settlers.[5] Portions of Bolivia, in contrast, became attractive because of the increasing demands of the international market for certain forest products, especially rubber, at the turn of the century.

More recently, the interests of Argentina and Brazil in these buffer states have taken on new dimensions. As both countries have industrialized over the past four decades, they have become increasingly interested in securing markets for finished export goods. Unable to compete in the international market with the more efficiently produced, cheaper goods of the developed states, both have given increasing attention to their smaller neighbors as trading partners.

An even more significant factor for Brazil has been the acquisition of energy sources in Paraguay and Bolivia. Brazil has scant petroleum reserves, yet its energy demands are expected to increase in the future at an exponential rate similar to the advanced industrial states,[6] and most hydroelectric possibilities close to urban centers have been tapped. Brazil is now involved with Paraguay in constructing the massive Itaipu dam to secure additional hydroelectric power from the river that separates the two states, a project that Argentina has bitterly opposed.[7] Brazil is also investing in oil exploration in Paraguay and already holds a share in Bolivian natural gas and petroleum production.[8]

These Brazilian economic penetrations suggest that the government in Brasilia will maintain a close interest in developments in the buffer states and will surely seek to protect Brazilian interests from prejudicial changes in governments or policies in these neighboring countries.

A further danger for tensions in the region is the current migration of significant numbers of Brazilians across poorly demarcated borders with the buffer states. Not only might Brazil be sensitive to the treatment of its nationals by these lesser governments, but it could also conceivably seek a redelineation of frontiers to its own advantage on the principle of *uti possidetis*, as it has done so often in the past.[9] Finally, tension is also likely to develop as a result of Argentina's recent, albeit sporadic, closings of its borders to Brazilian commercial traffic.

Even though Argentina and Brazil have avoided aggravating their mutual distrusts in recent years, they remain competitors. Their competition is reflected in the not-uncommon Argentine sentiment that "the natural enemy of all the Hispanic-American nations is Brazil . . . Brazil forms a foreign element within our body."[10] Such views are abetted by traditional Brazilian claims to manifest destiny. As one Brazilian concluded early in the century:

> The historic and political superiority of Brazil is manifest: united, colossal, irreducible. . . . It is destined to occupy in South America . . . the same preponderant place that the United States occupies in North America.[11]

The reality that today Brazil seems capable of achieving this ambition cannot be very comforting to Argentina.

THE GROWING DISPARITIES IN NATIONAL STRENGTH

A constant feature of Argentine foreign policy has been the determination to maintain a balance of power vis-à-vis Brazil. Since World War II, this preoccupation has given rise to a moderate arms race in the region in which Brazil has achieved what would seem to be a commanding military superiority.[12] But the power imbalance has not derived exclusively, or even primarily, from military considerations. Rather, it has been a function of differential economic and demographic growth rates, coupled with contrasting levels of political stability between the two states. Although it is impossible to accurately quantify military strength or to predict the outcome of military contests, it is possible to recognize some of the major ingredients of national strength as rough measures of relative power.

Brazil is an emerging international power, with the world's seventh largest population and tenth largest economy.[13] Brazil also had the nineteenth largest military budget in 1975, while spending a much smaller percentage of its GNP on defense than most of the other major military powers.[14] In comparison, Argentina has only one-fourth the population, less than one-third the GNP, and only slightly more than one-third the military budget (thirty-eighth largest in 1975) of Brazil.[15] The gap in these areas is likely to increase, since Brazil's population and economy have been growing at 2.9 and 6.9 percent per annum, respectively, for the past 15 years in contrast to Argentina's lower annual growth rates of 1.5 and 4.3 percent.[16]

These factors seem particularly relevant in calculating military strength in view of a recent empirical study of war and the variables correlated with victory. It was found that superior wealth explained 80 percent of all victories in the sample cases, and that 70 percent of all wars were won by the state with the larger population.[17] But population and GNP are not the only variables weighing in favor of Brazil. A nation requires not only the resources of power, but also the necessary national will, political stability, and sense of purpose to realize its potential. Ray Cline, in considering economic and military capabilities in relation to strategic purpose and national will, ranked Brazil sixth in the world in perceived power, ahead of the United Kingdom and Canada.[18] Brazil's political stability since 1964, although regrettable in terms of the violation of human rights on which some claim it has been predicated, has facilitated the nation's drive for regional hegemony and international stature. Argentina, conversely, has struggled with endemic civil disorder and a slumping economy over the same time span.

Brazilian leaders have been able to translate their nation's demographic and economic advantages into a quantitative military superiority. In 1976, Brazil had 81 percent more military personnel than Argentina, with a 55 percent higher military expenditure-to-troop ratio. Moreover, Brazil's air force held 61 percent more aircraft and the navy 26 percent more major ships than Argentina's.[19] On the qualitative side, the equipment was roughly comparable for both countries, as were training and organizational factors. But Brazil seems to be pursuing a more vigorous procurement program, is obtaining a sizable and relatively sophisticated domestic defense industry, and

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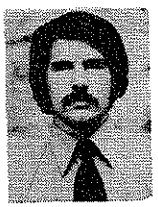

has even become an arms exporter of no small consequence.

Not only are the existing disparities in military spending and troop levels significant, they will become greater over time. If Brazil continues to allocate the same percent of GNP to defense in the future as in the recent past, and maintains the current troop-to-population ratios to the end of the century, the increasing burden on Argentina just to keep pace will be tremendous. For example, merely to maintain the existing *disadvantageous* ratios vis-à-vis Brazil, the more than $1.5 billion additional military spending which Argentina would have needed in 1975 to match Brazilian defense expenditures will become almost $10.9 billion by the year 2000.[20] Naturally, any increase in Brazilian military spending above its present modest levels could simply outstrip Argentina's capacity to sustain the existing ratios.

Geography and urban patterns likewise favor Brazil. Brazil is a large country with numerous and widely dispersed urban centers, almost all of which are well-removed from the Argentine frontier, so its political and economic war-making capabilities are decentralized and insulated. Argentina, conversely, is dominated by the Greater Buenos Aires metropolitan area, which will contain 38 percent of the national population by 1980.[21] The district extending from La Plata to Santa Fe produces more than 81 percent of the country's Gross Domestic Product (GDP).[22] This urban-industrial core is located near the Brazilian frontier and, it can be supposed, is more vulnerable to military operations than are the more distant and widely scattered Brazilian cities.

The point is that there exist if not conclusive at least persuasive grounds for believing that Argentina will fall increasingly under the shadow of quantitatively superior Brazilian conventional military forces. This preponderance may or may not directly threaten Argentine national security (the feeling here is that it would not), but it would certainly eclipse Argentine influence in the buffer states and enable Brazil to act with virtually no constraints to protect and promote its interests throughout the region. The question is whether Argentine leaders are prepared to accept this gradual slippage of power and influence, or if they would feel compelled to seek qualitative means for offsetting the insurmountable quantitative advantages of Brazil. One, but by no means the only, option would be to develop nuclear weapons. As one authoritative source has observed:

> Nuclear weapons might sometimes be considered alternatives to conventional weapons. Particularly if a state cannot either afford to buy the conventional weapons it thinks it needs or find a willing supplier, it might turn to nuclear weapons. These could be deliverable by fairly unsophisticated means and could in fact be faster, easier, and cheaper for a state to build itself than the sort of advanced conventional hardware that would be required to provide any reasonable capability against a well-armed adversary.[23]

The decision by either Argentina or Brazil to develop nuclear weapons would be well within their financial and technological means to accomplish in a short period of time.

NUCLEAR CAPABILITIES

Brazil and Argentina embarked on nuclear development programs early in the postwar period, even before the US had dropped its opposition to the spread of nuclear technology. With the advent of the US Atoms for Peace program, both countries benefited from American training and information, but Argentina shortly broke away from portions of the program in order to retain control over its own nuclear development. The US assistance promoted enriched uranium-light water technology leading to reactors for which—until 1971—the US held a fuel supply monopoly.[24] Argentina developed natural uranium-heavy water research reactors for which it could establish a domestic fuel cycle.

Argentine nuclear development progressed rapidly. In 1958, Argentina began operating Latin America's first research reactor, followed in 1974 by the first power reactor. Impressive strides were made in related fields leading to Latin America's first chemical separation plant in 1968 and the first plutonium reprocessing facility in 1977.[25] Argentina's existing and projected power reactors, because of their construction by foreign contractors, are under international safeguards; but much of the remaining nuclear industry is beyond the purview of international controls, and the nation's sizable uranium reserves supply it with virtually absolute national control over its nuclear program. The Argentine nuclear establishment is particularly dangerous because, as one expert points out, its natural uranium-heavy water reactors:

> . . . are by far the worst from a nonproliferation standpoint because of the availability of natural uranium and the possibility of continuous fuel unloading which permits the production of plutonium of good military quality without too serious an added economic burden."[26]

Under normal operating conditions, the Argentine-type reactors produce only about 8 kilograms of plutonium oxide per metric ton of spent reactor fuel, interspersed with highly radioactive fission products. The existing chemical separation and plutonium reprocessing facilities in the country, however, make it possible for Argentina to extract this plutonium, ostensibly for further power reactor use, but also possibly for the construction of weapons. Since there are no international controls on Argentina's uranium supplies, no leverage can be exerted on the disposition of the plutonium obtained from spent reactor fuel.

If Argentina proceeds with its current nuclear development program, it is estimated that the country will produce a net of 340 kilograms of plutonium per year by 1983, or enough for between 20 and 60 nuclear devices each year (each capable of causing perhaps 100,000 casualties if detonated in dense urban centers).[27] The technical expertise for constructing bombs already exists in Argentina, while the necessary design information is readily available in public documents and scientific journals. In short, Argentina is at the point where it can now develop a sizable nuclear force in a very short period of time without necessarily violating any stringent international agreements against proliferation.

Argentina, like Brazil, has neither ratified the Nonproliferation Treaty nor allowed the Treaty of Tlatelolco (establishing a nuclear-free zone in Latin America) to come into force on its territory.[28] Argentina's ability to construct its own research reactors completely outside international safeguards means that a concerted program of producing only partially-spent reactor fuel (which is more efficient for extracting weapons-grade

material) could be carried out with virtually no interruption of nuclear power generation. It might also be noted that already widely disseminated information would make possible the fabrication of very compact and lightweight nuclear explosives which could be deliverable by British Canberras already in the possession of the Argentine Air Force.[29]

The danger of proliferation in Brazil is somewhat different, and potentially greater, because of the contrasting evolution of the country's nuclear development. Brazil remained within the confines of American nuclear assistance until 1961, when radical politicians sought to break the leverage of the United States over their nuclear policies by converting to natural uranium reactors. Until the Soviet Union entered the market in 1971, the United States remained the only international supplier of enriched uranium reactor fuels, creating a certain dependency for nations which opted for enriched uranium power reactors. But when the Brazilian military came to power by a coup in 1964, they recommitted the country to enriched uranium technology. The indecision whether to develop natural or enriched uranium reactors delayed Brazil's nuclear development, while the decision to proceed with enriched uranium reactors after 1964 eventually produced serious political consequences which in the end increased the Brazilian proliferation danger.[30]

Brazil contracted with US companies for the construction of two power reactors and signed agreements with Washington for the supply of the enriched uranium fuel that the reactors would require. But before the completion of the reactors, the US responded to the oil embargo of 1973-74 by announcing that no new contracts would be entered into for the supply of enriched uranium and that existing agreements with Brazil were subject to review. Brazil found itself committed to a reactor program for which it no longer had a reliable source of fuel. The vulnerability of the nation's nuclear energy program was revealed quite clearly and contributed significantly to motivating the government to pursue fuel-cycle independence. Trends in the developed countries facilitated this objective, as environmental fears restricted the domestic markets of many major firms heavily involved in the nuclear industry. These firms turned increasingly to foreign contracts as their mainstay, for which they competed by "sweetening" deals with provisions for the transfer of sensitive technology.[31]

Brazil's determination to acquire fuel-cycle autonomy contributed to the signing of the now-famous 1975 Brazilian-West German reactor sale. The agreement calls for the construction by Kraftwerk Union of West Germany, in conjunction with Brazilian industry, of between two and eight enriched uranium reactors as well as assistance in building fuel fabrication and reprocessing facilities. These facilities will include a uranium enrichment plant which will provide Brazil with the ability to supply its own reactor fuel. Although the Ford Administration gave its tacit—if unenthusiastic—approval to the agreement, when the Carter Administration came to office it attempted vigorously to effect the revision of certain technology transfer provisions and to impose added safeguards. But aside from an international storage regime for stockpiling fuels and the strengthening of the prohibitions against the Brazilian replication of German-introduced technology without the acceptance of safeguards, the US failed to amend the contract in any significant manner.[32]

The provision for international storage of fuel will not obviate the proliferation danger introduced by the Brazilian fuel cycle, since easily convertible material will accumulate at various bottlenecks within the fuel-cycle and at the input and output ends of the reactors themselves. For example, the plutonium oxide or nitrate that would accumulate at the back end of a plutonium reprocessing plant "could be converted into plutonium metal using generally known methods and without remote handling equipment."[33] This operation could be accomplished in a facility the size of a small warehouse and cost less

than $1.5 million. Or weapons-grade material could be extracted from the unirradiated fuel rods stored as reloads at the input end of reactors. Using these reload rods, enough material could be produced in a facility no larger than a house and costing only a quarter of a million dollars for one bomb every two or three days.[34] Of course, the above implies a covert diversion of material to military use. In fact, it is conceivable that Brazil could proceed openly in developing nuclear explosives without necessarily violating the international safeguards imposed on German-introduced technology.

First, the prohibition against the replication of German technology without acceptance of safeguards will remain in effect for only 20 years from the date of the first transfer of information. More important, it would be possible, as one physicist has argued, for Brazil to draw upon the learning experience provided by the German assistance, and on internationally available information, to build parallel facilities which it could claim are not "replications" and therefore outside international controls.[35] It is similarly conceivable that an Argentine nuclear capability would compel Brazil to simply renounce international safeguards—perhaps on the basis of the *clausula rebus sic stantibus* (a treaty is not binding when the conditions under which it was made change). Any large-scale effort to produce nuclear weapons in Brazil would introduce a truly horrifying level of destructive capability into the area, since the projected nuclear capacity of the country will supply a net annual production of 1000 kilograms of plutonium by 1983.[36] This would be enough for between 50 and 200 fission bombs each year. Not only does Brazil presently possess aircraft capable of delivering these bombs (in particular, French Mirages), but it also has an independent space program with technology easily convertible to missile delivery.

It has been estimated that an annual commitment of $300 million added to a nation's military budget over the span of 10 years could easily provide a "small force of superpower quality" to a country *starting from scratch*.[37] We have amply shown that Argentina and Brazil would hardly be starting from scratch. In any event, a $300 million annual expenditure, were it actually needed, would not necessarily overburden either country. Added to 1975 military budgets, $300 million would have raised Argentine defense spending to 3.13 percent and Brazilian defense spending to 2.48 percent of their respective GNPs. These would not have been overly ostentatious defense expenditures compared to the Third World average of 6.1 percent.[38] Therefore, we are justified in suspecting that both countries are technologically and financially capable of developing sizable nuclear forces sometime before the close of the century, and possibly much sooner if regional tensions increase.

DETERRENCE, SECURITY, AND INFLUENCE

Before discussing the potential impacts of nuclear weapons on Argentine-Brazilian relations, it seems useful to quickly review certain generally recognized properties of nuclear forces. Most significant is the understanding that, under most circumstances, nuclear weapons can deter aggression more easily than they can defend against it. Deterrence is a political-psychological relationship between two states in which one (or both) seeks to convince the other that the cost in terms of nuclear retaliation for a given action will far exceed the anticipated benefits of proceeding. This ability to deter depends on accurately calculating what level of threatened damage will be perceived by the opponent as "unacceptable" in relation to his goals, and on the ability to make the threatened use of nuclear weapons credible. We can identify two major categories of deterrence: active and passive.[39]

Active deterrence, in the case of Argentina and Brazil, is the ability to force the opponent to avoid provocative actions in buffer regions. It implies the ability to protect

national interests in the regions by brandishing nuclear weapons. Passive deterrence, in contrast, is the ability to dissuade the opponent from direct aggression on the homeland of the deterring state. This would achieve *national defense* by deterring attacks on the national territory. Which type of deterrence is achieved by a state is a function both of the quantitative and qualitative dimensions of its deterrent force and the vulnerability, damage tolerance, and military capabilities of the adversary. A policy by either country to develop strategic forces should clearly comprehend beforehand which type of deterrence could be achieved and what its advantages and limitations would be.

Deterrence is achieved by holding the opponent's citizens and industry hostage to nuclear attack (a countervalue strike). Obviously, the greater the percentage of the opponent's industry and population that can be subjected to nuclear destruction, the more persuasive the deterrent becomes. But in cases where the opponent also possesses a nuclear capability, consideration must be given to (1) whether the opponent can respond to a threat with an attack on the threatener's nuclear forces (a preemptive counterforce strike); (2) who would suffer more in a nuclear exchange; and (3) whether the issue at stake is worth the risk of nuclear war. Active deterrence is the hardest to achieve because a nation must be willing to risk its own destruction over confrontations not directly related to its territorial security. Accordingly, active deterrence in which the opponent also possesses nuclear weapons normally demands large, sophisticated, and invulnerable nuclear forces capable of inflicting a very large amount of damage on an opponent even after the opponent has launched a first strike. Passive deterrence is more easily achieved because regardless of the above-mentioned considerations, it is assumed that nuclear weapons would be used by a state whose very existence was threatened by aggression. The credibility of passive deterrence, then, is the belief that it would be an automatic reflex for a state that was attacked. But again, the size of the nuclear force would determine whether the nuclear response would merely punish the aggressor (the French notion of tearing an arm off) or destroy his offensive war-making capacity.

Where two states locked in competition achieve the guaranteed ability to inflict unacceptable damage on each other with nuclear weapons (regardless of who strikes first), there begins to emerge a balance of terror in which the nuclear forces on each side cancel one another out.[40] Whether this balance of terror remains stable or not depends on whether quantitative and/or qualitative changes in the nuclear forces of one or both sides make a first strike appear advantageous. If either side had anything to gain by striking first (for instance, destroying a significant portion of the opponent's forces), or to fear from being struck first (that it would lose most of its retaliatory nuclear capabilities), then an extremely unstable and dangerous nuclear balance would exist. There are several reasons for at least suspecting that a balance of terror between Argentina and Brazil would, in time, tend inherently toward disequilibrium.

There is much more about the nature of strategic weapons and the requirements of deterrence which merits discussion, but this is not the appropriate place to review all the relevant concepts. We have said enough to recognize that nuclear weapons will not automatically increase the regional influence or national security of a state, and that the relationship between two nuclear states may demand constant and costly adjustments to maintain a stable balance of terror which inhibits the use of strategic forces. In fact, nuclear weapons do not necessarily cancel out other factors of national strength, such as population, economy, and conventional military preponderance. The panacea of nuclear weapons could easily turn out to be a self-destructive delusion for countries like Argentina.

THE UTILITY OF NUCLEAR WEAPONS

Let us begin by focusing on the utility of

nuclear weapons for Argentina, since the earlier discussion suggested that Brazilian conventional military superiority might be counterbalanced by an Argentine deterrent force. If this were the case, the most advantageous situation would be an Argentine nuclear monopoly. Yet even a nuclear monopoly would not guarantee improved Argentine influence or even security. This is because, in the first instance, a nuclear monopoly is not the same as a nuclear preponderance. For a nation to offset the conventional preponderance of a rival with nuclear weapons would require an overwhelming nuclear capability.[41] But even a preponderance of nuclear weapons might not achieve the desired effects in the Southern Cone because of certain geopolitical peculiarities.

Although the US apparently counterbalanced Russian conventional superiority in Europe during most of the 1950's by relying on nuclear superiority, there could be no more inappropriate analogy for the Argentine-Brazilian context. The US was able to threaten the Soviets with nuclear retaliation in complete confidence that the Soviets could not bring their conventional forces to bear directly on US territory. For countries like Argentina and Brazil, whose conventional forces are immediately accessible to each other, nuclear weapons could not be threatened or used with impunity from the ground forces of a superior rival. Another misperception by Argentina in reviewing the history of US-Soviet cold war relations would be the assumption that even a vast nuclear preponderance would function to inhibit a rival from engaging in provocative actions in areas of political competition. Studies show that the Soviets behaved most dangerously during those periods when the US held decisive leads in nuclear capabilities.[42] This implies that an Argentine nuclear capability might have little visible impact on Brazilian policies toward the buffer states.

Another difficulty in an Argentine nuclear monopoly would be the credibility of active deterrence. Argentina could not seek to exploit the political leverage of nuclear threats in disputes over the buffer states without incurring the danger of counterthreats from interested third states, such as the US and USSR. Thus, the leverage of Argentine capabilities could be nullified by the countervailing pressures of other states unwilling to allow a weaker nation to employ nuclear blackmail. The US was able to follow a policy of massive retaliation before 1957 in part because it could threaten nuclear attacks against Russia and China without regard to the possible reactions of other, more powerful states. Indeed, a politically and militarily significant segment of the world community supported and depended on the policy at the time. However, considerations of *realpolitik* would indicate that Argentina might find itself unable to derive political leverage from nuclear weapons in matters not directly related to its own territorial security.

In any event, Argentina could not realistically expect to enjoy a monopoly on nuclear weapons in the region for any measurable length of time. As a recent work on proliferation has observed, "Acquisition [of nuclear weapons] by either Argentina or Brazil . . . would likely spur the other to follow suit rapidly."[43] The knowledge that Argentina would soon lose its nuclear advantage could conceivably create pressures within the leadership to use its strategic advantage before it was lost. Or, more likely, an expensive and dangerous arms race could ensue in which increased defense spending would not purchase increased security, but only struggle to keep strategic forces at a given order of effectiveness vis-à-vis Brazil. Several considerations seem to justify the suspicion that once strategic forces were present on both sides the resulting balance of terror would be highly unstable and disadvantageous for Argentina.

The first would derive from the comparative damage that each side could inflict on the other with equal forces. It was pointed out earlier that Brazil's political and war-making capabilities are decentralized while Argentina's are highly concentrated. Also, Brazil has a much larger population

than Argentina. Therefore, with comparable strategic forces, Brazil could inflict absolute casualties which would represent a higher percentage of Argentina's population than the same number of absolute casualties would reflect for Brazil's population. This is even more important because both countries have areas of significant population concentration, especially Argentina. Thus, it appears that a more significant proportion of Argentina's population would be vulnerable to Brazil's strategic forces than the other way around. And, the disparity in the capabilities to inflict casualties will grow with time because of differential population growth rates and densities.[44] Also, the location of Argentina's urban centers close to the Brazilian frontiers poses another serious disadvantage for Argentina: Brazil could literally fire its weapons a much shorter range, while Argentina would need longer-range delivery vehicles, as well as more of them, to hit Brazil's more distant and dispersed industrial and population centers.

Of course, there is a ceiling of casualties beyond which considerations of comparative damage would mean little. For instance, if Argentina could hold 25 percent of Brazilian population hostage to nuclear attack, it might matter little that Brazil could reach 60 percent of Argentine population with its own nuclear forces. This would be true if 25 percent casualties represented "unacceptable" damage in the minds of Brazilian leaders who then would not be encouraged to take dangerous actions just because in an actual nuclear confrontation Argentina would suffer more.[45]

It would not be easy, however, for Argentina to develop a credible ability to cause 25 percent casualties in Brazil. By the year 2000, this would require saturation strikes against Brazil's four leading cities, containing 50.7 million persons.[46] Brazil, in contrast, could affect 42 percent of Argentine population by nuclear strikes against Buenos Aires alone, which will have a population of just over 14 million. Regardless of what level of nuclear explosives we anticipate (fission, boosted-fission, or fusion weapons) it is evident that Argentina would require more than three times the number of warheads and delivery vehicles to reach 25 percent of Brazilian population that Brazil would need to reach 42 percent of Argentine population. Whether Argentina could even achieve this level of nuclear capability is questionable. But even if it were possible, the balance of terror that could arise would hold grave dangers for Argentina because of the probability of "excess" Brazilian strategic forces available for counterforce use.

The point is simply that with equal forces, Brazil would need a smaller number of warheads and delivery vehicles to inflict proportional casualties equal or superior to those caused by Argentina's entire force. Therefore, the surplus forces would be available for targeting against Argentine strategic forces in counterforce strikes. This could be accomplished without reducing the percentage of Argentine population held hostage to countervalue strikes below a critical minimum (equal or superior to the percentage of Brazilian population held hostage by Argentine forces). In view of the information presented earlier showing Brazil's increasing economic edge and the greater amount of plutonium that will be produced within that country, it hardly seems unreasonable to anticipate that Brazil would be able to maintain strategic forces at least comparable to those of Argentina. It can be anticipated, then, that the strategic balance would be unstable in two directions.

In the first instance, quantitative (if not qualitative) advantages for Brazil could make a first strike appear potentially profitable. Forces could be targeted against the Argentine deterrent without diminishing Brazil's countervalue deterrent. Argentina could not compete in a counterforce exchange, in contrast, without reducing its countervalue deterrent. Argentina would then be confronted with a choice between responding to Brazilian counterforce strikes with countervalue retaliation (knowing full well that Brazil retained its own countervalue capability), or watching its deterrent force destroyed piecemeal. The likelihood that both

Argentina and Brazil would probably possess mixed delivery systems (missiles and aircraft) would increase the vulnerability of strategic forces to counterforce measures.

The second axis of instability would be the prospect that, in the event of nuclear warfare, Brazil would possess the resources to win. This would be true in either of two kinds of exchanges. In a spasm nuclear exchange, Brazil could use a percentage of its own forces capable of matching or surpassing the damage caused by the entire Argentine nuclear force. Afterward, Brazil would be left with a nuclear monopoly and could force Argentina to the bargaining table (assuming that a viable government survived). It no doubt seems absurd to talk about a "victor" in the aftermath of a spasm nuclear exchange, but such is the world in which we live.

A second type of exchange would involve initial attacks against military or industrial complexes away from major population centers in a confrontation of wills. As the nuclear exchanges graduated to increasingly important targets, the Argentine strategic forces would become depleted to the point that a subsequent countervalue nuclear exchange would weigh disproportionately on Argentina. Once again, this would result from the fact that, after a gradually escalating tit-for-tat exchange, a few remaining weapons on each side by the time major targets were reached would give the advantage to Brazil (since Argentina would need significantly more warheads and delivery systems to inflict proportional damage). Brazil might then negotiate from strength.[47]

All of the above discussion implies that it would be Argentina rather than Brazil which would need to follow a cautious foreign policy in order to avoid causing those kinds of tensions which might provoke the exercise of the other's counterforce option. Argentina would only begin to secure its deterrent when it achieved an overkill capability sufficient to permit the loss of a portion of its strategic forces and still retain the ability to inflict "unacceptable" damage on Brazil in retaliation. But the absolute number of casualties which Argentina would have to inflict to reach, say, 25 percent of Brazilian population would demand a strategic force of a size probably beyond Argentina's reach for several decades. The intervening years would not be especially comfortable or secure ones.

Other relevant considerations attach to the short distances-to-targets that would obtain in an Argentine-Brazilian nuclear balance. It would be possible, for instance, for Brazil to position its nuclear forces within three or four hundred miles of the major Argentine cities. Delivery time would, accordingly, be extremely short. This would narrow the critical time during which Argentina could detect, evaluate, and respond to nuclear attack. The same would apply to an Argentine first strike against Brazil. The importance of early warning, even if it is only 15 minutes, is that it (1) allows time for confirmation that a nuclear attack is, in fact, under way; (2) makes it possible to dispatch aircraft and other strategic delivery vehicles susceptible to counterforce measures; (3) provides at least the prospect that the size and intent of the first strike can be evaluated and retaliation measured to avoid accidental or counterproductive escalations; and (4) allows at least some form of expedient civil defense action.[48] Whereas the delivery time of US-Soviet ICBMs is on the order of 30-40 minutes, Argentine-Brazilian missiles might have delivery times as short as 10-15 minutes. There are reasons, then, for anticipating serious command and control difficulties within the strategic systems of both countries.

Finally, the dangers of unauthorized use, inadvertent attack, and accidental war would all recommend against the acquisition of nuclear weapons by countries with histories of political instability and/or military insubordination. It should not be overlooked that all existing nuclear-weapons states are governed by civilians, have remained comparatively stable over the past two decades (even India and China), and have successfully subordinated the military to the authority of the central government. The

possession of nuclear weapons by a state which has shown itself unable to control the actions of its military officers would create legitimate concerns within neighboring countries. This would be especially true in times of regional tension and political confrontation.

Aside from the possibility that the military might preempt decisionmaking in the use of nuclear weapons—which would destroy the political leverage of nuclear forces, which depends on negotiations between governments in complete control of their strategic forces—nuclear weapons could also be used by military-political factions for coercion against the central government itself. Much of Latin American politics has been colored by the military coup, and nuclear weapons would merely add to the available resources of perennial military conspirators.

There could likewise be serious interservice rivalries in determining which branch of the armed forces should have responsibility for strategic weapons, since the recipient service would then overshadow the others in political weight.

There is much more that deserves attention, but the purpose here has been to introduce the topic and not to exhaust all of its possibilities or thoroughly reveal its many facets. We have outlined several reasons for suspecting that nuclear weapons could not function as a surrogate for conventional military strength in Argentine-Brazilian competition. In particular, we have indicated that the acquisition of nuclear weapons by Argentina would more than likely create an arms race with Brazil in which the resulting nuclear balance would be highly unstable and unfavorable for Argentina.

These considerations, however, should not be construed to mean that there would not also exist serious disadvantages for Brazil in precipitating nuclear armament. We have already acknowledged perhaps the primary (albeit quite simple) incentive for Brazil to go nuclear:

> Nuclear weapons seem a necessary but not sufficient requirement for guaranteeing that a state will participate in or be consulted about the resolution of major political and security disputes.[49]

As Brady Tyson has noted,

> In terms of her relations with the rest of the world, Brazil may probably be best understood today as striving for great power status and expanded influence in world economic and political systems.[50]

Since it is indisputable that "a nuclear weapons capability is a symbol of modernity and technological competence as well as a source of status and prestige,"[51] Brazilian interest in nuclear weapons could result more from political ambitions than from security concerns.

But Brazil must weigh its global aspirations against the real costs of introducing nuclear weapons into its competition with Argentina. Nuclear weapons would be undesirable for at least two reasons. First, proliferation would introduce a new element into the military balance between Brazil and Argentina which could—although unlikely from everything that has been discussed—make it possible for Argentina to reverse its deteriorating power position by technological means. Brazil would have nothing to gain and virtually everything to lose in shifting from the present conventional balance of forces (which favors Brazil) to a strategic balance (which might favor Argentina). Second, even if Brazil were to retain the military advantage in nuclear forces, the actual costs of confrontation will likely be significantly increased. That is, victory in a nuclear confrontation would surely involve greater casualties and damage than victory in conventional warfare. Nuclear weapons would serve to heighten the destructiveness of warfare while probably not changing its outcome. Nuclear weapons could not, therefore, be considered by Brazil as a shortcut to regional hegemony or a cost-efficient approach to military preparedness.

CONCLUSIONS

The intent of this article has been to

provoke further investigation into the potential impact of proliferation in the Third World. The arguments were not meant to be conclusive or compelling, but rather reflective and speculative. The pandemic dangers of nuclear proliferation have heretofore been primarily treated from the perspectives of the existing nuclear-weapons states, and as such have not come to grips with the particular considerations that might lead nations to develop nuclear capabilities.

It is not enough to ask non-nuclear states to forego their nuclear options in the interest of an abstract international peace. Rather, it must be shown on a case-by-case basis how nuclear weapons will neither enhance the security nor increase the regional influence of would-be nuclear states if, as is to be expected, their principal rivals follow suit and likewise develop nuclear capabilities. In cases where the central motive is to secure international prestige, the Carter Administration has taken the position that "the best answer is to reduce the role of nuclear weapons in world politics."[52] This prescription, obviously, needs a more concrete explication and implementation than has thus far been offered by Washington. In the meantime, an expedient policy would focus on identifying the specific dangers a nation might face in its immediate geopolitical contest as a consequence of seeking global status with nuclear weapons.

Most significantly, solutions must be found for the security dilemmas of states like Argentina (which would include Israel, Pakistan, and even South Africa) which point away from the false salvation of nuclear weaponry and toward acceptable and workable arrangements. For example, the most viable approach to enhanced Argentine security would seem to be diplomacy and regional military alliances. Nuclear capability is no substitute for adjusting differences with rivals and creating political-military alliances with others with similar fears of a regionally powerful state. Indeed, the notion that states must "go it alone" is a recent aberration which runs counter to the dominant lesson of history that states must cooperate and interact to maximize their security and influence (i.e., engage in balance of power diplomacy).

With regard to aspiring nations like Brazil (which would include India and perhaps South Africa), the best solution would appear to be quick action by the leading states to include these nations in the councils of great power decisionmaking and, as a minimum, a gradual recognition of their special regional prerogatives by a delegation of authority and responsibility within their emerging spheres of influence. Otherwise, the necessity for nuclear capabilities to gain the international recognition to which they feel entitled will most surely be reinforced in the minds of their leaders.

NOTES

1. Albert Wohlstetter, "Spreading the Bomb Without Quite Breaking the Rules," *Foreign Policy*, 25 (Winter 1976), 149.

2. Bertrand Goldschmidt, "A Historical Survey of Nonproliferation Policies," *International Security*, 2 (Summer 1976), 180-87; George Questor, *The Politics of Nuclear Proliferation* (Baltimore: Johns Hopkins, 1973), *passim*; Wohlstetter, p. 88.

3. See Karl Kaiser, "The Great Nuclear Debate: German-American Disagreement," *Foreign Policy*, 30 (Spring 1978); Norman Gall, "Atoms for Brazil, Danger for all," *Foreign Policy*, 23 (Summer 1976); John R. Redick, "Regional Restraint: U.S. Nuclear Policy and Latin America," *Orbis*, 22 (Spring 1978); Edward Wonder, "Nuclear Commerce and Nuclear Proliferation: Germany and Brazil, 1975," *Orbis*, 21 (Summer 1977).

4. A summary of Brazilian-Argentine competition can be found in Brady B. Tyson, "The Drive for Great Power Status: New Problems for Brazilian Foreign Policy," in Harold Eugene Davis and Larman C. Wilson, ed., *Latin American Foreign Policies: An Analysis* (Baltimore: Johns Hopkins, 1975), especially p. 227; Philip Raine, *Brazil: Awakening Giant* (Washington: Public Affairs Press, 1974), pp. 186-221.

5. For background on the Brazilian use of *uti possidetis*, see Tyson, p. 226, and E. Bradford Burns, *Nationalism in Brazil: A Historical Survey* (New York: Praeger, 1968), especially pp. 51-54.

6. Brazil imports about 80 percent of its oil and faces severe energy supply problems in the future. See Tyson, p. 222, and J. Goldenberg, "Brazil: Energy Options and Current Outlook," *Science*, 14 April 1978, pp. 158-59.

7. Gall, p. 184.

8. Raine, pp. 190-92.

9. Wayne A. Selcher, "The National Security Doctrine and Policies of the Brazilian Government," *Military Issues Research Memorandum*, US Army War College, 15 July 1977, pp. 27-29.

10. Burns, p. 37.

11. *Ibid.*

12. John J. Finan, "Argentina," in Davis and Wilson, p. 265.

13. *World Bank Atlas* (Washington: The World Bank, 1977), p. 8.

14. US Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1966-1975* (Washington: US Government Printing Office, 1976), p. 14. Hereafter cited as *WME*.

15. *Ibid.*

16. *World Bank Atlas* (Washington: The World Bank, 1976), p. 19. Hereafter cited as *WBA, 1976*. Figures for economic growth rate have been derived by adding the population growth rates and the per capita GNP growth rates.

17. Steven Rosen, "War Power and the Willingness to Suffer," in Bruce M. Russett, ed., *Peace, War, and Numbers* (Beverly Hills: Sage Publications, 1972), especially pp. 177, 182.

18. Ray Cline, *World Power Assessment: A Calculus of Strategic Drift* (Boulder, Colorado: Westview Press, 1975), p. 124.

19. *Statesman's Yearbook, 1977-1978* (New York: St. Martin's Press, 1977), pp. 762-64, 798-99.

20. For 1975, *WBA, 1976*, p. 28. For the year 2000, figures were derived by assuming that the economy of each country would continue to grow at the average rate of the past 15 years (6.9 percent per year for Brazil and 4.5 percent per year for Argentina).

21. For a comparison of Argentina's and Brazil's projected population growth by cities through 2000, see Robert W. Fox, *Urban Population Growth Trends in Latin America* (Washington: Interamerican Development Bank, 1975), pp. 50-69.

22. Thomas E. Weil, et al., *Area Handbook for Argentina* (Washington: US Government Printing Office, 1974), pp. 254, 292. In 1971, this area, together with Cordoba, accounted for 81 percent of GDP, while Greater Buenos Aires held 65 percent of all industrial capacity.

23. Ted Greenwood, Harold A. Feiveson, and Theodore B. Taylor, *Nuclear Proliferation: Motivations, Capabilities, and Strategies for Control* (New York: McGraw-Hill, 1977), p. 43.

24. For a short history of the Argentine and Brazilian nuclear programs, see Gall, pp. 180-88. The US held a monopoly on the supply of enriched uranium until the Soviets entered the international market in 1971. By that time, perhaps as many as 15 countries were involved in research connected with enrichment and reprocessing, which weakened US leverage over the nuclear programs of developing countries. See Wonder, p. 283.

25. Gall, pp. 182-84, and Redick, pp. 165-67. Redick notes that Argentina is the eighth largest producer of processed uranium in the world and probably now has the capability of producing weapons-grade plutonium.

26. Goldschmidt, p. 73.

27. See Greenwood, Feiveson, and Taylor, pp. 141-43. The estimate that each bomb could cause 100,000 casualties is extremely conservative, and is put forward by the authors as the likely casaulties from a "crude plutonium bomb" detonated in a densely populated center (p. 137). It is more likely that Brazil and Argentina could produce weapons with yields at least as great as those dropped on Japan by the US and capable of causing casualties of upwards of 140,000 each. At least one source believes that "advances in the state of the art of nuclear-weapons technology have put fairly compact, lightweight nuclear explosives in the category of first- or second-generation weapons for Nth countries." See William Van Cleave, "Nuclear Technology and Weapons," in Robert M. Lawrence and Joel Larus, ed., *Nuclear Proliferation: Phase II* (Wichita: University Press of Kansas, 1974), p. 58.

28. Wonder, p. 286. Argentina has made some recent comments suggesting a willingness to accept the Treaty of Tlatelolco on its own territory, but the political motivations behind the move are suspect.

29. Van Cleave, pp. 54-58.

30. Gall, p. 186.

31. Wonder, p. 284.

32. Kaiser, pp. 98-99; Wonder, p. 289; Redick, pp. 168-69.

33. Wohlstetter, p. 150.

34. *Ibid.*

35. This point is made by Wonder, p. 286. It is supported by the views of Goldschmidt, p. 75, that even thoroughly safeguarded nuclear facilities contribute to a nation's unsafeguarded nuclear development by providing a learning experience and freeing resources for parallel programs.

36. Greenwood, Feiveson, and Taylor, pp. 141-43.

37. Leonard Beaton, "The Capabilities of Non-nuclear Powers," quoted in Van Cleave, p. 56.

38. *WME*, p. 14.

39. The differences between Active and Passive deterrence were given their first significant explication in Herman Kahn, *On Thermonuclear War* (Princeton: Princeton University Press, 1960), especially pp. 126-44.

40. For a fuller definition of a balance of terror and the elements for its stability, see Glenn H. Snyder, "The Balance of Power and the Balance of Terror," in Robert J. Art and Robert Jervis, ed., *International Politics, Anarchy, Force, Imperialism* (Boston: Little, Brown and Company, 1973), especially pp. 230-32.

41. *Ibid.*, p. 233.

42. For example, see A. F. K. Organski, *World Politics*, 2d ed. (New York: Alfred A. Knopf, 1968), pp. 315-29.

43. Greenwood, Feiveson, and Taylor, p. 40.

44. *WBA, 1976*, p. 19.

45. For a more detailed discussion of "unacceptable damage," see Morton H. Halperin, *Defense Strategies for the Seventies* (Boston: Little, Brown and Company, 1971), pp. 72-86. The figure of 25 percent casualties was taken as unacceptable because it is the minimum damage which the Nixon Doctrine considered necessary for US strategic forces to inflict on Russia in a second strike to guarantee deterrence. The actual damage threshold, however, is likely to vary from country to country in relation to culture and political values.

46. Fox, pp. 59-69.

47. The notion that "winning" a nuclear war would require reaching a point at which one side held a superiority in the number of cities and percent of population that it could destroy in the rival's territory, and then negotiating from the position of strength that this would permit, can be found in Kahn, pp. 174-78.

48. "Expedient civil defense" includes the most basic, immediate defensive actions in the event of a nuclear attack, such as taking cover in a ditch, culvert, or depression in the earth.

49. Greenwood, Feiveson, and Taylor, p. 50.

50. Tyson, p. 222.

51. Greenwood, Feiveson, and Taylor, p. 50.

52. Joseph S. Nye, "Nonproliferation: A Long-term Strategy," *Foreign Affairs*, 56 (April 1978), 620.