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Growth and decline of the military-industrial complex: The cases of Argentina and Brazil

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Abstract. This article examines most significant causes of the development of a weapons industry in Argentina and Brazil. International market and political conditions, domestic economic and political determinants, and regional contextual factors explain the evolution and makeup of the military industrial complex in these countries. The article examines all three sources and provides a summary profile of the arms sector in each country. Developments in the 1980s and early 1990s - domestic, regional, and international - have resulted in the near-collapse of arms production in Argentina and Brazil. In the last section, the implications of this dramatic contraction are explored.

Introduction

How and why do states without a tangible external threat to their security develop a weapons industry? Beginning sixty years ago, Brazil and Argentina initiated policies that would lead, by the 1960s and 1970s to substantial military industries. Why did these two key South American states feel compelled to inaugurate such costly endeavors? And, how did the arms market contraction after the cold war affect the Argentine and Brazilian defense industries? The political economy of the rise and fall of state-supported arms production is, then, the focus of this essay, within the larger context of global, regional and domestic political and economic transformations.

The growth period

International market and regimes

The initial impetus for the development of arms industries in Argentina and Brazil goes back to the 1930s and 1940s, when both countries' armed forces took incipient steps to create an indigenous capability in weapons production. However, it was not until the 1970s and early 1980s that Brazil's aircraft and arms industries were consolidated, and their export capacity - mostly Brazil's - became more significant. This capacity was strengthened by declining global arms markets in the early 1980s, despite the receptivity to arms purchases in areas of protracted military conflict, such as the Middle East.

Opportunities to strengthen political and economic relations with developing countries, fierce competition among producers, and national prestige considerations fueled an aggressive arms trade and lowered the resistance of traditional suppliers to diffuse technological and productive capabilities. In other words, changing patterns in arms trade helped shape a new international division of labor, expanding access to arms and technology markets for a group of emerging Third World arms producers like Argentina and Brazil. These conditions increased the ability of recipients to maximize indigenization in weapons production through assertive bargaining. The

effective growth of Brazil's arms exports began in 1976 and lasted until the early 1980s while Argentina's negligible production, despite an initial effort in the 1950s, surged slightly in the late 1970s.

International financial conditions at the time were beneficial to the development of arms industries in these countries. On the one hand, the 1973 oil shock and its aftermath increased constraints on domestic financing in oil importers like Brazil, which now required efforts to expand exports. On the other, it also provided Middle Eastern and other oil-producers with windfall petrodollars capable of funding the modernization of their armed forces, expanding the pre-1970s Third World arms market. Euromarkets flooded with recycled petrodollars were now a source of loans and suppliers' credits to finance domestic arms production and purchase of technology for countries like Argentina and Brazil.

Finally, international regimes related to arms transfers were fairly inactive or nonexistent during that period, imposing fewer constraints on arms exporters than would be the case in the 1990s. Thus, international political, strategic, commercial, and financial conditions point to an overall permissive environment for the development of arms production among emerging suppliers such as Brazil and Argentina during the 1970s.

Domestic determinants: Import-substitution and national security ideology

Import-substitution was the name of the game, providing an overarching industrialization strategy in Argentina and Brazil in the post-World War Two era, and state entrepreneurship was at its heart. There was a preponderance of the state sector as arbiter and agent of economic development and the state bureaucracy had a significant degree of freedom and maneuvering. The armed forces implicitly or explicitly controlled vast segments of the public sector and industrial infrastructure protecting it with high tariff surcharges, quotas, and subsidies.

As early as in 1930, a series of articles in Argentina's *Revista Militar* demanded the creation of state and mixed enterprises, and the adoption of protective barriers to accelerate national industrialization. More extreme positions within the armed forces favored industrial 'autarky.' Peron's rule accelerated and gave substantive meaning to this orientation to industrialization and to the role of the military in it. The mostly-military administrations that succeeded him deepened this trend, despite episodic and failed efforts to reverse some Peronist economic strategies.

The interpenetration of military and economic power, according to Rouquie, was not peculiar to Argentina, but its extent was unique in Latin America. Brazil's armed forces have also had an active interest in industrialization since the 19th century and an industrialist-technocratic orientation within the armed forces developed as early as the 1940s. The post World War Two large-scale state enterprises in steel-making, oil, petrochemicals, mining, and public utilities were largely influenced by military or formerly military technicians and bureaucrats.

An ideology of 'National Security' prevailed in Argentina and Brazil by the 1960s (with deeper historical origins), when the military ruled more often than not and when the armed forces enjoyed privileged budgets and ancillary activities such as weapons-production and the development of related industries. Brazil was under military rule from 1964 to 1985 and Argentina from 1966 to 1983, with a brief interlude between 1973-1976. By 1965, Brazil's military junta had reversed a long-term decline in military spending and President Medici (1969-1973) gave military

expenditures first or second priority in his budgets, absorbing over 20 percent of central expenditures on average. Argentina's General Onganía (1966-1970) also favored military spending and the juntas ruling between 1976 and 1983 maintained the highest levels of military-related expenditures in decades, over 34 percent of the total budget or about 4.2 percent of GDP.

The expression of import-substitution and an inward-looking orientation in the military sector was to seek as much military independence from suppliers as possible, a project embedded in Argentina in the Savio Law of 1941. In time, arms embargoes begot even stronger import-substitution efforts (in the case of Brazil, as a reaction against President Carter's human rights pre-requisites for arms sales). Domestic arms production and exports were regarded as an important means to 'great power' roles, 'grandeza,' 'equidistance' from the superpowers, and non-alignment. In the words of a former Brazilian officer who was the director of the Brazilian War Material Enterprise-IMBEL: 'We will sell to the left, to the right, to the center, up above and down below'. The ideology of National Security permeated the foreign affairs bureaucracy as much as the military institution itself. Arms exports held the promise of increased international leverage vis-a-vis suppliers of raw materials, oil, and technology.

The regional setting: Rhetorical closeness, distant neighbors

Brazil and Argentina have not fought each other in the twentieth century. Relations between the two giants in the Southern Cone, however, have never been very close. Rather, their relations were characterized by historical competition over territories, resources, and influence over buffer states - competition that occasionally developed into more serious expressions of mutual distrust. Brazil's fears of Argentine aggression went back over a hundred years -both fought their last war in 1825-1828 -and were exacerbated by Argentina's alignment with Axis powers during World War Two, when Brazil joined the Allies' military efforts in Europe. Military institutions and their central political role helped exacerbate the cold relationship. Argentina and Brazil became familiar cases in studies of nuclear proliferation -given four decades of intensive efforts to develop nuclear capabilities outside the global nonproliferation regime -despite repeated assertions that nuclear industries were solely directed at civilian activities. Notwithstanding the classical rhetoric of Pan-American solidarity -mostly directed against the US -a tacit historical competition largely defined the bilateral relations between these two key South American States.

Much of the twentieth century was thus best characterized by neither militarized conflict nor effective cooperation between Argentina and Brazil. No genuine cooperative economic schemes ever took hold until quite recently, as we shall see below. Although a lukewarm relationship, it is important to remember that the so-called Argentine-Brazilian rivalry has been largely overplayed, and that it never reached more than measured competition. Argentine-Chilean military rivalry was perhaps more pronounced, leading both countries to the verge of war over the Beagle Channel in the late 1970s. However, in the grand scheme of factors affecting weapons production in the Southern Cone, regional considerations seem to have played a rather marginal role in the evolution of arms industries in both Argentina and Brazil.

Brazil: A profile

Under the international, regional, and domestic conditions just described, Brazil developed an arms and aircraft industry characterized by an effective partnership between the state and private sector. The industry succeeded in achieving significant rates of indigenization, allowing Brazil to leap ahead, becoming one of the world's largest exporter of conventional arms in the mid-1980s.

Concrete strategies in Brazil's arms industry involved a policy of 'market reserve,' state financing, and technological support to private firms through the Aerospace Technical Center (CTA) and the army's Technical Center (CTEX, created in 1979 emulating the air force's CTA). The state reduced entrepreneurial ('strategic') and market uncertainty through its pro-curement of guaranteed shares, often at higher prices than their market value. It financed private R&D, built part of their infrastructural requirements, trained engineers, mediated between foreign technology suppliers and national firms, and transferred new technologies to private firms.

The air force concentrated in missile development, airplanes, and guided systems, the army in armoured vehicles and artillery, and the navy in electronic systems, communications and computers. The Ministry of the Navy initiated in the late 1970s activities in shipbuilding and nuclear-related technologies, including a nuclear submarine. IMBEL was established in 1975 under Army sponsorship, as a state-owned holding of seven major producers (and 55 private companies), administering Army arsenals and factories. The anti-statist movement of the latter part of the 1970s, and an extant private infrastructure in automobile manufacturing, acted as an effective barrier against state expansion in this area. By the early 1980s, IMBEL had a semi-privatized cooperative structure, and was granted tax exemption for most of its imports.

The three major enterprises accounting for most Brazilian arms exports at the time were Embraer, Engesa, and Avibras. The Air Force developed the state-owned firm EMBRAER in 1969 as the national champion of the aircraft industry, out of its Centro Tecnico Aeroespacial (CTA), the locus of technological research in aircraft design and production. The Ministry of Aeronautics manipulated Brazil's domestic market for civilian and military aviation to EMBRAER's advantage, through its procurement power, R&D support, and protective tariffs. The Ministry not only had effective control over EMBRAER itself, but increasingly concentrated -throughout the 1970s - R&D, training, financial, fiscal, marketing, regulatory, and international bargaining (for technology) related to the sector. By the late 1970s, the Ministry managed to camouflage EMBRAER as a mixed enterprise, as a result of a tax incentive scheme -a deduction of 1 percent in corporate income tax to purchase EMBRAER's shares -that provided the firm with low-cost, long-term, intervention-free capital. EMBRAER was thus considered a mixed enterprise, state-controlled, 90 percent privately-owned, with 246,937 shareholders.

EMBRAER began producing a variety of planes (air frames, parts, and navigation equipment), and licensed aircraft technology abroad (Tucano to Egypt and the United Kingdom). By the early 1980s Embraer was the sixth largest aviation company in the world (outside the US), producing the Xavante jet trainer and ground-attack plane (Italian license); the AMX fighter-bomber joint venture with Aeromacchi and Aeritalia, 80% Italian, sold to Brazil's and Italy's Air Force); the trainer 'Tucano' (sold to Lybia, Egypt, Iraq, among others, and produced in Egypt by the Arab Organization for Industrialization with Brazilian technology); the civilian (Pratt & Whitney engines) aircraft - Bandeirante (over 500 Bandeirantes sold to 34 countries), Brasilias (hundreds sold), 3 medium-sized general purpose aircraft (Xingu, Tapaj6, Araguaia), and the 'Ipanema' (for agriculture).

Some aircraft models were the product of skillfully negotiated industrial cooperation agreements with a foreign supplier designed to achieve rapid market penetration without excessive technological dependence. Preferred modes of technology transfer included coproduction arrangements (with Italian Aeromacchi for the jet-trainer Xavante, with Aeromacchi and Aeritalia for the AMX fighter) and licensing (from Piper for different light aircraft). The Tucano trainer and

the Bandeirante are of national design, but over 50 percent of the value of a Bandeirante was imported from the US and Canada. Efforts at nationalization of inputs resulted in the diffusion of technological capabilities to dozens of suppliers.

The Ministry of Aeronautics, but more so the Army, nurtured the private firm AVIBRAS in missile technology, turning Brazil into a designer of ground missiles, including guidance systems. Founded in 1961, Avibras was a pioneer aerospace company which produced the first Brazilian composite propellants in the 1960s. It developed the Sonda-I, 11-B and 11-C rockets, worked on the second stage of Sonda III and the first prototype of Sonda IV, and converted the Sonda series of sounding rockets into artillery rockets for exports. The Astros II rocket-launching system became its most successful product by 1983. Avibras' annual production grew from \$6 million in 1978 to \$391 million in 1987, and its work force from 250 to over 6,000.

ORBITA was created in 1987 as a joint venture among private firms (including Engesa) and Embraer, although it never materialized from the planning stages. It was originally designed to consolidate missile-development activities: to convert the Sonda-IV space rocket into a missile with the help of extensive technical assistance from West German and French firms, and to develop the Leo anti-tank missile and the Piranha air-to-air missile, which never entered the production stage. By the latter half of the 1980s Brazil's efforts in this area included the development of ground-based SS-300 missiles (which never came into being) and Barracuda sea-launched missiles for tactical warheads. The Satellite Launch Vehicle (SLV), capable of launching a 440 lb payload into a 435-mile orbit, was scheduled to be ready by early 1996, but was eventually cancelled. In 1993, about 200 Brazilian companies (including Avibras and Embraer) joined in the Aerospace Industries Association of Brazil, in order to promote exports.

Another private firm, ENGESA, became a major producer of armored vehicles, with over 90% of its production oriented towards exports. In the early 1970s Engesa was a still small firm with little in-house research activity, while by the end of the decade it became the world's largest producer of such vehicles - including the Urutu, Cascavel, and Jararaca - exporting to over 20 countries. Engesa relied on domestically developed technology in the automotive sector (about 17 percent of its sales were invested in R&D, \$1 M. in 1980), or on carefully selected and negotiated co-production agreements with several suppliers. Most engines were from General Motors or Mercedes Benz do Brasil. Engesa's armoured vehicles were sold to Libya, the PRC, Iraq, Iran, Nigeria, and Sudan, among others. The planned Osorio tank never went beyond a 1985 prototype (one of which went to Saudi Arabia).

In sum, the sector reflected a cooperative structure among state (particularly military), private sector, and research institutions. It succeeded in achieving relatively high levels of national design and indigenization of components and in using add-up engineering, integrating imported components into a new system. Over 90 percent of its production, including armored vehicles, aircraft, sophisticated rocket systems, and missiles, was exported to over 50 countries (15 percent of it to the USA). Buyers included Australia, France, UK, USA, Canada, New Zealand, Australia, France, Iraq, Jordan, Kuwait, Saudi Arabia, Gabon, Camerons, South Korea, Uruguay, Chile, Bolivia, Paraguay, Mexico, Venezuela, Peru, Nigeria, Togo, Sudan, Gabon, Mauritania. According to some estimates, about 50 core firms employed roughly 50,000 workers. Brazil's exports in this area are said to have comprised a significant share of all arms exports of the Third World by the late 1980s. Between 1980 and 1983 Brazil accounted for 94.4 percent of the arms exports of Brazil, Chile, Argentina, and Uruguay combined. SIPRI's Yearbook (1987) estimated

that between 1976 and 1982 these exports amounted to a total of \$530 million (in constant 1975 prices). ACDA data suggests that exports peaked in 1982 at \$749 million. By 1984 Brazilian sources estimated exports to be about \$1 billion and more, although experts concur on the general overestimation of the value of military exports for political purposes. SIPRI reports on exports of major weapon systems in 1987 for only \$491 million. It is important to highlight that estimates of employment and export performance of the military industries are generally not very reliable and most experts suggest caution in interpreting these figures, particularly those emanating from governmental sources at the time and weapons producers.

Brazil's relative success in arms production and exports, even if far less impressive than estimates at the time implied, could be traced not only to an effective reading of market signals, but also to the receptiveness of its planes for Third World conditions (due to size, price, low operating costs in short commuting routes, low maintenance requirements), the versatility of its armoured vehicles, simplicity in design (low maintenance requirements), adapt-ability to worst climate and terrain, and reliability. Finally, as a Third World supplier during the Cold War era, Brazil's 'no-strings-attached' partnership was particularly appealing.

Argentina: A profile

Argentina's arms industry traditionally was owned and controlled by the state. By 1945 the military conglomerate National Directory of Military Industries (DGFMI) controlled 14 state enterprises (including the first pig iron factory, Altos Hornos de Zapla) and 20,000 employees. Efforts to develop arms industries (including aircraft) started in earnest in the early 1950s, when Argentina ranked first among Third World producers. A de-facto tripartite division of the state among the three armed forces since 1955 placed the DGFMI under the control of the army. About 80 percent of DGFMI's output in the 1960s was for civilian use by major Army-controlled enterprises (YPF, Gas del Estado, Ferrocarriles Argentinos) and private industry. The expansion of DGFMI reflected the dominance of a statist orientation in the army, which became the dominant political force since 1963. Statism inhibited private entrepreneurship in the arms-producing sector.

The military de-emphasized indigenous arms production since the downfall of Peron and until 1976, when investment in state arsenals surged. The best known export output at the time was the TAM (Medium Argentine Tank), commissioned for design by the West German firm Thyssen-Henschel in 1973. Among recipients of TAM were Iran (about 100), Peru, Panama, Jordan, and allegedly Saudi-Arabia. Efforts at reducing dependence on foreign technology and licensing in the military complex run by the army were negligible. This is particularly striking if one compares the relative shares of R&D funds from the central budget allocated to the three forces, with their technical achievements. The navy's export share of total R&D investments in 1978 was 0.2 percent, the air force's 1.72 percent and the army's 18 percent. There was no shortage of army R&D agencies, which included twelve institutes under the supervision of the Council for the Armed Forces for R&D. A group of researchers at the Army's R&D center was never able to influence the army and the DGFMI in the direction of industrial promotion and technological investments.

The state-run aircraft industry created in 1927 became the National Mechanical and Metallurgical Industries (IAME) in 1952, the National Bureau of Aeronautical Manufacturing and Research (DINFIA) in 1957, and the Military Aircraft Industry (FMA) since 1968. Formally the air force's niche, it was effectively under the control of the army's DGFMI. The recurrent reorganizations reflect attempts at strengthening the sector, and stand in sharp contrast with the remarkable continuity of the navy's Atomic Energy Commission. FMA was far less dynamic than its Brazilian

counterpart. It relied heavily on foreign licenses after a period of intense design activity by former German Luftwaffe engineers in the 1940s and early 1950s, aimed at developing the Pulqui aircraft. Although considered an indigenous design, the Pucara was inspired on a US model and was highly dependent on imported parts. Limited numbers of Pucara were sold to Uruguay, Iraq, Central African Republic, Venezuela, Morocco, and El Salvador.

The Armed Forces Technical Research Center (CITEFA) started working on missiles in the early 1970s. With mostly German technical assistance (MBB) and Egyptian and Iraqi funding it was engaged after 1982 in the development of a medium-range (600 miles) surface-to-surface ballistic missile (Condor II) with a payload of 1,000 pounds. Developed by the air force at Falda del Carmen, the Condor II project was estimated to have absorbed \$300 M. Iraq and Egypt were to acquire 200 Condor II each (labelled the Badr 2000 in Egypt and the Saad 16 in Iraq). The Argentine government admitted delivering eight Condor II prototypes to Egypt in 1991. Argentina also produces an unguided multiple launch (200 km) rocket, the Alacran, capable of delivering a 100 Kg. payload, far below the MTCR threshold. The navy controlled the nuclear sector and the National Atomic Energy Commission's ambitious nuclear program. The navy's liberal orientation followed the British and American models and was evident in its emphasis on 'state subsidiarity,' which the nuclear program gave effective meaning by developing private firms in heavy components and other inputs for nuclear plants and fuel processing facilities.

Argentinian arms exports are estimated to have amounted to \$217 million between 1976 and 1982. By 1985, Argentina's revenues from arms exports were said to be as high as those from meat exports, although these estimates are -as in the case of Brazil -not entirely reliable. All in all, Argentina's arms industry was historically shackled by a statist orientation, and for the most part, was unable to translate copious investments into technologically and commercially significant capabilities.

During the growth phase of Argentina's and Brazil's arms industries, both developed extensive connections with Middle East clients. Brazil's military exports to Algeria, Libya, Egypt, Morocco, Qatar, Saudi Arabia, Tunisia, UAE, had turned this area into its major extra-regional market, followed by Africa (Gabon, Nigeria, Upper Volta, and Zimbabwe). Brazil's heavy oil dependency had lubricated these connections, leading to barter and countertrade agreements exchanging oil for weapons. Engesa's international debut was armoured vehicle shipments to Iraq in 1977. Between 1979 and 1982 Engesa delivered to Iraq close to 800 Cascavels, in addition to over 300 Jararaca and 300 Sucuri, turning Iraq into the recipient of a third of all Brazilian arms exports. A package of tanks, missiles, and aircraft equipment (\$1bn.) with Saudi Arabia followed in the mid-1980s. Embraer licensed the Tucano for production in Egypt (110 units) in 1983, with resales to Iraq. Over 90 percent of Avibras' exports went to the Middle East, principally Iraq and Libya (also Saudi Arabia), including the rocket system Astros II (range 40-70 km). By 1989 Brazilians were assisting Iraq in rocket aerodynamics, flight testing, the control of rocket trajectories, on-board electronics, and rocket propellants. At the time, Iraq was Brazil's eight largest trading partner. The Brazilian government revealed in 1990 that, since 1980, it had provided Iraq with enriched uranium and with assistance in uranium enrichment, with prospecting of uranium ore, and with a facility for converting yellowcake into uranium oxide. In 1993, UNSCOM inspection teams in Iraq were studying samples of nuclear material believed to be of Brazilian origin. Brazil was also suspected of providing Iraq with designs for centrifuges and even with an actual centrifuge.

Argentina also maintained military exports in the region. Different Argentine provinces developed different proclivities to sales in the Middle East, with Cordoba's independent foreign policy pushing for Pucara plane sales to Iraq, and Entre Rios opposing the sale, to protect its rice and tea exports to Iran (worth \$500 M.). Among other transactions in the 1980s, when nuclear exports were part of the nationalist diplomatic kit, Argentina supplied nuclear materials and services to Middle East countries. This included assistance in completing the two Iranian reactors at Bushehr and exporting large amounts of uranium dioxide to Algeria. By 1993 Argentina was still alleged to export low-enriched (20 percent) uranium fuel and nuclear-related services to Tehran. Argentina's best known military cooperation project in the Middle East was the Condor 2 project with Egypt and Iraq. Condor 2-related components were discovered by UNSCOM in 1993. Argentina allegedly helped Iraq in solid fuel technology and guidance systems, increasing the range of Iraq's Scuds. Guidance and control systems, however, were Argentina's own bottleneck in the development of the Condor II. The program was deactivated under heavy US pressure, with its components shipped to Spain's National Airspace Technical Institute (INTA) in 1993.

In sum, a relatively dense network of military cooperation -conventional and nuclear -developed between Argentina and Brazil on the one hand, and Iraq, Iran, Egypt, Algeria, Libya, and Syria on the other. With the contraction of state agencies and military budgets, this network faced significant threats. However, private actors including former military officers and entrepreneurs continued to offer their services to Middle Eastern arms-producing programs. Former Brazilian CTA and Orbita personnel were purportedly involved in plans to build a nuclear-version of the Piranha air-to-air missile for Iraq, although the Piranha itself had never entered the production stage in Brazil.³⁵ Argentine scientists were reported to assist Iraq's rocket program as well.

The period of decline

International constraints

The end of the Iran-Iraq war also ended a primary market for Brazil's arms industry. By the end of the 1980s, the international arms market became saturated, a situation made even worse from the perspective of weapons producers by the end of the Cold War and the ability of traditional suppliers to adjust to the requirements of Third World clients. In 1990, Saudi Arabia was ordering Abrams tanks, not Brazilian Os6rios, despite Engesa's effort to get a \$2.2 bn. deal by calling the tank 'Al Fahd.'³⁶ International financing for arms industries had dried up. Iraq stopped paying Engesa's bills in the late 1980s, contributing to Engesa's financial collapse in 1990. Avibras' sales dropped from \$350 million in 1987 to \$10 million in 1989, leading to its bankruptcy in 1990. Even Embraer, which could still rely on civilian exports, became heavily indebted by the early 1990s, forcing dramatic cuts in its projects and labor force.

Thus, the brief success of their arms exports ended with a double whammy: the sharp contraction of international demand on the one hand, and the heightened levels of supply on the other.³⁷ In addition, the emergence of international regimes aimed at controlling international arms transfers and sales -such as MTCR in missile-related technology -placed further political and technological constraints on the relative freedom of operation which Argentina and Brazil had enjoyed in the preceding decades. For example, Argentina's Condor II and Brazil's VLS program were under heavy MTCR pressures. Both Brazil's and Argentina's nuclear exports became under stricter supervision, with the latter even joining NPT and the Nuclear Suppliers' Club with its strict guidelines.

A new domestic political economy

Following democratization in the mid-1980s, the armed forces aimed -ultimately unsuccessfully- at exchanging the right to rule for the right to nurture military industries. The service heads of the army, navy, and air force in Brazil resisted the cancellation of their ministerial status and of the hitherto secure budgetary autonomy of their economic fiefdoms. Successive finance ministers in the 1980s were unable to stem fiscal expenditures favoring the military, subsidy-dependent private firms, and public employees. Under President Sarney an explicit directive was issued to the presidential cabinet to give priority to defense appropriations, leading to an increase in the military share of central government expenditures relative to the preceding six years of military rule. Sections of the military continued to develop a 'parallel nuclear program' with apparent weapons applications, even after attempts -through the Constitution drafted in 1988 -to place all nuclear activities under democratic control.

In Argentina, President Alfonsín challenged military prerogatives with some success, contracting military budgets by about 37 percent between 1984 and 1989. However, Alfonsín retained the air force's Condor II program in 1985, maintained relatively high levels of military expenditures (over 3 percent of GDP), and sustained Argentina's opposition to the NPT, its right to peaceful nuclear explosions, as well as its refusal to ratify the regional Tlatelolco treaty.

By the late 1980s and early 1990s Brazil and Argentina were poised for what amounted to a genuine revolution in the countries' political economy. The political coalitions backing Presidents Carlos S. Menem and Fernando Collor de Mello endorsed effective economic liberalization, privatization, military contraction, and structural adjustment, with unprecedented vigor. Following decades of import-substitution industrialization, genuine liberalization began taking hold, most consistently in Argentina, where the neoliberal program brought about privatization, low inflation, balanced budgets, and an average growth rate of close to 8 percent annually in the early 1990s. Arms and ancillary industries were now prime targets for privatization and conversion into civilian-oriented production. Menem and his Finance Minister Domingo Cavallo presided over the sharpest contraction of military budgets and military personnel in decades and over the elimination of the military draft. Economic reform lagged in Brazil with the ascension of Itamar Franco, who wooed a statist-populist constituency and the military, and attacked international institutions and their domestic allies. This phase was superseded by the election of Fernando H. Cardoso in 1994, whose coalition set out to embrace an economically-liberalizing revolution at home, in the region, and towards the rest of the world. Both Collor and Cardoso have decimated military budgets and worked to reduce the political influence of Brazil's armed forces.

The weapons-producing industries - recipients of state subsidies, fiscal incentives and R&D support - were a main casualty of the contraction of state expenditures and entrepreneurial activities. Fewer resources narrowed the political space for military expenditures and forced a redefinition of priorities. Although Brazil had been spending less than 1 percent of its GNP on the armed forces, among the world's lowest (Argentina spent 2.4 percent and occasionally far more), there were hidden costs and opportunity costs in the expansion of the military-industrial complex. Among the most important political costs was the expansion of the armed forces' influence, and its resistance to contracting the state. In Argentina, DGFM accounted for up to five percent of the country's GNP, swallowed over seven percent of the national budget, and accumulated over \$ 1.5 billion in foreign debt. Already by the mid-1980s, pressures to privatize

DGFM were mounting. The Condor II program was estimated to have absorbed between \$ 3-5 billion, although Iraq allegedly provided most of the funding.

Economic liberalization had a beneficial effect on the military's disentanglement from political and economic sources of power. Both in Brazil and Argentina institutions like the air force's CTA (Brazil) and IIAE (Instituto de Investigaciones Aeronauticas y Espaciales, Argentina), and the navies' IPqM (Brazil's Instituto de Pesquisa da Marinha) and National Nuclear Energy Commissions had enjoyed enormous bureaucratic autonomy. The level of political insulation and budgetary rent-seeking of military-related enterprises were reduced significantly under President Fernando H. Cardoso. Cardoso had cut off funding for missile development (VLS satellite launch) even earlier, as finance minister. Engesa itself ceased to exist and Brazil's nuclear sub-marine program was discontinued in 1996. The eventual cancellation of the Condor II project in Argentina symbolized the triumph of the new liberalizing agenda under President Menem over old power competitors in the Argentine political system, such as the Air Force. Both countries continued promoting space research - with very limited resources - having placed their respective Commissions for Space Matters directly under the President's supervision.

Finally, Menem scrapped the Condor II project, dealing a severe blow to the last military program with a potential for redressing decades of Argentine failure in military production. The Menem Administration played a game of occasionally pointing to foreign pressures and tradeoffs in dismantling this program. But, in reality, the external benefits of increased US support and international recognition complemented a domestic priority of killing the vestiges of a historically powerful statist rival: the military-industrial complex.

Regional breakthroughs

The leap in economic liberalization was matched by a leap in bilateral cooperation. Following decades of Argentine-Brazilian estrangement and failed attempts at genuine political and economic cooperation, the administrations of Carlos S. Menem in Argentina and Fernando Collor de Mello in Brazil laid out a blueprint of cooperation in the early 1990s, involving every issue-area, most notably economic integration and regional denuclearization. This was an unprecedented definition of regional cooperation in the Southern Cone, with MERCOSUR as an essential component. In July 1990, Collor and Menem signed the Buenos Aires Act, accelerating the timetable for the establishment of an Argentine-Brazilian common market by December 1994, and instituting automatic tariff reductions across the board. Argentina, Brazil, Uruguay, and Paraguay signed the Treaty of Asunción in March 1991, creating MERCOSUR (Mercado Comun del Sur, or MERCOSUL in Portuguese). The treaty stipulated the free circulation of goods and services within the region by 1995, an automatic schedule for tariff reductions, the institution of a common external tariff by 1995, the harmonization of laws and regulations concerning rules of origin and dispute settlement, and the coordination of macroeconomic policies.

This time, integrative schemes were not mere rhetoric, but effective policies. A genuine economic integration process was in place after many failed attempts during these countries' import-substituting and hybrid (including weakly liberalizing) phases. Trade within MERCOSUR quintupled between 1991 and 1995 while bilateral trade between Argentina, Brazil, and Chile tripled. Brazil's share of Argentine trade doubled between 1989 and 1993, from 10 percent to 20 percent of the total. Argentina's share of Brazil's trade nearly trebled between 1989 and 1993, from 3.7 percent to over 13 percent. In addition to the unprecedented cooperation between Argentina and Brazil in economic and infrastructural areas, a mutual commitment to renounce nuclear

weapons and the accession to the Treaty of Tlatelolco stipulations and to NPT (in the case of Argentina) have replaced three decades of nuclear ambiguity and competition. A highly cooperative regional context weakened even further the justification for extracting societal resources to maintain military-industrial complexes. Moreover, the commercial excuse for export-oriented complexes had withered away.

All in all, the contraction of arms production in Argentina and Brazil was overdetermined by international, regional, and domestic considerations. All three are linked by the process of economic liberalization, which led, as in many other cases in the industrializing world, to rationalization in budgetary allocations. While undermining military expenditures, neoliberal programs have often been oblivious to the development of social safety nets.

Conclusions

The external dimension of Brazil's and Argentina's political and economic transformation included not only an unprecedented embrace of liberal trade rules but also the abandonment of historical nationalist foreign policies across the board. By the early 1990s, Argentina had joined an array of inter-national regimes (including NPT and MTCR), severed its membership in the Nonaligned Movement, and sent a naval contingent to join the multilateral force in the Gulf war. The infamous Condor 2 project was put to rest in 1993, paving the way to increased Argentine access to investment, technology, and trade. Argentina's new credentials became also evident in its caution and deference to nuclear export guidelines and to the political sensitivities of the international community, regarding what are often referred to as 'rogue' states. In 1992 President Menem barred the transfer of nuclear reactor components, including uranium conversion and purification equipment, that Argentina had agreed to supply to Iran in 1987. Argentina joined the Nuclear Suppliers' Group restricting the supply of sensitive nuclear materials in 1994. By 1995, Chancellor Guido Di Tella was ready to cancel the (internationally legal) sale of an experimental nuclear reactor to Syria, with an uncharacteristic flexibility that revealed the content and bureaucratic carriers of Argentina's new policy. Whereas the Atomic Energy Commission had once a virtual monopoly over Argentine nuclear (including exports) policy, a refurbished Foreign Ministry had become pivotal to the implementation of the external aspects of Menem's liberalizing policies. The Brazilian government became similarly committed to pass a Congressional bill improving export control mechanisms for sensitive technologies. Brazil became a full MTCR member in October 1995 and has since received advanced missile technology from Russia.

Domestic political shifts away from policies embraced by the Menem and Cardoso administrations are possible, but not likely in the near term. Some political challengers and sectors of the military-industrial complex in both countries have criticized the demise of the military sector. However, the likelihood of a revival of an arms industry is significantly low, given the global, regional, and domestic logic that accelerated their downfall in the last decade.

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Notes

1. These global arms transfer trends can be seen in data from the annual publication *World Military Expenditures and Arms Transfers* (ACDA).
2. Alain Rouquie, *Poder military sociedad politica en la Argentina: 1943-1973*. Volume I (Buenos Aires: Emece, 1978), p. 277 and Volume II (1982), p. 321.
3. Stanley E. Hilton, 'The Armed Forces and Industrialists in Modern Brazil: The Drive for Military Autonomy (1889-1954)', *Hispanic American Historical Review*, Vol. 62, No. 4 (1982), pp. 629-673.
4. World Bank, Development Report (1986-1991); Arms Control and Disarmament Agency, World Military Expenditures (1967-1989).
5. Carlos H. Acuna, and William C. Smith, 'The Politics of 'Military Economics' in the Southern Cone: Comparative Perspectives on Democracy and Arms Production in Argentina, Brazil, and Chile', *Political Power and Social Theory*, Vol. 29 (1995), pp. 121-157, particularly p. 132.
6. See Patrice Franko-Jones, *The Brazilian Defense Industry* (Boulder, CO: Westview Press, 1992); Scott D. Tollefson, 'Brazilian Arms Transfers, Ballistic Missiles, and Foreign Policy: The Search for Autonomy' (Doctoral Dissertation, The Johns Hopkins University, Baltimore, MD, 1990); Ken Conca, *Manufacturing Insecurity: The Rise and Fall of Brazil's Military-Industrial Complex* (Boulder, CO: Lynne Rienner, 1997); and Etel Solingen, *Industrial Policy, Technology, and International Bargaining: Designing Nuclear Industries in Argentina and Brazil* (Stanford, CA: Stanford University Press, 1996).
7. On the role of arms exports in the broader context of foreign policy during those years, see Etel Solingen 'Technology, Countertrade, and Nuclear Exports', in William C. Potter (ed.), *International Nuclear Trade: The Challenge of the Emerging Suppliers* (D.C. Heath Lexington Books, 1990); and 'Managing Energy Vulnerability: Brazil's Adjustment to Oil Dependency', *Comparative Strategy*, Vol. 10, No. 2 (1991).
8. Child characterizes competition with Brazil as a 'quasi-obsession of Argentine geopolitical thinkers,' not matched in intensity on the Brazilian side. See Jack Child, 'A Geopolitical Thinking', in Louis W. Goodman, Johanna S.R. Mendelson, and Juan Rial (eds.), *The Military and Democracy: The Future of Civil-Military Relations in Latin America* (Lexington, MA: Lexington Books, 1990), p. 154.
9. This overview of Brazil's arms industry builds on Tollefson, Franko, and Conca (see fn 5) and Clovis Brigagao, *O Mercado de Seguram;a- Ensaio sobre economia politica da defesa* (Rio de Janeiro: Nova Fronteira, 1984).
10. Peter Lock, 'Brazil: Arms for Exports', in Michael Brzoska and Thomas Ohlson (eds.), *Arms Production in the Third World* (London: Taylor and Francis, 1986); Renato P. Dagnino 'Industria de armamentos: O Estado ea tecnologia', *Revista Brasileira de Tecnologia*, Vol. 14, No. 3 (1983), pp. 5-17; and 'A Industria de Armamentos Brasileira: Condicionantes e desenvolvimento', in A. O. Herrera et al. (eds.), *O Armamentismo e o Brasil* (Sao Paulo: Brasiliense, 1985).
11. Carl J. Dahlman, 'Foreign Technology and Indigenous Technological Capability in Brazil', in Martin Fransman and Kenneth King (eds.), *Technological Capability in the Third World* (London: Macmillan, 1984), pp. 3-30.
12. Lock, op. cit.; Franko, op. cit.; and Conca, op. cit.
13. Solingen, op. cit.
14. *The Risk Report*, Vol. I, No. 3 (April 1995), p. 6; Conca, op. cit.

15. *Jane's Defence Weekly* (January 11, 1987). The Roland and Cobra missiles were licensed by West Germany and France.
16. *The Nonproliferation Review* (Fall 1995), p. 155.
17. Brzoska and Ohlson, op. cit.
18. Brigagao, op. cit.; and Conca, op. cit., provides updated and reliable estimates of the industry's size and performance.
19. Alfred Stepan, *Rethinking Military Politics - Brazil and the Southern Cone* (Princeton, NJ: Princeton University Press, 1988).
20. *O Globo* (December 10, 1984).
21. Victor Millan, 'Argentina: Schemes for Glory', in Brzoska and Ohlson (eds.), *Arms Production* (1986), and Rouquie, *Poder militar* (1978-1982). The army also controlled the state steel firm SOMISA and DINIE (a group of 38 formerly German firms, primarily in pharmaceutical and chemicals, which were taken over as enemy property at the end of World War II), as well as firms in the iron ore, timber, and construction sectors (through majority shares), Solingen, Industrial Policy. The army also supervised the aircraft industry and the navy's AFNE yards.
22. On the statist tradition of the Army, its aversion to privatization, and its consistent preference for foreign equipment and technology, see R. D. Mallon and J. V. Sorrouille, *Economic Policymaking in a Conflict Society: The Argentine Case* (Cambridge, Mass.: Harvard University Press, 1975).
23. Millan, op. cit.
24. *London Sunday Times* (May 22, 1988). Over 20 European companies from West Germany, Italy, France, Spain, Switzerland, and Austria were supplying the Condor II program with technology. See Scott D. Tollefson, 'Argentina and the Missile Technology Control regime: A Reassessment' (Paper presented at the 34th Annual Convention of the International Studies Association, Acapulco, Mexico, March 24-6, 1993).
25. *FBIS Latin America*, August 24, 1993, p. 3 I.
26. Tollefson, op. cit., p. 17.
27. The structure, sources, and export performance of the nuclear sector in Brazil and Argentina are discussed elsewhere. See Solingen, op. cit.
28. Franko-Jones, op. cit.; and Tollefson, op. cit.
29. *Aviation Week and Space Technology* (August 17, 1987); and Tollefson, op. cit.
30. Gary Milhollin and David Dantzic, 'Must the US Give Brazil and Iraq the Bomb?' *The New York Times* (July 29, 1990), p. 19. See also Conca, op. cit.
31. *Eye on Supply* (Spring 1991), p. 13.
32. *The Nonproliferation Review* (Fall 1994), p. 121; and (Winter 1994), p. 101.
33. *Eye on Supply* (Spring 1992), p. 5; and (Fall 1992), p. 3.
34. *The Nonproliferation Review* (Fall 1993), p. 95; (Winter 1994), p. 144; and (Spring-Summer 1994), p. 155; Tollefson, op. cit.
35. *Eye on Supply* (Winter 1990-1991), p. 6; and (Spring 1991), p. 14; *Los Angeles Times* (December 9, 1989).
36. James Brooke, 'Gulf Crisis has Brazil in a Tailspin', *The New York Times* (Aug. 27, 1990), p.C10.
37. *SIPRI Yearbook* (1994).
38. Stepan, op. cit.
39. *Latin America Weekly Report* (November 30, 1985), p. 5.

40. Ruth Stanley, 'Cooperation and Control: The New Approach to Nuclear Non-proliferation in Argentina and Brazil', *Arms Control*, Vol. 13, No. 2 (September 1992), pp. 191-213.
41. Patrice Franko, 'De Facto Militarization: Budget-Driven Downsizing in Latin America', *Journal of InterAmerican Studies and World Affairs*, Vol. 36, No. 1 (Spring 1994), pp. 37-74.
42. Daniel Poneman, *Argentina: Democracy on Trial* (New York: Paragon House, 1987), p. 101. Paul H. Lewis, *The Crisis of Argentine Capitalism* (The University of North Carolina Press, 1990), p. 45. I. Augusto Varas, 'Democratization and Military Reform in Argentina', in Varas (ed.), *Democracy under Siege: New Military Power in Latin America* (New York: Greenwood Press, 1989), p. 53. Over \$7 billion had been invested in military industries, see *El Desarrollo Nuclear Argentina* (Buenos Aires: Edigraf, 1985), p. 166. By one estimate, 25 companies run by the Armed Forces producing weapons and planes received \$300 M. annually from the national budget (13 percent of the total for state firms).
43. 'Death of the Condor', *The New York Times* (June 8, 1991), p. A18.
44. Erber attributes the self-reliant characteristics of the computer and aircraft programs in Brazil to the relative autonomy of institutions within the state, especially those pertaining to the military establishment. See Fabio Erber, *Technological Development and State Intervention: A Study of the Brazilian Capital Goods Industry* (Ph.D. dissertation, University of Sussex, 1977), p. 349.
45. Menem went as far as placing retired Brigadier General Ernesto Crespo under house arrest for his public statements criticizing the cancellation of the Condor II program. See Tollefson, op. cit., p. 38.
46. For a more comprehensive treatment of Mercosur and the nuclear agreements between Argentina and Brazil in the 1990s, see Etel Solingen, *Regional Orders at Century's Dawn: Global and Domestic Influences on Grand Strategy* (Princeton, NJ: Princeton University Press, 1998).
47. Roberto Russell (ed.) *La politica exterior Argentina en el nuevo orden mundial* (Buenos Aires: Facultad Latinoamericana de Ciencias Sociales, 1992).