Apppendix I

Incentives/Disincentives

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Incentives/Disincentives

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Iran

1. Background

Iran is a country of 34 million people located to the south of the USSR, to the west of Pakistan, and to the east of Turkey and Iraq. It is governed by a hereditary monarch, the Shah, who holds most decisions on foreign and military policy very closely. There is no legal political opposition, but leftist guerrilla groups are active.

Apart from the “extractive” industries of oil and natural gas, which earn the bulk of foreign exchange, the major products of the Iranian economy are agricultural, including wheat and cotton.

While Iran is still a relatively underdeveloped country, its position as a prominent oil-exporting member of OPEC has brought it an enormous windfall of foreign currency holdings since 1973. This sudden currency inflow has brought about the intriguing problem of how to pass such prosperity forward, so that it will produce lasting well-being for Iranians into the next century. While some of this “petrodollar!’ income can be invested profitably abroad, much of it is to be spent directly on development of the Iranian economy, including an ambitious program for the generation of electricity with nuclear reactors. Because of the relatively small infra-structure of trained scientific and engineering personnel in Iran, such investments will rely heavily on foreign technology and manpower for another decade or two. Most projects will take the form of “turnkey” packages purchased from abroad.

The nuclear projects strike some observers as incredibly ambitious, calling for the installation of perhaps twenty 1000 megawatt reactors by the end of the 1980’s, more than doubling existing electric power capacity in the country. In some cases, reactors will be installed at locations which at this moment have no electricity of any kind.

With memories of a Soviet occupation of northern Iran during and after World War 11, the Iranian government has felt itself confronted with a continuing defense and deterrence problem. The insurance against a Soviet invasion has stemmed in part from American conventional or nuclear commitments, and more recently has been the justification offered for heavy Iranian purchases of conventional military equipment. While relations between Iran and the USSR are currently good, with the USSR purchasing piped natural gas from Iran, there is still evidence of suspicion about Soviet intentions on the part of the Shah and his government.

Justification for recent Iranian weapons purchases has also been based on Iran's regional politico-military role. Iran's relations with Iraq have been characterized by frequent disputes, although currently relations are improved. Iran has also sought to influence events in the Persian Gulf and on the Arabian peninsula. In 1971, Iranian troops landed on two strategically important islands in the Gulf vacated by the British. Iran has also been involved in combatting rebellions in Oman and other Gulf states at the request of the local regimes. In the aftermath of the Indian intervention in East Pakistan, the Shah is reported to have warned India against any military moves against West Pakistan as well. Whether the focus is the defense of Iran itself, or the projection of Iranian influence out into the surrounding region, the Shah has tended to emphasize the significance of armed forces. Already Iran is the dominant military power in the Persian Gulf region and is amassing hardware and constructing bases on a scale commensurate with a NATO country. Iran is rapidly becoming one of the world's stronger military powers.

Although Iran has signed and ratified the Nuclear Non-Proliferation Treaty, it has nonetheless become suspect on proliferation. This may be

attributed, in part, to the absence of public debate or a real legislative Process preceding Iran's ratification. This meant that no overt public opinion developed that would feel particularly committed to or bound by the treaty. The NPT also came before the windfall of OPEC, i.e., before Iran acquired the currency holdings facilitating major nuclear investments.

Further doubt followed the Indian detonation of a nuclear explosive in 1974, and a press interview with the Shah (immediately denied) in which he was quoted as saying that Iran might soon follow suit.

On the more positive side, the Shah and his government have presented some general proposals for a Middle East Nuclear Free Zone. While the boundaries remain to be defined, they clearly include Pakistan, Israel, Egypt and all the Arab states. They just as clearly do not include the Soviet Union or India, and thus do not depend on any nuclear-weapons-renunciation by states already having them. The proposal is in need of further definition, but can be seen as an offer by Iran to forgo nuclear explosives as long as the other Middle Eastern states cited do the same. If seriously pursued, this proposal could be a significant contribution to non-proliferation in the region.

Further clouding all predictions about Iranian policy is the special role of the Shah. Lower–ranking officials are discouraged from staking out positions on policy issued, or developing policy alternatives. If the Shah's regime were to fall suddenly a vacuum of policy direction might follow in which all things could become possible.

2. Incentives for the Acquisition of Nuclear Weapons

To purchase some additional insurance against Soviet invasion, in light of doubts about the continuing credibility of American commitments.

To acquire a counter to Indian political and military nuclear leverage, and to reassure Pakistan of meaningful Iranian support.

To acquire substantial global prestige and influence for the Shah and his country.

3. Disincentives to the Acquisition of Nuclear Weapons

The danger of antagonizing the United States, possibly resulting in the termination of American security commitments.

The risk of a slowdown or cutoff of European and American technological inputs to Iranian economic development.

The danger of antagonizing the Soviet Union, raising the spectre of preemptive military action.

The likely emulation of an Iranian nuclear weapon initiative by other Middle Eastern states thus clouding the vision of a prosperous twenty-first century Iran with a costly nuclear arms race and the risk of a regional nuclear conflict. Also, the acquisition of nuclear weapons by other countries in the region would tend to nullify Iran's conventional arms superiority.

The unsuitability of nuclear weapons to the sort of regional military police actions in which Iran is likely to be involved.

The vulnerability of the Iranian nuclear power program to a cutoff of overseas inputs of technology and uranium fuel.

4. Technical Capabilities

Iran has placed firm orders for four light water power reactors to be supplied by France and Germany. The first two of these reactors are scheduled for completion in the early 1980's. The power reactors will all be "turnkey" projects and many years may elapse before they can be manned entirely by indigenous Iranian personnel. This reliance on foreign technicians can amount to a check on proliferation. While much of the mineral wealth of Iran may yet be discovered, no large quantities of uranium have been uncovered, so that fuel requirements for the complex must be met abroad. Enriched uranium fuel will be supplied by France under an arrangement in which Iran has agreed to lend the French Atomic Authority $1 billion for the Eurodif enrichment plant under construction at Tricastin, giving Iran 10% ownership in the plant and entitling it to 10% of the output. Iran also has a 25% share of a second European enrichment facility, Coredif.

The Iranian nuclear electric complex, when it is finished, will be quite large, thereby generating substantial quantities of plutonium as well as electricity. While some interest has been shown in a plutonium reprocessing plant, no purchases have yet been negotiated, and strong outside disapproval has been communicated to Iran.

Recently, the former head of the Argentinian nuclear program, Admiral Quihillalt, was hired as a consultant to the Iranian Atomic Energy Commission. In addition, half of the foreign staff of the IAEC is from Argentina. To those outside observers who are given to looking for signs of a nascent Iranian nuclear weapons program, this was read as a signal that Iran would soon seek facilities applicable to a nuclear weapons program, following the path Argentina has taken. This would include the purchase of natural uranium fueled reactors instead of the more cost effective light water reactors Iran has ordered to date. This type of switch in orientation has not yet occurred and the presence of Argentinian technicians in Iran may simply reflect the more favorable employment conditions there.[1]

Iran's venture into nuclear power looks like very much of a "great leap forward". As such, it is likely to encounter disappointments of one sort or another. The schedules proposed by foreign manufacturers have in the Past been prone to slippage. The likely cost inflation in such reactor projects may similarly eat into Iran's foreign cash reserves. A proliferation problem is clearly emerging in the Iranian projects, but there is every reason to assume that it will appear later than formerly anticipated.

Given its substantial foreign currency holdings, and its reliance on foreign technicians in other areas, it is always possible that an Iranian government might seek to hire foreign bomb-designers on a "mercenary" basis.

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10 George H. Quester, "The Shah, and the Bomb", Policy Sciences 8 (1977) p. 25.

This is an avenue to nuclear explosives that no one else has tested yet, and is full of pitfalls.

5. Net Assessment-

The disincentives will outweigh the incentives for a considerable time into the future. The technical capability for manufacturing nuclear weapons will be compromised by the reliance on foreign technicians, foreign equipment, and uranium fuel. The military need for a nuclear weapon is not imminent, since relations with the USSR are relatively stable for the moment. The likely alienation of the outside world after a nuclear explosives decision might slow down or endanger the inputs of western material goods that make for Iranian prosperity. Iran is unlikely to jeopardize a major investment in nuclear electric power by overtly or covertly diverting fissile material to nuclear weapons production. Furthermore, a decision to make nuclear weapons would render the Shah's nuclear-free-zone proposal, irrelevant, and indeed might speed up the nuclear-weapons decisions of Israel and the Arab states and Pakistan.

We perhaps know less than we would like to know about the exact plans and world-vision of the Shah. There is every reason to believe that he would like to go into history as the man who brought prosperity to his country. While this may be very consistent with a program of investments in nuclear electricity it is not so clear that it would fit with a program of nuclear weapons. The Shah's proposals for a nuclear–free-zone, and his earlier decision to ratify the NPT, suggest that he may see this in the same way.

6. circumstances that Might Alter the Relationship between Incentives and Disincentives.

Among the circumstances that could shift the relationship between incentives and disincentives in favor of the former are the following:

A marked decline in the visible American inclination to support Iran against attack.

A marked increase in Soviet hostility toward the existing regime.

An assertion of new prerogatives in the region by India on the basis of the nuclear explosives it possesses?

The fall of Pakistan to outside invasion or domestic disintegration

The detonation of nuclear explosives somewhere else in the Middle East.

An outright rejection by Middle Eastern states of the proposal for a nuclear-free-zone,

A marked erosion of the domestic political prestige and support enjoyed by the regime -- an erosion which might be alleviated by a dramatic initiative like the acquisition of nuclear weapons.

Israel

1. Background

Israel is a small country of 3.3 million people who live mostly in urban or suburban areas in the northern part of the country. It is a constitutional democracy, in which the executive power rests with a Prime Minister and Cabinet based on a majority within a one-house parliament. Representation is through a number of political parties and elections are free and regularly held.

Although it may be characterized as a small industrial and commercial power that lacks heavy industry, Israel possesses a high degree of advanced technical skills and scientific accomplishment. An aircraft industry, electronics precision instruments and tools, and a first-class ordnance industry mark the exceptional nature of the Israel economy in comparison to other countries in the Middle East.

Israel borders on Egypt, Jordan, and Syria, with whom it has fought four major wars in the past thirty years. These countries as well as other Arab countries remain in a juridical state of war with Israel. Israel is without allies in the region and its population of only a little over 3 million people has repeatedly faced, in war, countries with combined populations of 100 million people. While Israel has been adept in converting foreign military equipment to its own tactical purposes, it, like the other countries in the region, is dependent on foreign suppliers for its military equipment. While the population of Israel is prosperous and fully employed, enjoying a relatively high standard of living, the burden of a very large defense budget has been felt in the form of an annual inflation rate in excess of 30 percent. The enormous costs of Israel's many wars have been borne in part by contributions from sympathizers living abroad as well as through military assistance provided directly by the United States.

Israel's dependence on U.S. military supplies and economic support makes it highly sensitive to changes in American attitudes and policies. Recent moves towards "even-handedness" in the region, the sale of U.S. military equipment to Egypt, increasing American dependence on Arab oil and U.S. concern with limiting the

arms trade all add to Israeli fears and insecurities. One major result is an emphasis on increased military self-reliance.

Israeli nuclear weapons policy has not been the subject of intense public debate, although in recent years, the number of articles on the subject in the Israeli press had increased significantly. Articles in the foreign press concerning Israel's nuclear capability are often reprinted, and political leaders have made general statements concerning the utility or disutility of nuclear weapons in the Arab-Israeli context. The general public, however, apparently considers this subject to be a matter of national security, best left to political and military leaders.

While Israel's military forces have been successful in defending the country in short wars, the 1973 war witnessed the first military setback to Israel when Egyptian forces crossed the Suez Canal and managed to secure the eastern bank. Among the consequences was the loss of some Israeli territory gained in the 1967 war, and more importantly, a loss of confidence in the ability of the Israeli Defense Forces to stem any Arab attack on the state. Shaken confidence, continuing threats of war, the rising burden of defense costs, and fear that U.S. support is weakening may increase the attractiveness of nuclear weapons deployment as a means of restoring certitude to Israel's defense capability.

Israel has not detonated a nuclear weapon, nor declared herself a nuclear power, but there are a number of credible reports of the existence of an advanced nuclear weapons program. Israel is now generally credited with the potential of assembling, delivering, and successfully detonating a nuclear weapon on short notice. As a result, Israel should not be considered as simply another Nth country with a future potential for developing nuclear weapons, but neither is Israel a nuclear weapons state in the sense of India, because India has demonstrated its nuclear capability with its 1974 detonation. The crucial questions for Israel concern the incentives and disincentives for demonstrating its nuclear capability with a test detonation and deployment of nuclear weapons.

2. Incentives for the Testing and Deployment of Nuclear Weapons

- Calculation that the more overt the nuclear weapons capability, the more credible the deterrent. Thus, a clear capability might deter

major Arab attacks, at least on Israeli population centers, whereas an ambiguous nuclear potential might not be as effective.

- Growing Western dependence on Arab oil may render U.S. support for Israel's security increasingly less and the need for a purely Israeli deterrent more compelling.

Ž Limitations on Israel's ability to develop and perfect a nuclear weapon force without actual testing.

- Belief that an overt capability will force the world community, including the Arabs, to acknowledge the reality and permanence of Israel's existence.

- The disparity between the size of Israel's armed forces and those of the neighboring Arab states is likely to grow over time, thereby diminishing Israel's ability to deter attack. An overt nuclear capability could arrest this trend.

- anxiety that Israel's defensive position is being and will continue to be eroded by diplomatic pressure aimed at achieving peace in the Middle East.

- Belief that the overt threat of the use of nuclear weapons on Arab oil fields will force the industrialized world to restrain the Arabs.

3. Disincentives to the Testing and Deployment of Nuclear Weapons

Ž The desire to preserve the present situation which permits Israel to gain the benefits of threshold nuclear weapons status but pay few of the costs associated with an overt weapons capability.

- The prospect that overt acquisition of weapons by Israel would cause one or more of its Arab adversaries to acquire a comparable capability resulting in the possible nuclearization of future wars.

- Fear that testing of nuclear weapons by Israel would alienate its supporters abroad and stop weapons supplies from the United States.

- Desire to maintain the moral principles and respectability of the Zionist and Israeli ideology.

- Fear that the possession of an overt (and vulnerable) nuclear force would make Israel a target for a pre-emptive nuclear or conventional attack.

- Overt nuclear weapons facilities and storage areas would probably become high priority terrorist targets.

- Deployment of nuclear weapons could increase the likelihood of their unauthorized or accidental use.

4. Technical Capabilities

Israel unquestionably has the scientific and technical know-how to fabricate

nuclear weapons. Its reactor at Dimona appears to have had the purpose in part of the production of plutonium and it is generally assumed that Israel has the capability to separate plutonium from spent fuel. Research in the country, the possession of precision machining capabilities, the aviation and avionics industry, and the first-rate ordnance industry leave little doubt of Israel's competence to fabricate nuclear weapons and delivery systems. Israeli scientists have studied in Western universities and scientific institutes, while scientists from the U.S. and Western Europe have probably carried to Israel whatever techniques Israel may have at one time lacked.

Evidence suggests that Israeli scientists have long ago conducted the research necessary to the fabrication of weapons from available fissile material.

5. Net Assessment

Israel's clear capability to fabricate nuclear arms along with the obvious weight of the incentives to do so, make it impossible to rule out the existence of Israeli nuclear weapons. Certainly, Israel is widely perceived as already possessing such a capability although there is no conclusive evidence in support of this assumption. As a result of its ambiguous status, Israel enjoys many of the advantages of an overt weapon capability, including deterrence, while avoiding many of the costs, including precipitating an Arab nuclear arms program and antagonizing the United States. Consequently, the interaction between incentives and disincentives favors not crossing the nuclear threshold overtly. This is particularly true as long as the United States continues to provide adequate conventional weapons and credible security guarantees.

6. Circumstances That Might Alter the Relationship Between Incentives and Disincentives.

- The incentives for an overt Program of construction and deployment of nuclear weapons will be strengthened if there is a substantive weakening of U.S. support for Israel.
- The materialization of a situation in which Israel's existence as a state is in serious jeopardy or its population centers clearly threatened.

- The new Likud government may feel that the time has come to demonstrate Israel's military strength by displaying a nuclear weapons capability.
- The acquisition of nuclear weapons by one of the Arab states.
- The coming to power in the Israeli. parliament of a party that assumes accommodation with the Arabs is the optimal way to achieve peace in the middle East and protect Israel's security.

Two features distinguish the Israeli case. First, Israel is, and has been since its inception, in a state of belligerency with nations that surround it. The very existence of the state has been under constant challenge. Consequently, it requires no great imagination to conceive a scenario under which Israel would actually use any nuclear weapons it possessed. Second, Israeli position vis-a-vis proliferation is unique in that the suspicion that it has and will use nuclear weapons is seen to be of greater utility than an overt revelation that it really does possess them. It is quite possible that this strategy will be followed by other Nth countries including South Africa, South Korea, and Taiwan.

Brazil

1. Background

Brazil is a country of 110 million people, with a territory spread over a large portion of South America. It has been governed by a military regime since President Goulart was ousted from power in 1964. While the regime has used severe measures to repress domestic dissidence, including reported instances of torture, it has also achieved a substantial level of economic growth, and has thereby won some acceptance from the Brazilian populace.

Brazil has no significant border disputes with any neighbors. The South American continent as a whole has been generally free of military threats for many years. An old and continuing rivalry with Argentina is a significant factor in Brazilian policy formation and the growth of Argentina's nuclear capabilities and facilities may have had an impact on Brazil's nuclear policy. While Brazilian statements have hinted at an interest in peaceful nuclear explosives, allegedly for use in some massive river-dredging projects, there has been no official public speculation about any need for nuclear weapons. The armed forces of Brazil and its neighbors have over time assumed more of a domestic than an external function, and major weapons systems have become primarily symbols of national prestige. The continent has, however, recently seen a dramatic upswing in the quality and costs of the military equipment procured.

While plagued with unsolved problems of poverty, income maldistribution, and the movement of population from the countryside to overcrowded cities, Brazil has nonetheless achieved substantial economic development. The Brazilian economic "miracle" is based in part on an encouragement of foreign investment. The boom is thus dependent on infusions of American technology, and is likely to need continued infusions far into the future. Despite

considerable industrial development, agriculture still accounts for roughly two-thirds of Brazil's foreign exchange earnings. Coffee, soybeans, and iron ore are the principal exports.

While the Brazilian regime is committed to replacing-an agricultural economy with a diversified industrial structure, it has been hard hit by the increase in oil prices, since Brazil must import virtually all of its petroleum. This has clearly increased the attractiveness of nuclear power. An additional factor which explains at least part of the interest in nuclear industry is the existence of significant hydroelectric potential at remote locations in the Brazilian jungle. To try to transmit electricity from these waterfalls by wire to the Brazilian industrial cities would be extremely wasteful of power. An alternative would be to -use the hydroelectric power at the site where it is available to enrichuranium, and then to transport the enriched uranium to power reactors close to the factories. The net result would be electrical power production exceeding that available from hydroelectric sources alone.

Brazil has shown interest in being recognized as a major power, and perhaps the preeninent power in Latin America. Signs of this include statements by government leaders, encouragement of domestic population growth (when many nations around the globe are trying to reduce their birth rate), the claim to territory in Antarctica, and the expression of interest in peaceful nuclear explosives. The use of PNE's has been mentioned in connection with proposals for excavating oil shale, for linking a number of rivers into an integrated network, and for the excavation of ports.[1]

While the government of President Goulart, the last popularly-elected

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1. H. Jon Rosebaum, "Brazil's Nuclear Aspirations", in Nuclear proliferation and the Near Nuclear Countries, 0. Marwah and Schulz, eds., Ballinger, 1975).

chief executive, played a significant role in the initiation of the Latin American Nuclear Free Zone Treaty, succeeding regimes have worked mainly to water it down, and signed it only after clauses were attached making it non-binding on Brazil unless all the world's nuclear-weapons states had adhered to various protocols. Brazil has refused to sign the Nuclear Non-Proliferation Treaty and has issued a number of statements attacking that treaty. Brazil is legally obligated to accept inspection and forego explosives manufacture on a project-by-project basis, as part of the sales contracts it signs with the United States or other suppliers, but it is not presently bound by any general treaty renouncing nuclear weapons. This hesitation to sign the NPT is not necessarily an indication of a Brazilian program to develop nuclear weapons, but rather appears to signify a reluctance to renounce the option to initiate such a program in the future.

The position of the regime in Brazil is such as to allow it to produce nuclear explosives without first securing popular consent. Some public opinion polls have been taken which seem to show enthusiasm for the government's stand in favor of the peaceful nuclear explosives option, but such polls were conducted in an atmosphere which would make it difficult for contrary opinion to emerge.

2. Incentives for the Acquisition of Nuclear Weapons

Desire to obtain prestige and great-power recognition for Brazil in the outside world.

Belief that such prestige would augment popular support for the regime at home.

Rivalry with Argentina, which has tended to be slightly ahead of Brazil in the nuclear field and which may be perceived as embarking on a weapons program.

3. Discentives to the Acquisition of Nuclear Weapons

Belief that United States and European inputs to the Brazilian economy, both nuclear and non-nuclear, might be less forthcoming if a move toward nuclear explosives became evident.

Concern that any Brazilian nuclear explosives acquisition would stimulate similar action by Argentina. The end result could be a costly nuclear arms race in Latin America to the detriment of all concerned.

Concern for the hostile reaction of other Latin American countries, a number of which have become parties to the Latin American Nuclear Free Zone Treaty, including Mexico, Chile and Venezuela

Fear that a nuclear weapons arsenal may become the focus of coup attempts by military factions.

Fear that nuclear explosives might be used by domestic dissidents in a terrorist action.

4. Technical Capabilities

As part of its general drive to industrialize, Brazil is accumulating an infrastructure of trained people in the nuclear field. The nuclear facilities operating in Brazil for the forseeable future will nonetheless be imported from sources such as the United States and Germany.

The first major power reactor obtained by Brazil was an enriched-uranium fueled reactor (LWR) purchased from Westinghouse; this was inherently less proliferation-prone than the natural uranium fueled reactor (CANDU) which Argentina selected. This was seen by many as a sign that Brazil was putting commercial considerations of cost effectiveness in electricity production ahead of thoughts of a weapons option. Proposals concerning the second round of purchases, however, have caused a great deal of attention to be directed towards Brazil. In 1975, West Germany and Brazil signed a multibillion dollar agreement which will entail Brazilian acquisition of the entire fuel cycle from West Germany including as many as eight power reactors, a jet nozzle uranium enrichment capability, a fuel fabrication plant, and a plutonium reprocessing facility. This agreement has resulted in U.S. protests to Germany and Brazil because of the potential use of these. facilities for nuclear weapons.

It will almost certainly be a decade before any of these facilities are

in operation, and the sales agreements, as with the American supplied reactors, call for IAEA safeguards. This agreement reaffirms the principle of nuclear nonproliferation and specifies that German approval must be obtained prior to re-export of any materials, facilities or technology provided by Germany. It also includes a Brazilian commitment not to use any of these items for the production of nuclear explosives. Nonetheless, Brazilian scientists and industry will gain extensive experience in handling nuclear material and concern has been expressed that Brazil might be able to duplicate such facilities in an indigenous construction effort. Brazil may also achieve fuel cycle independence which would allow a unilateral abrogation of safeguards without major penalties to its nuclear energy program.

Brazil has as yet not found any significant quantities of uranium on its territory, but extensive prospecting is underway A more certainly available natural resource is the waterfalls at remote locations, whose electric potential can most easily be “transmitted” by use of uranium enrichment.

While Brazil (like Argentina) has signed “nuclear cooperation” agreements with India, these agreements seem to be innocent, since they specifically exclude “classified” matters, and all the Indian work on nuclear explosives is classified.

5. Net Assessment

Incentives seem to be somewhat outweighed by disincentives for the short-run and possibly for the middle term. The Brazilian government has an internal pro–bomb lobby in the military, but it also has an anti-bomb faction. While officials of the Foreign Ministry are prone to tout the advantages of “peaceful nuclear explosives’; officials responsible for economic growth tend to be against such projects, for fear of alienating the outside participation

in Brazil's economy that may be crucial to continued growth. Since growth is the major source of support for the regime, this is not a consideration that can be dismissed lightly.

It will be at least a decade before any weapon program can easily be undertaken using purely indigenous means. Any gains from acquiring such weapons will tend to be offset by U.S. displeasure and possible retaliation, by the likelihood that Argentina would move to acquire a bomb, and by the resentment of other Latin American states. Already U.S.-Brazilian relations have been severely strained by the planned Brazilian purchase of German enrichment and reprocessing facilities.

6. Circumstances that might Alter the Relationship between Incentives and Discentives

Much will depend on how the Brazilian economy grows and on how much such growth continues to be interlocked with American investment and technology. If such growth remains the continuing base of public acceptance for the regime, this may be a lever that can discourage proliferation well into the future.

Brazilian interest in a nuclear explosive will rise sharply, however, if Argentina takes steps to acquire the bomb.

South Africa

1. Background

South Africa is a country of 26 million people of which 4½ million are of European descent and 22 million are of African or mixed African and European descent. It is a federal republic with a President elected for a term of seven years, but the powers of government are exercised by a prime minister and cabinet chosen by the majority party in the two-house legislature. A number of political parties exist and elections are regularly held but the franchise and other rights of citizenship are enjoyed only by the white, European, portion of the population.

South Africa is the most advanced industrial nation in Africa and is well endowed with minerals and agricultural produce, from which it derives most of its foreign currency. The fruits of industrialization and trade have supplied the European population with a high standard of living and the amenities of a modern industrial state. South Africa depends on the export of its products and resources, including large quantities of uranium, to obtain those articles of heavy machinery and armaments which it is not yet capable of producing itself. South Africa's abundant coal reserves provide for most of its energy needs.

Apartheid policies have resulted in a situation in which friendly relations have only been maintained with Rhodesia, a bordering country with an even smaller proportion of European to African population than South Africa's, and with Botswana which abuts South Africa along the Transvaal frontier. The eastern land border is with Mozambique, a former Portuguese colony and the northwest border is with Namibia, the former mandated territory of Southwest Africa presently under South African control.

In addition to increasingly violent internal opposition to white minority rule, African nationalist movements in Mozambique, Rhodesia (Zimbabwe), Namibia, and Angola, all work to surround South Africa with a number of hostile regions and insurgent movements which threaten its existence.

At the same time, South Africa's position at the southern tip of Africa makes its fate a matter of concern to the maritime powers of the world whose ships pass the Cape of Good Hope. South Africa is pictured by its government and its white citizens as the representative of West European strategic interests in southern Africa and as the leading anti-Communist force in Africa. This view is reinforced by the presence of Soviet or Cuban military personnel in Angola and to a lesser extent, Mozambique. Its apartheid policies have made South Africa the target of economic boycott and recrimination by the Third World nations and to a lesser degree, by Western Europe and the United States. On the other hand, Western investment in South Africa and South Africa's rich mineral resources and strategic position foster an ambivalence on the part of Western countries toward the regime.

White fear of the impact of political equality limits the possibilities for a voluntary and peaceful transition to majority rule while the desire to employ Africans and Cape Coloureds to maintain the economy and services limits the possibilities for a complete political separation between African and European populations. Strong racial prejudices make any progress toward integration difficult.

The outlook for stability in South Africa is poor. Failure of the white majority to bring Africans into the political process and to promote black education has been increasing disaffection among the politically fragmented black population. The likelihood that any Western nation would

commit itself to defense of the white minority against an uprising by the black majority population or against attack from surrounding African nations is small. This leaves the white population alienated from the world community, fearing extermination, expulsion or at least the loss of property and political rights. Every criticism of South Africa's internal policies from abroad and every successful terrorist raid serves to increase feelings of isolation.

Such conditions of isolation and desperation have led to speculation that South Africa may be considering the development of nuclear weapons. While the Prime Minister has stated that South Africa's interest in nuclear power extends only to peaceful applications, he and members of his cabinet have made reference to the possibility of "mounting a nuclear defense" if the existence of the regime is threatened. The republic of South Africa has neither signed nor ratified the Nuclear Non-Proliferation Treaty and seems unlikely to do so.

The South African government has the legislative and administrative power to develop nuclear weapons without submitting the question to public opinion.

2. Incentives for the Acquisition of Nuclear Weapons.

The hope that the possession of nuclear weapons will discourage hostile external intervention (including that of USSR and Cuba) into South African domestic affairs.

The belief that technical superiority in armaments can compensate for the numerical inferiority of the white population.

The hope that by acquiring nuclear weapons, South Africa would raise the potential cost of a conflict to such a high level that black Africans, either on their own or at the behest of the superpowers, will agree to an accommodation acceptable to the white population.

The knowledge that South Africa is diplomatically and spiritually isolated from the West and is unlikely to receive any outside assistance against threats to its security.

3. Disincentives to the Acquisition of Nuclear Powers.

Doubts about the utility of nuclear weapons in fighting the kind of war that South Africa is likely to face.

The possibility that construction of nuclear weapons would impel one or more of the Black African states to acquire a nuclear capability of its own. At a minimum, a South African weapon would seem likely to further exacerbate the relationship with Black Africa.

Fear that the acquisition of nuclear weapons would result in the complete rupture of economic and technical relations with the West.

The hope that the West may yet help the white regime if it is faced with a Soviet supplied and Cuban led invasion, but that this slim possibility is muted if South Africa were to become a nuclear power.

4. Technical Capabilities.

South Africa was one of the early sources of uranium for the post World War II era and the country has remained an important supplier in the world uranium market ever since. It has a long history of uranium extraction technology and is capable of producing nuclear grade material. In the early 1970's South Africa announced that it would mount a major effort to develop an enrichment capability. By enriching uranium prior to export, South Africa hopes to earn $500,000,000 annually in foreign exchange beginning in the mid-1980's. While the specific enrichment technique and any other details on it remained secret for many years, information now available suggests that the method is a variant form of the aerodynamic nozzel. Indications are that South African industry has provided some 90% of the technology and support for this process, the remaining coming from foreign sources, available in "normal channels". Intentions are that a commercial enrichment plant will be in operation in 1984 and full capacity of 10,000 metric tons SWU/ year [1)] will be attained by 1986. A major portion of this output will almost certainly enter the world market to supply the growing number of LWR's.

South Africa sees itself as a supplier of nuclear fuel and has indicated that its needs are for export earnings rather than atomic weapons. It must be recognized, however, that imbedded within these commercial steps is the potential for a weapons program. According to recent reports, the pilot plant at Valindaba can enrich uranium to weapons grade levels.

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1) metric ton = 1,000 kilograms

In addition, South Africa has made a major investment in nuclear power research and development projects. The American designed Safari-1 research reactor has been in operation since 1964 and although American supplied enriched uranium fuel has been necessary for operating the reactor, South Africa is or soon will be capable of independent fuel production and reactor operation. In 1981, the first of several French supplied commercial nuclear power reactors are expected to begin operation. While these reactors will add little directly to South African nuclear weapons capability, they provide added experience in handling nuclear material and facilities and are a possible source of plutonium. The U.S. is committed to supply enriched uranium to fuel these reactors between 1981 and 1984 during which time U.S. safeguards will apply. But given South Africa's projected nuclear independence by the mid-1980's, safeguards may become moot.

The state of technology and industry is such that there is no barrier from that quarter to development of nuclear weapons. Since its nuclear weapons potential is based on uranium enrichment, rather that plutonium separation, South Africa faces fewer technical difficulties in the fabrication of a weapon than do other countries. Uranium weapons are more easily constructed and detonated than plutonium weapons. A minimal supply of highly enriched uranium sufficient for a single weapon may have already been produced during the development and prototype operation of the enrichment process.

5. Net Assessment.

At present the incentives for South Africa to acquire an overt nuclear weapons capability are probably insufficient to outweigh the very real disincentives. Nuclear weapons would be of little use in fighting a war against insurgents or in suppressing a domestic revolt. A South African weapon would place immense pressure on Black African states to acquire a countervailing capability or at least a nuclear guarantee. An expanded war in which both sides have access to nuclear weapons would place South Africa, with its predominantly urban population, at a disadvantage.

On the other hand, the pressure on South Africa by the African nationalists, the general strategic and diplomatic isolation of South Africa and the difficulties in maintaining internal stability all place the country in a desperate situation in which it may feel that it has little to lose in overtly "going nuclear". Events in Rhodesia as that country is subject to increasing attack supported by the Soviet Union and its allies tends to strengthen the South African view that its position will become increasingly precarious. Nuclear weapons may be viewed as a means of keeping the Soviet Union and Cuban forces at a distance.

Given these considerations, South Africa may conclude that its interests are best served by remaining poised at the nuclear threshold. This posture based on a clear technical capability to fabricate nuclear explosives may enable South Africa to maximize its bargaining power with the U.S. and the Black African nations without incurring the liabilities associated with the overt acquisition of a weapon. The implicit threat to assemble and detonate a nuclear weapon is more useful to South Africa than the demonstration of nuclear capability through a test detonation.

Consequently, South Africa may become a second country following the path ascribed to Israel above, collecting the potential for deploying nuclear weapons on short notice, letting rumors and speculation leak out that such a weapons arsenal has been readied, but never detonating such a warhead in a test, or explicitly confirming possession of nuclear explosives in any public statement.

6. Circumstances that might alter the relationship between incentives and disincentives.

Among the circumstances that could alter the relationship between incentives and disincentives are the following:

An increase or diminution in Soviet activity in Southern Africa

Changes in the perceived orientation of U.S. policy toward the conflict between whites and blacks in Southern Africa;

Incentives could be strengthened by the fall of white rule in Rhodesia and the intensification of guerrilla operations within South African territory.

An attempt to impose a great power settlement on South Africa to bring about majority rule would strengthen incentives.

A Great Power guarantee of a political settlement acceptable to the white minority would strengthen disincentives.

In the event of an accommodation between whites and blacks in South Africa, any incentives for the development of nuclear weapons would largely disappear.

A black revolt within South Africa that forced the European government out of power before it could complete development of nuclear weapons would reader the entire question moot.

South Korea

1. Background

South Korea is a country of 35 million people, located south of the 39th parallel on the Korean Peninsula. Its government is headed by an elected president who rules through a premier and a cabinet with the assent of a national assembly. The assembly is composed principally of the President's party, the Democratic Republic Party although other parties are represented as well.

The South Korean constitution vests strong executive authority in the President acting through a premier and cabinet that is responsible to the President rather than to the popularly elected National Assembly. While the President must, in theory, maintain enough popular support to gain periodic re-election and while opposition parties exist, the South Korean government has become increasingly repressive forcibly suppressing dissent and opposition. A policy favored by the President will generally be adopted and implemented by a Presidentially-led bureaucracy and military. That means that a presidential decision to acquire nuclear weapons need not be publicly debated nor even become public knowledge.

South Korea is a moderately industrialized nation whose population is employed in mining, agriculture and industries manufacturing light consumer goods for home consumption and export. It is a relatively prosperous country with a high rate of literacy amongst the population and is engaged in mining, agriculture, and industries manufacturing light consumer goods for home consumption and export. It is a relatively prosperous country with a high rate of literacy amongst the population and is in the process of developing steel and machinery products.

South Korea is abutted by the Democratic Republic of North Korea at the 38th Parallel, with the Soviet Union and the People's Republic of China in close proximity. Japan, along with the U.S., the principal trading partner of Korea, lies offshore. The Soviet Union and the Peoples's Republic of China maintain strong military, naval and air forces capable of quick and direct intervention in the Korean Peninsula. Some forty thousand American personnel are still stationed in Korea providing combat ground and air forces to guarantee the security of the country and the integrity of the demilitarized zone at the 38th parallel.

Both the Republic of Korea and the Democratic Peoples's Republic of Korea claim to be the legitimate rulers of the Korean Peninsula and seek the reunification of that peninsula under a single government. The intractable problem of the reunification of the two Koreas is constantly at the forefront of both North and South Korean policy.

A constant fear of a North Korean invasion, backed by China or the Soviet Union has made South Korea highly dependent on United States military assistance. The declining ability of South Korea to persuasively present its case for continued support to the U.S. public, however, strengthens the government's inclination to increase its capability to defend itself. The South Korean cause has been steadily losing support in the U.S. due in large part to the increasingly dictatorial nature of the Park regime, the persecution of opposition party leaders, and the activities of the Korean Central Intelligence Agency in the U.S.

Meanwhile, the withdrawal of the U.S. from South Vietnam and Cambodia and the removal of military units from Taiwan has increased South Korean fears concerning the strength of U.S. support. The announced intention of the Carter Administration

to withdraw U.S. ground forces from the Peninsula will probably reinforce that insecurity. Despite whatever security guarantees that may accompany *it,* such a withdrawal will probably stimulate South Korea's interest in acquiring nuclear weapons. In South Korea, it is assumed that withdrawal of U.S. forces will be followed by a North Korean invasion of the South. Whether or not that assumption is well-founded, it is the premise upon which the present government in South Korea operates and North Korean propaganda has done little to counter it. Nuclear weapons may be seen as a deterrent to invasion, as an important defensive weapon in the event of such an invasion, and as a means of deterring the Soviet Union or China from assisting North Korea.

South Korea has signed the nuclear Non-Proliferation Treaty but has not yet ratified it. Whether the signing of the treaty was in response to U.S. pressures or to a genuine concern about nonproliferation is not clear. If it was a consequence of the former, any perceived weakening of the U.S. security guarantee would weaken South Korea's commitment to the Treaty. At the same time, any hint that South Korea had set out to acquire nuclear weapons would bring forth condemnation for the U.S., the U.S.S.R. , the PRC and many of South Korea's Asian and European trading partners and would strengthen the view of those who already view the regime with distaste. Proliferation, or the hint of it, could be expected to strain the already fragile security guarantees by the United States and hasten the dissolution of that arrangement. This fact constitutes an inhibition against overt South Korean proliferation as long as there is some chance that the U.S. security guarantee will be honored. In addition, any restraints that the Soviet Union and China may have placed on North Korea could be weakened by an overt South Korean nuclear weapons program. The development of nuclear weapons may be viewed as a preclude to a South Korean attempt to reunify Korea by force.

2. Incentives for the Acquisition of Nuclear Weapons

Fear that North Korea will once again attempt to unify Korea by force.

Uncertainty regarding a continued U.S. military presence in the Far East and the viability of U.S. security guarantees.

Necessity to offset North Korea's military support from China and the Soviet Union.

- Desire to establish South Korea's standing as an independent nation commanding international attention and respect.

- Possibility that a South Korean nuclear weapon capability would make a new Korean conflict so dangerous as to compel superpower intervention to preserve the status quo.

Belief that nuclear weapons would bolster the confidence of the South Korean population in the country's future.

Desire to demonstrate South Korea's industrial and technical superiority over North Korea.

3. Disincentives to the Acquisition of Nuclear Weapons

- Prospect that proliferation would alienate the United States sufficiently to cause a withdrawal of all U.S. forces (including air forces) form the Peninsula and an end to all U.S. military assistance.

Likelihood that Japan would be sufficiently concerned by proliferation to take diplomatic and economic measures against South Korea. The most direct effect might be upon the 26% of total South Korean exports that go to Japan and the Japanese assistance to Korean industrial development.

Fear that proliferation would harden the attitudes of China and the Soviet Union in support of North Korea.

- Fear that a nuclear armaments would be discovered by the North Koreans prior to actual completion of any weapons and precipitate on a preemptive attack from the North.

South Korean nuclear arms may induce North Korea to seek its own nuclear weapons capability.

4. Technical Capabilities

South Korea is a rapidly industrializing nation that has already begun the construction of two nuclear power plants near Pusan. Long range plans call for

the construction of 25 plants by the year 2000. While Korea has the technical engineering personnel for the development of nuclear weapons, it is entirely dependent on foreign sources for fuel, fuel reprocessing and reactor components. Acquisition of the facilities for the development of nuclear weapons is not beyond the financial reach of South Korea, but the expense would require a major re-allocation of existing resources that are presently devoted to industrialization.

The first Korean power reactor is scheduled to begin operation in 1977, and is fueled with enriched uranium. In 1975, Korea signed an agreement for the purchase of a CANDU reactor which is fueled with natural uranium and is more conducive to the production of weapons grade plutonium than light water reactors. The reactor is covered by Canadian restrictions on the use of the technology or materials for development of explosive devices. Two research reactors, furnished by the United States, a TRIGA Mark II and a TRIGA Mark III, are operated by the Korean Atomic Energy Research Institute. These reactores are not suitable for plutonium production and there is no evidence of fuel reprocessing, or plutonium production, even on a laboratory scale.

Given South Korea's lack of separation or fuel reprocessing facilities and of a nuclear reactor designed chiefly for plutonium productions it is unlikely that it could develop nuclear weapons in less than five years even with some outside assistance. Under strong U.S. pressure, South Korea abandoned efforts to purchase a French designed reprocessing plant. Without any outside assistance, it appears unlikely that South Korea could acquire a nuclear device in less than ten years. A significant arsenal of nuclear weapons would require an even longer time.

5. Net Assessment

At present incentives and disincentives appear to be closely balanced with the latter slightly preponderant. The obstacles to proliferation are chiefly political, technical and administrative. It would be difficult for the Korean government to initiate a clandestine program given its dependence on foreign suppliers for equipment and material and with the presence of U.S. military forces in Korea. Open pursuit of a nuclear weapons program would raise intense objections by the superpowers and other nations, like Japan, strongly opposed to proliferation.

On the other hand, fear of a North Korean invasion and declining support from the U.S. provide strong incentives for a South Korean nuclear weapons program.

In sum, South Korea has considerable political-military incentive to "go nuclear" but lacks the material means to do so. The strength of the incentives to proliferate will be primarily dependent on the presence or withdrawal of the American commitment to the defense of South Korea.

6. Circumstances that might alter the relationship between incentives and disincentives

Among the circumstances that could alter the relationship between incentives and disincentives are the following:

- The incentives would be greatly strengthened by a withdrawal of all U.S. forces from South Korea.
- A rapprochement between the Soviet Union and the People's Republic of China would increase the fear of North Korean attack and strengthen the incentive to proliferate.
- A Japan, U.S., and South Korean alliance guaranteeing the status quo in the Korean Peninsula would strengthen the disincentives to proliferation.

Japanese acquisition of nuclear weapons would tend to strengthen the incentive to proliferation.

Changes in the relationship among North Korea, the Soviet Union and the Peoples's Republic of China can strengthen or weaken the South Korean requirement for nuclear weapons.

The Federal Republic of Germany

1. The Security Perspective of the Federal Republic of Germany

Since its creation as an independent state following the Allied Occupation at the end of World War II, the FRG has been presented with a unique set of security problems. In their most acute form, these problems have revolved around the need to deter a Soviet ground assault in the heart of Europe. In view of the enormity of this task, as well as the firm European and Soviet opposition to independent German rearmament, German security perspectives have been dominated by the alliance relationship with the United States and NATO. At the same time, as a defeated power whose re-entry into European politics was a cause Of considerable controversy within the ranks of the NATO allies, the FRG has feared that it would be relegated to the position of a junior partner within the Alliance, and has since struggled for equal status.

2. The Nuclear Debate

With various exceptions, the Bonn regime has found that the best mix of solutions for these problems has been to renounce any German possession or control over nuclear weapons, while asking the United States to remain committed to the use of its own nuclear weapons if a Soviet attack should ever come. Such a mix would work to deter Soviet attack, while not panicking Moscow or Paris or Bruxelles with the prospect of a German nuclear force.

While renouncing any right to produce nuclear weapons in one of the several treaties associated with the ending of the Allied occupation in 1954-55, the FRG was nevertheless anxious to obtain modern weapon systems, including nuclear capable systems, lest it be perceived as a second class power within the NATO hierarchy. At the same time, the Soviet Union began to reach a level of strategic parity with the Us. As a result, doubts concerning the reliability of the U.S. nuclear commitment to Europe's defense began to surface on the continent. FRG officials grew increasingly uneasy; this unease stimulated FRG desires for a "Finger on NATO nuclear trigger," as Franz Joseph Strauss and the CDU party put it. No leading West German political leader, however, has ever seriously suggested that Germany consider acquiring nuclear weapons of its own; and when German efforts to gain a direct and acknowledged

share in the NATO nuclear decision-making process in the MLF proposal produced sharply unfavorable reactions throughout Western Europe, even that objective was abandoned.

Given West Germany's industrial power and technical ability, it has the clear capability to develop nuclear weapons, should it ever choose to do so. Germany has made a major commitment to nuclear power and supports a large nuclear energy research and development program, including breeder reactor research. German scientists and industry have developed the jet nozzle uranium enrichment process, which has been sold to Brazil, and were active in the development of the gas centrifuge process to be used to enrich uranium in Europe.

German scientists, however, are led by a group which signed a pledge in 1957 not to participate in any research of military value, and the Germany Defense Ministry has few ties with nuclear research. While W. Germany is capable of developing an independent closed fuel cycle (with the exception of the initial uranium supply), it will acquire enriched uranium through URENCO, a European consortium and its small fuel reprocessing laboratory is tied to France. By becoming involved in multilateral nuclear fuel facilities, W. Germany has sought to allay fears of a covert nuclear weapons program based on nuclear power plants. Furthermore, all German reactors use slightly enriched uranium fuel, which is less than optimal for the production of weapons grade plutonium. A covert German nuclear weapons program would run the risk of exposure by Eastern. agents who have succeeded in penetrating the German security system on numerous occasions, and revelation of such a program theoretically could result in the loss of W. Germany sovereignty.

West Germany signed the NPT in 1969, but ratification was delayed until 1974. This five-year delay was a result of misgivings and divisions within Germany concerning the effect of the NPT, although it should not be taken as an indication of a desire for a German nuclear weapons development program. Germany's continuing moral debt, public and scientific opposition, certain retaliation from both East and West, the cost, and low utility of a small German nuclear force all weigh against

such a desire.

Initial German hesitation to sign the NPT was based on an uneasiness about the intentions of the Soviet Union, which was at that time still seen as a major threat to national sovereignty; on the fear that Germany ratification of the NPT could disrupt European integration; and a more general fear that the NPT would interfere with the development of industrial nuclear facilities. When Winy Brandt became Prime Minister and initiated the Ostpolitik policy, he signed the NPT and when safeguards agreements between Euratom and the IAEA were negotiated, the NPT was ratified. In addition, by that time, renunciation of nuclear weapons was not seen as resulting in an inevitable relegation to the level of a third-rate power and loss of international status.

Japan

1. The Security Perspective

Since Japan has a highly developed island economy deficient in indigenous resources, the import of resources and the export of semiprocessed and manufactured goods is essential for the maintenance of a high level of output and continued growth.[1] Thus, to foster and maintain Japan's economic well-being, access to foreign sources of raw materials and other commodities, open routes of transportation, and unimpeded access to export markets are essential. Although the security of the sea-lanes has traditionally been viewed as a significant consideration, the energy crises of 1973-74 demonstrated the vulnerability of some of the other factors which are essential for Japan's economic well-being.[2]

The military threat to Japan is considered less acute than the economic threat. Japan is not likely to be confronted with a major invasion of its islands by conventional forces, but would be vulnerable to nuclear weapon strikes delivered by USSR or PRC missiles or aircraft.

2. The Nuclear Debate

The strong moral aversion to nuclear weapons voiced by the Japanese public may have decreased somewhat in recent years, but a large segment of the population remains opposed to the acquisition of nuclear arms by their country.

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[1] Yuan-li Wu, U.S. Policy and St$_{ra}$ Interests in the Western pacific, p. 102 (New York: Crane, Russak & Company, Inc., 1975).

[2] Ibid.

One U.S. scholar has observed that the Japanese "nuclear allergy" has perhaps been overrated or taken too much for granted since 1945.[3] George Quester acknowledges a great deal of sincere Japanese revulsion to nuclear weapons in the aftermath of Hiroshima and Nagasaki. But he is also of the opinion that there has been a conscious exploitation by the Japanese of the guilt feelings of the United States and other nations with regard to the first and only use of these weapons. Manifesting an aversion to nuclear weapons contributed to Japan's goal of reacquiring respectability in the aftermath of World War II.

The Atomic Energy Basic Law, enacted in 1955, explicitly prohibits Japan from developing nuclear weapons or applying nuclear technologies for military purposes. Constitutionally, "defensive" nuclear weapons are permissible to Japan, but this provision is subject to grave difficulties in interpretation and application. A credible nuclear deterrent today assumes possession of a second-strike capability, which, in turn, implies deployment of SLBMS. These missiles, by current Japanese definition, must be considered offensive weapons. Thus, although the possession of nuclear weapons is theoretically permitted under the Japanese Constitution, the types permitted are so limited as to make their acquisition impracticable under current circumstances. Nevertheless, this appears to be a surmountable barrier. If conditions appear to call for a Japanese nuclear deterrent, the government could simply "clarify" the meaning of "defensive" as it applies to nuclear weapons. A 1970 Defense white paper stated the official view that the development of tactical nuclear weapons would not violate the Japanese constitution.[4]

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3 George H. Quester, The Politics of Nuclear proliferation, p. 111 (Baltimore: Johns Hopkins University Press, 1973).

4 Yoshiyasu Sato9 "Japan's Response to Nuclear Developments: Beyond 'Nuclear Allergy'", in O. Marwah and Schulz, Nuclear Weapons and the Near Nuclear Countries, (Cambridge, Mass.: Ballinger, 1975 p. 229)

While a few Japanese defense analysts have advocated keeping a more "open mind" on whether Japan might not be better off with nuclear weapons in its arsenal, most have been firmly opposed to such a development.

One of their principal arguments is the claim that nuclear weapons, the badge of strength and prestige for over two decades, are now of little military value in an era in which diplomacy is the key to security in a multipolar setting. Another argument is advanced on the premise that, although nuclear weapons might prevent a major war, they cannot prevent small conflicts.[5] It is further postulated that any Japanese nuclear force would be too small for deterrence and irrelevant for local wars.

The scientific elite of Japan has similarly been staunchly opposed to such possibilities, steering junior colleagues away from any "open-mindedness". One might note that this has been in marked contrast with the senior scientists of France and India, or indeed at times of Australia Germany, and Argentina. Due to the strong hierarchical structure of Japanese university life it is difficult for junior scientists to hold independent views which are at odds with those of the "establishment". Thus scant tolerance has been extended to any junior scientists voicing "open-minded" opinions on nuclear weapons for Japan. This anonaly has implications for any clandestine efforts to develop nuclear weapons because of its impact on the ability to recruit covertly the essential minimum number of scientists that would be required for developing a nuclear weapons program.

To be meaningful a Japanese nuclear force posture would have to possess an assured second-strike capability. If China is postulated

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5 Fred Greene, Stresses in U.S. - Japanese Security Relations, P. 93 (Washington, D.C.: Brookings Institution, 1975).

as a potential enemy, it is noteworthy that the largest 1,000 Chinese settlements hold only 12 percent of the population, and China has an extensive civil defense program. There is a vast asymmetry in the vulnerability of densely populated, insular Japan vis-a-vis the People's Republic of China. About 32 percent of Japan's total population is concentrated in three circular areas with radii of about 30 miles each, centered on the cities of Tokyo, Nagaya, and Osaka.[6] Thus the cost of an assured second-strike capability would appear to be prohibitive. Any smaller Japanese nuclear weapons capability could leave Japan more vulnerable than it is now, for the development of any Japanese nuclear force is likely to lead to a withdrawal of U.S. security guarantees provided under the U.S.-Japan Security Treaty.

While it is assumed that Japan is under the "U.S. Nuclear Umbrella," detente between the U.S. and the Soviet Union, normalization of U.S.-Chinese relations, reduction of U.S. military power in the Far East, the proximity of Soviet naval and air power to Japan, and Peking's growing nuclear arsenal casts Japan's future position in doubt. The desire for an" 'autonomous diplomacy'[7] is frustrated by the sensitivity of its foreign trade to international political issues and by its military weakness. The simple issue of Japanese fishing rights in its own waters has remained largely unsettled since before World War 11 and has become increasingly critical with the growth of the Soviet fishing industry.

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[6] Adelphi Paper No. 92, East Asia and the World System: Part II: The Regional Powers. Papers from the Ste. Adele (Quebec) Conference, (London: The Institute of Strategic Studies, Nov., 1972), p. 24.

7 Asian peace and Japanese Diplomacy,'[1] Senkai (Tokyo), August [1970]; and "Rogers Statement. . . Should Counter with Autonomous Diplomacy Argument," Yomiuri (Tokyo), August 13, 1972.

Japan's military and naval forces are not adequate to the defense of the home islands nor for providing security to Japan's maritime traffic. Japan is therefore dependent on the good will of its neighbors, the validity of the U.S. security treaty, and the continued orderly operation of the world's commercial arteries.

While eschewing nuclear weapons development, Japan has invested heavily in nuclear power generating facilities. Japanese technology is highly advanced, and the increasing demand for electric power, coupled with the lack of domestic energy sources, has led to a growing reliance on nuclear power. Japanese scientists have gained a great deal of experience handling nuclear materials, and there are apparently no significant technical barriers to the development of nuclear weapons in Japan. At the same time, however, it must be noted that Japan has relied solely on light water reactors for power production and has not as yet constructed a fuel reprocessing plant. A major nuclear weapons program would require an entirely new set of nuclear reactors suitable for the production of weapons grade plutonium and a plutonium separation plant. Any such program would place Japan's energy production system in jeopardy, however, as Japan is dependent on outside sources of uranium and enrichment services which might be cut off were Japan to develop nuclear weapons. This would then jeopardize the entire Japanese economy.

Japan is a party to the Non-proliferation Treaty, having signed it in 1970, and having ratified it six years later. The long interval between signature and ratification indicated serious misgivings on the part of some Japanese towards the treaty. The nuclear industry had first successfully opposed the treaty, fearing a competive disadvantage due to the safeguards system. By 1975, however, the industry realized that further delay would

actually hurt the growth of nuclear power in Japan, and supported the NTP. The remaining opponents of ratification were unwilling to give up Japan's nuclear weapons option. Eventual Japanese ratification signified the importance attached to economic rather than military uses of nuclear technology. After six years of discussion and debate, the Japanese understanding of and commitment to the NPT and its provisions is among the strongest of the non-nuclear states.

3* Special Circumstances

Nuclear weapons may hold some attraction to Japan as a deterrent and badge of great-power status. The offsetting disadvantages are, however, overwhelming. In addition to public resistance at home, a Japanese nuclear force could be expected to intensify accusations abroad concerning the "remilitarization" of Japan and might even precipitate a movement to form an anti-Japanese military alliance among nations which suffered Japanese occupation in World War II. Tokyo has to be sensitive to world opinion because of the vulnerability of its trade, and a wide spread anti-Japanese movement could result in economic discrimination, closing of vital waterways, or similar problems.

Sweden

1. Security Perspective

Neutrality in World War II enabled Sweden to emerge from the conflagration as politically stable, economically unscarred, and militarily capable. Thus, the country had every incentive to maintain a credible form of armed neutrality in the late 1940s. Sweden's experience differed from the other Nordic powers, all of which had suffered military defeat.[1]

Throughout the postwar era, Swedish foreign policy has sought to chart an independent neutral course between NATO and the Warsaw pact. It is recognized, of course, that Sweden would be unable to withstand an attack by either coalition. The concept behind the organization of Swedish defenses is that any attack on the country could be so costly in terms of lives and equipment because of the resistance offered that any invader would consider the effort unworthy of return.[2] Accordingly, the Swedish government has provided deep shelter for important industries, protected military communications centers, maintained modern well-equipped forces, constructed extensive combat fortifications, and instituted a system of universal military training.

2. The Nuclear Debate[3]

The way in which the Swedish nuclear power program was established reflected an official desire to keep the nuclear weapons option open. A.B. Atomenergi, the semi-private corporation charged with nuclear development, opted for domestically designed and produced natural uranium reactors. This decision was apparently motivated by an

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1. Egil Ulstein, Nordic Security, Adelphi "Paper No. 81 (London: The International Institute for Strategic Studies, 1971), pp.6-7.

2. "In Defense of Sweden", International Defense Review, Vol. 111, No. 4 (December 1970), p. 395.

3. The section on the nuclear debate is summarized from Jerome Garris, "Sweden's Debate on the Proliferation of Nuclear Weapons," Cooperation and Conflict, Vol. VIII (1973), pp. 189-208.

intention not to commit scarce resources to the development of an enrichment process. It also meant that Sweden would be able to produce materials needed to support a weapons program without reliance on an external source of supply.

At the same time, the leadership of the ruling Social Democrats was uncomfortable with the prospect of acquiring nuclear weapons, and--for over a decade--resisted efforts by the military and their Conservative Party allies to force a decision to begin nuclear weapons development.

While the option remained open, advocates of a nuclear capability based their arguments on the need for tactical nuclear weapons deployed defensively to maintain Sweden's neutrality. As popular opinion began to shift in favor of non-acquisition, the military-Conservative coalition scaled down its demands, and urged a military research program which might keep the option open. The Social Democrats and their allies of the Liberal and Center parties continued to delay a decision and, in the meantime, pursued an active policy of supporting international efforts at disarmament and arms control. By the late 1960s, opponents of a national nuclear force were clearly ascendant: The Swedish Riksdag ratified the NPT in December 1968, with little debate and no opposition.

Several factors appear to have contributed to the decision to refrain from exercising the nuclear option:

- The Social Democrats exercised great restraint in resisting early pressures to proliferate.
- The government undertook a commitment to the goals of international disarmament and arms control.
- The nature of Swedish coalition politics, which makes compromise easy but decisions on controversial issues difficult, militated against the coalition supporting the acquisition of nuclear weapons.
- The Swedish public witnessed a real debate over the issue that spanned over a decade.
- Some military personnel concluded that increased conventional forces were more useful to Sweden than nuclear weapons.
- The perceived threat emanating from the East receded with the first stirrings of U.S.-Soviet detente.

3. Special Circumstances

The waning Swedish interest in acquiring nuclear weapons can be traced to several strategic developments in the 20 years between the creation of A.B. Atomenergi and ratification of the NPT. The first was the enormous growth of the U.S. and Soviet nuclear arsenals and the growth of the two great military pacts. The kind of armed neutrality that Sweden could seriously entertain in the late 1940s and early 1950s simply became less credible as the Cold War went on and as NATO and Warsaw Pact capabilities grew. The national defense burden also increased with the growing cost and complexity of modem arms and equipment. By the early 1970s, the Swedes openly admitted that there would be no follow-on to the Viggen fighter-bomber, the pride of the Air Force.

As the relevance of Swedish military forces shrank it became evident to the leadership in Stockholm that Swedish security interests were best served by striving to reduce East-West tensions, thereby minimizing the risk of confrontation and conflict in Europe. It is probably that the Swedes see their continued neutrality as a potential assest in mediating disputes between Washington and Moscow.

Conclusion

Japan, Sweden and the Federal Republic of Germany have each refrained from proliferation despite the technical and industrial capability that places nuclear weapons easily within reach of those countries. All three countries have extensive civilian nuclear power programs and each faces potential adversaries whose military strength and strategic position are threats to their independence.

Japan is party to a security treaty with the United States which is intended to deter strategic nuclear attack; the Federal Republic of Germany is a member of the North Atlantic Treaty Organization that is pledged to assist any of its members who are attacked; and Sweden is neutral, although it is assumed within Swedish defense circles that a Soviet attack on Sweden would be part of a general attack on NATO and that therefore NATO would in fact become an ally of Sweden under those circumstances.

The considerations that dictate nonproliferation for the three countries are chiefly political. Each eschews nuclear weapons, in part, because of their intrinsic qualities and because of the disapprobation that such weapons elicit among their citizenry. For Japan and Germany, there is the additional consideration that any nuclear weapons program would carry overtones of militarism reminiscent of the time when both countries were bent on conquest. Sweden on the other hand, cherishes a role as a neutral and an advocate of peace and reconciliation, a position that would be compromised by possession of nuclear weapons. Beyond that, the military utility of national nuclear forces for each of the three countries is problematical. Japan and Germany are allied to nuclear powers, implying that nuclear weapons would be available for their defense in the event

of war, while none of the three countries can reasonably hope to deploy nuclear forces sufficiently adequate to defend against a determined attack by its potential adversaries. None of the three countries wishes to challenge its nuclear-armed adversaries, and both Japan and Germany are careful to respect the nonproliferation policy for their ally, the United States.

For the three refrainers examined here, the acquisition of nuclear weapons within the current context on international affairs would bring unwarranted changes on their circumstances in the international community without strengthening commensurately their respective defensive capabilities. Such is not the case with some other nuclear-capable countries.