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Why We Buy the Weapons We Do

JAMES R. KURTH

Few areas of public policy are more fraught with consequences, both globally and domestically, than U.S. weapons procurement. In this essay, James R. Kurth begins by distinguishing four sorts of explanations for the pattern of that procurement that are offered by conventional literature—strategic, bureaucratic, democratic, and economic explanations—then tests these explanations against the major weapons decisions of the Kennedy, Johnson, and Nixon administrations. He develops in particular detail a variant on the industry-specific sort of economic explanation, featuring in his own construction “follow-on” and “bail-out” imperatives for government support of weapons producers. While this revised economic explanation illuminates many of the decisions in the procurement process, however, Kurth find it distinctly limited as a general theory of that process. It does not, for example, easily fit the U.S. decision to launch and continue with a major MIRV (multiple independently targetable reentry vehicles) missile program, where more explicitly strategic and bureaucratic explanations seem more plausible. Kurth concludes that no single available theory captures the complexity of the procurement process, and counsels explanatory eclecticism in understanding the mysteries of weapons development.

How can American weapons policy be explained? Why, for example, does the United States buy MIRV's, despite expert testimony about the grave dangers that these missiles will bring? With their high accuracy in targeting, their high number of warheads, and their high immunity to aerial surveillance, MIRV's can provoke a Russian fear of an American first strike against Russian land-based missiles. The Russians in turn will acquire their own MIRV's, perhaps leading again to “the reciprocal fear of surprise attack” and “the delicate balance of terror” of the 1950's. Why does the United States buy such costly aircraft as the F-111, with its frequent crashes and repeated groundings, the C-5A, with its mechanical and structural failures, and the B-1, said to be obsolete even before the first prototype is built? And why has the United States in recent months sharply increased its deliveries of other expensive military aircraft to underdeveloped countries, which in most cases do not need and cannot afford such equipment?

The problem with such questions about American weapons policy is not that there are no answers but that there are too many answers. Around MIRV, or around many cases of aircraft procurement by the U.S. military services, or around many cases of aircraft exports to the underdeveloped countries, there has grown up a cluster of competing explanations, a thicket of theories. Does MIRV, for example, result from rational

calculations about Russian threats, or from reckless pursuit by weapons scientists and military bureaucrats of technological progress for its own sake, or from resourceful efforts by weapons manufacturers and their allies in Congress to maintain production and profits, or from some combination of these factors? More generally, we can distinguish in the academic and journalistic literature on weapons policy four broad types of explanations, each of which purports to account for the policy.

Strategic explanations, which are the explanations favored by the policy-makers and officials themselves, argue that weapons policy results from rational calculations about foreign threats or from the reciprocal dynamics of arms races.

Bureaucratic explanations see weapons policy as the outcome of competition between bureaucracies, especially the military services, and as the output of standard operating procedures within bureaucracies.

Democratic explanations see weapons policy as the outcome of electoral calculations by the President and by the members of Congress.

Finally, *economic* explanations see weapons policy as the result of the needs of the capitalist system or, in a less sweeping formulation, as the result of the needs of particular corporations in the aerospace industry.

Let us try to cut away at the thicket of theories that surrounds American weapons policy. My focus will be on those cases already mentioned—MIRV, F-111, C-5A, B-1, and the recent exports of military aircraft. But I will touch upon all of the major cases of aircraft and missile procurement by the U.S. government during the 1960's and 1970's, that is, during the Kennedy, Johnson, and Nixon Administrations.

Aircraft Procurement: Whys and Wherefores

The two most debated cases of manned aircraft procurement in the 1960's were the F-111 fighter-bomber and the C-5A jumbo transport. Both aircraft became famous, even notorious, because of "cost overruns," mechanical failures, prolonged groundings, and congressional investigations. Further, in June 1970 the Air Force awarded a contract to produce prototypes of a new, large, manned bomber, the B-1, which begins anew the numbering of the bomber series and which would go into operational deployment in the late 1970's. By that time, given the efficiency of strategic missiles and anti-aircraft missiles, the new B-1 would be about as useful and about as obsolete as the first B-1 of the 1920's.

Why does the United States buy such aircraft? There are, of course, the official, strategic explanations: The F-111 is needed for a variety of tasks, such as tactical bombing, strategic bombing, and air defense; the C-5A is needed for massive airlifts of troops and supplies; and the B-1 is needed for strategic bombing and post-attack reconnaissance. But these explanations neglect the fact that the respective tasks can be performed by a variety of ways and weapons, and that these particular manned aircraft are not clearly the most cost-effective (to use the proclaimed criterion of Robert McNamara) way to do so.

Bureaucratic explanations are also possible: The F-111 is needed by the Tactical Air Command to preserve its power and prestige within the over-all balance of the military bureaucracies; the C-5A is needed similarly by the Military Airlift Command; and the B-1 is desired by the aging commanders of the Air Force and of the Strategic Air Command within it, who look back with nostalgia to their youth and to the manned bomber in which they rode first to heroic purpose and then to bureaucratic power.

But these explanations are not fully satisfactory: Neither the Tactical Air Command nor the Military Airlift Command is the strongest organization within the Air Force (the strongest is the Strategic Air Command), and probably neither of them could achieve

such expensive programs as the F-111 and C-5A without allies. And even the powerful commanders of the Air Force and the Strategic Air Command could not achieve the B-1 on the basis of nostalgia alone, especially in a period of unusually sharp criticism of military spending and after the predecessor of the B-1, the B-70, had been cancelled as obsolescent by McNamara several years before.

An alternative explanation, more economic in emphasis and more general in scope, can be constructed, for these aircraft and perhaps for some other weapons systems also, by drawing some relations between two variables for the period since 1960: (1) aerospace systems which are military or military-related (i.e., military aircraft, missiles, and space systems) and (2) aerospace corporations which produce such systems.

Aerospace Systems The major military aerospace systems produced at some time during the period from 1960 to 1973 have been the following, grouped according to six functional categories or production sectors: (1) large bombers: the B-52, B-58, and B-70 (only two prototypes of the B-70 were produced before it was cancelled); (2) fighter-bombers and fighters: the F-111, F-4, F-8, A-7, and F-14; (3) military transports: the C-130, C-141, and C-5A; (4) missile systems: Minuteman and Polaris and their MIRV successors or "follow-ons," Minuteman III and Poseidon; (5) anti-missile systems: ABM, including the Spartan and Sprint missiles; (6) space systems: the military-related Apollo moon program.

Major military aerospace systems presently planned for production in the mid or late 1970's are the B-1, which can be seen as a long-delayed follow-on to the cancelled B-70; the F-15, which will be a follow-on to the F-4; a lightweight fighter; an STOL transport; Trident or the Undersea Long-Range Missile System (ULMS), which will be a follow-on to Poseidon, and perhaps a super-MIRV, which will follow Minuteman III; and the military-related space shuttle program.

These add up to 24 major military or military-related aerospace systems for the 1960's and 1970's. For most of the 24, the procurement of the system has involved or will involve expenditures which amount to at least \$3 billion and in some cases (for example, the B-1) as much as \$15 billion.

Aerospace Corporations In 1960, there were a large number of aerospace corporations which produced military aircraft, missiles, or space systems. Four stood out, however, in the sense that each received in fiscal year 1961 military and space "prime contracts awards" of some \$1 billion or more: General Dynamics, North American, Lockheed, and Boeing. During the dozen years since, each of these four corporations has continued to receive normally each year \$1 billion or more in military and space contracts, although Boeing occasionally has dropped below that amount, as did North American Rockwell in FY 1972. (North American changed its name in 1967 when it merged with a smaller company, Rockwell-Standard; the corporation again changed its name in 1973, to Rockwell International.)

In addition, some aerospace corporations which were minor contractors in 1960 expanded their military and space sales during the 1960's until they too reached the \$1 billion level. McDonnell, which received military and space contracts of \$295 million in FY 1961, greatly expanded its military sales, primarily with the F-4 Phantom, which was used extensively in the Vietnamese war. In 1967, McDonnell merged with Douglas, another minor contractor. In FY 1961, Douglas was awarded contracts of \$341 million, much of which went to research and development programs for Skybolt, an air-to-surface missile cancelled in 1962, and for Nike Zeus, the first anti-missile; in FY 1966, the last

year before the merger, Douglas was awarded contracts of \$539 million. Since 1967, the merged corporation of McDonnell Douglas has normally received each year contracts of \$1 billion or more. Grumman, another minor contractor in FY 1961 with contracts of \$249 million, also greatly expanded its military and space sales, primarily with two large subcontracts awarded in the early 1960's, one for the aft fuselage of the F-111 and one for elements of the Apollo moon program. In 1968, Grumman also reached the \$1 billion level.

Thus, there are now six aerospace corporations which produce military aircraft, missiles, or space systems and which each normally receive some \$1 billion or more in military and space contracts each year; in FY 1972, General Dynamics, Boeing, Lockheed, McDonnell Douglas, and Grumman were each awarded contracts amounting to \$1 billion or more; North American Rockwell was awarded some \$900 million.

A seventh, smaller contractor should also be noted, the LTV Aerospace division of the conglomerate LTV, formerly Ling-Temco-Vought. LTV Aerospace is normally the next largest aircraft producer after the big six; it is also part of a conglomerate with annual sales—commercial as well as military—of more than \$3 billion. Although it received less than \$100 million in military and space contracts in FY 1961, LTV Aerospace also expanded its military sales in the 1960's, primarily with the A-7 Corsair, which, like the F-4 Phantom, was used extensively in the Vietnam war. In FY 1972, LTV Aerospace was awarded contracts of \$410 million.

We should consider Lockheed, which is normally the largest military contractor, as having two main military divisions, Lockheed-Missiles and Space, located in California, and Lockheed-Georgia. Similarly, we can split McDonnell Douglas into its McDonnell division in Missouri and its Douglas division in California. There are thus nine major production lines.

Given these aerospace systems and aerospace corporations, two related but different economic explanations can be constructed, which we shall call the follow-on and the bail-out imperatives.

The Follow-on Imperative

We can chart the major military aerospace systems according to the production line to which the U.S. government awarded the contract and according to the years when major development or production phased in or out or is scheduled to do so. Some interesting patterns result (see Table 1).

About the time a production line phases out production of one major government contract, it phases in production of a new one, usually within a year. In the case of new aircraft, which usually require a development phase of about three years, the production line normally is awarded the contract for the new system about three years before production of the old one is scheduled to phase out. In the case of new missiles, the development phase usually is about two years. Further, in most cases, the new contract is for a system which is structurally similar while technically superior to the system being phased out, i.e., the new contract is a follow-on contract. (An exception is Apollo, but even here North American was NASA'S largest contractor before the Apollo contract was awarded; in the case of the B-1, the follow-on is one step removed from the B-70.)

A large and established aerospace production line is a national resource—or so it seems to many high officers in the armed services. The corporation's managers, shareholders, bankers, engineers, and workers, of course, will enthusiastically agree, as will the area's congressmen and senators.¹ The Defense Department would find it risky

Table 1

The Follow-on Imperative: Major Production Lines and Military Aerospace Systems

	General Dynamics	North American Rockwell	Boeing	Lockheed M & S	Lockheed Georgia	McDonnell	Douglas	Grumman	LTV Aerospace
1960	B-58	B-70	B-52; Minuteman	Polaris	C-130	F-4	Nike Zeus <i>d</i>	Miscellaneous	F-8
1961		Apollo <i>d</i> in	Minuteman buildup	Polaris buildup	C-141 <i>d</i> in				
1962	B-58 out F-111 <i>d</i> in		B-52 out					F-111 <i>sub d</i> in	
1963								Apollo <i>sub d</i> in	
1964		B-70 out			C-141 <i>p</i> in				A-7 <i>d</i> in
1965					C-5A <i>d</i> in		Nike Zeus out Spartan <i>d</i> in		
1966	F-111 <i>p</i> in	Apollo <i>p</i> in	Minuteman III <i>d</i> in	Poseidon <i>d</i> in				F-111 <i>sub p</i> in Apollo <i>sub p</i> in	F-8 out A-7 <i>p</i> in
1967									
1968			Minuteman out Minuteman III <i>p</i> in	Polaris out Poseidon <i>p</i> in	C-141 out C-5A <i>p</i> in				
1969						F-15 <i>d</i> in		F-14 <i>d</i> in	
1970		B-1 <i>d</i> in							
1971				Trident <i>d</i> in					
1972		Apollo out Shuttle <i>d</i> in				F-4 out	Spartan <i>p</i> in	F-111 <i>sub</i> out Apollo <i>sub</i> out F-14 <i>p</i> in	
1973					C-5A out	F-15 <i>p</i> in			
1974	F-111 out Lightweight fighter in?	B-1 <i>p</i> in	Minuteman III out Super-MIRV or SST in?	Poseidon out Trident <i>p</i> in?	STOL transport in?				A-7 out

d = development; *p* = production; *sub* = subcontract.

and even reckless to allow a large production line to wither and die for lack of a large production contract. This is especially so because for each of the aircraft production sectors (large bombers, fighters, and military transports), there are actually only a few potential production lines out of the nine major lines we have listed. Large bombers are likely to be competed for and produced by only General Dynamics, North American Rockwell, and Boeing; fighters and fighter-bombers by only General Dynamics, North American Rockwell, Boeing, McDonnell division, Grumman, and LTV Aerospace; and military transports by only Boeing, Lockheed-Georgia, Douglas division and, for small transports, Grumman. Thus, there is at least latent pressure upon the Defense Department from many sources to award a new major contract to a production line when an old major contract is phasing out. Further, the disruption of the production line will be least and the efficiency of the product would seem highest if the new contract is structurally similar to the old, in the same functional category or production sector, i. e., is a follow-on contract. Such a contract renovates both the large and established aerospace corporation that produces the weapons system and the military organization that deploys it.

This latent constraint or rather compulsion imposed on weapons procurement by industrial structure might be called the *follow-on imperative* and contrasted with the official imperative. The official imperative for weapons procurement could be phrased as follows: If strategic considerations determine that a military service needs a new weapons system, it will solicit bids from several competing companies; ordinarily, the service will award the contract to the company with the most cost-effective design. The follow-on imperative is rather different: If one of the nine production lines is opening up, it will receive a new major contract from a military service (or from NASA); ordinarily, the new contract will be structurally similar to the old, i. e., a follow-on contract.

The follow-on imperative can perhaps explain the production line and the product structure of 12 out of the 13 major contracts awarded from 1960 through 1972: (1) Minuteman III follow-on to Minuteman, (2) Poseidon follow-on to Polaris, (3) Trident follow-on to Poseidon, (4) C-141 follow-on to C-130, (5) C-5A follow-on to C-141, (6) A-7 follow-on to F-8; (7) F-14 follow-on to F-111 major subcontract, (8) F-15 follow-on to F-4, (9) Spartan follow-on to Nike Zeus, (10) space shuttle follow-on to Apollo, (11) F-111 after B-58 (superficially a less certain case, but the two planes are structurally similar, with the F-111 being a relatively large fighter-bomber and the B-58 being a relatively small bomber), (12) B-1 delayed follow-on to B-70. In regard to the 13th contract, Apollo, North American might have been predicted to receive the award: it was already NASA'S largest contractor.

The imperatives of the industrial structure are reinforced, not surprisingly, by the imperatives of the political system, as would be suggested by a democratic explanation. Six of the production lines are located in states which loom large in the Electoral College: California (Lockheed-Missiles and Space, North American Rockwell, and Douglas division of McDonnell Douglas), Texas (General Dynamics and LTV Aerospace), and New York (Grumman). The three others are located in states which in the 1960's had a senator who ranked high in the Senate Armed Services Committee or Appropriations Committee: Washington (Boeing; Henry Jackson), Georgia (Lockheed-Georgia; Richard Russell), and Missouri (McDonnell division of McDonnell Douglas; Stuart Symington).

It might be said, however, that one should expect most contracts to be follow-on contracts. Production of the original system should give an aerospace corporation a competitive edge in technical experience and expertise which will win for it the next system awarded in the same production sector. But in at least three major cases (the government has kept other cases secret), the Source Selection Board chose, on technical

grounds, a different corporation than the one already producing a similar system; the contract became a follow-on contract only when the Board was overruled by higher officials. With the F-111, the original, technical choice was Boeing, rather than General Dynamics; with the C-5A, it was Boeing rather than Lockheed; and with Apollo, it was Martin rather than North American. More importantly, it is not always obvious that there should be any new system at all in an old production sector. This is especially the case because of the recent evolution of the six functional categories or production sectors. The aerospace systems within them or follow-on contracts are of course becoming progressively more complex and expensive, but they are also becoming progressively more dangerous strategically (MIRV), or operationally (F-111, F-14, and C-5A), or at best dubious (B-1, F-15, ABM, and the space shuttle).

The Bail-out Imperative

A related but inferior economic explanation can be constructed by looking at the annual sales, income, and employment figures for all seven (originally eight) aerospace corporations for the period 1960 to 1971 (at this writing, figures for 1972 are not yet available). Again, we can chart the major military aerospace systems according to the corporation to which the U.S. government awarded the contract and according to the years in which it did so. But this time we will also include in the table those years in which the corporation suffered either (1) a drop in sales of almost 10 percent or more from the previous year, (2) a deficit in income, or (3) a drop in employment of almost 10 percent or more from the previous year (see Table 2).

There have been many occasions when an aerospace corporation has experienced one or more of these three difficulties. In 12 cases, the U.S. government within the next year has awarded the corporation a new major military contract: (1) General Dynamics and the F-111 in 1962, (2) North American Rockwell and the B-1 in 1970, (3) North American Rockwell and the space shuttle in 1972, (4) Boeing and the Minuteman buildup in 1961, (5) Lockheed and the Polaris buildup and the C-141 in 1961, (6) Lockheed and the C-5A in 1965, (7) Lockheed and the development of Trident in 1971 (as well as a government guarantee of \$250 million in bank loans), (8) McDonnell and the Air Force version of the F-4 in 1962, (9) Douglas and Skybolt in 1960, (10) McDonnell Douglas and the Johnson Administration's approval of the Sentinel ABM system, including Spartan, in 1967, (11) McDonnell Douglas and the Nixon Administration's approval of the Safeguard ABM system, including Spartan, in early 1969, (12) McDonnell Douglas and the F-15 in late 1969. In a 13th case, Ling-Temco-Vought was awarded the A-7 in February 1964, a little more than two years after its deficit year of 1961. These observations suggest that the government comes to the aid of corporations in deep financial trouble, that there is what might be called a *bail-out imperative*.

In three cases, each of them recent, the government has not awarded any new major contract to the afflicted corporation. General Dynamics did not immediately receive contract aid after its bad years of 1970 and 1971, although it is in a good position to receive large subcontracts for the space shuttle in 1973. (Similarly, General Dynamics did not immediately receive aid after 1960 but was awarded the F-111 in 1962.) Boeing did not immediately receive aid after 1969, but perhaps this was because the government planned for the SST to fill the gap in 1971; instead the SST was cancelled by Congress. Ling-Temco-Vought went through a series of deficit years beginning with 1969 and resulting from its conglomerate manipulation rather than from its aerospace production;

Table 2

The Bail-out Imperative: Corporate Financial Troubles and Military Aerospace Systems

	General Dynamics	North American Rockwell	Boeing	Lockheed	McDonnell	Douglas	Grumman	LTV Aerospace
1960	\$27,000,000 deficit		9% employment drop	\$43,000,000 deficit		\$19,000,000 deficit 25% emp. drop Skybolt in		
1961	\$143,000,000 deficit	Apollo in	Minuteman buildup	Polaris buildup C-141 in	24% sales drop 13% emp. drop	32% sales drop 22% emp. drop		\$13,000,000 deficit
1962	20% emp. drop F-111 in				Air Force F-4 in		F-111 subcontract in	
1963	25% sales drop						Apollo subcontract in	
1964				17% sales drop				A-7 in
1965				C-5A in		Spartan in		
1966			Minuteman III in	Poseidon in		\$28,000,000 deficit		
1967					McDonnell Douglas merger			
					Johnson ABM decision			
1968					11% employment drop			
1969		9% employment drop	13% sales drop 15% employment drop	\$33,000,000 deficit	Nixon ABM decision 16% sales drop 13% emp. drop; F-15 in		F-14 in	\$38,000,000 deficit
1970	12% sales drop \$7,000,000 deficit 22% emp. drop	10% sales drop 22% employment drop B-1 in	34% employment drop	\$86,000,000 deficit 13% employment drop	31% sales drop 14% employment drop		16% sales drop 21% employment drop	\$70,000,000 deficit 18% employment drop
1971	16% sales drop 17% employment drop	10% emp. drop 1972; space shuttle in 1972:	17% sales drop 16% employment drop	12% emp. drop \$250,000,000 loan guarantee Trident in			20% sales drop \$18,000,000 deficit	11% sales drop \$57,000,000 deficit 24% emp. drop

it also did not receive contract aid. In three other cases, the government had just awarded the corporation a development contract for a major weapons system, which could be expected to revive the corporation as the system moved toward production (General Dynamics, 1963; McDonnell Douglas, 1970; and Grumman, 1970). Over-all, however, the bail-out imperative is a less general explanation than its follow-on counterpart: three major weapons systems have been awarded without an immediately preceding corporate crisis (Minuteman III, Poseidon, and the F-14). On the other hand, the bail-out imperative might have predicted the government's \$250 million loan guarantee for Lockheed; the follow-on imperative would not.

The follow-on and bail-out imperatives may also explain part of the recent increase in U.S. exports of military aircraft to underdeveloped countries. As Table 1 indicates, Lockheed-Georgia has recently faced a severe problem, for it is phasing out production of its much-criticized C-5A. The production line needs a new major contract, but it is unlikely to receive one until the more unsavory aspects of the C-5A have faded from congressional memories. This is especially the case since Richard Russell, the powerful Senator from Georgia, died in 1971. The Nixon Administration has come to the rescue, however, through the device of increased exports. Readers may have already noted from Table 1 that the C-130 military transport has never been completely phased out of production at Lockheed-Georgia; throughout the last decade, a small number have continued to be produced, many of them for delivery to foreign countries. Now, with production of the C-5A phasing out, production of the C-130 is again building up. The Nixon Administration sent large numbers of C-130's to the South Vietnamese air force during the "peace is at hand" phase of November and December 1972, despite the fact that the South Vietnamese probably will not be able to maintain an aircraft with the C-130's complexity. The aircraft sent to South Vietnam were drawn from various military units, where they will be replaced by production from the Georgia plant. Further, C-130's form a large part of the recent contracting by Iran to buy \$2 billion in military equipment from the United States, in what, according to the *New York Times*, "Defense Department officials describe as the biggest single arms deal ever arranged by the Pentagon."² The sales to Iran also include F-4's, and will assist McDonnell Douglas in the transition period before it reaches full production of the F-15.

The follow-on and bail-out imperatives at first glance might seem to explain not only cases of aircraft procurement and aircraft exports but also cases of missile procurement (the Minuteman and Polaris buildups of 1961-1964, the Spartan missile of the ABM, and, with the follow-on imperative, Minuteman III and Poseidon, which are the MIRV successors to Minuteman and Polaris). But an extension of the two imperatives from aircraft to missiles is not without problems.

First, a general point, the mere fact that a condition is present in many cases does not in itself demonstrate that it is important or salient in each of them. Alternative explanations may be less general but more real. This is especially likely with cases which are both strategically momentous and publicly debated, such as the Minuteman and Polaris buildup and the ABM. Elsewhere, I have analyzed these particular cases in non-economic terms.³

Second, in particular regard to MIRV, the two imperatives are insufficiently precise. Neither explains why highly accurate warheads as opposed to merely multiple ones (MIRV as opposed to MRV) were procured; economic needs would have been met equally well with a missile carrying either kind of warhead, and therefore economic needs alone do not explain the most important part, the "I" of MIRV. Consequently, there is a need to examine the case of MIRV on its own and in search of an alternative explanation.

MIRV Procurement: Bureaucrats and Technocrats

Why did the United States develop and deploy MIRV? The official explanation is again a strategic one, and the usual argument has been that MIRV is needed to penetrate Russian ABM systems. But this, like the economic explanations, does not explain why highly accurate, as opposed to merely multiple, warheads (MIRV instead of MRV) are needed. Nor does it explain why the United States continued to develop MIRV in the mid-1960's after the Russians limited their development of ABM, or why the United States continues to develop MIRV today after the SALT agreements to mutually limit ABM. A more accurate strategic explanation, suggested by censored congressional testimony, would argue that MIRV was developed in order to increase the U.S. capability to destroy Russian missiles:

Question by Senator Mike Mansfield (D-Mont.):

Is it not true that the U.S. response to the discovery that the Soviets had made an initial deployment of an ABM system around Moscow and probably elsewhere was to develop the MIRV system for Minuteman and Polaris?

Answer by Dr. John S. Foster, then Director of Defense Research and Engineering:

Not entirely. The MIRV concept was originally generated to increase our targeting capability rather than to penetrate ABM defenses. In 1961-62 planning for targeting the Minuteman force it was found that the total number of aim points exceeded the number of Minuteman missiles. By splitting up the payload of a single missile (deleted) each (deleted) could be programmed (deleted) allowing us to cover these targets with (deleted) fewer missiles. (Deleted.) MIRV was originally born to implement the payload split up (deleted). It was found that the previously generated MIRV concept could equally well be used against ABM (deleted).

Although Secretary of Defense McNamara had rejected a first-strike targeting doctrine, the Air Force commanders, formally his subordinates, had not. They preferred a first-strike doctrine, with its double implication that the United States could win a war with the Soviet Union and that the Air Force would have the prime role in doing so, to a second-strike doctrine, which implied that the United States could only deter a war and that the Air Force would be only an equal of the Navy in the task. Against McNamara, the Air Force commanders could not achieve an official first-strike targeting doctrine for the United States; with MIRV, however, they could achieve a real first-strike targeting capability for the Air Force. The initiation of MIRV in 1961-1962, then, can be explained by interservice rivalry and bureaucratic politics.

Further, the research and development of MIRV in the mid-1960's was of course highly classified. This kept knowledge of MIRV from Congress and the public as well as the Russians. Nor, in the early phases of the program, did Defense officials have any need to build support in Congress and the public for large expenditures of funds. As a result, the MIRV program faced no political opposition, and it quietly progressed in accordance with technical and bureaucratic procedures of research and development within Defense.

The MIRV program may have been reinforced by another round of bureaucratic politics in late 1966. McNamara was attempting to prevent the procurement of ABM but

was meeting with the united opposition of the Joint Chiefs of Staff, supported by leading members of Congress. One of the main arguments of the proponents of ABM was that the Russians were going ahead with their own ABM system. One way for McNamara to neutralize this argument was to go ahead with an American offensive system with high penetration capabilities, i. e., MIRV. Thus, in late 1966, MIRV procurement may have been the price for ABM postponement. The price bought only a delay in ABM of less than a year.

The MIRV program continued to quietly progress in accordance with technical and bureaucratic procedures of research and development through 1967 and 1968. By the time the strategic implications of MIRV became public knowledge, it had already been tested, the production of Minuteman III and Poseidon missiles had already commenced, and the conversion of Polaris-launching submarines into Poseidon ones had already begun. Given this momentum generated by bureaucratic processes, the MIRV program could have been brought to a halt in 1969 or after only if the President or leading members of Congress had been willing to expend an extraordinary amount of political capital. And thus MIRV finally reached the point where bureaucratic pressures were reinforced by economic ones; where John Foster, the Director of Defense Research and Engineering, could make an economic argument against stopping the MIRV program before a congressional committee in 1970, much like our earlier argument about production lines:

Another consequence of our stopping at this time would be financial. These programs I am discussing now have a number of years of research and development behind them and have also developed a significant production capability. . . . I do not see how we can justify the added expense that would be incurred as a result of keeping production capability on a standby.⁴

Further, once the United States had successfully tested MIRV, the Russians could not be sure that the United States had not also deployed it. The Russians probably then felt themselves compelled to develop, test, and deploy their own MIRV; the Russian program, in turn, reinforces the pressures behind the American one.

In summary, the procurement of MIRV, of highly accurate as well as multiple warheads, resulted from a developmental process over a relatively lengthy time. It is best explained by a combination of bureaucratic politics and bureaucratic processes: bargaining among different actors within the executive branch and standard procedures for research and development. Although the Minuteman III and Poseidon missile programs can be fitted into the broader economic framework formed by the follow-on imperative (but not by its bail-out counterpart), economic explanations do not capture the most important part of MIRV.

Bureaucratic politics may have structured another aspect of American missile procurement, that is, the close parallelism of the Air Force and the Navy programs. As Table 1 indicates, each service took the same steps at the same time: Minuteman and Polaris buildup in 1961, Minuteman III and Poseidon development in 1966, and production in 1968. Indeed, the first flight test for Minuteman III and the first flight test for Poseidon occurred on the same day, August 16, 1968. It is as if the two services had reached an agreement on rough equality, a "minimax" solution, in regard to their respective progress in the prestigious mission of strategic offense. If so, the recent funding for development of the Navy's Trident has imposed a considerable strain on the Air Force to achieve comparable funding for development of a super-MIRV or a mobile missile system.

The Trident program is important in another sense. Given the necessity to maintain an invulnerable nuclear deterrent, a long-range, submarine-launched missile system is clearly the most rational way to do so; for the next decade at least, its vulnerability to Russian attack will be much less than that of land-based missiles, even with such Air Force gimmicks as ever more hardened silos or putting missiles on railroad cars. The present development and eventual procurement of Trident, therefore, can readily be explained in strategic terms; Trident is one of the few American weapons systems initiated since 1960 for which the best explanation is the strategic explanation. Bureaucratic and economic interests are present, of course, and may insure that the rational, strategic choice will in fact result. But, over-all, Trident is a salutary reminder that not all cases of American weapons procurement can be reduced to bureaucratic and economic factors.

Cancellation and Compensation

Any satisfactory analysis of policy outcomes within an issue area must account not only for those outcomes which did occur but also those which, despite similar conditions, did not. In regard to aerospace weapons systems, an analysis must account for the two major cases of non-procurement or cancelled procurement in the period since 1960. These were the B-70 large bomber and the Skybolt air-to-surface missile, designed to be launched from large bombers. Superficially at least, economic explanations such as the follow-on and bail-out imperatives, and bureaucratic explanations stressing the dominant role of the bomber generals within the Air Force, would have predicted large-scale production of the B-70 and Skybolt.

Why did the United States cancel the B-70 and Skybolt? A strategic explanation, focusing on the vulnerability of the manned bomber and on its low cost-effectiveness versus Minuteman and Polaris, might seem quite sufficient (although similar strategic considerations have not been sufficient to bring about the cancellation of the B-1). Such strategic factors may have been reinforced by bureaucratic politics; that is, McNamara's determination to establish his authority over the military services and over the traditional autonomy of their procurement practices. A similar argument has been made to explain McNamara's insistence on commonality between the Air Force and the Navy versions of the F-111, another case which occurred at the same time, 1961-1962. Together, strategic and bureaucratic factors seem to account for the cancellations.

In the case of the B-70, however, cancellation came at the cost of compensation. First, as an account by Arthur Schlesinger suggests, the Air Force and its allies in Congress had to be compensated for the cancellation of the B-70 with a massive missile buildup, with its attendant costs of a Russian buildup and an arms race.⁵ Second, as the follow-on imperative suggests, North American had to be compensated for the cancellation of the B-70 with another major contract, in this case the Apollo moon program.

The cancellation of Skybolt a year later does not seem to have exacted such a price. The Air force and its allies in Congress did not receive any obvious compensation (although one could imagine the continuation of the Minuteman buildup and of the MIRV program as part of an over-all compromise). Douglas, which was a minor contractor at the time, did not immediately receive another major contract comparable to Skybolt. This suggests that the compensation pattern for minor contractors (less than \$500 million in military and space contracts per year) may be different than the pattern for major ones (more than \$1 billion in military and space contracts per year) and that there may be a sort of class system for weapons contractors.

In summary, then, cancelled procurement is best explained by eclectic accounts. Strategic analysis and bureaucratic politics can enact a cancellation, but when a

dominant military organization and a major aerospace corporation are involved, bureaucratic politics and economic imperatives will also exact a compensation. Such considerations would predict, for example, that any successful effort in the mid-1970's to cancel the B-1 would be confronted on the morrow of victory with a super-MIRV for the Strategic Air Command and more space shuttles for Rockwell International. [. . .]

Notes

1. See Les Aspin, "Games the Pentagon Plays," in *Foreign Policy*, Summer 1973.
2. The *New York Times*, February 22, 1973, p. 2.
3. James R. Kurth, "Aerospace Production Lines and American Defense Spending," in Steven Rosen, ed. *Testing the Theory of the Military-Industrial Complex* (Lexington, MA: D.C. Heath & Co., 1973), chapter 6.
4. Hearings before the Subcommittee on Arms Control, Committee on Foreign Relations, U.S. Senate 91st Congress, June 4, 1970.
5. Arthur M. Schlesinger, Jr., *A Thousand Days* (Boston: Houghton Mifflin, 1965), pp. 499-500.