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How Funding Instability Affects Army Programs

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Summary

At any given time, the U.S. Army is supporting many large and small weapon and equipment programs at every stage of the acquisition cycle, from concept development to disposition. And each year, senior-level decisionmakers make changes, both large and small, to the funding allocations for these individual programs for a host of reasons, such as shifts in priorities and requirements, the emergence of new opportunities, engineering-design modifications, contractor-performance and technical problems, and overall budget reductions. After the fact, the decisions to make these funding changes may turn out to have been mistakes; but they nevertheless reflect the best judgment of Army and Office of the Secretary of Defense (OSD) leaders given the information available to them at the time. However, regardless of the root causes or reasons for the changes, the result is the same: funding instability that programs must absorb.

Some Army officials are concerned that funding changes in Army weapon programs may occur without adequate attention being paid to how they will affect the management of those programs. Professional acquisition officials understand that funding instability affects program management in general, but those who are responsible for initiating the funding changes may not have this understanding. Moreover, circumstances in individual programs differ so much that even knowledgeable senior officials may not fully appreciate how funding changes are likely to affect the management of a particular program. As a result, funding decisions made during program reviews may result in unintended effects on a program's performance goals, cost, or schedule.

This project sought empirical information from the experience of recent Army weapon system programs to clarify the effects of changes in their funding. Three different approaches were used to shed light on the research issues. One was an exploratory quantitative analysis to define and measure funding instability and determine whether it was associated with symptoms of program management problems. Eighteen major Army programs were used for this analysis. The second approach employed three case studies of the activities of individual programs to determine whether funding instability occurred and, if so, how it occurred and what its adverse effects were. The third approach was an analysis of evidence on funding instability in Army and Air Force programs since 2000.

Evidence from Exploratory Quantitative Analyses

Cost growth and schedule slippage have been persistent problems in Department of Defense (DoD) and Army programs. The literature on acquisition management shows that external direction leads to slippage in acquisition program schedules and that technical complexity is a major factor in program cost growth. Moreover, program stability tends to limit cost growth. Conversely, instability in programs creates these two adverse effects through changes in quantities and in the productivity of existing plants and equipment, as well as through subtle changes in management and subcontractor activities. These effects differ among programs, and the literature detects no strong patterns across all the services and DoD agencies.

An earlier comparison of adverse effects in Army and other service acquisition programs generally confirmed the lack of strong distinctions. Development cost growth in all services increases with time, but the average cost growth is quite similar in the Army's and other services' major programs. The general pattern of procurement cost growth is also similar across the services, although it is somewhat higher for the Army. Schedule slippage is large in both the Army and the other services. In all these comparisons, however, the variations within all services dominate the differences in service averages.

Our analysis of data from Army acquisition programs (see Table S.1 for a list of the 18 programs selected) provided new measures of funding instability. These measures compare the absolute value of differences between planned and actual funding (expressed in constant dollars) for a five-year period with the planned funding level. In effect, they summarize the differences between the actual funding profiles and those estimated at Milestone B (i.e., the point at which the decision to begin system development is made). The measure is the ratio of the absolute value of changes summed over five years to the sum of the planned funding for the same five years. Thus, funding instability is relative to the funding planned at Milestone B. Since the relevant milestone decisions occurred in different years, the funding instability measures reflect data from different periods. In short, the measure of funding instability is the difference between planned and actual funding, and the higher this measure, or “score,” the greater the instability. Thus, the funding instability scores are based on planning estimates made relatively early in the program, a time of substantial uncertainties about technologies, contractors, and costs. Our use of the new measures revealed wide variation among Army programs in both development and procurement funding instability.

In general, funding instability is higher for procurement than for development—more than twice as large on average. Furthermore, changes between planned and actual funding are the norm when year-by-year comparisons are made. It is important, however, to keep in mind that funding instability can be either a cause or an effect of program problems.

Our analysis also estimated adverse outcomes, such as cost growth and schedule changes, for the same 18 Army programs. Although these measures of adverse outcomes also showed wide variations among the 18 programs, a statistical analysis found only one association between funding instability and adverse outcomes: Procurement funding instability is correlated with schedule slippage. Such an association may or may not indicate a cause-and-effect relationship.

In sum, cost growth and schedule slippage in Army programs are generally comparable to those experienced in other services, and funding instability in Army programs is not strongly associated with

Table S.1
Funding Instability Scores for 18 Selected Army Programs

System	Type	Development Funding Instability Score	Procurement Funding Instability Score
Family of Medium Tactical Vehicles (FMTV)	Vehicle	27.9	52.5
Bradley Fighting Vehicle System Upgrade	Vehicle	36.7	32.2
Black Hawk Utility Helicopter (UH-60A/L)	Helicopter	2.3	32.0
Longbow Apache Airframe (AFM)	Helicopter	3.5	24.3
Chinook Improved Cargo Helicopter (CH-47F)	Helicopter	58.6	31.1
Javelin	Missile	86.2	75.4
Guided Multiple Launch Rocket System (GMLRS)	Missile	39.0	68.6
Longbow Hellfire	Missile	22.1	41.3
Brilliant Anti-Armor Technology Preplanned Product Improvement (BAT P3I)	Munition	44.1	100.0
Sense and Destroy Armor Submunition (SADARM 155)	Munition	nil	88.4
Advanced Threat Infrared Countermeasure/Common Missile Warning System (ATIRCM/CMWS)	Electronic	19.6	95.3
Forward Area Air Defense Command, Control, and Intelligence (FAAD C2I)	Electronic	44.7	99.9
Longbow Apache Fire Control Radar (FCR)	Electronic	2.0	18.2
Joint Surveillance Target Attack Radar System Ground Station Module (JSTARS GSM)	Electronic	32.2	33.3
Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T)	Electronic	20.2	66.7
Joint Surveillance Target Attack Radar System Common Ground Station (JSTARS CGS)	Electronic	18.6	92.7
AN/TYQ-45 Maneuver Control System (MCS)	Electronic	6.5	62.4
Combat Service Support Control Systems (CSSCS)	Electronic	10.7	76.8
Average:		26.4	60.6

SOURCE: Calculated from *Selected Acquisition Report* data.

these two adverse outcomes. The only way to determine whether there is a connection is to conduct a more detailed analysis. The three case studies we conducted, which are summarized next, are a step in this direction.

Evidence from Case Studies

Three case studies are not sufficient for drawing strong policy conclusions. Nonetheless, the cases studied suggest that the major sources of funding instability originated outside the Army, in events such as the Cold War's end and the Global War on Terrorism. The Army's establishment of ambitious program goals also contributed to high levels of funding instability. But funding changes made during top-level internal Army reviews did not appear to create significant difficulties for Army program managers in our three case studies.

The Javelin program's experiences show these effects. The program approved for development of the Javelin missile system in 1989 was recognized as ambitious at the time. Technical problems followed, and the development schedule had to be extended, resulting in what was high development funding instability by our measure. In addition, before the Javelin could move into production, the Cold War ended, Army forces were cut, and the Javelin procurement objectives were cut nearly in half. These "fact of life" changes led to high procurement funding instability. Their effects included development cost growth, an extended development schedule, and substantial increases in procurement unit acquisition costs.

A similar mix of internal and external sources of funding instability was uncovered in our case study of the FAAD C2I program, which was approved for development in 1986. The complexity and ambitiousness of the original program goals led to problems that were accommodated by several program restructurings. For example, delays in the deliveries of government furnished equipment led to slips in related activities. A solicitation for an ambitious subsystem failed to attract a single qualified bidder. And FAAD C2I requirements for identification friend or foe capabilities were shifted to the Air Force. These and other

events created substantial development funding instability. They also led to essentially all of the planned procurement slipping out of the initial five-year period. The end of the Cold War and the lessons drawn from Operation Desert Storm led to additional restructuring, as well as to reductions in procurement reflecting reductions in the Army's force structure. These changes caused a five-year slip in the program's completion of system development and demonstration. However, force structure reductions ended up countering unit cost increases enough to make the FAAD C2I program's cost growth less than the average cost growth among the 18 programs included in the quantitative analysis.

The evidence from the CH-47F case study reveals that the program's funding instability was the result of recommendations made by the program manager and the initial effects of the Global War on Terrorism. Faced with the contractor's substantially increased procurement unit costs, the CH-47F program manager recommended a one-year slip in the start of low-rate production and an associated one-year extension of the development effort. Army leadership approved this recommendation. Then, as a result of operations in Afghanistan, a decision was reached in 2003 to reorder the planned production, moving acquisition of the special-operations version of the CH-47 from later in the production run to its start. The extension of the development effort caused the schedule to slip by eight months but had only a small effect on development costs. The reordering of the production program, however, led to a substantial slip in the schedule for achieving the "first unit equipped" with CH-47Fs.

None of the problems that were revealed in the case studies as significant for Army program managers originated in across-the-board or targeted funding cuts initiated by Army leadership. This is not to say that funding instability did not create problems for program managers. Contractual, program, budget, and public information activities all required adaptations done in close coordination. But the root causes of funding instability were for the most part grounded in significant events beyond the Army leaders' control.

Evidence from More-Recent Experience

Since the concerns of Army leaders about the effects of funding changes on program management are more likely to have arisen from more-recent program experiences, we performed additional analyses of funding instability from 2000 through 2004.

The research and development (R&D) funding instability experienced by Army programs during FY 2000 through FY 2004 was considerably greater than that experienced by Army programs in the 1980s and 1990s. This higher degree of instability may well be the result of Army leaders' efforts to obtain the funds needed to create new transformational programs by modifying or canceling ongoing programs. Army programs also experienced greater R&D funding instability than did Air Force programs in this period.

This was not the case for procurement funding instability during the period. In this case, the Army and Air Force programs experienced a roughly similar degree of instability. And the procurement instability for the Army programs in 2000 through 2004 was considerably less than it had been for Army programs in the 1980s and 1990s. One possible explanation is that the set of programs that had passed Milestone C (i.e., the start of procurement) and entered the production phase by 2000 were in consonance with Army leaders' intermediate goals of maintaining and modernizing the force while pursuing transformation with newer systems.

We found that change was the norm in both the Army and the Air Force. Each of the development and procurement programs we studied experienced at least one change in funding. And for the great majority, actual funding differed from planned funding in every year.

The net result of the more recent funding changes was generally higher actual expenditures. Overall, the funding for Army development programs increased by 20 percent. Similarly, the Air Force added 14 percent to its planned development program spending. In procurement programs, the Air Force added nearly \$5.3 billion, or 26 percent to its planned funding. In contrast, the Army cut about \$636 million, or 4 percent of the procurement spending planned for FY 2000 through FY 2004.

Implications

This study was motivated by concerns that decisions made within the Army during program and budget reviews were having unanticipated and unintended effects on program execution. Our research examined three types of evidence for this issue and found little indication that this was the case. Our analysis of the relationship between funding instability and adverse program results (such as cost growth and schedule slippage) found only a single reliable association: Procurement program funding instability is associated with schedule slippage. Our three case studies suggest that external events—i.e., events beyond the control of Army leaders—were the most important sources of funding instability. Finally, an analysis of Army program funding from FY 2000 through FY 2004 showed that funding instability had increased in development programs but decreased in procurement programs. Additionally, a comparison of recent Army and Air Force funding instability found generally similar patterns in the two services.

As a whole, the evidence shows that funding deviates from plans for numerous reasons. Many programs are affected by major external events, such as geopolitical changes and reductions in defense spending. Some programs are affected by ambitious goals that cannot be achieved with available funds. Most funding instability arises not from events inside the Army, but from root causes that lie outside the Army.

Nor should one equate high funding instability with mismanagement. Large funding changes often are made for valid reasons. Changes in R&D funding may reflect an application of funds to solve unexpected technical problems; procurement changes typically arise from changes in acquisition quantities. Regardless of why they are made, changes are necessarily reflected in program funding data.

In our analyses, it was sometimes difficult to separate cause from effect. In the case of Javelin, the end of the Cold War led to reductions in Army force levels that, in turn, led to reductions in the number of Javelin missiles required. The outcome was a unit cost increase greater than 15 percent—an increase large enough to be considered a “Nunn-McCurdy breach,” which must be reported to Congress. Here, the evidence of cause and effect is clear and direct. In the FAAD C2I case,

the ambitious technical goals of the original program were not met, development was stretched out, and procurement was delayed. Here, the root cause was the ambitious Army decisions made in 1986 and the next few years. In these two cases, funding instability was the result of program problems, not the cause of them. Based on this evidence, we can say that funding instability, per se, is not an important cause of Army program managers' problems.