



INSTITUTE FOR DEFENSE ANALYSES

**Program Duration, Funding Climate, and  
Acquisition Policy  
(Conference Presentation)**

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## Executive Summary

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A paper presented to the 16<sup>th</sup> Annual Naval Postgraduate School Acquisition Research Symposium sketched a theory of how major defense acquisition programs (MDAPs) react to changes in the intensity of competition for acquisition funding and changes in acquisition policy. Statistical analysis supported the conclusion that average cost growth is, as the theory suggests, higher for programs that passed Milestone (MS) B in bust funding climates and that average cost growth was reduced by reforms implemented by David Packard in 1969.

The theory also implies that individual program characteristics will similarly respond to funding climate and acquisition policy. This implication has not been tested. Doing so is the purpose of this presentation using program duration as an example. The data available for this study are not ideal and the simple model considered has some inherent limitations. Consequently, this presentation should be regarded as an exploratory first effort.

Program duration (in years) was taken to extend from MS B through the final year in which systems were acquired (as reported in the final Selected Acquisition Report). The results are based on a sample of 86 MDAPs that passed MS B during the period Fiscal Year (FY) 1965–FY 2009. Observations within each of the nine commodity classes distinguished are normalized to the mean duration of the commodity class.

Estimated program duration was found to have a weak negative association with funding climate; that is, MDAPs that pass MS B in a boom climate tend to be of shorter duration than those that pass MS B in a bust climate. The estimated coefficient of funding climate was not statistically significant. In view of the shortcomings of the data, this finding is mildly encouraging, however. No statistically significant association between changes in acquisition policy and program duration was found.

The estimated coefficient of a time trend was positive and highly significant. This supports the conventional wisdom that program durations have increased over the past few decades. A categorical variable was used to differentiate new starts from programs that acquired variants or modifications of a system in the inventory or remanufacture (VMR) of it. The estimated coefficient of this variable was negative and highly significant; that is, as would be expected, VMR programs have shorter schedules than new starts. Two other variables were included in the model: (1) the approved quantity in the MS B baseline divided by the average approved MS B quantity for the commodity class; and (2) the quantity of the system finally acquired divided by the MS B quantity. The first of these is a proxy for the MS B schedule, while the second is a proxy for changes in the schedule post-MS B. The estimated coefficient of each of these variables is positive, as would be

expected, and highly significant. About 26 percent of the variation in program duration for the sample is accounted for by the model estimated.

# **Program Duration, Funding Climate, and Acquisition Policy**

**Presentation to the 17<sup>th</sup> Annual  
Naval Postgraduate School  
Acquisition Research Symposium**

**May 14, 2020**

**David L. McNicol  
Adjunct Research Staff Member  
Institute for Defense Analyses**

- There is a well-established connection between the cost growth of Major Defense Acquisition Programs (MDAPs), the intensity of competition for funds at Milestone (MS) B, and acquisition reforms introduced by David Packard in 1970.
- Schedule, like projected cost, is one of the factors that, within limits, can be manipulated during the run-up to MS B to make a program look more attractive.
- It is therefore reasonable to examine, as this briefing does, whether there is an association between program duration, funding climate, and major changes in acquisition policy.
- The bulk of this briefing identifies the variables that go into the model.
- Estimates of two versions of the model are then presented and their implications indicated.

1. Dependent variable is normalized program duration



2. Conceptual taxonomy that guided specification of the independent variables



Realistic duration at MS B

Stretch due to unrealistic MS B schedule and quantity

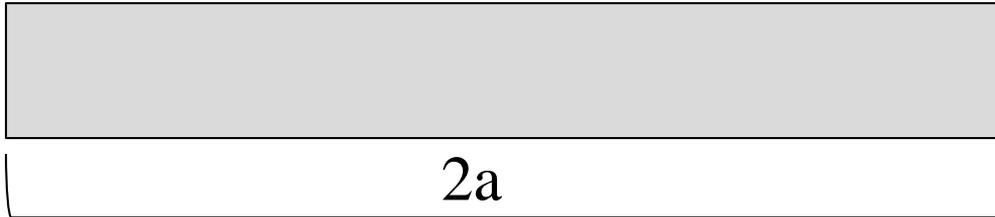
Stretch due to other factors

# 1. The Dependent Variable

The dependent variable is program duration, from MS B through the end of procurement, divided by the average program duration of programs in the same commodity group.

	<b>Mean Duration (yrs)</b>	<b>Number in Group</b>
Surface Combatants	14.7	9
Submarines	15.2	5
Support Ships	6.2	6
Tactical Aircraft	14.7	15
Electronic Aircraft	14.3	12
Large Aircraft	13.5	8
Helicopters	19.8	17
Satellites	12.9	9
Tanks & Tracked Vehicles	14.8	5

## 2a. Proxy for Realistic Duration at MS B

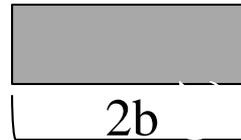


Realistic duration at MS B

- We do not observe realistic duration, and previous studies provide no useful guidance about how to measure it.
- It seems a reasonable rule of thumb that the realistic duration will be longer, the greater the planned purchases at MS B.
- On this basis, the variable used is the ratio of planned quantity at MS B to mean planned quantity for the commodity class.

Variable name: normalized QMSB

## 2b. Stretch due to unrealistic MS B schedule and quantity

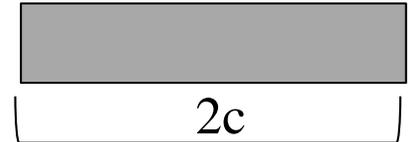


- Like estimated cost, the estimated schedule in the MS B baseline may be conditioned by the intensity of competition for funds.
- This is modeled here in the same way that cost growth was modeled in D. L. McNicol, *Acquisition Policy, Cost Growth, and Cancellations of Major Defense Acquisition Programs*, IDA Report R-8396, Sept. 2018.

### Variable Names

W	Funding climate; proxy for competition for funding
DSARC 1	Defense Systems Acquisition Review Council 1970–1982
DSARC 2	Defense Systems Acquisition Review Council 1983–1986
DAB 1	Defense Acquisition Board 1987–1993
AR	Acquisition Reform 1994–2000
DAB 2	Defense Acquisition Board 1987–1993

## 2c. Stretches due to Other factors



- Stretches due to other factors fall into two main categories:
  - Decisions to change the time period over which the same amount is acquired.
  - Decisions to (in total) buy more or fewer of the system.
- We have no readily available way to model the first of these.
- The second can be represented as the ratio of the actual number of systems bought to the MS B baseline quantity.

### Variable names

Q Growth	Actual quantity procured divided by MS B quantity
VMR	Marker for MDAPs that are a variant, modification, or remanufacture of a fielded system
Time	Fiscal Year 1970 = 1

# Results with Acquisition Policy Variables

Variable	Estimated Coefficient	P-Value
Intercept	0.601	< 0.001***
Normalized QMSB	0.1840	0.002***
W	0.014	0.918
DSARC1	-0.230	0.115
DSARC 2	-0.127	0.478
DAB 1	0.167	0.490
AR	-0.037	0.880
DAB 2	-0.180	0.494
Q Growth	0.197	< 0.001***
VMR	-0.139	0.121
Time	0.005	0.480

$R^2 = 0.322$  N = 86.

The estimated coefficient of each of the acquisition policy variables is statistically insignificant, and one does not have the expected sign.

# Results without Acquisition Policy Variables

Variable	Estimated Coefficient	P-Value
Intercept	0.498	< 0.001***
Normalized QMSB	0.170	0.002***
W	-0.063	0.490
Q Growth	0.166	0.062*
VMR	-0.147	0.082*
Time	0.008	0.020**

R<sup>2</sup> = 0.258 N = 86.

- Each of the estimated coefficients has the expected sign and each except funding climate is statistically significant at the 10 percent level or better.
- There is no indication that funding climate has a significant association with program duration, although the estimated coefficient does have the expected negative sign.
- The estimated coefficient of Time is positive and statistically significant.

- The results suggest three substantive conclusions:
  1. Major changes in acquisition policies in effect at MS B apparently are not associated statistically with changes in MDAP duration.
  2. There is evidence that the duration of MDAPs has become longer over time and that could perhaps be explained by the cumulative effects of changes in acquisition policy.
  3. There is at best very slender evidence of an association of funding climate at MS B and duration. This does not rule out a pronounced effect on the duration of EMD alone.
  
- Three aspects of the modeling are novel and worth noting:
  1. Normalization of duration by the mean duration of the commodity group.
  2. Use of MS B quantity divided by the average MS B quantity of the commodity class as an independent variable.
  3. Use of quantity growth as an independent variable.

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