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NAVAL POSTGRADUATE SCHOOL

NAVAL RESEARCH PROGRAM

MONTEREY, CALIFORNIA

ANALYSIS OF PRICING MODELS IN THE DEFENSE INDUSTRY

TO SUPPORT COST PROJECTIONS

by

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Prepared for: N9

Sponsor POC: Mr. Chris Marsh

FY15 MID-YEAR REPORT

Background

Because developing a new weapon system involves advanced technology pertinent to national security, the pricing of such systems primarily relies on cost estimation, as opposed to basic economic principles such as supply and demand. During the R&D period—which can take up to several years—however, the research may hit a roadblock and the various costs may change. As a consequence, such projects are often subject to substantial delays and cost overrun.

This project will develop a mathematical model for the interaction among stakeholders in the defense industry, including the government and major defense contractors. The goal is to identify market mechanism to improve the efficiency of the contracting process. These mechanisms could improve the cost estimation process or contracting structure to better manage risk.

Process

We developed a mathematical model to describe the interaction between the US Government and contractors in the defense industry, when the US Government wants to develop a new weapon system. The mathematical model incorporates random processes, game theory, and optimal decision making. We already have a prototype of the mathematical model, and are working to make the model more practically relevant. In particular, we will use the notional data provided by the sponsor to calibrate our model parameters.

Findings and Conclusions

In our model, to develop a new weapon system, the government initially can fund several parallel projects, and later decide which projects to keep and which to kill. Keeping a project is expensive, but allows the government to learn more about the project's design and potential. Having parallel projects running also motivates each contractor to work harder in order to improve the chance that its project will receive continual funding, and the chance of eventual selection.

Recommendations

We will continue to analyze the model, and work with the topic sponsor to improve it. The research goal is twofold: (1) Explain why the development and manufacturing of advanced weapon systems are often subject to program cost increases and delays; and (2) Identify market mechanisms to improve the efficiency of the bidding and contracting process in order to better manage risk. The recommendation from this study has the potential to save the government a substantial amount of money.