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Estimating the Benefits of the Air Force Purchasing and Supply Chain Management Initiative

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Prepared for the United States Air Force
Approved for public release; distribution unlimited
Whenever an organization implements a new or revised process, it needs to know whether that process is achieving the expected outcomes. But because other processes may be changing at the same time, it can be difficult to determine how much of the overall outcome is attributable to that process or to some combination of events. The Air Force faces just such a problem as it strives to transform its logistics processes to better support the warfighter through its Expeditionary Logistics for the 21st Century (eLog21) program.

An initiative implemented at the Air Force Materiel Command, called Purchasing and Supply Chain Management (PSCM), is one of the tools being use to reach this objective. The goals of this type of management are to reduce supply-chain operating costs and to improve readiness by focusing on the customer (the warfighter) and linking demand and supply planning, purchasing, inventory management, and suppliers. The Air Force has implemented PSCM and would like to determine whether and how well it is meeting its desired improvement objectives.

Even as this initiative is being implemented, however, other factors that could affect supply-chain performance have also been changing. Yet, as our review of the literature on estimating the effects of various PSCM-type initiatives revealed, we were unable to identify any studies that explicitly account for such factors. In light of this shortcoming, we have developed a theoretical method for estimating outcomes of the PSCM initiative. This method uses an econometric model that can hold other factors constant as a means of discriminating between the changes in supply-chain performance attributable to a PSCM initiative.
and those attributable to other factors. AFMC supports the eLog21 program through three initiatives. The command’s PSCM initiative supports the specific objective of improving equipment availability by 20 percent and reducing annual operations and support costs by 10 percent by fiscal year 2011. The means of doing so will be reducing the sourcing cycle time, reducing material purchase and repair costs, and improving supply material availability (the availability of spare parts). For purposes of illustration, we chose to focus on the last of these areas.

One indicator of supply material availability is the number of MICAP incidents. A MICAP incident occurs when a piece of equipment—an aircraft or weapon system, for example—is unable to perform at least one of its missions because it lacks a part that base supply cannot provide. MICAPs are reported at the NIIN level and are associated with the specific type of aircraft or weapon system. Theoretically, PSCM should reduce MICAP incidents by increasing material availability by improving “wholesale” response time and reducing total costs, among other things. PSCM could also affect the number of parts that need to be removed because it could encourage improvements in manufacturing and repair quality and increased reliability rates. In this study, we wanted to examine how PSCM affected the number of quarterly MICAP incidents at the part level.

Our model essentially takes what economists call a difference-in-difference approach. It holds part- and time-level effects constant, so that the estimated PSCM effect is identified by how MICAP incidents change for a given part when it is supplied under a PSCM contract. The model we describe here hints that parts repaired or purchased under PSCM contracts had fewer MICAP incidents than the same parts repaired or purchased under contracts not written under PSCM. However, the sensitivity of the results to additional explanatory variables indicates that the results must be interpreted with caution. In particular, other important, though unrelated, elements of MICAP inci-

1 Wholesale refers to the activities conducted by AFMC and its ALCs. Decreasing administrative and production lead times and increasing contractor responsiveness would improve wholesale response times.
dents are likely to be changing concurrently with the implementation of PSCM initiatives. We hypothesize one of these to be the number of parts being removed. While some parts may be removed for maintenance on a schedule, other removals may be unscheduled because parts have failed. Among other things, the number of parts removals depends on the rate at which aircraft operate, generally referred to as operational tempo. As operational tempo changes over time, it will be (probably incidentally) correlated in some way with the implementation of PSCM initiatives. Because of the likely existence of these other factors, we cannot conclude that the estimated correlation between the PSCM initiative and the number of MICAP incidents represents the causal effect.

To accurately estimate the impact of PSCM initiatives on supply-chain metrics, applications of this econometric approach need to obtain data on these other factors that could be incidentally correlated with the implementation of the initiative and that affect the metrics. In our example of measuring the impact of PSCM initiatives on MICAP incidents at the part level, we use flying hours as one of these factors. However, we recommend that future applications of this econometric approach use NIIN removals as a co-occurring factor. This would permit a test of the usefulness of this approach to estimating the effect of PSCM or other initiatives on metrics that are aligned with the goals of such initiatives as eLog21.