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Estimating DoD Transportation Spending

Analyses of Contract and Payment Transactions

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Prepared for the U.S. Transportation Command

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Preface

Increasing numbers of enterprises are improving their purchasing and supply management (PSM) by applying best practices identified in academic and professional literature. These firms report that they have improved performance, reduced total costs, and limited risks through these practices. Recognizing the applicability of these practices to transportation services, the U.S. Transportation Command (TRANSCOM) asked the RAND Corporation to conduct baseline analyses of transportation spending to help improve the management of transportation dollars by the U.S. Department of Defense (DoD) and to provide input on alternative ways to aggregate transportation requirements.

A key part of identifying PSM improvement opportunities is conducting a spend analysis. A spend analysis examines expenditures by dimensions such as type of good, service, or supplier; expenditures and numbers of contracts for each; and other variables showing how money is spent on goods and services. This report analyzes DoD transportation spending for insights on opportunities that DoD may realize through PSM innovations for its transportation purchases. Specifically, we analyze data on

- trends in the broader transportation market in which TRANSCOM buys services
- contract transactions (typically of at least \$25,000) by DoD and other federal agencies for transportation and related services
- payment transactions by DoD for transportation services by shipping mode, provider, route, and weight.¹

This research should be of interest to DoD personnel involved in purchasing transportation services who want to improve PSM practices for these services. Although it focuses on TRANSCOM, this briefing relies on the format, methodology, and, in some general descriptions, content of earlier spend analyses prepared for the U.S. Air Force (Moore, Cook, et al., 2004) and U.S. Marine Corps (Moore, Grammich, et al., forthcoming). The following RAND publications document earlier work:

¹ Other original tasks for this project included analyses of transportation spending by the Defense Logistics Agency (DLA) and of expenditures by shipment material and volume (or cube). The analysis of DLA expenditures appears in Appendix F. Unfortunately, the PowerTrack data we had hoped to use to analyze shipment material and volume proved to be of little use. For example, PowerTrack data on material shipped showed that 68 percent of shipments were for unknown items or “freight all kinds.”

- Nancy Y. Moore, Clifford A. Grammich, Mary E. Chenoweth, and Judith D. Mele, *Targets for Marine Corps Purchasing and Supply Management Initiatives: Spend Analysis Findings* (DB-512-USMC, forthcoming)
- Mary E. Chenoweth and Clifford A. Grammich, *The F100 Engine Purchasing and Supply Chain Management Demonstration: Findings from Air Force Spend Analyses* (MG-424-AF, 2006)
- Nancy Y. Moore, Cynthia R. Cook, Clifford A. Grammich, and Charles Lindenblatt, *Using a Spend Analysis to Help Identify Prospective Air Force Purchasing and Supply Management Initiatives: Summary of Selected Findings* (DB-434-AF, 2004)
- Nancy Y. Moore, Laura H. Baldwin, Frank Camm, and Cynthia R. Cook, *Implementing Best Purchasing and Supply Management Practices: Lessons from Innovative Commercial Firms* (DB-334-AF, 2002).

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Summary

In fiscal year (FY) 2003, the U.S. Department of Defense (DoD) spent nearly \$7 billion on transportation, travel, and relocation services from commercial enterprises. These purchases included a broad variety of expenditures related to the movement of personnel and things such as equipment, spare parts, vehicles, food, clothing, fuel, and household goods.

Given a continuing need to make the most of existing resources, including those used for transportation, the U.S. Transportation Command (TRANSCOM) asked the RAND Corporation to conduct a spend analysis of transportation purchases. This work represents the most rigorous attempt to date to estimate DoD transportation expenditures and to identify opportunities for improving transportation spending and supplier management. In addition to analyzing data on transportation purchases, this research also examined changes in the transportation service market and how they might affect DoD purchases.

Of particular concern to DoD is whether the transportation industry has been consolidating. The question of consolidation is important for two reasons. First, consolidation could affect the options that DoD has for procuring transportation services and thereby limit options for improving purchasing and supply management (PSM) of transportation services. Second, a decreasing number of firms could also affect overall efforts to meet congressionally mandated goals for procurement from small businesses. Data limitations prevent us from looking directly at this issue, but our analysis of the available data on firm employment by industry found little evidence that transportation firms are consolidating or increasing in size. The vast majority of firms in these industries also remain far below the size thresholds used to define small business for procurement purposes, although some of these industries do have a large amount of business concentrated among relatively few firms.

Regarding DoD purchases specifically, two principal data sources are available. These include Individual Contracting Action Report (ICAR) data (DD350) on contract transactions and PowerTrack data on payments for transportation services.² Unfortunately, no single data source is available on transportation purchases; rather, analyses of total purchases must be pieced together from differing sources.

DD350 data accounted for \$5.2 billion in transportation purchases in FY 2003. They offer information on buyers, suppliers, industry classification, competitiveness of a market for

² PowerTrack is an electronic payment system operated by U.S. Bank, developed to speed payments to transportation carriers.

a given service, and whether a business is considered small or disadvantaged. DD350 data show that transportation spending is largely in competitive markets for which best PSM practices are most easily implemented. They indicated that TRANSCOM offices are the leading, and sometimes exclusive, buyers for the services they purchase, indicating in turn that those with the most expertise in making such purchases are indeed making them. They appear to indicate only a few limited additional opportunities for further leveraging of TRANSCOM's transportation contracts. Nevertheless, some additional leverage might be gained by partnering with other agencies that would pay a fee to benefit from TRANSCOM's leverage and expertise in purchasing transportation services. Additional leveraging opportunities might be available in using contracts rather than tenders (i.e., voluntary or negotiated offers by a qualified carrier to provide transportation services at specified rates or charges for a period of time) for many purchases. Finally, still more leveraging opportunities might be found through compilation of more exhaustive data gathered explicitly for spend analysis purposes.

Unfortunately, DD350 data do not include data on firms paid by tenders rather than by contracts, nor do they offer information on shipment characteristics such as mode and channel. For these characteristics, we analyzed PowerTrack payments for transportation services, totaling nearly \$1.9 billion in FY 2003 (with a small overlap with DD350 data). These are particularly helpful for identifying data for trucking firms not appearing in DD350 data; indeed, two trucking firms among the top 10 transportation providers to DoD appear only in PowerTrack data. PowerTrack data also show a large number of shipments by the Defense Logistics Agency (DLA) not completely captured in DD350 data. Limited implementation outside the United States confines inferences that can be made from PowerTrack data, although the details they do show were primarily for shipments from the United States to overseas locations made by air rather than sea. DoD shippers may wish to explore these data further and to separate truly urgent air shipments from those that can be consolidated and shipped by cheaper, water modes. Within the United States, the very large majority of shipments are made by land rather than air routes. PowerTrack data also provide additional insights on small businesses. In fact, including PowerTrack records in calculating small business procurement would show that 14.3 percent, rather than 11.6 percent, of transportation spending goes to small firms.

Combining DD350 and PowerTrack data and eliminating overlaps between them shows that DoD spent about \$6.7 billion for transportation services in FY 2003. About 69 percent of these expenditures was for freight transportation; about half of the freight transportation was by air freight transportation. About a third of freight transportation expenditures was for sending freight over water, largely by ocean vessels. The remaining freight transportation expenditures were for motor and rail. Motor freight was particularly fragmented, with most motor freight spending being spread over nearly 600 firms. Passenger travel expenditures accounted for the remaining 31 percent of transportation expenditures, much of which appears to be concentrated among a relatively small number of air travel firms. The combined data also show that the U.S. Air Force and the U.S. Army are the two biggest purchasers of transportation services but that understanding the purchases of other branches and agencies, particularly those of the U.S. Navy, requires analysis of PowerTrack data.

Our analysis of combined data indicates that DoD has additional opportunities to consolidate transportation spending, particularly where it uses tenders to purchase transporta-

tion services. With such consolidation, TRANSCOM could better manage all carriers; reduce rates; and improve quality, delivery, and visibility of services. Such improved management of spending and carriers could reduce DoD's total transportation spending while continuing to meet user requirements. Bringing business currently conducted through tenders under contracts would also help DoD better meet small business goals. Any moves to bring tender transactions under contract would have to address the concerns of local transportation managers about the loss of autonomy and flexibility that tenders offer them. Nevertheless, if shippers are selected and contracts written to reflect requirements, this should not affect options to meet customer needs. In fact, bringing more spending under contract could improve incentives and accountability for carriers.

For additional future analyses, both DD350 and PowerTrack data could be improved to offer more insights on transportation expenditures. TRANSCOM should work to obtain regular access to DoD and federal contracting data for analytic purposes, not just query capability. In addition, it should develop capabilities to aggregate spending to parent carriers, linking subsidiaries to their parents. In addition, it should seek to propagate valid contract numbers to PowerTrack, which can help eliminate double-counting of dollars when combining DD350 and PowerTrack data. Having contract numbers in PowerTrack data would also allow TRANSCOM to identify the extent to which shippers use its contracts and to improve analyses of shipping channels, modes, weight, and volume.

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We appreciate the many individuals who participated in this study by discussing how their services or agencies recorded transportation spending, including individuals from every component command and a number of transportation management officers at bases and stations. Many of the business rules documented here first came from these interviews.

At RAND, we thank John Ausink and Nancy Nicosia for their helpful reviews and suggestions for improvement. We also thank Roberta Shanman, RAND reference librarian, for tirelessly trying to track down the rationale for exemptions of some transportation services from Federal Acquisition Regulations. We thank Marc Robbins for sharing with us the unpublished research that he has done on shipment costs by weight, destination, and mode. Finally, we thank Donna Mead for her help in formatting this document.

Abbreviations

AFB	Air Force Base
AMC	Air Mobility Command
BOL	Bill of Lading
CBP	County Business Pattern
CCR	Central Contractor Registry
CONUS	contiguous United States
CPI	Consumer Price Index
CRAF	Civil Reserve Air Fleet
D&B	Dun and Bradstreet
DD350	Individual Contracting Action Report form
DD1057	form for monthly contracting summary of actions \$25,000 or less
DDAA	Defense Distribution Depot, Anniston, Alabama
DDC	Defense Distribution Center
DDDC	Defense Distribution Depot, San Diego, California
DDDE	Defense Distribution Depot, Europe (in Gernersheim, Germany)
DDHU	Defense Distribution Depot, Hill, Utah
DDJC	Defense Distribution Depot, San Joaquin, California
DDOO	Defense Distribution Depot, Oklahoma City, Oklahoma
DDOU	Defense Distribution Depot, Ogden, Utah
DDRT	Defense Distribution Depot, Red River, Texas
DDSP	Defense Distribution Depot, Susquehanna, Pennsylvania
DDWG	Defense Distribution Depot, Warner Robins, Georgia

DFAS	Defense Finance and Accounting Service
DIOR	Directorate of Information Operations and Reports
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DoD	U.S. Department of Defense
DoDAAC	U.S. Department of Defense Activity Address Code
DPO	Distribution Process Owner
DSC	Defense Supply Center
DSO	Defense Subsistence Office
DTCI	Defense Transportation Coordination Initiative
DUNS	Data Universal Numbering System
EDI	Electronic Data Interchange
FAR	Federal Acquisition Regulation
FMS	Foreign Military Sales
FPDS	Federal Procurement Data System
FPDS-NG	Federal Procurement Data System—Next Generation
FSC	Federal Supply Class
GBL	Government Bill of Lading
GPC	Government Purchase Card
GSA	U.S. General Services Administration
HHG	household goods
HQ AMC/A34Y	Contract Airlift, Directorate of Air, Space, and Information Operations, Air Mobility Command
ICAR	Individual Contracting Action Report
IMPAC	International Merchant Purchase Authorization Card
ISO	International Organization for Standardization
LTDR	Long Term Data Repository
LTL	less-than-truckload
MPH	Manifest Print History

MSC	Military Sealift Command
NAICS	North American Industry Classification System
OCONUS	outside the CONUS
OEM	original equipment manufacturer
OSD	Office of the Secretary of Defense
PPI	Producer Price Index
PSC	Product and Service Code
PSM	purchasing and supply management
RDC	Regional Domestic Contract
SBA	U.S. Small Business Administration
SDDC	Surface Deployment and Distribution Command
SEC	U.S. Securities and Exchange Commission
SIAD	Statistical Information Analysis Division
SIC	Standard Industrial Classification
TCN	Transportation Control Number
TMO	Transportation Management Office
TRANSCOM	U.S. Transportation Command
TTC	Tailored Transportation Contract
UPS	United Parcel Service
USC	Universal Service Contract
USPS	U.S. Postal Service
VISA	Voluntary Intermodal Sealift Agreement
WHS	Washington Headquarters Services
WWX	Worldwide Express



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Estimating DoD Transportation Spending

by

**Nancy Y. Moore, Mary E. Chenoweth, Elaine Reardon,
Clifford A. Grammich, Arthur Bullock, Judith Mele,
Aaron Kofner, and Eric Unger**

In FY 2003, the U.S. Department of Defense (DoD) spent an estimated \$6.7 billion on direct purchases from commercial enterprises of transportation, travel, and relocation services. These purchases included a broad variety of expenditures related to the movement of personnel and things such as equipment, spare parts, vehicles, food, clothing, fuel, and household goods. They represented more than 1.6 percent of the \$437 billion in DoD outlays in FY 2003 (DoD, 2006).

As DoD seeks to execute an increasingly broad array of tasks around the world, it also seeks to make the most of its existing resources. Improving its purchasing and supply manage-

ment (PSM) of transportation services offers one way to make the most of existing resources and improve performance as well.

Spend analyses are recognized as a first step in implementing best PSM practices (Moore, Baldwin, et al., 2002). A spend analysis examines expenditures, or spend, by commodities and suppliers, identifying opportunities for PSM improvements.

In this briefing, we review what spend data indicate about opportunities for applying best PSM practices to DoD transportation services. Though transportation services are unique in some ways, previous research has indicated that they can and should be purchased with many of the same rigorous purchasing practices used to acquire other goods and services (Dobler and Burt, 1996).¹

A spend analysis, including a detailed evaluation of purchases and suppliers, can help identify where purchasing practices can be made more rigorous. With a spend analysis as a first step, private firms have found that they can often consolidate, leverage, and reduce their logistics and transportation spend.²

¹ Until the 1980s, Dobler and Burt note, regulation prevented most carriers from “developing competitive service-oriented arrangements with their customers.” Since deregulation, carriers have “compete[d] vigorously and are interested in negotiating arrangements that are mutually advantageous” (1996, p. 592).

Altogether, Dobler and Burt recommend that 13 different variables be considered in evaluating carriers or transportation suppliers. These are (1) financial stability and profitability; (2) equipment capability; (3) number and location of terminals and break-bulk carriers; (4) quality programs, e.g., International Organization for Standardization (ISO) 9000 registration; (5) percentage of ships that are interlined, i.e., shipped over more than one line; (6) average transit times between major origins and destinations; (7) on-time performance record; (8) available elements of service; (9) cooperativeness in improving services and reducing costs; (10) effectiveness of the system for tracing shipments; (11) claims as a proportion of billed shipments; (12) claim settlement ration; and (13) shipping rates for the contract period. Many of these should be considered in development and implementation of a supply strategy and are beyond the scope of a spend analysis. Unfortunately, data on these are also generally unavailable for spend and other analyses.

² The Hewlett-Packard Company provides a striking case. Since its merger with Compaq, it has reduced its carrier base by 69 percent and brought nearly 99 percent of its logistics spend under contract. One logistics provider that had 28 contracts with Hewlett-Packard and Compaq now has one. Such initiatives helped Hewlett-Packard reduce by a fifth its supply chain cost as a share of revenue. See Hannon (2004) and Carbone (2004).

Purpose of the Study

- **Sponsor: U.S. Transportation Command**
- **Objectives:**
 - **Analyze DoD's total direct spending for transportation**
 - **Identify opportunities to improve transportation spending and supplier management**

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To help improve management of transportation expenditures, the U.S. Transportation Command (TRANSCOM) asked RAND researchers to perform baseline transportation spend analyses. These analyses will help improve the management of DoD transportation dollars and suppliers and provide input into alternative ways to aggregate DoD's transportation requirements for purchasing execution.

Our research had two objectives. First, we sought to analyze DoD's total direct spending for transportation, i.e., purchase of transportation services from carriers. Second, we sought to identify opportunities to improve transportation spending and supplier management. Often spend analyses can indicate such opportunities by identifying multiple purchasers of identical goods and services, multiple purchases or purchasers from the same parent supplier, and contracts for goods or services available from only one source. Opportunities for improved performance also might be realized through outsourcing to third-party logistics services.³

³ Third-party logistics providers originated in the 1930s but grew only slowly until the deregulation of the transportation industry that began in the late 1970s (Leenders et al., 2002). Such firms have grown rapidly in the past decade. Their growth has been linked to that of intermodal transportation. Such firms may encompass all trucking and warehousing services, express shipments, courier services, freight forwarding, and customized systems and communications.

Chapter Topics

- **Transportation Management in DoD**
- **Research Questions**
- **Research Methodology**

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We begin our analysis with an overview of transportation management and purchasing within DoD, the specific questions that we attempt to answer, and our study methodology. In later chapters, we review the uses of a spend analysis, changes in the market in which DoD buys transportation services, trends that we observed in available data, and recommendations both for transportation spending practices and for more detailed analysis necessary for more refined recommendations.

Transportation Management in the Department of Defense

- **U.S. Transportation Command**
 - **Air Mobility Command (AMC)**
 - **Military Sealift Command (MSC)**
 - **Surface Deployment and Distribution Command (SDDC)**

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TRANSCOM at Scott Air Force Base (AFB), Illinois, oversees most DoD transportation of goods and personnel. TRANSCOM has three component commands, including the

- Air Mobility Command (AMC), at Scott AFB, responsible for air transport
- Military Sealift Command (MSC), in Washington, D.C., responsible for ocean transport
- Surface Deployment and Distribution Command (SDDC), in Alexandria, Virginia, responsible for ground transport.

Appendix A presents further information on TRANSCOM and its component commands.

DoD organizations may also purchase additional transportation services identical to those offered on TRANSCOM contracts. Such purchases are often called *maverick* in the literature on commercial purchasing practices. We discuss these further in analyzing elements of DoD transportation spend.

Research Questions

- **What data exist on DoD transportation spending?**
- **What does DoD spend on transportation?**
- **What opportunities for improvement are indicated by existing data on DoD transportation purchases?**
- **What broader industry trends affect the market for transportation services and the opportunities for DoD within it?**

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To better manage transportation expenditures, suppliers, and performance, including its own and other maverick purchases of transportation services throughout DoD, TRANSCOM asked RAND researchers to conduct an overview of all DoD transportation spending to identify ways to increase DoD leverage with suppliers, reduce transaction costs, and better manage transportation services. This led us to develop the following research questions:

- What data exist on DoD transportation spending? Are there gaps or overlaps in these data? How can these data be improved?
- What does DoD spend on transportation? How does it spend this? What forms of transportation does it use?
- What opportunities for improvement are indicated by existing data on DoD transportation purchases? How might DoD policy goals, such as those for purchasing from small businesses, affect its opportunities to improve PSM for transportation services?
- What broader industry trends affect the market for transportation services and, in turn, the opportunities DoD has to improve its PSM of these services?

Study Methodology

- **Identified and evaluated sources for transportation spend data**
- **Reviewed transportation industry trends and statutes exempting some transportation purchases from Federal Acquisition Regulations**
- **Combined and analyzed transportation data**

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To answer our research questions, we undertook several tasks.

First, we identified and evaluated sources of transportation data. This included interviewing DoD purchasers of transportation services to identify practices for making and recording transportation purchases, as well as interviewing those familiar with service transportation payment and data systems. In Appendix B, we discuss in more detail our interview process and the information we elicited from the interviews. Because we ultimately gathered data from several disparate sources, we developed business rules for combining and analyzing data, including identifying and reducing data gaps and overlaps. We describe these in Appendix B as well.

Second, to assess how changes in the transportation industry might affect opportunities identified in spend analyses for implementing best PSM practices, we analyzed public data for trends in the size of the transportation supply market as well as the distribution of firms within it. We also reviewed statutes exempting certain transportation purchases from Federal Acquisition Regulations (FARs) and attempted, without success, to identify the rationale for such exemptions.

Third, we combined and analyzed the two key data sources on transportation and related purchases identified in our attempt to estimate total DoD spending for transportation and related services. Because each source contained unique information not in the other, we also analyzed them separately to gain as much insight as possible on their strengths and weak-

nesses as well as on the nature of DoD's spending for transportation and related services. This included analyzing the data by mode (i.e., air, water, or land), channel (i.e., by origin and destination), weight, and nature of the service (e.g., chartered or scheduled). Unfortunately, due to poor or missing data, we could not analyze freight data by particular shipment volume or contents.

Outline

- **Introduction**
- **Uses of a Spend Analysis**
- **Changes in the Transportation Services Market**
- **Contract Transactions for Transportation and Related Services**
- **Payment Transactions for Transportation Services**
- **Estimating Total Transportation Purchases**
- **Conclusions and Recommendations**

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Before reviewing the sources of transportation data and our analyses, we discuss two topics. In the next, second chapter, we provide an overview of the uses of a spend analysis and what benefits can be realized from one. This should help the reader better understand insights that can be expected from available data, which often, as with TRANSCOM, must be gathered from several disparate sources, none originally constructed for spend analyses. In the third chapter, we discuss recent changes in the transportation service market. This should help the reader better understand what broader trends are affecting DoD purchases, including opportunities to improve PSM for transportation services.

We then present findings from different data sets. The fourth chapter reviews data on contract transactions for transportation and related services. The data we use for this, compiled from Individual Contracting Action Reports (ICARs) (referred to as DD350 data), offer a great deal of detail on purchases by organization, supplier, and other characteristics but, until recently, were limited to transactions of at least \$25,000. In the fifth chapter, we examine PowerTrack data on payments to providers.⁴ This source offers better coverage, albeit with less

⁴ PowerTrack is an electronic payment system operated by U.S. Bank, developed to speed payments to transportation carriers.

detail, of smaller transactions.⁵ We also examine PowerTrack data for insights on shipments by mode and channel.

We present an estimate of total transportation spending from combined DD350 and PowerTrack data in the sixth chapter. In the seventh, concluding chapter, we summarize our findings and recommendations.

⁵ Appendix F analyzes transportation spending by the Defense Logistics Agency (DLA). One reason for this analysis was to determine what information might be available on its purchases, particularly smaller transactions not covered by our other data sources. For more discussion of differing sources of data on DLA spend, see Moore, Grammich, et al. (forthcoming), especially Chapter Five.

Uses of a Spend Analysis

Outline

- Introduction
- **Uses of a Spend Analysis**
- Changes in the Transportation Services Market
- Contract Transactions for Transportation and Related Services
- Payment Transactions for Transportation Services
- Estimating Total Transportation Purchases
- Conclusions and Recommendations

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In this chapter, we present an overview of a spend analysis, including its elements, the RAND approach to such an analysis, and indicators of PSM opportunities and risks evident in it; data sources for it; and caveats that must often accompany it.

What Is a Spend Analysis?

- **An in-depth analysis of purchases by product, service, dollar value, number of contracts, supplier, purchasing organization, etc.**
- **An in-depth evaluation of the supply base by industry, firm, geography, risk, dependency, socioeconomic variables, etc.**
- **The application of analytical and benchmarking tools with these analyses to identify opportunities and risks**

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A spend analysis is an evaluation of enterprisewide

- *purchases*, i.e., what an enterprise is buying, including purchases by product or service, dollar value, number of contracts, supplier, and purchasing organizations
- *supply base*, i.e., suppliers by industry, firm, geography, risk, dependency (i.e., the percentage of business that a firm gets from a single customer), and socioeconomic variables (e.g., those identifying small or disadvantaged businesses) that may be relevant to purchaser policy goals.¹

A spend analysis can be time-consuming and labor-intensive, particularly in gathering disparate data such as those for DoD transportation purchases. Nevertheless, private firms have found that, without one, it is difficult to identify targets for better PSM practices, develop supply strategies for specific commodities, select the best suppliers, and manage suppliers so as to maximize rewards and minimize risks (Moore, Baldwin, et al., 2002). A spend analysis can help identify goods and services with the greatest vulnerability and value, to which the most senior or qualified purchasing personnel should be assigned. These personnel can then develop

¹ For a description of the characteristics, benefits, and challenges of three levels of spend analysis and their increasing application in business, see Aberdeen Group (2002).

supply strategies and adjust the enterprise's sourcing approach and relationships to market conditions for a product or service.

In addition to internal spend data, information for decisions on changing purchasing practices should include external data on markets and suppliers. This might include information, for example, on supplier finances, other leading customers, and prevalent practices in a given market. Internal and external data should be integrated for quantitative and benchmarking analyses to identify risks and opportunities for savings and performance improvements through application of best PSM practices. Such integration, for example, may reveal corporate family relationships and identify interrelated or duplicate suppliers as well as commodities and commodity groups for which there are consolidation or substitution possibilities. It can also be used to measure compliance with preferred vendor programs (and socioeconomic goals).

RAND Approach to Spend Analysis

- **Reviewed literature on supply strategies including supply base stratification and spend analysis**
- **Identified different sources of contracting and other data to “piece together” total transportation spend**
- **Identified indicators of prospective PSM benefits and risks**
- **Analyzed data for opportunities to apply best PSM practices**
- **Identified other information and analytic capabilities to help improve PSM practices for transportation services**

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This work is a direct outgrowth of RAND research on the implementation of innovative PSM practices at commercial firms (Moore, Baldwin, et al., 2002). Earlier RAND research found that, among innovative private firms, spend analyses are emerging as a first step in developing supply strategies, a best PSM practice. As part of its effort to improve purchasing practices, TRANSCOM asked RAND to conduct a first-order spend analysis using currently available data.²

To examine how military services and agencies might conduct a spend analysis, we reviewed existing literature on supply strategies (including stratification based on importance of suppliers and their commodities and services), interviewed managers at innovative firms, and gathered information at conferences for purchasing professionals. We then collected DoD purchasing data to identify major components of total transportation expenditures for TRANSCOM and the services.³ From our general literature review, we identified indicators of benefits and risks that may be evident in spend analyses, then analyzed available data on

² A first-order spend analysis uses spend data as initially available and gathered within an enterprise. Often such data may be combined with other relevant data, e.g., on parts or components of a contract for multiple parts, to discern more details about spend. A first-order spend analysis can be used to make the case for improving purchasing and supply management and for improving spend analysis capabilities (including spend data collection).

³ Earlier work on the Air Force is described in Moore, Cook, et al. (2004) and on the Marine Corps in Moore, Grammich, et al. (forthcoming).

them. We also identified other information and analytic capabilities that services or agencies would need to improve their spend analyses. This might include, for example, better data collection and capabilities to assess transportation shipments by weight, volume, and origin and destination.

Indicators of Sourcing Opportunities

- **Savings**
 - ***Suppliers with multiple contracts***
 - ***Products or services with many suppliers***
 - ***Many independent buying organizations***
 - ***Cost growth exceeding relevant inflation indices***
- **Performance improvement**
 - **Varied or poor quality and/or delivery**
 - **Long wait times**
 - **Little information sharing or supplier innovation**
 - ***Few multiple year contracts***

We discuss some of these (*italicized*) in this report

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Any sourcing decision has the potential to yield rewards or introduce risks to operations (Moore, Baldwin, et al., 2002; Sawchuk, 2002). The rewards include opportunities for performance improvements and savings (Aberdeen Group, 2002). Potential risks arise when overall performance suffers as a result of supply chain or supplier performance issues, including delays, variable quality of services, or increasing costs.⁴ The italicized indicators are those that can be assessed with data available for a first-order spend analysis. The others are those that might be assessed with more exhaustive data.

Opportunities for savings result from the potential for increased leverage, economies of scale or scope, reduced transaction costs, and improved collaboration and cooperation (Moore, Baldwin, et al., 2002). A spend analysis may indicate opportunities for savings by identifying suppliers with multiple contracts, products or services with multiple suppliers,⁵ and cost growth exceeding relevant inflation indices.⁶ It may indicate opportunities for improving performance through data on quality or delivery, supplier responsiveness, condition of shipped

⁴ For more general discussion on risks, see Zsidisin, Ragatz, and Melnyk (2003) and Peck et al. (2003).

⁵ One recent analysis of supply chain practices, for example, found that enterprises with best practices have about half the number of suppliers per dollar of spend as others do (Sawchuk, 2005).

⁶ See Ellram (2002) for a detailed example of how Deere and Company measures cost savings relative to the Producer Price Index (PPI).

goods on arrival, supplier innovation, and the number of multiple-year contracts.⁷ Innovative suppliers may apply different strategies to different groups of customers, just as, for example, airlines provide better service to their most frequent fliers (and most profitable customers) and more regular customers may get better responsiveness from transportation suppliers in settling claims for damaged shipments or in expediting occasional urgent shipments (Steele and Court, 1996; Dobler and Burt, 1996). By better understanding its total expenditures, TRANSCOM can better demonstrate to suppliers its value as a customer, even in the tradeoffs and commitments it sometimes asks suppliers to make, such as that for prioritized wartime shipments in exchange for larger peacetime business at possibly higher rates.

⁷ Short-term contracts often discourage suppliers from investing in performance improvements because the payback period may exceed contract length or otherwise be too short to cover contract investment costs. In transportation, for example, carrier costs and rates for shippers include not only the costs that carriers incur transporting goods, but also costs for fixed assets, operational overhead, and even backhaul (Bowersox, Closs, and Cooper, 2002; Coyle, Bardi, and Langley, 2003). Couriers with only short-term contracts may not have incentives to make investments or other plans for reducing these costs to particular shippers.

Frequent contract bidding can also lead to a high supplier “churn” or turnover rate. This can affect quality of new services as new suppliers must learn specific contract requirements and interpret contract specification or work scope. It discourages suppliers from developing and implementing quality and process improvement practices. Quality-control practices may require investments that suppliers are reluctant to make for buyers with considerable contract churn. Erratic customers are also likely to get a higher price, lower priority, and lower responsiveness from suppliers (Hahn, Kim, and Kim, 1986).

Indicators of Sourcing Risks

- **We examine situations where there are *only one supplier or few bidders*. Other indicators of risks include**
 - **Suppliers with financial problems**
 - **Goods or services with low or variable demand**
 - **No contract**
 - **No supplier performance incentives or commitment to improve**
 - **Inadequate or poor information on past supplier performance**
 - **Inappropriate scope of work**

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Prospective sourcing risks can be indicated by cases with the following characteristics:

- Only one supplier, limited competition, or limited substitution opportunities. These could lead to opportunistic behavior by suppliers (Williamson, 1985). Past reports of the DoD inspector general have documented opportunistic behavior by defense contractors, including overcharging or incorrectly billing for work (see, for example, Phinney, 2004; Ivanovich, 2004; and Dine, 2002). We can, with the data available for a first-order spend analysis of DoD transportation purchases, examine some contract situations in which there is only one supplier or a few bidders. A complete spend analysis and additional necessary market research would assess other indicators of risks, as listed below.
- Suppliers with financial problems. These could cause a supplier to go out of business or shirk on performance, presenting a supply risk. Due diligence during supplier qualification and selection regarding supplier finances and capabilities are among the standard practices to prevent such problems. This can be critical in the transportation industry, in which some sectors still continue to experience a “shakeout” following deregulation of the

early 1980s.⁸ Investigating a “carrier’s ability to handle claims quickly and efficiently” can also yield valuable information on its financial stability (Farris et al., 2000, p. 971).

- Low and variable demand. Such demand can make it difficult to find suppliers because variable workloads increase costs (Hahn, Kim, and Kim, 1986). Transportation providers will wish to keep their assets (e.g., aircraft, ships, trucks, trains) and personnel as busy as possible to gain the highest return on their capital investments. In contract negotiations, carriers may seek to reduce or eliminate empty backhaul (i.e., return of transportation assets to point of origin without paying loads), specify regular pickup times, or increase tonnage, by offering concessions such as reduced rates (Coyle, Bardi, and Langley, 2003).⁹
- No contract in place. If no contract is in place, suppliers may, unknown to the buyer, leave the market. This can be a particularly difficult situation when buyers need to find a new supplier for a low-demand service for which no other provider may be available. Even if another supplier is available, such a situation can add considerable time to the supply process as personnel identify new suppliers, go through the bidding process with them, select one, and negotiate and establish a contract. Many DoD transportation purchases are made through tenders. Though tenders have many of the same features as contracts, including outlining responsibilities for both parties and penalties for poor service or service failure, and offer flexibility to users, they lack many of the oversights of contracts and may not always offer best overall values to users. Private firms have found that contractual relationships for transportation services can yield rate discounts of 25 to 50 percent and be tailored to specific needs (Dobler and Burt, 1996; Coyle, Bardi, and Langley, 2003).¹⁰
- No supplier performance incentives or a prescriptive statement of work. Without a formal commitment to improvement or without a performance-oriented statement of work that may encourage suppliers to innovate in providing services, only limited improvements may be made. Among specific improvements private firms may seek in their transportation services are greater levels of reliability, higher levels of service, fewer lost and damaged shipments, and other improvements in transportation that can reduce total costs (Leenders et al., 2002).
- Inadequate or poor past performance information. This prevents replacement of poor performers, rewarding of good performers, and identification of new suppliers. We have noted how records on claim settlement can provide some information on performance,

⁸ Leenders et al. (2002, p. 422) note, “Within 10 years of passage of the Motor Carrier Act of 1980, the number of carriers had more than doubled. The shakeout in the trucking industry continues into the early twenty-first century with bankruptcies and the consolidation of carriers. For example, as of 1991 only 10 of the 60 largest less-than-truckload (LTL) carriers from 1968 were still in business.”

⁹ Some transportation services, e.g., LTL shipping, are, by their nature, designed to serve low and variable demand. Yet even these can benefit from cost-reduction efforts such as buyer consolidation of its supplier base and subsequent award of more business to fewer suppliers (Farris et al., 2000).

¹⁰ Coyle, Bardi, and Langley (2003, p. 376) also note that deregulation of the transportation industry has “increased shippers’ ability to enter into contracts with carriers,” thereby eliminating “the uncertainties in rates and services that common carriers provide.”

as well as why such information can be particularly critical given continuing changes in transportation service industries. Ideally, shippers should investigate and monitor carrier performance on delivery and transit times, claim frequencies and settlements, availability and condition of equipment, driver performance, tracing capabilities, and finances, among other variables (Coyle, Bardi, and Langley, 2003).

- Inappropriate scope of work. This may arise when contracts cover too little, or too much, work, creating diseconomies of scale and scope and leading to decreased performance or increased costs and reduced visibility of costs as well. Buyers may seek services such as cargo tracking that a supplier may not be able to perform. Many private firms are increasingly focusing on breadth of service, or “the ability of a carrier to handle multiple parts of the logistics process, including transportation, warehousing, inventory management, and shipper-carrier relationships” (Leenders et al., 2002, p. 414). Broad scopes of work may make it more difficult for buyers to determine actual costs for each service in highly complex contracts (such as those that may be developed with third-party logistics providers).

Some of these problems may be relatively easy to identify in existing data, but only the problem of limited competition can be partially analyzed with the data available to us for this study. Other problems must be researched in more detail using other data sources.

Indicators showing opportunities for savings and performance improvements as well as risks from applying best PSM practices can help in targeting initiatives and tailoring supply strategies to specific circumstances. We examine in more detail opportunities TRANSCOM may find for PSM initiatives, including consolidating purchases across suppliers and the buying organization, as well as how market conditions may limit these opportunities.

Several Data Sources Must Be Used to Analyze DoD Transportation Spend

- **Enterprises typically lack ideal data on spend, but can find insights in existing sources**
- **Challenges to analyzing DoD transportation expenditures include**
 - **No standardized data system for recording all transportation purchases**
 - **No standardized process for transportation procurement across DoD**
- **Data sources we analyze in detail include**
 - **FPDS**
 - **DD350**
 - **PowerTrack**

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Enterprises typically have data systems that track purchases from and payments to providers of goods and services. Although such data systems may not be ideal for detailed spend analyses, they can provide initial indications of areas to probe further. Below we discuss data sources for a DoD transportation spend analysis. None is ideal for such research, but all can offer some insight on improving PSM practices.

Two general challenges arise in using existing data to analyze DoD transportation expenditures. First, there is no standardized data system for recording all DoD transportation purchases, nor is there any single exhaustive source on all such purchases. Rather, information on transportation purchases is entered into different data systems with incompatibilities prohibiting their integration for use in an exhaustive analysis of DoD transportation spend. In addition, none of these systems is designed for conducting a spend analysis.

Second, there is no standardized process for transportation procurement across DoD. Rather, different DoD organizations use somewhat different types of actions and data entry rules in making transportation purchases. This lack of standardization in data systems and procurement processes leads to gaps and overlaps among and between the different systems.

The three principal sources of data on DoD transportation purchases are Federal Procurement Data System (FPDS), DD350, and PowerTrack data. We discuss each below and on the next chart.

Until recently, DoD purchases made on FAR contracts were recorded on DD350 forms used for reporting individual contracting actions.¹¹ DD350 data include information on contract value, purchase office code (not necessarily the actual user or shipper), provider, industry classification, number of solicitations and offers, type of market (e.g., sole source or competitive), and provider's socioeconomic status (e.g., whether the provider is a small or disadvantaged business). As such, they offer a considerable amount of useful detail for a high-level spend analysis. DD350 data account for \$4.8 billion of DoD transportation spend in FY 2003 and \$5.2 billion of such spend in FY 2004.

Not all transportation purchases are made through FAR contracts reported in DD350 data. Many, as noted, are made through tenders, negotiated settlements between a qualified carrier or transportation service provider and a shipper (e.g., a federal entity) that lists terms and conditions, price, service rates, and charges to move freight. Because tenders do not use FAR contracts, transactions using them are not recorded on DD350 forms. Nevertheless, data on many transportation services procured through tenders are available from PowerTrack, a fee system that DoD requires providers to use that pays quickly (i.e., within two or three days) for completed services. PowerTrack records include data on dollars, shippers, carriers, mode, weight, and volume for each shipment action. PowerTrack data account for \$1.7 billion in DoD transportation expenditures in FY 2003. PowerTrack is also used to pay some DD350 contractors; we later discuss the overlaps and how to adjust for them in our analysis. Appendix B discusses in more detail means for procuring transportation services and paying their providers.

Other sources of data on transportation purchases are less detailed. Until FY 2005, data from monthly contracting summary of actions \$25,000 or less forms (DD1057), used to record purchases of \$2,500 to \$25,000 before the DD350 reporting threshold was lowered, offer only monthly totals by purchase office code on total dollars obligated and dollars to small business. DD1057 data lack information on contractor name, type of contract, and category of obligation. In FY 2003, government purchase cards (GPCs) were used for some transportation purchases of less than \$2,500, but the data offer each transaction only by card holder, merchant, and amount of purchase, with only occasional detail on the good or service purchased.¹² They have little detail on origin, destination, weight, volume, and mode of shipment, such as in PowerTrack data, or on characteristics such as specific purpose, type of market, or industry classifications for the purchase, such as in DD350 data. After interviews with transportation personnel, we concluded that pursuing possibly sensitive GPC data would require extraordinary costs relative to the benefit of the limited insights that it was likely to offer for a reportedly small amount in purchases.

¹¹ The dollars recorded on DD350 forms are obligations. Throughout this documented briefing, we refer to these obligations as *purchases* or *expenditures*.

¹² Simplified acquisition methods now permit GPC purchases of up to \$25,000 if certain conditions are met. See DoD (2007b).

Additional and Supplemental Data

- **Additional data used for our analysis include**
 - **DD350 data for other DoD and federal government transportation purchases**
 - **Dun & Bradstreet DUNS file linking contractor ID codes to parent firm ID codes**
 - **Supplier financial data**
- **Complete, detailed analyses would require**
 - **Contract data linked to individual shipments**
 - **Other purchases not in DD350 or PowerTrack data (e.g., purchase card transactions)**

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In addition to DD350 and PowerTrack data on DoD transportation purchases, we use other data in our spend analyses. We use DoD-wide DD350 data to compare transportation purchases made through TRANSCOM and those made by non-DoD agencies and departments. We examine the FPDS for other federal purchases of transportation services to determine what common transportation services and suppliers, if any, there are for DoD and other government agencies.¹³

We also obtained from DoD a Dun and Bradstreet (D&B) Data Universal Numbering System (DUNS®) file that links establishment contractor ID codes used in DD350 data to parent firms.¹⁴ Identifying total purchases made from any particular company can be difficult because many suppliers have multiple divisions, names, locations, and contractor ID codes. By using the DUNS file, we could aggregate transportation purchases from parent firms and identify leading providers of transportation services as listed in DD350 data. Because the Power-

¹³ The FPDS has been the federal government's central database of information on federal procurement actions since 1978 (Woods, 2003).

¹⁴ For our analysis of FY 2004 DD350 data, we used D&B data that were current as of February 2005, about the same time that the FY 2004 DoD-wide DD350 data were released by the Statistical Information Analysis Division (SIAD) of DoD's Washington Headquarters Services. For analysis of FY 2003 PowerTrack and DD350 data, we used February 2004 DUNS data, also supplied by SIAD.

Track data extract that TRANSCOM gave us did not contain DD350-compatible contractor ID codes, aggregating the TRANSCOM data by parent company had to be done manually, i.e., finding the parent company in the DUNS data by matching local company name strings between PowerTrack and the DUNS data and then using the DUNS parent company name in the analysis. (Companies that did not have a local match in the DUNS data became their own parent companies in our analysis. For more on PowerTrack and DD350 data analysis issues, see Appendix C.)

Spend data aggregated by supplier, even if completely accurate and exhaustive, still must be interpreted carefully. Mergers, acquisitions, and divestitures occur over time and make the relationship between subsidiaries and divisions, their locations, and parent firms a moving target for analysis.

We also used publicly available U.S. Securities and Exchange Commission (SEC) data to determine DoD percentage of sales for some publicly traded leading suppliers of transportation services (SEC, 2006). This helped us to learn the importance of DoD business to its leading transportation suppliers and to determine whether it is a significant or minor customer for these firms.

A complete spend analysis would go beyond the data described here. Such an analysis would examine more specific purchases within transportation Product and Service Codes (PSCs). It would link individual shipments to specific modes, routes, and contracts and tenders and note special shipping requirements such as those for refrigeration or movement of hazardous materials and for time of year. Such data would be needed to determine how best to organize transportation purchases, identify means to improve purchasing leverage, and develop supply strategies for meeting future requirements. A complete analysis would also include other purchases not in DD350 or PowerTrack data, including purchases made with Government Purchase Cards.

Further Analysis Requires Substantial Information and Expertise

- **User needs, preferences, priorities**
- **Markets**
 - **Leading suppliers**
 - **Consolidation practices**
 - **Terms and conditions**
 - **Performance measurement and incentives**
- **Technology, including latest processes, materials, and innovations**
- **Potential suppliers**
 - **Management style (e.g., centralized or not)**
 - **Breadth of core competencies**
- RAND – **Synergy of services**

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A complete transportation spend analysis would also require analysis of the needs, preferences, and priorities of shippers throughout DoD. This might include analysis of specific services by contract and shipper with details beyond those in DD350 or PowerTrack data.

In addition to the information available in a spend analysis, research is also needed on leading suppliers, reasons for their poor or superior performance, terms and conditions of their contracts, and how suppliers typically group services for sale. Such information can help shippers to structure contract requirements reflecting leading industry practices and attract the best suppliers. Because DoD needs to balance prospective savings, performance improvements, risks, socioeconomic and other business goals, including (as discussed in Appendix A) incentives for firms to participate in the Civil Reserve Air Fleet (CRAF) or the Voluntary Intermodal Sealift Agreement (VISA) and other regulations that may not be present in the private sector, not all best commercial practices may be appropriate for its shipping needs. Nevertheless, knowing the practices and processes typical to the industry, particularly the latest technology and innovations (e.g., for in-transit visibility), will enable DoD to attract and select suppliers who are exemplars in their field. In some circumstances, DoD may seek a supplier providing only the least expensive point-to-point transportation of goods. In others, it may desire services such as packing, warehousing, or moving of shipments in transit.

Information on potential suppliers, their management, and their competencies also helps purchasers make the best supplier selection. Contracts with suppliers who provide relatively

homogeneous services may be an appropriate target for consolidation. Contracts may not be as easily consolidated with large suppliers whose autonomous business units provide distinct products.¹⁵ A thorough analysis of information necessary for making purchasing decision also requires information on providers' core competencies and synergies.

¹⁵ For example, data not shown in this briefing indicate that Raytheon received \$9.4 million for rail services provided to DoD in FY 2004, more than any other firm received in DD350 dollars for such services. Although Raytheon has many other DoD contracts, it is possible this spend, already consolidated in a single contract, could not be further consolidated within a large firm whose services range from professional and technical services to space and airborne systems.

Analysis Must Take into Account Valid Motives for Current Spend

- **Valid reasons for current practices may include**
 - **Varied requirements or unique specifications**
 - **Lack of economies of scale or scope**
 - **Separate funding sources**
 - **Limited return on investment needed to develop new sources**
 - **Independent supplier business units**
 - **Political pressures for specific suppliers**
- **Data analysis is necessary but not sufficient for selecting PSM initiatives**

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Spend and other purchasing analyses must recognize that many existing practices were developed in response to certain policies. That is, there may be valid motives for the current ways of purchasing transportation services. These must be fully researched and understood to determine if new PSM practices can be used to develop more effective supply strategies.

Potential limits to using many PSM practices may include unique requirements limiting opportunities for consolidation. Not all transportation companies, for example, serve all routes on which DoD needs service. Different routes and goods also require different types of service, such as that for hazardous substances.

In some cases, there may be few opportunities to improve PSM of transportation services. There may, for example, be limited benefits from economies of scale or scope, different sources of funds that cannot be consolidated, suppliers strongly resisting consolidation of contracts across independent business units,¹⁶ and political or other pressures for specific

¹⁶ In some cases, e.g., those providers that are also original equipment manufacturers (OEMs) for which DoD is the dominant customer, DoD may be able to overcome such resistance. Although DoD, as we will discuss, is a leading customer for some of its providers of transportation services, the dependency of such suppliers is not as great as that we found for some suppliers in earlier spend analyses (Moore, Cook, et al., 2004, and Moore, Grammich, et al., forthcoming). For example, we found in earlier research that the Air Force alone accounts for more than 10 percent of total sales to five of its top 10 suppliers. As we will see in later data, only one supplier of transportation services DoD accounts for more than 10 percent of sales.

types of suppliers. (In our interviews, for example, we found anecdotal evidence of some DoD shipping personnel who prefer the flexibility of tenders, under which shipping services could be ordered more quickly than under FAR contracts.) Therefore, significant research, analysis, data validation, data cleansing and enhancement, and other activities beyond an analysis of contract transactions are required before best PSM practices can be confidently applied to develop purchasing and supply strategies, select suppliers, or negotiate contracts for transportation services.

In the next chapter, we review broad trends in the transportation industry. Although this cannot suffice for the more detailed research described previously, it should provide the reader with some helpful background information in interpreting our similarly broad findings.

Changes in the Transportation Services Market

Outline

- **Introduction**
- **Uses of a Spend Analysis**
- **Changes in the Transportation Services Market**
- **Contract Transactions for Transportation and Related Services**
- **Payment Transactions for Transportation Services**
- **Estimating Total Transportation Purchases**
- **Conclusions and Recommendations**

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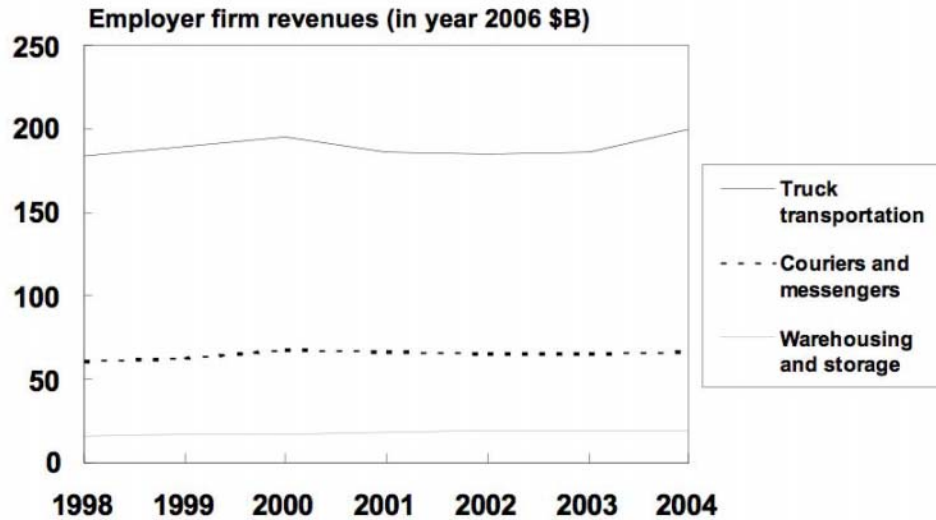
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Data on changes in the transportation service market vary by specific industry. The Service Annual Survey by the U.S. Census Bureau offers annual data on revenues for selected transportation industries. We use these to examine recent changes in the industries of truck transportation (North American Industry Classification System, or NAICS, three-digit code 484), couriers and messengers (NAICS 492), and warehousing and storage (NAICS 493). The quinquennial economic census, also conducted by the U.S. Census Bureau, offers less frequent data on revenue and employment for a wider variety of industries. We use these to examine some

recent changes in air transportation (NAICS 481) and water transportation (NAICS 483) not covered in the Service Annual Survey.¹ County Business Pattern (CBP) data, also collected by the U.S. Census Bureau, offer information on firms, employment, and payroll, including size of firms. We use these to assess consolidation in transportation industries.

¹ Other three-digit NAICS groupings within the two-digit categories for transportation (48) and warehousing (49) are rail transportation (482, for which data are not collected by the Census Bureau), transit and ground transportation (485, including, for example, public transit systems), pipeline transportation (486), scenic and sightseeing transportation (487), support activities for transportation (488), and postal service (491).

Slow Growth in Truck Transportation, Courier, and Warehousing Industries



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Source: U.S. Census Bureau (2006a)

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The Service Annual Survey can be used to analyze broad economic trends in the truck transportation, courier, and warehousing industries. It is a mail survey of approximately 60,000 selected service businesses with paid employees. The survey provides estimates of revenue and other measures for most traditional service industries. Broad transportation industries included in the survey are truck transportation (NAICS 484), couriers and messengers (NAICS 492), and warehousing and storage (NAICS 493).

Truck transportation is the largest of these three and, in fact, one of the largest of all transportation industries, with \$199.7 billion of revenues in 2004. (All dollar figures presented in this chapter are for the year 2006, with conversions made using the Bureau of Labor Statistics' [BLS] online Consumer Price Index [CPI] inflation calculator; see BLS [undated].) Its growth has been somewhat erratic, decreasing in real terms in 2001 and 2002 but increasing overall by 8 percent between 1998 and 2004.

The overall numbers for truck transportation disguise variation within it. For example, revenues in general freight trucking, long distance, truckload (NAICS 484121) increased by 24 percent to \$81.5 billion in 2004 from 1998. Those in general freight trucking, long distance, less-than-truckload (NAICS 484122) decreased 9 percent to \$31.2 billion.

Service Annual Survey data on truck miles traveled show that firms have been able to stabilize backhaul while total miles traveled have increased. This problem, reflected in miles

traveled by empty vehicles to points of origination, can raise prices for shippers. In 1998, 20 percent of miles were backhaul; in 2004, 19 percent were.²

Courier and messenger services (NAICS 492) had \$66.9 billion in revenues in 2004. This was an increase of 9 percent since 1998, albeit one that largely occurred in 1999 and 2000. Couriers (NAICS 4921) comprise nearly all this broad category, with \$63.2 billion in revenues in 2004, and were responsible for all growth in it, increasing 10 percent.

Warehousing and storage (NAICS 493) is much smaller than the other two industries shown, with \$19.1 billion in revenues in 2004, but it has grown more rapidly, by 18 percent, than the others since 1998. General warehousing and storage (NAICS 49311) comprises most of this sector, with \$11.7 billion in revenues in 2004. Refrigerated warehousing and storage (NAICS 49312) is the next largest industry in this category, with \$3.2 billion in revenues in 1998.

² More specifically, in 1998, trucks of employer firms traveled an estimated 77.5 billion miles, of which 15.5 billion, or 20 percent, were backhaul. In 2004, trucks traveled an estimated 87.8 billion miles, of which 16.9 billion, or 19 percent, were backhaul.

Economic Census Data Allow Comparisons in Other Industries

- **Conducted at five-year intervals since 1967, but**
 - **Transportation industry surveyed less intensively before 1992, and some individual industries (e.g., railroads) are never surveyed**
 - **Some data comparability problems**
- **We examine 1997 and 2002 data for**
 - **Air transportation (excluding large passenger carriers)**
 - **Water transportation**

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The quinquennial economic census can be used to analyze broad economic trends in the air and water transportation industries. Conducted since 1967, these censuses offer less frequent but more detailed data on industries, including transportation industries not included in the Service Annual Survey. The census, conducted by mail, includes data on business characteristics such as payroll, employees, revenue, legal form, and product line.

There are some limits to these data. They are not collected as frequently as the Service Annual Survey and therefore do not offer much trend data on industry size. Transportation, utility, and communication industries were not covered completely until 1992, and some transportation industries, such as railroads and large scheduled air certificated passenger carriers that report data to other agencies, are always excluded. Changes in industrial classification systems in the late 1990s mean that recent data cannot be readily compared to earlier data.

Nevertheless, the economic census allows us to examine detailed data on two transportation industry classifications not covered elsewhere: air transportation (NAICS 481, excluding large certificated passenger carriers) and water transportation (NAICS 483).

Air Transport of Freight Is Shifting to Nonscheduled Carriers

	Revenues (2006 \$B)			Paid employees (1,000s)		
	1997	2002	% change	1997	2002	% change
Total air transportation (NAICS 481)	25.6	22.3	-13	89.1	99.1	11
Scheduled freight (481112)	5.17	3.65	-29	23.2	22.9	-1
Non-scheduled freight (481212)	0.97	1.31	35	4.0	4.4	11
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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Source: U.S. Census Bureau (2006b).

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Air transportation firms (NAICS 481) included in the economic census (and excluding large certificated passenger carriers) had estimated revenues of \$22.3 billion in 2002, a decrease of 13 percent since 1997. Employment in this sector increased 11 percent.

Within this broader category, we present data on two categories of more specific interest to DoD transportation managers: scheduled freight air transportation (NAICS 481112), abbreviated as “scheduled freight” in the chart, and nonscheduled chartered freight air transportation (NAICS 481212), shown as “non-scheduled freight.” Scheduled freight air transportation is provided by “air carriers fly[ing] regular routes on regular schedules and operat[ing] even if flights are only partially loaded” (U.S. Census Bureau, 2002). Nonscheduled chartered freight air transportation is provided by “carriers often operat[ing] during nonpeak time slots at busy airports” and with more flexibility on “choice of airport, hours of operation, load factors, and similar operational characteristics” (U.S. Census Bureau, 2002).

The scheduled freight air transportation industry, with \$3.65 billion in revenues in 2002, was about three times as large as the nonscheduled chartered freight air transportation industry, with \$1.31 billion in revenues in 2002. Nevertheless, revenues in the scheduled freight air transportation industry shrunk by more than a fourth in real terms between 1997 and 2002,

with employment shrinking 1 percent as well. Revenues in the nonscheduled freight air transportation industry increased by more than a third between 1997 and 2002.³

The freight air transportation industry is concentrated among the largest firms. The four largest firms (of 208) in scheduled freight air transportation account for 64 percent of revenue in it. The four largest firms (of 231) in nonscheduled freight air transportation account for 37 percent of revenues in it; the eight largest account for 55 percent.

³ One possible reason for the decrease in scheduled freight air transportation industry revenues is the use of firms outside the industry to ship freight by air. In particular, there has been increasing use of integrated carriers “to meet the growing demand for time-definite and deferred services. Time-definite means getting the goods where they need to be when the shipper wants them there, but it does not necessarily mean overnight. Deferred services refers to the use of ground transportation for airfreight products in situations where integrated carriers like [United Parcel Service of America], Roadway [Express], and Landair [Transport] offer faster, reliable transportation. . . . Shippers are able to generate the savings of [just-in-time] inventory management without relying on overnight services due to carrier improvements in efficiency” (Leenders et al., 2002, p. 429).

Water Transportation Industry Is Shrinking

	Revenues (2006 \$B)			Paid employees (1,000s)		
	1997	2002	% change	1997	2002	% change
Total water transportation (NAICS 483)	29.9	26.3	-12	72.9	66.2	-9
Deep-sea freight (483111)	14.4	7.4	-49	18.5	12.7	-31
Coastal and Great Lakes freight (483113)	5.8	5.7	-2	21.7	21.3	-2
Inland water freight, except towing (483211)	3.5	2.8	-19	10.6	11.6	9
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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Source: U.S. Census Bureau (2006b).

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Water transportation firms (NAICS 483) in the economic census had \$26.3 billion in revenues in 2002, a decrease of 12 percent since 1997. Employment in this sector decreased 9 percent between 1997 and 2002.⁴

Within the broad category of water transportation, we present data on three categories of more specific interest to DoD transportation managers: deep-sea freight transportation (NAICS 483111), coastal and Great Lakes freight transportation (NAICS 483113), and inland waterway freight transportation except towing (NAICS 483211). These three (exclusive) industry categories accounted for 61 percent of revenues in water transportation industries in 2002, although their share of revenues is shrinking.

The deep-sea freight transportation industry is contracting rapidly, with a 49-percent decrease in revenues and a 31-percent decrease in employment between 1997 and 2002. Inland water freight revenues decreased 19 percent, although its employment increased 9 percent. Coastal and Great Lakes freight transportation decreased only 2 percent in revenues and 2 percent in employment.

The overall shrinkage in the water transportation industry is most closely linked to that in deep-sea freight transportation. This industry accounted for 48 percent of revenues in the

⁴ In contrast, international seaborne trade is growing about 4 percent per year and has nearly doubled in the past quarter century (UNCTAD, 2005).

broad category in 1997 but only 28 percent in 2002. In July 2002, the year of the last economic census, the number of privately owned oceangoing commercial U.S.-flag ships was down to 231 ships (Kesteloot, 2003). This number, a new low, represented a loss of 34 ships in just the previous year and of 139 ships since 1990. The U.S. Department of Transportation Maritime Administration and DoD have a number of programs to ensure that the U.S. commercial fleet can support national security in times of need. For example, under the VISA, established in 1997, carriers agree to support DoD deployment contingency needs in exchange for subsidies from the Maritime Security Program and priority over non-VISA participants in DoD transportation procurements.⁵

Coastal shipping likely remained relatively steady for two reasons. First, federal regulations now require U.S.-flag shipping vessels to have at least 75-percent ownership by U.S. citizens. Second, public officials are encouraging use of “short-sea shipping” to shift freight transportation from crowded coastal highways, particularly in the northeastern United States (Kesteloot, 2003).

Levels of business concentration among the largest firms in water transportation industries are roughly similar and generally below those for air transportation firms. In 2002, the top four firms accounted for

- 33 percent of revenues among the 1,416 water transportation firms (NAICS 483)
- 32 percent of revenues among the 901 deep-sea freight transportation firms (NAICS 483111)
- 27 percent of revenues among the 494 coastal and Great Lakes freight transportation firms (NAICS 483113)
- 46 percent of revenues among the 235 inland water freight firms (NAICS 4832111).⁶

⁵ For more on the VISA, see Appendix A as well as USDOT (2003).

⁶ Inland water freight here includes towing. Data on concentration on inland water freight excluding towing (NAICS 4832111) firms are not available.

Is the Transportation Industry Consolidating?

- **Large levels of concentration and decreasing number of firms in some industries provide suggestive, but not definitive, evidence**
- **Broader consolidation of industry into fewer, larger firms could affect ability of DoD to meet small business goals**
- **To examine broader consolidation in transportation industry, we reviewed County Business Pattern data on firms by number of employees**

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The large levels of concentration in the air transportation industry; the shrinking number of firms in deep-sea freight transportation; and mergers, acquisitions, and bankruptcies among transportation firms suggest some consolidation in the transportation industry.⁷ The evidence we have reviewed so far, however, is only suggestive for the broader transportation industry and cannot be considered definitive.

The question of consolidation in the transportation industry is important to DoD for at least two reasons. First, consolidation could affect the options that DoD has for procuring transportation services. Although having a lower number of firms in the transportation industry need not adversely affect DoD procurement—especially should the military be able to develop strategic relationships with the remaining larger suppliers—DoD transportation managers should still be aware of such trends. Second, consolidation may affect the opportunities DoD has to meet goals for procurement from small businesses. At present, DoD, like all federal agencies, has a mandate to spend 23 percent of its prime contract dollars for pro-

⁷ For broader historical discussion of mergers, acquisitions, bankruptcies, and other consolidation in the transportation industry, see Leenders et al. (2002).

cured goods and services with small businesses.⁸ Consolidation of transportation industries into fewer, larger firms can make meeting such goals more difficult.

To examine the extent to which consolidation may be occurring across transportation service industries, we examined CBP data since 1998 (the first year in which CBP data were gathered by NAICS rather than Standard Industrial Classification [SIC] code). CBP data, extracted from the U.S. Census Bureau's Business Register, Company Organization Survey, and other Census Bureau programs such as Current Business Surveys, include aggregate data on the number of U.S. firms and number of employees per firm by NAICS code.

CBP data are not ideal for examining consolidation and, particularly, whether the number of small businesses is changing within an industry. CBP data classify firm employment only by broad categories (1–4, 5–9, 10–19, 20–49, 50–99, 100–249, 250–499, 500–999, and 1,000 or more). Furthermore, for federal procurement purposes, firms may be classified as *small* either by their number of employees or by their annual revenues (SBA, 2006). Among transportation industries, employment size is used to define *small* businesses in water transportation, annual revenue is used to define such businesses in truck transportation, and both employment size and annual revenue are used to define *small* air transportation firms.⁹

Nevertheless, to use CBP data for analysis of consolidation within the transportation industry, we examined the proportion of firms in selected industries with at least 500 employees. We believe this to be appropriate for two reasons. First, 500 employees is the most common size standard used to define small businesses by employment size across all industries.¹⁰ Second, it is the lower of the two common employee-size standards used by the U.S. Small Business Administration (SBA) to define *small* transportation firms.¹¹ Its application should therefore provide a conservative estimate of small business participation within a specific industry.

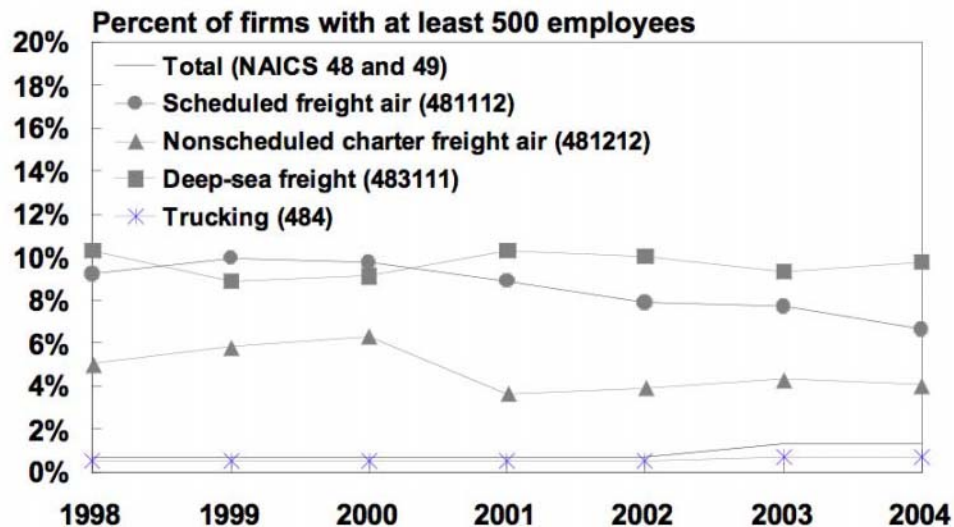
⁸ For more on this goal and its evolution, including difficulties DoD may have in meeting it in future years, see Grammich et al. (forthcoming). For discussion of how DoD purchasing from small businesses varied by industry, see Reardon and Moore (2005).

⁹ For example, nonscheduled chartered passenger air transportation firms (NAICS 481211) are defined as *small* if they have fewer than 1,500 employees, regardless of their annual revenues. There is an exception within this particular industry for offshore marine air transportation service firms, however, which are considered small if they have fewer than \$25.5 million in annual revenues, regardless of their number of employees.

¹⁰ For a complete listing of size standards by six-digit NAICS codes, see SBA (2006).

¹¹ Small businesses in all water transportation industries are those with no more than 500 employees. Courier and air transportation businesses—in industries in which small businesses are defined by numbers of employees—are those with no more than 1,500 employees.

There Is Little Evidence That Transportation Firms Are Increasing in Size



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Source: Small Business Administration (2006a)

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Few firms have at least 500 employees. In 2004, only 0.3 percent of all firms in all industries had at least 500 employees; among transportation and warehousing firms, 1.3 percent did.

The proportion of transportation firms with at least 500 employees increased from 0.7 percent to 1.3 percent between 2002 and 2003, but there is still little evidence of consolidation in industries of interest to DoD transportation planners. The proportions of firms with at least 500 employees decreased in 2004 for three of the four individual industries shown above, with that for the fourth, deep-sea freight, still being below the 10-percent threshold it reached in earlier years.

Across all transportation industries, in only four of nine broad groupings—air transportation (NAICS 481), water transportation (NAICS 483), pipeline transportation (NAICS 486), and warehousing and storage (NAICS 493)—did more than 2 percent of firms have at least 500 employees. Of these four, only in warehousing and storage was the proportion of firms with at least 500 employees greater in 2004 than in 1998. Put another way, these data indicate the challenges DoD faces in ensuring small business participation in providing transportation services may not be worsening.¹²

¹² Among far smaller firms, it appears that the only possible challenge to DoD small business procurement goals may be the failure of such firms to increase as rapidly in number as others. In 1998, for example, 88.0 percent of transportation and warehousing firms had 20 or fewer employees; in 2004, only 87.4 percent did. Nevertheless, the number of such small

Analysis of the most recent economic census microdata, showing specific characteristics for anonymous individual firms, could be a source of valuable information to DoD transportation purchasers, particularly in studying whether trends in revenue mimic those in employment. Should such data indicate that the largest firms are increasing their share of revenue, DoD may wish to consider what such concentration might mean for its small business procurement efforts. For now, however, our analysis of employment size by firm within transportation industries indicates little concentration in recent years.

This chapter has reviewed several broad trends in the transportation industry that may affect DoD contracting opportunities. What new opportunities may await DoD depend as well on its current practices. We turn next to sources of data on these.

transportation firms increased from 136,213 in 1998 to 144,065 in 2004. Furthermore, this threshold is far below the 100-employee threshold, which is the lowest for defining small business in *any* industry.

Contract Transactions for Transportation and Related Services

Outline

- **Introduction**
- **Uses of a Spend Analysis**
- **Changes in the Transportation Services Market**
- ***Contract Transactions for Transportation and Related Services***
- **Payment Transactions for Transportation Services**
- **Estimating Total Transportation Purchases**
- **Conclusions and Recommendations**

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As mentioned earlier, there is no single, exhaustive source of data on DoD transportation expenditures. Rather, transportation data must be pieced together from several disparate sources.

Among these, DD350 data on contract transactions deserve special attention both for the overall proportion of transportation spend included in them as well as for the detail they offer on categories of transportation spend data. DD350 data account for more than \$4.9 billion, or 73 percent, of the approximately \$6.7 billion DoD spend on transportation services in FY 2003 as well as nearly \$5.2 billion in FY 2004. In addition, as noted earlier, DD350 data

include information on contract value, purchase office code, provider, industry classification, number of solicitations and offers, type of market (e.g., sole source or competitive), and provider's socioeconomic status (e.g., whether the provider is a small or disadvantaged business).

Summary of FY 2004 DD350 Transactions for Transportation, Travel & Relocation Purchases

• Prospective target areas		
–	\$5,169 M in purchases	
–	406 different purchase office codes	
–	6,281 different contracts	
–	14,065 contract transactions	
–	3,405 different contractor I.D. Codes	
–	3,061 different parent company I.D. Codes	
–	33 different Federal Supply Class (FSC) Codes	
• Prospective challenges		
	<u>% of \$s</u>	<u>% of contracts</u>
– Sole source contracts	5	29
– Three or more bids	85	45
– Small business contracts	12	39
– Purchase orders	4	78

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Altogether, DD350 purchases of transportation, travel, and relocation services totaled \$5.169 billion in FY 2004. Traditionally, purchases recorded in DD350 data have been limited to contract actions of at least \$25,000, although a small portion of contract dollars we examine is for smaller actions.¹ Although such purchases do not encompass all DoD purchases for transportation, travel, and relocation services, they still reveal a great deal about the complexity of such purchases.

These data show that, in FY 2004, 406 different purchase office codes procured transportation and related services through 6,281 contracts and 14,065 contract transactions with a large number of suppliers and their subsidiaries, represented by 3,405 contractor ID codes, owned by 3,061 parent firms.² On average, DoD spent \$822,958 on each of these contracts,

¹ Beginning in FY 2005, FAR 4.602(c)(1) required contract actions of at least \$2,500 to be recorded on DD350 forms. Previously, purchases of \$2,500 to \$25,000 were only summarized on DD1057 forms. Defense agencies have implemented this at varying paces in recent years. In FY 2003, 11.5 percent of DD350 contract actions were for transactions between \$0 and \$25,000; in FY 2004, 3.5 percent of DD350 actions were for such transactions. In both years, the total dollars spent on such small contract actions were less than 0.01 percent of those spent on more traditional DD350 actions for transactions of at least \$25,000. Put another way, for the period we consider, transportation actions and, particularly, dollars reported in DD350 data were concentrated among contract actions of at least \$25,000.

² For data collection purposes, the DoD assigns codes to each unique purchasing or contracting activity. Because there can be more than one purchasing activity and, therefore, code at a location, we use the term *purchase office code*, which is

\$367,473 on each contract action, and \$1,688,664 with each parent company. Median values, however, were much lower: \$15,392 for contracts, \$11,550 for actions, and \$19,389 for parent companies.

These contracts were for a wide range of transportation and related services represented by 33 PSCs. PSCs are federal government indicators of service classes that are often more finely grained than the NAICS codes developed by the U.S. Department of Commerce. Appendix D provides a full list of transportation-related PSCs in which DoD purchases services. We define transportation and related spending as that for all PSCs beginning with V, or, as we later refer to it, PSC Vxxx, which covers all expenses for transportation, travel, and relocation purchases. This is a very broad category, for which (particularly in examining combined DD350 and PowerTrack purchases) we will later assess some subsets of particular interest to TRANSCOM.

The DD350 data point to both challenges and opportunities for improving transportation purchasing practices. For example, sole-source and single-source contracts account for 29 percent of DD350 contracts and 5 percent of DD350 contract dollars for PSC Vxxx. A limited number of available suppliers can affect efforts to implement new PSM initiatives, particularly when no other supplier is available. At the same time, 45 percent of Vxxx contracts and 85 percent of Vxxx contract dollars had three or more bidders. This indicates that DoD is purchasing many transportation-related services in competitive markets for which suppliers may be more willing to cooperate with buyers in implementing new PSM practices.

Small businesses hold 39 percent of DD350 contracts and receive 12 percent of DoD contract dollars for PSC Vxxx. Some of these contracts may stem from federal goals for small business procurement. As noted earlier, DoD, like all federal agencies, has a statutory goal to spend 23 percent of its prime contract dollars for procured goods and services with small businesses. As we will later see, DD350 data substantially underestimate the actual proportion of transportation dollars that are spent with small businesses. Meeting small business goals can present some challenges to introducing best PSM practices such as supply base rationalization and consolidation. We will later review how DoD can improve its PSM practices for transportation while continuing to fulfill small business policy goals.

Some best PSM practices seek to reduce the number of contracts an enterprise holds for a particular service or with a particular supplier. Identifying whether these options would be relevant to TRANSCOM is difficult to do with DD350 data alone. Some “contracts” for transportation services are actually purchase orders off master solicitations. In other words, these appear to be multiple numbers of contracts but are actually part of a best purchasing practice already instituted. As we discuss later, many of DoD’s small purchases of transportation services do not appear in DD350 data. Nevertheless, although we focus on other indicators for

also the name of the data element in the DD350 data, rather than *purchasing office* or a similar variant. Similarly, contractor ID codes denote physically separate facilities or sites or independent business units. A company (e.g., FedEx) with more than one facility or one business unit (e.g., FedEx Express, FedEx Ground, FedEx Kinko’s) can have more than one contractor ID code. Because DD350 records the purchase office code associated with the contract award and not necessarily the shipper purchasing transportation services, the actual number of shippers and their transactions can exceed the number of DD350 purchase office codes and DD350 transactions.

applying best PSM practices, we also note some opportunities for consolidating the supply base or increasing DoD leverage with suppliers.

One way to increase leverage and improve PSM practices generally is to have an organization within the enterprise that has the most expertise with a commodity be responsible for purchasing that commodity. One broad way to apply such a practice is to have TRANSCOM and its component commands purchase transportation services for all DoD. TRANSCOM has maintained its leadership in transportation purchasing even as purchases of transportation and related services have sharply increased, possibly as a result of recent operations in Afghanistan and Iraq. While the total value of DD350 Vxxx purchases by DoD increased from \$2.5 billion to in FY 2001 to \$5.2 billion in FY 2004, the proportion made outside TRANSCOM purchase office codes³ decreased from 14.7 to 13.9 percent.

³ TRANSCOM purchases are those made from purchase office code QA02 in AMC; W81GYE in SDDC; and G0133, G0233, G0333, G0433, G0633, G0733, G0833, G1979, G1980, G2205, G2381, G2404, G308A, and G8779 in MSC. All other DD350 purchases for PSC Vxxx, including those made from purchase office codes G6077 in MSC and QA06, QA07, QA08, QA09, QA12, QA14, QA24, QA25, QA26, QA27, QA28, QA29, and QA30 in AMC, are considered non-TRANSCOM purchases.

TRANSCOM Offices Make Most DD350 Transportation Purchases for DoD

Code	Purchase office	Component*	\$M	Ctrx	Actions
QA02	HQ AMC/DOY	AMC	2,171	868**	2,760
W81GYE	HQ, MTMC	SDDC	1,227	121	267
G0333	Military Sealift Command	MSC	483	21	117
G0633	Military Sealift Command	MSC	452	143	248
G0233	Military Sealift Command	MSC	71	11	44
W91QUZ	ACA, ITEC4	Other	63	14	73
NJ30A	Naval Regional Contracting Center	Other	57	26	42
G0133	Military Sealift Command HQ	MSC	56	40	93
G6077	TAGOS Support Unit Atlantic	MSC*	54	2	16
W52P1J	U.S. Army Industrial Operations	Other	33	2	131
<i>All Other</i>			499	5,038	10,274
<i><u>Total</u></i>			<u>5,169</u>	<u>6,281</u>	<u>14,065</u>
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.					

*AMC, MSC, and SDDC purchases listed are within TRANSCOM, except those for Purchase Office Code G6077, which is outside TRANSCOM.

**Many of these are purchase orders off a master solicitation.

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FY2004 DD350, PSC Vxxx

Spending for transportation and related services is concentrated within a few offices of TRANSCOM. In fact, just two TRANSCOM purchase office codes account for 66 percent of Vxxx spending, while the top four offices account for 84 percent.

Above we list the top 10 purchase office codes ranked by DD350 dollars they spent in FY 2004 on transportation-related services (PSC Vxxx). Columns for this table include

- Code, the alphanumeric purchase office code for each office
- Purchase office, the name listed for it in the DD350 data
- Component, whether the office was part of the AMC, MSC, SDDC, or another part of the military
- \$M, the number of dollars, in millions, that each office spent on transportation and related services in FY 2004
- Ctrx, the number of contracts each code had for transportation and related services
- Actions, the number of actions each code had through these contracts.

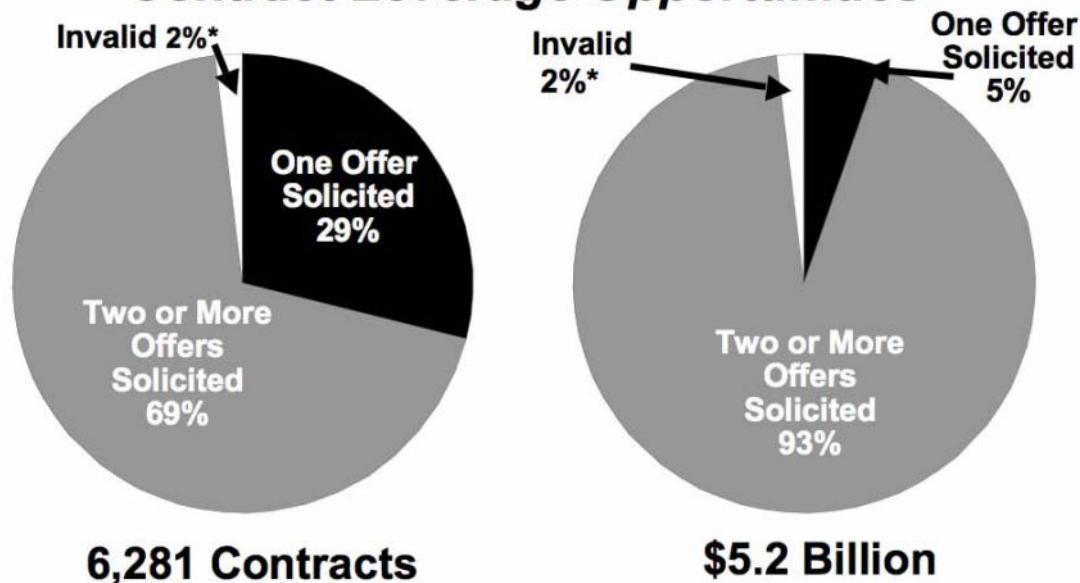
Top purchasers were consistent in FY 2003 and FY 2004. Of the top 10 listed above, eight were also in the top 10 for FY 2003.

Remaining transportation spending occurs in a wide variety of offices, and often for services of less interest to TRANSCOM (e.g., lodging). Altogether, more than 350 purchase office

codes made purchases for transportation and related services in FY 2003, and more than 400 did so in FY 2004. Fewer than 20 purchase office codes are associated with TRANSCOM but hundreds of DoD purchasers of transportation and related services outside TRANSCOM.

Some of this spend may be fragmented through a large number of contracts that increase transaction costs and reduce the buyer's power to negotiate price discounts and improvements in quality while also limiting supplier economies of scale or scope as well as other opportunities to reduce supply chain costs. The extent to which spend is fragmented through multiple contracts, however, is difficult to evaluate in some TRANSCOM component command purchase offices. For example, many of the 868 "contracts" held by the purchase office code for the directorate of operations at AMC headquarters (HQ AMC/DOY) are actually multiple purchases made off a single, master solicitation (Moore, Cook, et al., 2004). A single, master solicitation for such a large number of purchases is precisely the type of best PSM practice that TRANSCOM should pursue, but one whose actual implementation is obscured in these data.

Sole or Single Source Solicitations May Limit Contract Leverage Opportunities



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*Invalid data on solicitations for 125 DD350 contracts, representing 2 percent of all contracts. These contracts also accounted for 2 percent of all dollars expended through DD350 contracts. Source: FY04 DoD-wide DD350 data for PSC Vxxx.

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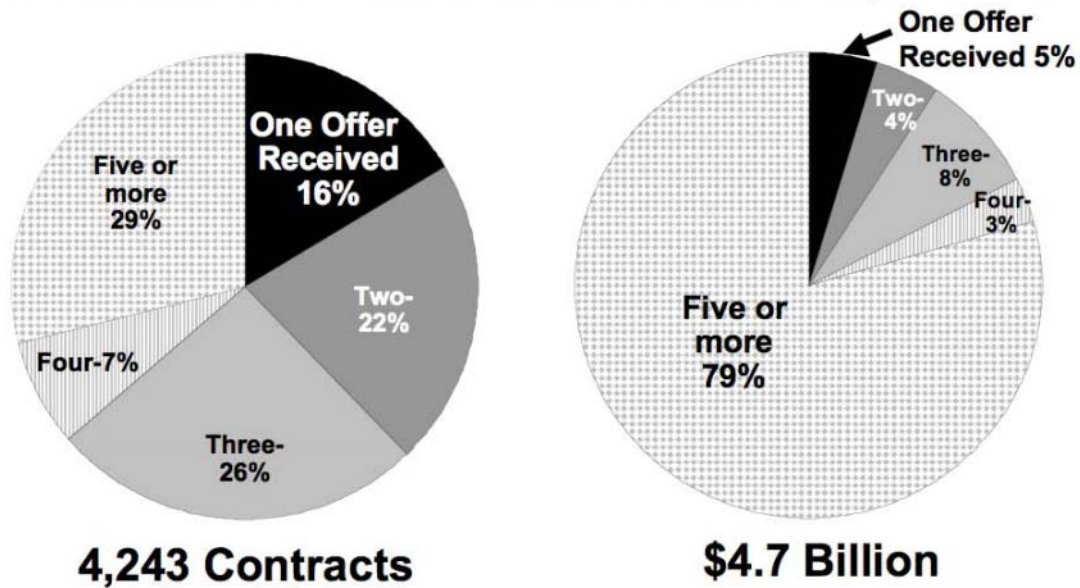
Some purchases for transportation and related services are on contracts designated as sole source or single source. We consider a contract to be sole or single source if it had at least one sole- or single-source action on it.

Unfortunately, these are not differentiated unambiguously in DD350 data. Implications for PSM differ considerably by whether a contract is sole source, i.e., one for which only one supplier has, or is judged to have, the required capability, or single source, i.e., one for which a single source may be selected for other reasons.

A great many sole- and single-source contracts—1,093 of 1,845 total—are for lodging. It is not clear whether these contracts are for establishments providing the only lodging in a given area or for establishments that DoD has chosen as a single source for other reasons.

Because we could not examine DD350 purchases by route, we do not know how many transportation-related purchases are for locations that have only one carrier providing services from or to it. Determining this would indicate what cost savings may be realized in sole- or single-source contracts or what multiple sole- or single-source contracts might be consolidated so as to reduce transaction costs for both the shipper and carrier.

Number of Offers Received on Competitive Solicitations* Shows Limits of Competition



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*Data are for number of offers received for contracts for which there was more than one solicitation and for which the number of offers is known.

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Even when soliciting more than one offer for a transportation service, there were still some limits to competition, particularly on individual contracts. On Vxxx contracts for which more than one offer was solicited, nearly two in five had only one or two offers received, and nearly two in three had three or fewer offers received. Nevertheless, more than \$4 in \$5 spent on such contracts was on contracts for which at least five offers were received.

Again, because we could not analyze DD350 transportation spend by route or destination, we do not know how many of these purchases are for locations that have only limited transportation service.

Data on Dollars by PSC Show Both Leveraged and Fragmented Spending

Rank	Name	\$M	Ctrx	Sole-srce \$	Small biz \$	Leading purchaser	
						Name*	% total \$
1	Passenger Air Charter	1,189	828**	0.0	5.5	AMC	99.8
2	Marine Charter for Things	1,105	218	14.2	21.9	MSC	95.0
3	Air Charter for Things	973	76	0.4	6.1	AMC	99.5
4	Vessel Freight	873	47	0.0	2.6	SDDC	99.9+
5	Other Cargo and Freight	242	158	2.4	1.9	SDDC	97.2
6	Lodging	173	2,938	21.7	40.5	Other	95.8
7	Motor Freight	109	178	1.8	27.9	Other	58.3
8	Other Services	108	179	7.1	15.6	Other	84.6
9	Air Freight	7	42	40.8	24.1	Other	83.7
<i>All other</i>		<i>389</i>	<i>1,664</i>	<i>12.8</i>	<i>32.6</i>	<i>Other</i>	<i>72.1</i>
<i>TOTAL</i>		<i>5,169</i>	<i>6,281</i>	<i>5.2</i>	<i>12.4</i>	<i>AMC</i>	<i>42.0</i>
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.							

*AMC, MSC, and SDDC purchases listed are those only within TRANSCOM; for example, this table indicates 95.0 percent of DoD purchases for PSC V124 are made by MSC offices that are within TRANSCOM.

**Many are purchase orders off a master solicitation.

FY2004 DD350, PSC Vxxx

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One way to examine how an enterprise is leveraging—or, conversely, fragmenting—its spending is to examine who the leading purchaser is of a given service. Ideally, for example, AMC would purchase all air transportation services for DoD, including passenger air charter, air charter for things, and airfreight.

The table shows the transportation and related PSCs on which DoD spends the most money. Columns for this table include

- Rank, where each PSC ranks by dollars in FY 2004 among all transportation and related PSCs within Vxxx
- Name, the name for each PSC
- \$M, millions of dollars spent on DD350 contracts associated with each PSC in FY 2004
- Ctrx, the number of DD350 “contracts” associated with each PSC in FY 2004
- Sole-srce \$, the proportion of DD350 dollars in each category spent with sole- or single-source suppliers
- Small biz \$, the proportion of DD350 dollars in each category spent with small businesses

- Leading purchaser name, indicating whether TRANSCOM purchase offices within AMC, MSC, or SDDC were the leading purchaser of the commodity or whether the residual “other” category was the leading purchaser
- Leading purchaser % total \$s, indicating how much of the commodity the leading purchaser purchased in FY 2004 (the top line, for example, indicates that AMC purchase offices spent 99.8 percent of DoD DD350 dollars for passenger air charter services).

Just as TRANSCOM component command purchase office codes ranked at the top of purchase offices procuring transportation services, so here TRANSCOM component command purchase office codes are responsible for virtually all DD350 spending in categories that dominate DoD transportation spending. Further down the list of related services, other, non-TRANSCOM offices are responsible for most DoD spending within a category. This is perhaps not surprising for widely needed lodging services or for the catchall PSC V999 used for “other services,” but it is more striking for services such as motor freight and airfreight.

The large, non-TRANSCOM spend for motor freight is primarily the result of a \$52.5 million contract of a Naval Regional Contracting Center (purchase office code NJ30A) with Raith Engineering and Manufacturing. Other non-TRANSCOM offices also spent \$11 million for motor freight services, while SDDC offices of TRANSCOM spent \$45 million.

Virtually all DoD DD350 monies for airfreight, or \$7.2 million of \$7.5 million in FY 2004, were spent by non-TRANSCOM offices. (We list airfreight as a separate category in this table both to contrast it with air charter for things and to address specific interests of TRANSCOM personnel.) Rather than airfreight, TRANSCOM relied more on air charter for things, spending \$968 million on this category in FY 2004, while the rest of DoD spent \$5 million. Transportation planners may wish both to explore situations in which air charter for things does not meet the needs of airfreight customers, i.e., situations which may lead to maverick buying that fragments spend for this commodity, and to leverage more airfreight purchases.

Many of the categories on which DoD spends the most dollars are also those in which it has the most contracts. DoD has more contracts for lodging than any other transportation-related service, which is not surprising given the likely widespread need for it from the hundreds of providers who supply it.⁴ The second highest number of contracts is in passenger air charter services, but many of these “contracts” are actually purchase orders made off master solicitations.

The third highest number of contracts among categories listed in this table is for Marine Charter for Things. Again, this may be a result of a high number of carriers needed for a variety of destinations, although DoD and TRANSCOM may want to explore consolidation of the 218 contracts shared among 95 supplier parent firms.

⁴ There were 1,836 contractor ID codes associated with the 2,938 contracts for lodging. Similar patterns of high numbers of contracts and contractor ID codes are evident among the transportation services with the third highest number of contracts, passenger motor charter service, and the fourth highest number of contracts, motor passenger service. DoD spends relatively little DD350 funds on these other services. It spent \$20 million on motor passenger services, of which no expenditures in FY 2004 were from TRANSCOM, and \$26 million on motor charter service, of which 12 percent was from TRANSCOM. We later discuss some implications of the high number of contracts for motor charter and passenger service.

The fourth highest number of contracts listed in this table is for “other services,” perhaps not surprising given the catchall nature of this category. The fifth highest number of contracts listed in this table, for motor freight, PSC V112, may be worth further investigation. As noted, most DoD spend for this category is in a single, non-TRANSCOM contract with Raith Engineering. The rest, however, is split among 177 contracts held by 133 firms. Even the TRANSCOM portion of this spend is highly fragmented, divided among 47 contracts held by 34 firms. We will later discuss the consequences of such fragmented spending for motor freight when examining other data on trucking services.

The categories listed in this table are generally competitive, but there are exceptions. In particular, more than 10 percent of DD350 dollars spent on marine charter for things, lodging, and airfreight are sole or single source. Although such contracts may limit PSM innovations, they need not exclude them. For example, several sole-source contracts with a single supplier could be consolidated.

Many of these categories have high levels of small business participation, but some lag. Small business participation for passenger air charter services, air charter for things, vessel freight, and other cargo and freight are all below 10 percent. Should DoD demand for these services already dominated by large businesses increase—and that for passenger air charter, air charter for things, and vessel freight are all several times higher than what they were in the late 1990s—then DoD may find these areas posing a challenge to its overall small business goals.

Little Overlap Between DoD and Other Federal Transportation Spending

DoD			Other Federal		
PSC	Name	\$M	PSC	Name	\$M
V121	Air Charter for Things	1,533	V126	Space Transport, Launch	158
V124	Marine Charter for Things	1,170	V213	Rail Passenger Services	89
V221	Passenger Air Charter	1,008	V221	Passenger Air Charter	87
V119	Other Cargo and Freight	252	V301	Relocation Services	46
V115	Vessel Freight	161	V231	Lodging—Hotel/Motel	41
V231	Lodging—Hotel/Motel	160	V225	Ambulance Services	25
V114	Stevedoring	130	V003	Packing/Crating Services	16
V999	Other Transportation Svcs.	96	V212	Motor Passenger Services	16
V003	Packing/Crating Services	59	V999	Other Transportation Svcs.	14
V002	Motor Pool Operations	58	V121	Air Charter for Things	11
All Other		283	All Other		58
TOTAL		4,918	TOTAL		560
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.					
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FY2003 DD350 and FPDS, PSC Vxxx

To consider leverage opportunities for transportation services, we examined other federal purchases in transportation and related PSCs. Unfortunately, given difficulties in aggregating purchases across the federal government in the new Federal Procurement Data System—Next Generation (FPDS-NG), FY 2003 was the most recent year for which we could easily compare data. These data revealed relatively little overlap with DoD purchases.

Altogether, DoD spends about nine times through DD350 contracts what all other federal agencies do for transportation services and thus may be the most important federal customer for many transportation suppliers. Among the top 10 transportation PSCs in which DoD purchased in FY 2003, five were also in the top 10 for the rest of the federal government, but, for each of these five, DoD spent from four to 140 times what other federal agencies did. Some services, e.g., lodging, may be so localized as to preclude more leveraged spending, while others, e.g., “other transportation, travel, and relocation services,” are so general as to also preclude specific efforts for more leveraged purchasing.

The data also show some continuity in DoD transportation purchases. Seven of the top eight services shown previously for FY 2004 also appear among the top eight services listed in this table.

Transportation Spending Is Concentrated Among a Few Top Suppliers

Name	\$M	Ctrx	Ctr IDs	PSCs	Purch Off Code	Leading purchaser	
						Name	% total
North American Airlines	962	3	1	3	1	AMC	100
FedEx Corp	948	20	8	9	42	AMC	98.7
A P Moller Maersk Group	639	21	7	3	5	SDDC	48.6
Government of Singapore	226	3	3	2	2	SDDC	94.2
General Dynamics Corp	225	6	6	1	2	MSC	100
Wallenius Wilhelmsen Lines	204	2	1	1	1	SDDC	100
P & O Nedlloyd Container Line	198	1	1	1	1	SDDC	100
Patriot Holdings LLC	150	1	1	1	1	MSC	100
Ocean Shipholdings Inc	73	5	5	1	1	MSC	100
Air Transport International	68	2	1	2	1	AMC	100
<i>All other</i>	<i>1,476</i>	<i>6,217</i>	<i>3,371</i>	<i>33</i>			
<i>TOTAL</i>	<i>5,169</i>	<i>6,281</i>	<i>3,405</i>	<i>33</i>		<i>AMC</i>	<i>42.0</i>
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.							

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FY2004 DD350, PSC Vxxx

One way to examine PSM practices with leading suppliers is to examine the number of contracts and dollars these suppliers have as well as whether purchasers with expertise in a given commodity are leading efforts to leverage spending with a supplier. Ideally, a buyer with the most expertise in a given firm's services would be responsible for purchases from that supplier, and purchases would be made with as few contracts and associated administrative expenses as possible.

To examine how well DoD meets these ideal practices, we show in this table its leading suppliers of transportation services. Columns for this table include

- Name, the name of each leading supplier
- \$sM, millions of dollars spent on DD350 contracts for transportation services with each leading supplier in FY 2004
- Ctrx, the number of DD350 contracts for transportation services with each supplier
- Ctr IDs, the number of contractor ID codes, sometimes indicating autonomous business units, with each supplier
- PSCs, the number of PSCs in which each supplier sells transportation services
- Purch Off Code, the number of purchase office codes associated with contracts for each supplier

- Leading purchaser name, indicating whether TRANSCOM component command purchase offices within AMC, MSC, or SDDC were the leading purchaser of transportation services from the firm listed
- Leading purchaser % total, indicating what proportion the leading purchaser bought of all transportation services it supplied to DoD (the top line, for example, indicates that AMC purchased 100 percent of all transportation services that North American Airlines sold to DoD through DD350 contracts).

DoD transportation spending through DD350 contracts is concentrated with a few large suppliers. The top three firms account for 49 percent of DD350 dollars spent for transportation services in FY 2004, while the top 10 account for 71 percent.

Relatively few contracts are used for the top suppliers, which indicates that DoD and TRANSCOM in particular are leveraging their dollars with these suppliers. Only two of the suppliers listed in this table have more than a half dozen contracts. Half have only as many contracts as they have contractor ID codes (possibly indicating autonomous business units across which contracts are not easily consolidated). Transportation services that these suppliers provide are, in nearly every case, limited to three or fewer PSCs.

Analyses not shown here indicate that these firms are offering competitive services, which indicate opportunities for continuous improvements where DoD business is being leveraged. Only three firms listed in this table received any sole-source dollars for transportation services, and only one (General Dynamics) received more than 1 percent of its dollars for transportation services in sole-source contracts.

In only two cases in this table are more than two purchase office codes associated with transportation contracts for a supplier. In only one case is the leading TRANSCOM purchaser, whether AMC, MSC, or SDDC, responsible for less than 90 percent of DD350 transportation spending with these suppliers. (For the one exception, Moller Maersk, MSC TRANSCOM component command purchase offices purchased 44.8 percent of transportation services sold to DoD, in addition to the 48.6 percent shown in this table sold to SDDC. In other words, TRANSCOM component command purchase offices were still responsible for more than 90 percent of DoD transportation purchases with it.) In short, though DD350 spending with these suppliers may already be highly leveraged, the competitive markets in which they operate may offer opportunities for continuous improvements and supplier development.

Little Overlap Between DoD and Other Federal Spending for FedEx Corp

DoD	PSC	Name	\$M	Ctrx	PO Codes
1	V121	Air Charter for Things	750	5	7
2	V221	Passenger Air Charter*	286	4	1
3	V003	Packing/Crating Svcs.	5	3	3
4	R604	Mailing and Distribution Svcs.	1	6	25
5	V111	Air Freight	1	12	39
<i>All other</i>			3	26	73
<i>TOTAL</i>			<i>1,047</i>	<i>37</i>	<i>100</i>
Other	PSC	Name	\$M	Ctrx	PO Codes
1	R604	Mailing and Distribution Svcs.	5	11	28
2	R602	Courier and Messenger Svcs.	2	27	18
3	V111	Air Freight	1	3	13
4	R699	Other Administrative Support Svcs.	0.4	1	2
5	V112	Motor Freight	0.3	2	2
<i>All other</i>			1	11	15
<i>TOTAL</i>			<i>10</i>	<i>44</i>	<i>66</i>
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.					

RAND *Contracts include those with multiple companies offering several services and which were coded for passenger air charter services.

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FY2003 DD350 and FPDS, PSC Vxxx

Earlier, we noted that there was limited overlap between PSCs in which DoD purchased transportation services and those in which other federal agencies did as well. Here we consider the issue of overlap among suppliers, particularly what leverage opportunities may be expected across the government with leading transportation suppliers.

In analyses not shown here, we found very little overlap among suppliers of transportation between DoD and other federal agencies. In FY 2003, the leading air and land transportation suppliers for DoD provided no such services to other federal agencies, while the leading water transportation supplier provided only a very small amount of such services to other federal agencies.⁵

Even for companies offering widely used transportation services, such as FedEx, there may be little overlap between DoD and other federal needs. In this table, we examine for FY 2003 the PSCs in which DoD and other federal agencies most commonly purchased services from FedEx. Columns in the table include

⁵ More specifically, North American Airlines, which was also the leading DoD provider of transportation services in FY 2003, provided no such services to other federal agencies that year. Wallenius Wilhelmsen Lines and Air Transport International, which also ranked among the top 10 transportation service providers to DoD in FY 2003, also provided no such services to any other federal agency. The only top supplier of transportation services to DoD in FY 2003 to also provide these services to other federal agencies was Moller Maersk. Moller Maersk sold \$287 million in transportation services to DoD in FY 2003 but only \$45,000 to other federal agencies.

- DoD/Other, showing the rank of each PSC among DoD or other federal purchases from FedEx
- PSC
- Name, the name of each PSC listed
- \$M, the dollars DoD or other federal buyers spent for each PSC from FedEx
- Ctrx, the number of FedEx contracts in each PSC listed
- PO Codes, the number of purchase office codes buying services in each PSC listed.

In FY 2003, DoD spent more than 100 times what other federal agencies spent with FedEx. Within DoD, nearly all this spending—\$1.035 billion of \$1.047 billion—was concentrated within TRANSCOM, and nearly all of that was for air services purchased by AMC. AMC used only six contracts for this spend. Outside AMC, however, there was a great deal of fragmented spending. Non-TRANSCOM spend, for example, was split among 32 contracts in 31 PSCs. Non-DoD spending with FedEx, totaling less than \$10 million, was split among 44 contracts in 16 PSCs.

Although multiple purchase offices appear, in some cases, to have made use of common contracts, it is unclear how much further consolidation of spend is possible. Only two PSCs—mailing and distribution services and airfreight—appear among the top five both for DoD and for other federal buyers. For both, other federal buyers actually spend more than DoD does, and DoD spending occurs completely outside TRANSCOM. Still, it may be worth exploring whether consolidation of these purchases under a larger TRANSCOM FedEx contract for a broad range of services, including those in which TRANSCOM has much higher purchases, may help increase overall DoD, and federal agency, leverage.

Any such efforts should use more refined data than DD350 or FPDS data, because of both the limited variables and some inadvertent quirks in them. For example, the data underlying this table indicate that DoD spent \$286 million in passenger air charter services from FedEx, a service that the firm does not offer directly. Instead, on several contracts, FedEx led a consortium that provided this particular service.⁶ Better data on provider and mode of transportation for specific actions might help better identify opportunities for improving PSM of transportation services.

⁶ See, for example, DoD (2000, 2001b, 2002) on contracts with Federal Express Charter Programs for work performed by others such as American Trans Air.

DD350 Data Help in Understanding Transportation Purchases But Have Limits

- **Data confirm much transportation spending is in competitive markets**
- **TRANSCOM offices are leading buyers for DoD transportation services**
- **Data may indicate still additional leverage possibilities, but**
 - **There is little overlap between DoD needs and those of other transportation purchasers**
 - **More refined data would be needed before making purchasing decisions**

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In sum, DD350 data help confirm many traits of current PSM practices for transportation and related services. They demonstrate that transportation spending is largely in competitive markets for which best PSM practices are more easily implemented. They indicate that TRANSCOM component command purchase offices are the leading, and sometimes exclusive, buyers for the services they purchase, indicating that those with the most expertise in making such purchases are indeed making them.

DD350 data indicate some additional leverage possibilities for transportation and related purchases, but these are limited. There is little overlap between TRANSCOM and DoD needs and those of other federal purchasers of transportation services. This does not necessarily preclude joint efforts by DoD and non-DoD offices to improve PSM practices, but it does mean that any such efforts will have to address differing needs. For services for which it is the leading buyer, TRANSCOM could perhaps get a little more leverage by partnering with others, but others would get considerably more.

DD350 data do not offer insights on the needs and priorities of customers, only on some characteristics of their purchases. DD350 data also do not offer detailed data on characteristics important to transportation purchases, such as weight, volume, or mode. In some cases, the information they offer may be misleading, as in the case of passenger air charter services seemingly offered by FedEx. More recent data might help identify whether opportunities for PSM

innovations in transportation services have evolved across federal agencies, but aggregating such data across the recently implemented FPDS-NG has proven cumbersome.

In the next chapter, we examine another source of data on transportation purchases by DoD. These provide differing details, particularly for smaller purchases, and help show the value of differing perspectives, as well as the need to use such perspectives in considering possible PSM improvements.

Payment Transactions for Transportation Services

Outline

- **Introduction**
- **Uses of a Spend Analysis**
- **Changes in the Transportation Services Market**
- **Contract Transactions for Transportation and Related Services**
- **Payment Transactions for Transportation Services**
- **Estimating Total Transportation Purchases**
- **Conclusions and Recommendations**

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DD350 data, as noted earlier, cover a large portion of DoD transportation spend. Such data, however, have traditionally included few transportation purchases less than \$25,000. They also lack information on specific shipments by shipper, weight, volume, or mode, as well as transactions made through tenders and not by FAR contracts.

To examine both smaller shipments and other characteristics of all shipments, we obtained a copy of a special, one-time PowerTrack data extract of freight payment transactions from June 1, 2002, to May 30, 2004, specifying in detail those payments for DoD FY 2003. Power-

Track data include the name and location of the transportation carrier, buyer or shipper of the service, mode of service, origin and destination, cost of the transaction, piece count, weight, special status of the shipment (e.g., hazardous material), pickup and delivery date and time, and priority level of the transaction.

PowerTrack is an electronic payment system operated by U.S. Bank, developed to speed payments to transportation carriers.¹ Transportation carriers working for the federal government submit invoices to PowerTrack and are paid by U.S. Bank, less a handling fee.

DoD initially implemented PowerTrack for transportation services originating in the United States, but it is now implemented for services originating outside the United States as well. Not all transportation services purchased by the government appear in PowerTrack. Unscheduled ocean freight shipments or international long-range airfreight shipments are not paid by PowerTrack. Data can be missing for firms even within the United States. For example, United Parcel Service (UPS) transactions were not recorded in the system for FY 2003. Other payments not in DD350, such as purchase card transactions, are also not recorded in PowerTrack.

¹ Implementation of PowerTrack has reduced payment time from 50 to 70 days to about two days. See National Research Council (2001).

Overview of PowerTrack FY 2003 Transactions

- **\$1.88 B in purchases**
- **613 different carriers**
- **3.91 M transactions**
 - **\$481 average transaction**
- **35 different shipment modes**
- **18 DoD parent shippers (e.g., DLA, Army, Navy)**

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Source: FY03 PowerTrack data

PowerTrack data cover characteristics of individual shipments. As such, the data include details not in DD350 data. They record payments of all dollar values and consequently have more small firms and carriers than DD350 data have.

Altogether, PowerTrack data that we analyzed include \$1.88 billion in purchases with 613 carriers managed through 3.91 million transactions. The average PowerTrack transaction in FY 2003 was \$481—well below the traditional \$25,000 threshold for inclusion in DD350 or even the more recent (and lower) threshold of \$2,500. Nevertheless, the average total payment per carrier, \$3,066,884, was higher than the average number of DD350 dollars per firm in FY 2003 or FY 2004.² These transactions covered 35 different shipment modes and include shipments made by 18 DoD parent organizations (e.g., Army, Defense Logistics Agency [DLA], Defense Information Systems Agency [DISA]) of varying sizes. Appendix E presents a full list of shipment modes covered in PowerTrack.

We sought to aggregate transactions for establishments to their parent companies by matching carrier names to a DUNS file linking parent and child organizations. We converted

² One possible reason for the low average transaction value is the requirement for each container, truckload, or package in an LTL shipment to have a separate commercial bill of lading. This may result in a higher number of transactions, in turn reducing the average amount spent per “shipment.”

payments made in euros to dollars by using the average exchange rate in FY 2003 (Federal Reserve Bank, 2004).

Top Ten Modes by Dollars

Shipping Mode	Dollars Millions	Records Thousands
Air Freight	628	3,018
Less Than Truckload	510	517
Ocean Shipping	298	103
Rail	151	4
Motor	64	105
Truckload	59	37
Pipeline	54	<1
Water/Pipeline Intermodal Move	24	10
Barge	21	1
Less Than Trailer	6	28
All others*	64	85
Total	1,880	3,910
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.		

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**"All other" modes here include modes we later classify as "air," "land," "water," and "other."

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Source: FY03 PowerTrack data.

PowerTrack data for FY 2003 include a narrower range of transportation services than do DD350 data. A primary difference between the two is their treatment of passenger transportation, included in DD350 but not in PowerTrack.³ Because PowerTrack does not use PSCs and DD350 uses generalized modes for shipments, making other comparisons between the two data sources is somewhat difficult.

In addition to passenger air travel, DD350 appears to show more transportation spending than PowerTrack does for the following:

- Airfreight: DD350 data for FY 2003 show \$1.532 billion in air charter for things in FY 2003, while PowerTrack shows \$628 million in airfreight. One reason for the difference may be the lack of coverage of shipments originating outside the contiguous United States (OCONUS), as we discuss further below.
- Marine freight: DD350 shows \$1.170 billion in marine charter for things in FY 2003 as well as \$161 million in vessel freight. PowerTrack shows only \$298 million in ocean

³ All federal passenger travel on scheduled airlines is paid through contracts established by the GSA. These transportation purchases appear in neither DD350 nor PowerTrack. Other DoD passenger travel is made through chartered aircraft and other air passenger service that appears in DD350 but not in PowerTrack.

shipping. This difference, too, may stem from differing levels of coverage for shipments originating in the contiguous United States (CONUS) or elsewhere.

Conversely, PowerTrack appears to show more transportation spending than does DD350 for the following:

- Truck freight: PowerTrack shows \$510 million in less-than-truckload (LTL), \$64 million in motor, \$59 million in truckload, and \$6 million in less-than-trailer.⁴ By contrast, DD350 data for FY 2003 show only \$58 million for motor pool operations and \$56 million for motor freight. The large difference in coverage here likely stems from the considerable amount of truck freight purchased from tenders, often with small companies or in small transactions, none of which may appear in DD350.
- Rail: PowerTrack shows \$151 million in rail payments, while DD350 shows only \$16 million in rail freight and \$4,000 in rail passenger service. Again, we surmise that purchases made from tenders are the primary reason for the difference.
- Domestic water freight: PowerTrack shows \$24 million in water/pipeline intermodal moves and \$21 million in barge service. We surmise that many of these shipments are made through tenders that do not appear in DD350 and possibly through small businesses that also prefer to use tenders as well.

Overall, airfreight, LTL shipments, and ocean shipping are the predominant modes appearing in PowerTrack data, accounting for nearly three-fourths of all dollars and more than 90 percent of records. PowerTrack includes more LTL shipments than DD350 does and, for airfreight and ocean shipping, includes more individual shipments but fewer dollars.

⁴ Unfortunately, we could not determine the difference between *less-than-truckload* and *less-than-trailer*, nor what differentiates *motor* from such categories as truckload or LTL. We surmise that these distinctions were once relevant, but have become less so.

Top Ten PowerTrack Shippers by Dollars

Shipper	Dollars Millions	Records Thousands
DLA	778	2,511
Army	382	209
TRANSCOM	194	57
Navy	126	472
Air Force	112	294
AAFES	86	51
DCMA	69	135
National Guard	41	23
DECA	36	22
NEXCOM	31	117
Other	25	20
Total	1,880	3,910
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.		

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Source: FY 2003 PowerTrack data.

PowerTrack also indicates a different profile of shippers from that evident in DD350 data. It shows DLA as the top DoD user of transportation in FY 2003 with \$778 million in shipments. By contrast, DD350 data we examined earlier showed only \$12 million in transportation contracts held by six DLA purchase office codes. DD350 data also showed TRANSCOM purchasers were the predominant buyers of transportation services. In PowerTrack, TRANSCOM ranks third, accounting for just over 10 percent of PowerTrack spend.

There are several reasons for this difference. *Users of a service* is identified in PowerTrack but not necessarily in DD350 data. DD350 data show the purchasing office writing the contracts and issuing the contract actions for international airlift services, Universal Service Contracts (USCs), and Tailored Transportation Contracts (TTCs), but PowerTrack would record information on the actual units shipping the goods. As a result, DD350 would show more dollars for purchasing offices, such as the component commands, and PowerTrack would show more dollars for units or shippers.

The nature of services recorded in each system would also lead to differences in their data. Shipments made off tenders may appear in PowerTrack but are not in DD350 data. Therefore, analyses using PowerTrack data show a good many purchases that are not in DD350. By contrast, many TRANSCOM component command purchases, particularly those for chartered whole aircraft or ships, require a contract whose payments do not appear in PowerTrack. Therefore, PowerTrack data exclude many TRANSCOM purchases in DD350.

In addition, PowerTrack offers some detail on purchases by service or agency not always evident in DD350 data. Should an Army office, for example, order a ground shipment from a contract included in both DD350 and paid by PowerTrack, the shipment may be recorded as part of a bulk purchase of many other shipments and linked only to the component command awarding the contract transaction recorded in DD350 data. But it may also be traced as a separate transaction and linked to the specific shipper, carrier, and route in PowerTrack.

PowerTrack data show the Army with the second most PowerTrack dollars in FY 2003, accounting for 20 percent of all PowerTrack expenditures but only 5 percent of PowerTrack records. The \$384 million in Army PowerTrack expenditures exceeds the \$372 million in non-TRANSCOM Army spend in DD350 in FY 2003. The Navy ranked fourth with 7 percent of dollars but 12 percent of records. The \$126 million in Navy PowerTrack expenditures is considerably less than the \$207 million in non-TRANSCOM Navy transportation spend in DD350 data in FY 2003. In other words, PowerTrack may cover more non-TRANSCOM shipments by the Army, while DD350 may cover more such shipments by the Navy. We later examine how DD350 and PowerTrack compare in purchases of transportation services by military service.

Top Ten Carriers by Dollars

Parent Company	Dollars Millions	Records Thousands
Air Mobility Command	227	24
Federal Express Corporation	175	1,802
A. P. Moller Maersk Group	123	45
Landstar Express America, Inc	110	51
Menlo	95	255
DHL Airways Corporate Office	71	778
CSX	61	6
APL Limited	57	26
Union Pacific Rail Road	47	1
Burlington Northern Santa Fe Rail Road	40	1
Other	874	920
Total	1,880	3,910
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.		

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Source: FY03 PowerTrack data

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PowerTrack appears to feature more small suppliers than do DD350 data, although it also provides unique coverage of several large carriers as well. In FY 2003, the top 10 suppliers listed in this table received just over \$1 billion in PowerTrack payments. Three issues are worth noting regarding these.

First, although most PowerTrack expenditures are concentrated among the top 10 suppliers listed, PowerTrack payments are still far less concentrated than those for DD350. The top 10 PowerTrack suppliers received 54 percent of all PowerTrack dollars, while the top 10 DD350 transportation suppliers received 65 percent of dollars for PSC Vxxx (and the top two received 47 percent).

Second, with the exception of Federal Express and A. P. Moller Maersk Group, none of the top 10 carriers as ranked by PowerTrack dollars appears among the top 50 as ranked by DD350 dollars. Only one of the top 10 (Landstar Express, an LTL carrier) provides truck freight services. Beyond the top 10, PowerTrack has insights on many firms not available elsewhere, including many small trucking firms typical of the industry. We later discuss how data from these firms may affect calculations of DoD small business purchase.

Third, PowerTrack data have their own quirks that can affect interpretation. The top carrier in the PowerTrack data is not a commercial firm but the AMC. AMC appears as a seller in these data because it serves as a conduit between DoD customers and air carriers for airfreight tenders and many contracts for freight shipment (Contract Airlift, 2005). It is not known how

linking these data to actual suppliers would change the rankings in this table. Unfortunately, there is no way to retrieve the name of the carrier actually hired by AMC for these services.

Summary of Freight by Channels

Origin	Destination	Dollars (Millions) by Mode					
		Air	Sea	Land (Motor)	Land (Rail)	Other* and unknown	Total
CONUS	CONUS	199	29	632	147	56	1,063
CONUS	OCONUS	267	171	18	2	< 1	458
OCONUS	CONUS	15	< 1	1	1	< 1	18
OCONUS	OCONUS	14	3	3	< 1	42	62
Unknown		133	140	5	< 1	0	279
Total		628	344	658	151	98	1,880
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.							

RAND *Primarily pipeline within CONUS.

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This table summarizes PowerTrack data on the distribution of CONUS and OCONUS shipments by major freight transportation mode. These data are for FY 2003, when fielding of the system OCONUS was incomplete. PowerTrack has data on both origin and destination for about 83 percent of the dollar value of its shipments.

Overall, at least 81 percent of PowerTrack dollars (i.e., excluding unknown) are for shipments originating in the CONUS; at least 57 percent are for shipments whose origination and destination are both in the CONUS. This is not surprising given the initial implementation of PowerTrack only for shipments originating in the CONUS. Other leading specific channels of shipments not broken out in this table include

- CONUS to Southwest Asia,⁵ \$186 million
- CONUS to Pacific,⁶ \$102 million
- CONUS to Western Europe,⁷ \$82 million

⁵ Southwest Asia includes the Persian Gulf states. Shipments from Southwest Asia to the CONUS, totaling \$7.2 million in FY 2003, comprised the largest channel, rated by dollars, originating outside the CONUS.

⁶ Pacific shipments included those to Guam, Hawaii, Japan (including Okinawa), and South Korea.

⁷ Western Europe shipments included those to Belgium, France, Germany, Gibraltar, Italy, the Netherlands, Spain, and the UK.

- CONUS to Central Asia,⁸ \$33 million.

Shipments from the CONUS to OCONUS are far greater than those from OCONUS to the CONUS. We surmise that this is because of the incomplete fielding of PowerTrack for FY 2003 overseas and the outbound shipment of consumable and other items needed for the buildup to operations in Iraq in 2003.

Most shipments from the CONUS to OCONUS, as measured by dollars, were made by air, but a good many were made by water as well. The majority of air and water shipments were used to ship goods and materiel from CONUS to OCONUS. DoD shippers may wish to consider ways to explore these data further and to separate truly urgent air shipments from those that can be consolidated and shipped by cheaper water modes.⁹

Nearly all land (motor) shipments were, not surprisingly, within the CONUS, where such shipments constituted the majority of shipments as well. Virtually all land (rail) shipments were also within the United States. Rail shipments can offer a means to ship very large items more cheaply than motor (road) freight (Dobler and Burt, 1996; Leenders et al., 2002).

Most “other and unknown” shipments within the CONUS were for pipeline shipments, while nearly all such shipments to and from OCONUS were by unknown mode.

⁸ Central Asia shipments included those to Afghanistan, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkmenistan, and Uzbekistan.

⁹ Unpublished RAND research by Marc Robbins indicates that OCONUS air shipments from depot to final destination ranged from \$2 to \$8 per pound in early 2006, while shipments by water cost a few pennies per pound. Within the CONUS, air shipments cost \$0.89 to \$1.87 per pound, while small package surface cost \$0.12 to \$0.55 per pound, LTL shipments ranged from \$0.15 to \$0.41 per pound, and shipments on scheduled truck service ranged from \$0.05 to \$1.00 per pound.

PowerTrack Has Other Elements of Varying Usefulness

- **Transportation Control Numbers can be linked to other databases**
- **Shipping and billing weight are included**
 - **Some entries are for cubic feet instead**
 - **Some suspicious data on weight by mode**
- **Product description and code variables are either missing or too complex to be useful for a top-level spend analysis**

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PowerTrack has other data that can be useful for a spend analysis, but the actual utility of these varies.

Nearly 94 percent of PowerTrack records have entries for customer order numbers. For 63 percent of PowerTrack records, the customer order number is the Transportation Control Number (TCN). These data can be used to link to other databases that might be helpful in other analyses.

Nearly all, or 99 percent, of PowerTrack records have a shipping weight entry, and 75 percent have a billing weight entry. For nearly 1 percent of records, however, these weight entries are actually volume entries. Furthermore, several weight entries are for small packages shipped by water with seemingly high per-pound costs, leading us to believe that the data contained some errors.

PowerTrack has several variables on shipment contents, but these are either rarely entered or too complex for use. Product ID codes, for example, are entered on only 3 percent of records. At the other extreme, product description is entered on all records, but more than two-thirds of such records are either for “freight all kinds” or “description not provided.”

Estimating Total Transportation Purchases

Outline

- **Introduction**
- **Uses of a Spend Analysis**
- **Changes in the Transportation Services Market**
- **Contract Transactions for Transportation and Related Services**
- **Payment Transactions for Transportation Services**
- **Estimating Total Transportation Purchases**
- **Conclusions and Recommendations**

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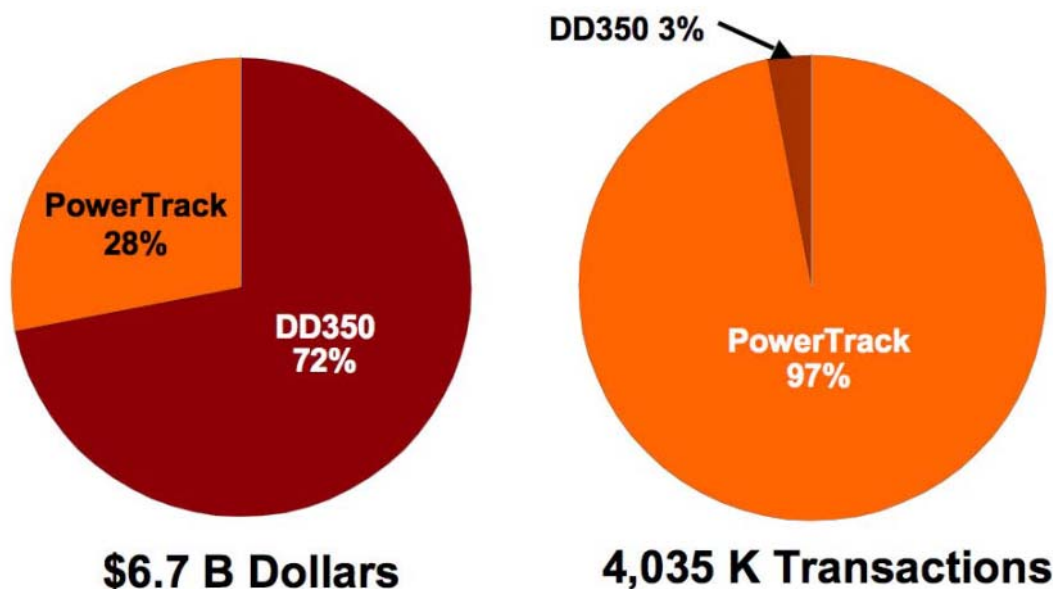
41

As seen in the previous two chapters, DD350 data provide a broad global overview of many transportation purchases, typically larger ones, but include fewer smaller purchases and lack data on such characteristics as mode or channel. PowerTrack data provide basic information on many more typical and smaller purchases, but, until recently (and after the time period for which data were provided to us), included few shipments OCONUS.

In this chapter, we present an estimate of total transportation spending in these two data sources, with particular focus on shipments of interest to TRANSCOM.¹ Our estimate is a more rigorous attempt to estimate all transportation spending across DoD. We also provide an estimated breakdown of our estimate by type of freight, passenger, and other transportation services (e.g., services of unknown mode), as well as an analysis of small business participation in this spend, yielding several insights not previously available.

¹ For another check on these two data systems and their coverage, we analyze data on DLA shipments, including data in the management information system of the distribution standard system, provided to us by the DLA Office of Research and Resource Analysis. This single source of information on DLA shipments both large and small is relatively unique among DoD information systems. We present our analysis of these data in Appendix F. This analysis also found that, although imperfect for reasons noted throughout our main analysis, the DD350 and PowerTrack data are more comprehensive than other sources on transportation expenditures.

Total FY03 DoD Transportation Related Spending*



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*PSC Vxxx plus PowerTrack - overlap

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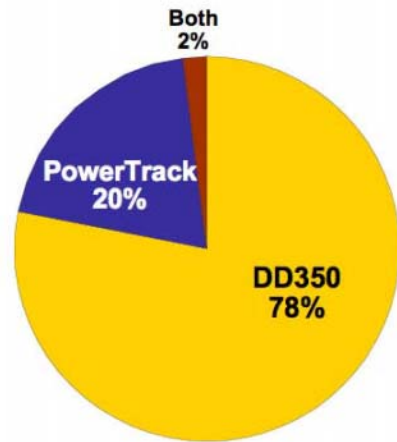
SOURCES: FY03 PowerTrack + Vxxx DD350 data - Overlap

Combining DD350 data on PSC Vxxx with all PowerTrack shipment mode data and subtracting all known overlaps (e.g., USCs or TTCs, as discussed in Appendix B), we estimate that DoD spent more than \$6.7 billion on transportation-related services in FY 2003. This is an underestimate for three reasons. First, these data do not include some spending, such as purchase card transactions, which we were told were very few and very small for transportation services. Second, contract actions of less than \$25,000 not paid by PowerTrack are not in these data. Third, neither DD350 nor the FY 2003 PowerTrack extract record transactions made from tenders that began OCONUS, such as overseas trucking and containerized shipping originating OCONUS.

The bulk of the combined spending is recorded in DD350 data, as shown in this figure. Even after removing USCs and TTCs from DD350 (rather than PowerTrack), 72 percent of spending on transportation-related services appears in DD350.

At the same time, the amount of activity in PowerTrack, as measured by the number of transactions, is much higher; PowerTrack has more than 30 times as many transactions as DD350 has. The average size of the DD350 actions (\$400,253 in FY 2003) is more than 800 times larger than that in PowerTrack. Median DD350 actions are only about 25 times as large as the average PowerTrack transaction. Average shipment data are of no more than limited use (in part because of the PowerTrack treatment of individual packages as individual shipments).

Distribution of Providers of Transportation Related Services



Transportation Services Providers

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SOURCES: FY03 PowerTrack + Vxxx DD350 data - Overlap

DD350 include nearly four times as many transportation service providers as are evident in PowerTrack data. In all, TRANSCOM used 2,797 parent suppliers in FY 2003: 78 percent appear only in DD350 data, 20 percent only in PowerTrack, and 2 percent in both. The overlap includes some large carriers, such as North American Airlines, Federal Express, and A. P. Moeller Maersk Group.

Top Ten Transportation Services Providers*

Parent Company	Dollars			Actions			DoD % sales
	M	% DD350	% PwrTrk	#	% DD350	% PwrTrk	
North American Airlines	1,235	97	3	35,987	86	14	NA
Federal Express	1,218	86	14	1,835,755	2	98	7
AP Moller-Maersk Group	370	67	33	45,542	1	99	2**
Air Mobility Command	227	0	100	24,082	0	100	NA
Wallenius Wilhelmsen Lines	219	100	0	20	100	0	21
General Dynamics Corp.	160	100	0	157	100	0	1
Landstar Express	110	0	100	51,188	0	100	7
Menlo	95	0	100	254,770	0	100	3
Ocean Shipholdings, Inc.	79	100	0	1	100	0	NA
Air Transport International LI	75	100	0	656	100	0	NA
Other	2,921	62	38	1,786,414	3	97	
Total	6,708	72	28	4,034,700	3	97	
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.							

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Source: PSC Vxxx + PowerTrack – overlap.

**Reported in Danish currency (Krone) and converted to dollars using Federal Reserve Bank (2004).
Zeroes in columns are absolute, e.g., Wallenius Wilhelmsen has no dollars or actions in PowerTrack.

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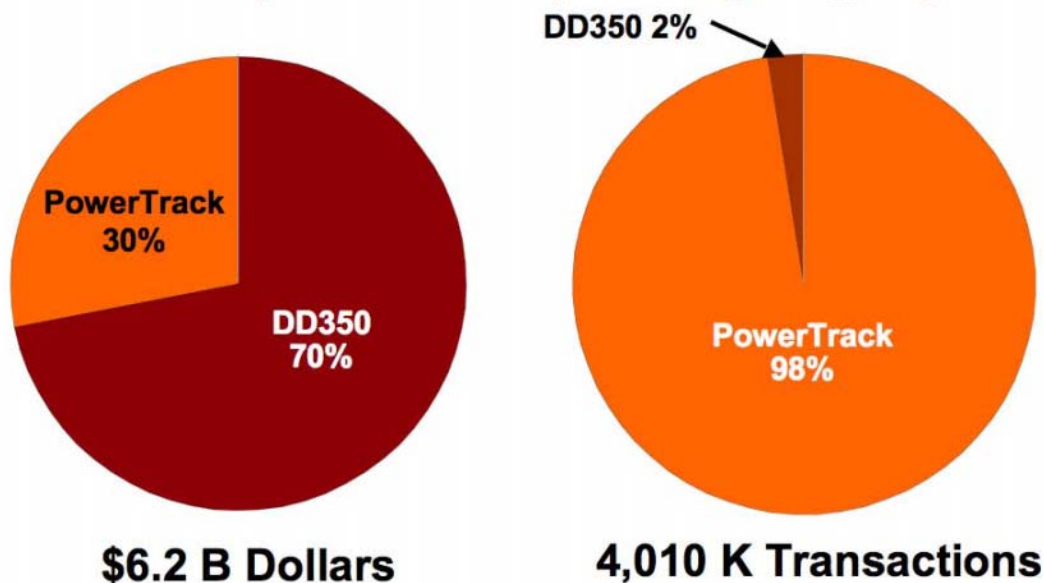
Here we present combined PowerTrack and DD350 spend for the 10 largest carriers. Although the three largest carriers are included in both data sources, none of the other top 10 is. Therefore, without combining the data, only a skewed perspective is available on the leading suppliers.

More than one-third of combined spending, 37 percent, is concentrated with the top two carriers. Most spending (56 percent) is concentrated with the top 10 carriers in this table. Most of the top carriers in this table are companies that provide transportation services for passengers and freight.

Transportation spending alone appears to provide DoD with little leverage with these firms. In only one does DoD transportation spending comprise more than 7 percent of firm revenues. Nevertheless, there are some opportunities for leverage. DoD spending on transportation constitutes 21 percent of sales by Wallenius Wilhelmsen Lines. DoD spending on transportation constitutes only 1 percent of sales by General Dynamics, but DoD has other expenditures with General Dynamics it could leverage with the firm as well for improvement in transportation services. (General Dynamics, a large aerospace OEM, provides crews to DoD for chartered vessels.)

Unfortunately, as noted earlier, the data did not permit us to link expenditures with AMC to the actual carriers providing the service nor to determine how so linking such expenditures would affect the rankings in this table.

Focusing on Key Categories Reduces “Transportation” Spending Slightly



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SOURCES: FY03 PowerTrack + DD350 data for PSCs V111, V112, V113, V115, V119, V121, V122, V124, V211, V212, V213, V214, V221, and V222 - Overlap

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At TRANSCOM's request, we also analyzed a more narrow range of transportation expenditures.

We first deleted several PSCs not of primary interest to TRANSCOM. These included those for motor pool operations, packing and crating services, stevedoring, vessel towing for things, space transportation and launch services, security vehicle services, ambulance services, taxicab services, navigational aid and pilotage services, lodging, military personnel recruitment, and civilian personnel recruitment. Doing this resulted in data showing \$6.2 billion in spend, 70 percent through DD350, through 4.012 million transactions, 98 percent in PowerTrack.

To group our combined DD350 and PowerTrack file into categories for analysis, we also dropped PSCs for relocation services; passenger marine charter services; other transportation, travel, and relocation services; and other vehicle charter for transportation of things. Doing this resulted in data showing \$6.2 billion in 4.010 million transactions, again with 70 percent of dollars in DD350 and 98 percent of transactions in PowerTrack.

Relationships of Different Freight Categories

Freight category	DD350	PowerTrack	
Air	Air charter for things	Air	Air taxi
	Air freight	AirFreight	Air Freight Guar.Traffic
		AMC Channel	Small Parcel Air
Water	Marine charter for things	Barge	Ocean (Roll on – roll off)
	Vessel freight	Ocean vessel	Inland waterway
		Water/pipeline intermodal move	
Land (motor)	Motor charter for things	Driveaway service	Driveaway, truckaway, towaway
	Motor freight	Expedited truck	Flatbed
		Motor	Less than trailer
		Less than truckload	Motor freight (common carrier)
		Motor freight (pkg carrier)	Shipment agent (truck)
		Surface freight forwarder	Supplier truck
		Towaway service	Truckload
		Tank truck	Van
Land (rail)	Rail freight	Rail	

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As mentioned earlier, TRANSCOM was particularly interested in certain freight-related spending categories in the DD350: air charter for things, air freight, marine charter for things, vessel freight, and motor freight. To make these categories comparable to the PowerTrack data, we classified air charter for things and air freight as *air modes*, marine charter for things and vessel freight as *water modes*, and motor freight as a *land (motor) mode*. We further added motor charter for things to the land (motor) classification as shown in this table, so as to devise a motor category that would be most comparable to PowerTrack expenditures likely in this category.

PowerTrack expenditures were classified as shown in this table. For further categorization of transportation spending, we considered land (rail) as a separate mode, comprising DD350 rail freight contract transactions and PowerTrack rail expenditures. Finally, we considered passenger expenditures, reported in only DD350 data, as its own category, split between air, water, and land (motor) and land (rail) passenger service.²

² Air passenger travel expenditures in DD350 data are those for the categories passenger air charter service and air passenger service. Water passenger travel expenditures are those for the DD350 categories marine passenger service or passenger marine charter service. Land (motor) passenger travel expenditures are those for the DD350 categories motor passenger service, passenger motor charter service, or taxicab service. Land (rail) passenger travel expenditures are those for the DD350 category rail passenger service. Categories listed in Appendix D on transportation and related PSCs or in Appendix E on PowerTrack modes but not listed here or in this table are considered outside the air, water, land (motor), land (rail), and passenger categories we analyze.

About 69 Percent of Transportation Related Spending Is for Freight Movement

Transportation category	Dollars				Carriers/companies				Average \$K per company
	Total (M)	% of Total	% in DD350	% in PwrTrk	Total	% in DD350	% in PwrTrk	% in Both	
Freight	4,637	69	62	38	836	32	63	5	5,546
Air	2,167	32	71	29	173	23	72	5	12,526
Water	1,585	24	78	22	219	63	31	6	7,236
Land (motor)	717	11	8	92	589	16	81	3	1,218
Land (rail)	168	3	10	90	25	24	76	0	6,706
Passenger	1,109	17	100	0	380	100	0	0	2,919
Air	1,011	17	100	0	60	100	0	0	16,852
Water	30	< 1	100	0	11	100	0	0	2,763
Land (motor)	68	1	100	0	314	100	0	0	215
Land (rail)	< 1	< 1	100	0	1	100	0	0	4
Other	962	14	90	10	1,812	89	11	<1	531
Total	6,708	100	72	28	2,765	78	20	2	2,426

NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.

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SOURCES: FY03 PowerTrack + Vxxx DD350 data - Overlap

TRANSCOM was especially interested in freight-related spending. About 69 percent (\$4.6 billion) of overall transportation spending in FY 2003 was in a freight category.

Roughly half (almost \$2.2 billion, or 32 percent of overall spending) of freight transportation spending was for airfreight transportation. Two-thirds of such spending was concentrated among two firms: Federal Express Corporation (\$861 million) and North American Airlines (\$585 million). Most airfreight transportation dollars (\$1.533 billion) are also spent on charter contracts recorded in DD350. This suggests that DoD spending for airfreight is quite concentrated among select suppliers and that there is probably not much opportunity to further concentrate it.

Another third of freight shipping (23 percent of overall spending) is spent sending freight over water, largely by ocean vessels. Nearly one-fourth of such spending is concentrated among two firms: A. P. Moller Maersk Group (\$370 million) and General Dynamics Corporation (\$134 million). More than half (\$918 million) was among the top 10 providers. This means that 44 percent of spend in this category is spread over the remaining 209 carriers. Still, most (\$1.170 billion) water transportation dollars were spent for charter contracts recorded in DD350.

Land (motor) transport accounts for only about one-sixth of freight shipping dollars (and 11 percent of all transportation-related dollars) but has, by far, the highest number of carriers (589). Nearly one-fourth of spending in this category was concentrated between two firms:

Landstar Express America (\$110 million) and Federal Express Corporation (\$48 million). Less than half (\$344 million) was concentrated among the top 10 firms. This means that 52 percent of spending in this category is spread over the remaining 579 carriers, representing a highly fragmented spend. Only a small fraction (\$3 million) of land (motor) transportation dollars was spent through charter contracts recorded in DD350.

Land (rail) transport comprised less than 4 percent of freight spending and less than 3 percent of all transportation-related spending and was limited to 25 carriers. The top three carriers, Union Pacific (\$42 million), Burlington Northern Santa Fe (\$39 million), and CSX (\$37.4 million), accounted for 71 percent of spend in this category, and the top six carriers accounted for 95 percent. The vast majority (\$151 million) of land (rail) transportation dollars were spent through PowerTrack; none was spent through charter contracts recorded in DD350.

These data indicate that DD350 provides greater coverage of transportation by air and water, while PowerTrack provides greater coverage of that by land. Because we do not have contract numbers in PowerTrack, we cannot identify exactly all the overlaps between the two data systems. Consequently, we can only estimate how much spend for different modes is recorded in each system. Many trucking businesses appear to be small businesses. By recording land freight primarily in PowerTrack, which is not used to measure progress toward meeting federal small business goals, DoD is likely not receiving credit for all of its small business spending. We discuss this further below.

Ideally, we would have isolated household goods from other freight because it is considered a large spend category of interest but data limitations prevented us from doing so. DD350 contains a category for relocation services, but the small dollar amount of transactions for this category suggests that household goods shipments are reported using other PSCs. In PowerTrack, less than a half million dollars in expenditures were coded as purchased by DoD offices responsible for moving household goods, and only \$300 were coded under the household goods (HHG) shipping mode.

Passenger spending is reported only in DD350 data. Nearly all passenger spending, or more than \$1.01 billion of the \$1.11 billion DoD spent on this in FY 2003, is on air travel. Air passenger spending is the third largest single category noted in this table and is larger than all the land transportation categories combined. How much more leverage DoD can gain here is unclear; there are already relatively few providers of air passenger transportation. The average number of dollars per company is higher than that for any other category shown in this table. The average per company for air passenger charter services, which we discussed earlier in our analyses of DD350 data and in which nearly all this spend is concentrated, is higher still.

There is a relatively large number of providers of land (motor) passenger transportation. This suggests there may be many local providers serving local needs (e.g., busing recruits to bases or training camps), although there may be some areas here worth further investigation.³

³ One provider of motor passenger services, for example, in FY 2004 had 48 DD350 contracts with 17 purchase offices totaling \$436,000, suggesting that there may be a relatively high amount of administration costs for relatively little spend. TRANSCOM, however, as earlier noted, directly purchases relatively little motor charter or passenger services, limiting what it can do to reduce costs to DoD for these services.

Estimates of Transportation Related Spending Going to Small Firms Would Rise If PowerTrack Dollars Were Included

Mode/PSCs	DD350			PowerTrack			DD350 + PowerTrack		
	\$s (M)	Small Bus. \$s (M)	% \$s Small Bus.	\$s (M)	Small Bus. \$s (M)	% \$s Small Bus.	\$s (M)	Small Bus. \$s (M)	% \$s Small Bus.
Freight									
Air	1,539	95	6.1	199	40	20.0	1,738	134	7.7
Water	1,241	232	18.7	29	9	31.2	1,270	241	19.0
Land (motor)	59	11	18.4	632	207	32.7	691	218	31.5
Land (rail)	16	0	0.3	147	2	1.7	164	2	1.5
Passenger	1,109	45	4.0	0	0	0.0	1,109	45	4.0
Other	864	176	20.4	56	24	43.7	919	201	21.8
Total	4,828	558	11.6	1,063	282	26.6	5,891	841	14.3
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.									

RAND Overall, the data suggest that 14.3 percent of transportation spending, not 11.6 percent, goes to small firms

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As noted in this table, including PowerTrack data in analyses of transportation spending can depict more accurately how well DoD is meeting goals for small business procurement. Federal agencies, including DoD, have a congressionally mandated goal to spend at least 23 percent of their prime contract dollars for goods and services with small business. Some categories of purchases, such as those from businesses outside the United States, are excluded from this goal.

Although DoD meets or comes close to this goal in its overall spending, its spending with many small businesses is short of this level in many industries, including transportation. In FY 2003, only 11.6 percent of DoD transportation spending through DD350 contract actions went to small businesses.

To estimate how much PowerTrack spending and total transportation spending might be with small businesses, we made two adjustments to the PowerTrack data. First, because contracts with businesses outside the United States are excluded from small business goals and their calculation, we analyzed only those PowerTrack records for shipments whose origin and destination were both within the CONUS. (This also had the effect of excluding the \$227 million in shipments for which the AMC was listed as the carrier.) Second, we used the small business indicator in the DUNS file provided to us to identify whether businesses in PowerTrack were small businesses. We assumed that any businesses with identification numbers not listed in the DUNS file at all were small business; such businesses had \$13.8 million in business.

Our analysis suggests that 14.3 percent of combined DD350 and PowerTrack dollars for transportation and related services go to small businesses. Although this is short of the congressionally mandated goal, it is about a fourth higher than that shown in DD350 data alone and therefore above what analyses not using PowerTrack show. For each mode except passenger travel, PowerTrack shows a higher proportion of dollars going to small businesses than is evident in DD350 data.

The proportion of transportation dollars that go to small business varies by mode. Land (motor) shipments have the highest proportion of dollars, 31.5 percent, going to small businesses, while other modes not individually shown have the second highest, 21.8 percent. Land (rail) shipments have the lowest proportion of dollars going to small businesses, 1.5 percent, while passenger travel has the second lowest, 4.0 percent.

DoD Buyers of Transportation, Travel, and Relocation Services

DoD buyer	Dollars			Actions		
	Total (M)	% DD350	% PT	Total	% DD350	% PT
Air Force	2,727	96	4	385,717	24	76
Army	1,474	91	9	480,574	2	98
DLA	1,172	67	33	231,378	10	90
Navy	790	2	98	2,511,267	< 1	~100
Other Defense Agencies	545	12	88	425,764	< 1	~100
Total	6,708	72	28	4,034,700	3	97
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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SOURCES: FY03 PowerTrack and Vxxx DD350 data - Overlap

In this table, we summarize transportation spending by the services and agencies for both DD350 and PowerTrack. The Air Force was responsible for 41 percent of DoD transportation spending in FY 2003, nearly all of which was through DD350. The Army was responsible for 22 percent of spending, with the vast majority of these dollars, but not actions, through DD350 as well. DLA was responsible for 17 percent of transportation spend, but only two-thirds of this was recorded in the DD350. The Navy and other DoD agencies were responsible for the remainder; these expenditures were coded primarily in PowerTrack. In sum, DD350 data provide greater coverage of the services with the largest transportation spend, but PowerTrack has better coverage for smaller users of these services and for actions of larger users as well. Put another way, as noted throughout this briefing, different data sources provide differing insights on the needs and opportunities for PSM improvements among different users of transportation and related services.

Conclusions and Recommendations

Outline

- **Introduction**
- **Uses of a Spend Analysis**
- **Changes in the Transportation Services Market**
- **Contract Transactions for Transportation and Related Services**
- **Payment Transactions for Transportation Services**
- **Estimating Total Transportation Purchases**
- **Conclusions and Recommendations**

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What do the data we have reviewed indicate about DoD transportation spending and opportunities to apply best PSM practices to improve it? How might TRANSCOM and DoD gain additional insights into transportation spend? We address these questions in our conclusions and recommendations.

Both DD350 and PowerTrack Data Offer Insights on Transportation and Related Spending

- **73 percent of DoD's spending is included in DD350 contract transaction data**
- **DD350 and PowerTrack are rich sources of information on DoD-wide transportation spending**
 - **Both contain information on shipper, supplier, and mode**
 - **DD350 contains**
 - **Supplier socioeconomic status**
 - **Type of solicitation and contract**
 - **PowerTrack contains**
 - **Origination and destination**
 - **Weight and cube**

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Both DD350 and PowerTrack data offer insights on transportation and related spending, including an estimate of total spending. We estimate that DoD spent about \$6.7 billion on transportation, travel, relocation, and related services in FY 2003. Of that amount, almost three-quarters, or 73 percent, was recorded in DD350 contract transaction data, with the remainder recorded primarily in PowerTrack data.

DD350 and PowerTrack data both offer rich sources of information on transportation and related spending. Both contain similar types of information on shipper, supplier, and mode of transportation. DD350 data also include information on the supplier's socioeconomic status, type and competitiveness of solicitation, and type of contract, while PowerTrack contains information on the origin and destination of the freight. PowerTrack also has information on weight and cubic feet, although the usefulness of these is questionable because of incomplete entries.

Both Sources Suggest Several Opportunities to Improve PSM of Transportation and Related Spending

- **Opportunities for improving PSM of transportation and related spending include**
 - **Increasing leverage**
 - **Reducing transaction costs**
 - **Better management of services, spending, suppliers, and supplier relationships**
- **Data on non-DoD transportation spending suggest opportunities to leverage DoD spending and TRANSCOM expertise**

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Analyses of both DD350 and PowerTrack data indicate several opportunities to improve PSM of transportation and related services, particularly freight services. Many individual carriers have multiple contracts or transactions. Consolidating such purchases into fewer, larger, and longer-term contracts as TRANSCOM component commands have with USC and TTC contracts could help DoD gain leverage with such suppliers and better integrate planning, synchronize operations, and facilitate communications. A few large suppliers provide transportation and related services in multiple modes or PSCs, often purchased by differing DoD organizations. Consolidating these transactions could help reduce transaction costs.¹

For some services, e.g., air transportation, we found a concentration of spending among top suppliers, a practice consistent with recent surveys of best purchasing practices.² In other modes, such as land transportation, DoD spend is dispersed among a large number of carriers, suggesting opportunities to concentrate spending. Consolidating more of this spending to

¹ The Worldwide Express contract for small package air transportation is an example of a transportation contract used by multiple DoD organizations. Few contracts have been written spanning multiple modes because, until recently, only TRANSCOM's component commands had authority to write contracts.

² Leading procurement organizations operate with fewer suppliers per dollars in spend (4,171 per \$1 billion in spend) than do typical companies (7,710 per \$1 billion) and concentrate 80 percent of their spending on 5.9 percent of their suppliers. See "Hackett Report Finds Best Purchasing Orgs See Greater ROI" (2005).

contracts could help reduce transaction costs and improve services by giving managers instruments to develop integrated relationships and an ability to monitor service performance and quality.

Although non-DoD transportation spending is much less than that for DoD and distributed differently across PSCs, there are some opportunities for DoD to gain leverage with its carriers and for non-DoD agencies to leverage DoD's purchasing power and expertise through consolidation of these purchases where possible. In addition, TRANSCOM could gain additional revenue from overhead charges when non-DoD organizations use its contracts, which in turn could help defray its PSM costs.

Among carriers that have contracts and tenders, the combined DD350 and PowerTrack data permit a top-level analysis of these two kinds of spending by dollars, but not by particular routes or shippers. Thus, by using only these data sources, it is difficult to know who is using transportation contracts and who is not. Having complete information on spend, routes, and shippers would permit TRANSCOM to tailor future transportation contracts better to customer needs.

Recommendations to Improve DoD's Management of Its Transportation and Related Spending

- **Use contracts rather than tenders wherever feasible**
 - **Leverages business**
 - **Supports FARs**
 - **Improves visibility of spending**
- **Develop TRANSCOM capability to analyze transportation-related spend data**
 - **Aggregate within and across modes, shippers, and carriers**
 - **Establish rules for combining data**
 - **Assess additional indicators of sourcing opportunities and risks**

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One means by which spend could be better leveraged is by using contracts rather than tenders wherever feasible. Tenders, by their definition, are offers by carriers for specific modes and routes. They are usually offered independently of business volume; that is, their terms and conditions are not likely to be influenced by other purchases a buyer may make from a supplier. They can also be changed unilaterally by the carrier and contain few means of accountability for performance and quality.

Fewer contract and independent tender transactions with carriers would enable improvements in communication, cooperation, and collaboration as well as better oversight and management of services and spending. It could, in particular, improve visibility of spend, such as that with small businesses, and enable in-transit visibility of shipments.

Local transportation managers may be concerned about the loss of autonomy and flexibility resulting from switching to contracts. One reason that DoD shippers say they use tenders is the lack of service quality or flexibility (e.g., unreliable schedules at their location from particular carriers). Nevertheless, if suppliers are selected and contracts are written that can meet a broad range of requirements, this need not affect options available to meet customer needs when viewed from a DoD-wide perspective. Put another way, contracts can be written to ensure both relatively competitive options for each individual location and low total costs to the DoD across all locations. In fact, bringing more spend under contract could improve incentives and accountability for carriers to deliver quality services consistently to a broader

customer base. At the same time, accommodations may be needed so that shippers needing the flexibility of tenders because of limited options are not penalized for using them.

TRANSCOM should also develop the ability to analyze DoD's transportation and related spending so that it can comprehensively aggregate spending within and across modes, shippers, and carriers. This would enable TRANSCOM to assist in developing contracts spanning more than one component command.

TRANSCOM also needs to establish rules for combining data across sources. In FY 2003, over one-fourth of DoD's transportation and related spending was not recorded in the DD350 data because of tenders and because PowerTrack had not yet been installed OCONUS. PowerTrack freight payment data captures many of the tender transactions not recorded in DD350 but also includes some payments made on contract shipments also recorded in DD350, which must be subtracted from any total spending estimates to eliminate double-counting of dollars. Unfortunately, PowerTrack does not currently contain valid DoD contract numbers for payments made on FAR contract transactions; until these numbers are fully represented in PowerTrack transactions, TRANSCOM will need, as noted, to establish business rules for combining the two data sources. It may want to begin with the rules developed for this analysis and refine them over time.

In addition to developing the capability to analyze DoD transportation spend data, TRANSCOM should develop capabilities to track indicators of transportation sourcing opportunities and risks identified but not analyzed in this briefing. For example, it should continually compare the rates it pays to industry inflation factors. It should also develop the capability to monitor its carriers' financial health, performance, capabilities, and capacities as well as the responses to its solicitations. Finally, it needs to measure how well its carrier relationships meet DoD's transportation needs.

Recommendations Regarding DD350

- **Obtain regular access to DoD and federal data for analytic purposes, not just query capability**
- **Develop capabilities to aggregate spending to parent carriers, linking subsidiaries to their parents, e.g., through DUNS codes**

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DoD contract transaction data have moved to the FPDS-NG. Like PowerTrack, this system is operated by contractors. TRANSCOM needs to develop the capability to regularly extract DoD and other federal transportation data from this system for spend analysis purposes.

Spend analyses require the capability to aggregate data to parent carriers. Although the DD350, FPDS-NG, and PowerTrack all contain links to parent companies, they are not always up-to-date. This may require TRANSCOM to have access to additional data sources such as the Central Contractor Registry (CCR) or DUNS files to properly aggregate spending to the most up-to-date listing of parent firms.

Recommendations Regarding PowerTrack

- **Obtain regular access to data for analytic purposes, not just query capability**
- **Ensure valid contract numbers are propagated by data systems to PowerTrack, thus**
 - **Eliminating double counting of dollars when combining DD350 and PowerTrack data**
 - **Providing additional analytic capabilities**
- **Link modes to PSCs or include PSCs in PowerTrack**

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TRANSCOM also needs to obtain regular access to U.S. Bank's PowerTrack data for analytic purposes rather than just having query capability. It needs to get complete extracts of raw data elements that it can analyze from different perspectives, including shipper, carrier, mode, route, and type of freight.

It should also ensure that valid contract numbers are propagated by data systems discernible to PowerTrack. PowerTrack has a contract number data field, but this was not populated with valid DoD contract numbers in FY 2003. The upstream DoD data systems that feed information to PowerTrack appear to have data elements that could contain a contract number, but, according to our interviews, these, too, are often not populated. Even if they are populated, it appears that this information is not passed to PowerTrack. Because PowerTrack does not have valid DoD contract numbers, TRANSCOM cannot precisely identify overlaps between PowerTrack and DD350. For example, AMC currently uses a correcting record data element to subtract dollars that would otherwise be double-counted in combined analysis of DD350 and PowerTrack data. Having the contract number in all PowerTrack records would allow DoD to avoid such double-counting as well as allow TRANSCOM to identify the extent to which shippers use its contracts, thereby providing important feedback on how well its contracts are meeting customer needs or how they might be improved.

TRANSCOM also needs to develop links between PowerTrack modes and DD350 PSCs or include DD350 PSCs in PowerTrack so that purchases of similar transportation services in

the two data sources can be more easily combined and analyzed together. If information on what is transported is important, then TRANSCOM needs to have shippers and carriers enter standardized materiel description codes in PowerTrack, such as FSC codes. This would allow further tailoring of transportation contracts that better leverage DoD's transportation requirements and satisfy its large customer base.

Conclusions for TRANSCOM

- **Opportunities exist to**
 - **Further consolidate transportation spending**
 - **Better manage carriers**
 - **Reduce DoD's total transportation spend while continuing to meet user requirements**
- **Need to capture and report use of small businesses through tenders**

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Our analysis indicates that TRANSCOM has additional opportunities to further leverage its spending, particularly where tenders are used to purchase transportation services. With such leveraging, TRANSCOM could better manage all its carriers; reduce its rates; and improve quality, delivery, and visibility of services. Such improved management of spending and carriers could reduce DoD's total transportation spending while continuing to meet user requirements.

A considerable portion of transportation spending using tenders is not captured in DD350 data and therefore is not counted toward meeting the congressionally mandated goal for using small and disadvantaged businesses. TRANSCOM needs to develop a procedure for better capturing and reporting its use of such businesses. Other opportunities to improve management by route, mode, carrier, shipper, and type of freight could also be realized through improved recording and subsequent analysis of improved data.

TRANSCOM and Its Component Commands

TRANSCOM was established in 1987 and is one of nine unified commands composed of forces from two or more services.¹ It has a broad and continuing mission as the single manager of the global defense transportation system. TRANSCOM coordinates the movement of troops and materiel via military and commercial modes of transportation. It provides direction, control, and supervision of cargo and passenger transportation services and serves as the focal point for transportation management of all common-user lift.

TRANSCOM has its roots in training exercises that exposed gaps in defense transportation systems, including those between military and civilian personnel and between mobilization and deployment plans, as well as a need to consolidate transportation, including authority to direct elements of the transportation system throughout DoD. Its establishment gave the United States a single, four-star, unified combatant commander to serve as a single point of contact for defense transportation customers and whose role, after the first Persian Gulf War, was expanded to peacetime as well (except for those transportation assets that were service-unique or theater-assigned). Since 2003, the TRANSCOM commander has been designated as the Distribution Process Owner and “serves as the single entity to direct and supervise execution of the Strategic Distribution System” to “improve the overall efficiency and interoperability of distribution related activities” (TRANSCOM, 2006a).

TRANSCOM is located at Scott AFB, Illinois. It has three component commands: the Air Force’s AMC, the Navy’s MSC, and the Army’s SDDC.

AMC, also located at Scott AFB, provides strategic and tactical airlift, air refueling, and medical air evacuation services as needed for the deployment, sustainment, and redeployment of U.S. forces. Among the special duty and operational aircraft assigned to it are C-17 Globemaster III, C-3 Galaxy, C-141 Starlifter, KC-135 Stratotanker, KC-10 Extender, and C-9 Nightingale aircraft. (Air Force One is also among AMC assets.) CRAF makes additional long-range aircraft available to AMC during national emergencies. CRAF comprises aircraft from civilian carriers that contractually commit to make their aircraft available when needed. To provide incentives for offering aircraft to CRAF, the government makes peacetime airlift business available to participants. Altogether, participants receive more than \$2 billion

¹ Much of this background is adapted from TRANSCOM (2005b, 2006a, 2006b).

each year for providing airlift services, of which about one-fourth is guaranteed (AMC, 2005, 2007).²

MSC, located in Washington, provides sealift transportation services for deployment, sustainment, and redeployment of U.S. forces. It provides sealift with a fleet of government-owned and -chartered U.S.-flagged ships. Sealift ships principally move unit equipment from the United States to theaters of operation all over the world. The VISA is the primary sealift mobilization program, developed in the mid-1990s. With the secretary of defense's approval and with the secretary of transportation allocating capacity in a highest-stage activation, the TRANSCOM commander would activate, in stages, sealift available under VISA, which has never been activated. VISA participants receive preference for DoD peacetime cargo business. MSC also operates a fleet of pre-positioned ships strategically placed around the world and loaded with equipment and supplies to sustain Army, Navy, Marine Corps, Air Force, and DLA operations. These ships remain at sea, ready to deploy on short notice, significantly reducing the response time for the delivery of equipment and supplies to a theater of operations.

SDDC, located in Alexandria, Virginia, is the overland lift component and primary surface distribution manager for TRANSCOM. SDDC is present in 24 ports worldwide, providing ocean terminal, commercial ocean liner, and traffic management services for the deployment, sustainment, and redeployment of U.S. forces. It also has military terminals in Sunny Point, North Carolina, and Concord, California. Its responsibilities for surface transportation include serving as the interface between DoD shippers and the commercial transportation carrier industry. This includes movement of DoD member HHG and privately owned vehicles. SDDC is the nation's largest customer to the moving industry, with more than 500,000 personal property moves each year. It also arranges approximately 600,000 domestic freight shipments, 72,000 shipments of private vehicles, and 518,000 passenger movements each year. It provides transportation for troops and materiel to points of departure in the United States and overseas. Its assets include 10,000 containers and 1,350 rail cars.

² Leading CRAF contract recipients for FY 2006 included the Alliance Contractor team of Evergreen International Airlines and World Airways, Inc., with contracts guaranteed to pay at least \$191 million and potentially paying \$1.222 billion; the Federal Express team of Atlas Air and Polar Air Cargo, with contracts guaranteed to pay at least \$140 million and potentially paying \$864 million; and the UPS team of Kalitta Air and North American Airlines, with contracts guaranteed to pay at least \$17 million and potentially paying \$42 million.

Interview Process and Resulting Business Rules for Analyzing Transportation Spend

Many transportation purchases are not included in standard contract data because of legal and statutory exemptions. FARs (Subpart 47.2), for example, exempt “[t]he acquisition of freight transportation from domestic or international air carriers and [i]nternational ocean carriers” as well as freight transportation “acquired by bills of lading,” that “for which rates are negotiated under 49 U.S.C. 10721(b)(1),” or by “[c]ontracts at or below the simplified acquisition threshold.”

To determine which systems might contain transportation spend data not in the standard contract system as well as possible gaps and overlaps between data systems, we identified a small sample of DoD personnel representing DoD transportation buyers and having significant expertise in transportation, data collection, and contracting. Altogether, we identified 662 DoD offices with PowerTrack transportation expenditures. From these, we identified services and offices with the most contract actions, dollars, and dollars per action for transportation and related expenditures. We also sought to include local bases or organizations with significant transportation expenditures and a small selection of organizations not in the top of the rankings.

We ultimately interviewed representatives of 13 offices in the AMC, MSC, and SDDC, as well as in the Air Force, Air Force Materiel Command, Army, DLA, Marine Corps, and Defense Finance and Accounting Service (DFAS). Representatives of Navy offices that we contacted declined to be interviewed. The discussion below reflects both general understanding of transportation systems and insights we gained from interviews.

Although there is no single source of data on transportation expenditures, data are available from instruments used to order or pay transportation services. We review these below.

There are three primary instruments for purchasing transportation services: FAR contracts, shipping tenders, and GPCs.

The process for *FAR contracts* reflects a typical purchasing process in which DoD identifies requirements and allows adequate time for notifying vendors of the solicitation as well as for the vendors to submit bids. Nearly all purchase actions meeting a minimum dollar threshold (\$25,000 before FY 2005 and \$2,500 starting thereafter) made through such contracts are recorded on DD350 forms. The resulting data are ultimately aggregated into the FPDS. DD350 data include information on contract value, good or service purchased, purchase office code issuing the contract, supplier winning the contract, industry classification of supplier, number of solicitations and offers, competitiveness of market, and whether the supplier is a

small or disadvantaged business. Such information is useful for a high-level spend analysis. Altogether, DD350 data account for \$4.8 billion of DoD transportation and related spend (i.e., that for PSC Vxxx) in FY 2003 and \$5.2 billion of such spend in FY 2004. Although DD350 data cover most transportation purchases, they fall short in at least two areas. First, they have traditionally included only contract actions of at least \$25,000.¹ Second, DD350 data do not cover all categories of transportation and related spend by DoD. (Table B.1 summarizes transportation spend by instrument of ordering or payment.)

Tenders, or negotiated agreements between a qualified carrier or transportation service provider and a buyer (e.g., a federal agency), listing terms and conditions, price, service rates, and charges to move freight, are used to procure many types of freight services not procured through FAR contracts. FAR procedures are not used for tenders. Tenders need less lead time than FAR contracts do if they are not already in place. Because they are easier to adapt to changing market conditions, they can provide greater flexibility for government business. Carriers need not provide service and are subject to less accountability for performance and quality shortfalls. Some transportation managers say that they value the ability to choose among a wide range of carriers, particularly those that are responsive to their particular, local needs. Because they do not use FAR contracts, tenders are not recorded on DD350 forms and no FPDS data are available on them. Nevertheless, as we discuss below, some data are available on payments for services rendered through tenders.

GPCs may also be used to procure transportation services. They are primarily used by non-TRANSCOM purchasers for air shipments of less than 150 pounds. Such purchases are summarized monthly by card owner. Like DD1057 data, the monthly summaries of GPC transactions do not offer detailed data on specific services purchased and lack detailed data on suppliers such as that available in DD350. GPC merchant codes for suppliers also differ from DD350 DUNS codes.

In sum, of the data sources on purchases in FY 2003, DD350 data offer the most usable data but do not include all purchases. To analyze purchases not in DD350 data, data on tender and other small payments must be considered. There are two principal instruments for paying transportation services: payments by DFAS and PowerTrack.

All DoD suppliers, except foreign vendors who perform work outside the United States, must be registered in the central contract registration database prior to and during performance and through final payment of any contract (DoD, 2006). This database includes data elements available in DFAS. Unfortunately for present purposes, DFAS is used primarily to pay FAR contracts, for which DD350 data already provide a good many variables. (DFAS is also used to pay for tender shipments of household goods and personal property, but these categories were not of primary interest to TRANSCOM in this study.) Furthermore, DFAS data elements are quite limited, including only payer, payee, dollar amount of transaction, and budget category of spend. Payments made by DFAS to U.S. Bank (i.e., reimbursements for

¹ Contract actions of \$2,500 to \$25,000 were traditionally recorded on DD1057 forms, which monthly summarized such purchases by purchase office. DD1057 data were eliminated in FY 2005 when DoD required all contract actions of at least \$2,500 to be recorded on DD350 forms.

PowerTrack payments) and other direct payments made to carriers, e.g., chartered aircraft or ships, are lumped together into monthly bills.

PowerTrack data provide more details than DFAS data did. They also include many payments not in DFAS, primarily for tenders. PowerTrack was developed to speed payment to carriers and standardize the carrier payment process. Carriers pay U.S. Bank a fee for quick payment once a claim has been validated. The resulting records yield data elements on actual dollars spent for a shipment and its shipper, carrier, mode, weight, volume, origin, and destination. More importantly, most tender shipments are paid by PowerTrack. This means that PowerTrack provides the only usable data for a spend analysis on many purchases not recorded in DD350. PowerTrack does have several drawbacks. It was initially designed to pay trucking companies for shipments within the United States. It has been expanded to other modes of transportation and shipments outside the United States, but older data lack information on such shipments. It was not designed to provide DoD with detailed spend data. Extracting data for a spend analysis requires a special request and considerable labor. There is also some overlap between PowerTrack and DD350 that researchers must address in assessing total transportation spend.

Table B.1 shows categories of shipments by routes (e.g., within or outside the United States); type of service; whether the shipment is arranged by FAR contracts, tenders, or GPCs; and whether it is paid by PowerTrack or DFAS.

Table B.1
Spend Analysis Business Rules

Routes and Organizations	Type of Service	DD350	Tenders	GPC, IMPAC ^a	PowerTrack	DFAS
Domestic (CONUS to CONUS)						
AMC	< 150 lbs, scheduled (GSA express delivery services, small parcel, includes Alaska, Hawaii, and Puerto Rico)	Yes		Yes ^b	Yes ^b	
	< 150 lbs, scheduled (outside any contract)		Yes		Yes	
	> 150 lbs, scheduled		Yes		Yes	
	Passenger or cargo full plane-load charters (master solicitations; very few domestic cargo charters)	Yes				Yes

Table B.1—Continued

Routes and Organizations	Type of Service	DD350	Tenders	GPC, IMPAC ^a	PowerTrack	DFAS
MSC	Unscheduled ocean	Yes				Yes
SDDC, surface	Scheduled TTCs	Yes			Yes	
	Scheduled, outside TTCs		Yes		Yes	
SDDC, ocean	Scheduled, containerized, regional domestic contracts (RDCs), Puerto Rico, Azores, Alaska	Yes			Yes	
International (CONUS to OCONUS, OCONUS to CONUS, OCONUS to OCONUS)						
AMC	< 150 lbs, scheduled (Worldwide Express or WWX)	Yes		Yes ^b	Yes ^b	
	> 150 lbs, scheduled (category A international airlift services)	Yes			Yes ^b	
	> 150 lbs, scheduled (outside category A)		Yes		Yes ^b	
	Category B passenger or cargo charter (international long-range contract)	Yes				Yes
MSC	Unscheduled ocean	Yes				Yes
CONUS origination						
SDDC, ocean	Scheduled, containerized, USCs	Yes			Yes	
	Scheduled, containerized, outside USC		Yes		Yes	

Table B.1—Continued

Routes and Organizations	Type of Service	DD350	Tenders	GPC, IMPAC ^a	PowerTrack	DFAS
OCONUS origination						
SDDC, ocean	Scheduled, containerized (40% of SDDC's ocean bookings)		Yes		Yes ^b	
Miscellaneous						
DLA	Otherwise unavailable		Yes		Yes	Yes
GSA	GSA city-pairs, passenger, scheduled	Yes			Yes	Yes
All military services	Spot bids, scheduled or unscheduled		Yes		Yes, where available	
	Household goods		Yes			Yes
	Personal property		Yes			Yes
	Hawaii and Guam (for at least ocean services)		Yes			Yes
	Kuwait				No	
Air Force					CONUS standing up in Europe, Guam	
	Hazmat					Yes
	Korea					Yes
Army					CONUS	
USMC	Only one overseas base in Japan				CONUS, Japan	
Navy	No OCONUS Transportation Management Offices (TMOs)				CONUS	

^a IMPAC = International Merchant Purchase Authorization Card, a GPC.^b Except where unavailable.

DD350 and PowerTrack Data and Analysis Issues

DD350 Issues and Background

The TRANSCOM component commands, through their military services and the defense agencies, have long collected data on transactions equal to or greater than \$25,000 using the DoD Form 350, Individual Contracting Action Report, which was stored in the DD350 Contract Action Reporting System. The services sent these data to DoD, which consolidated them across the services and defense agencies. The DoD Washington Headquarters Services/Statistical Information Analysis Division (WHS/SIAD) managed the DD350 database that was used for the current analyses.¹ These data and associated documentation are available in electronic form at DoD (2007b).

Changes in DD350 Data Reporting

FAR 4.602(c)(1) now requires data collection points in each government agency to collect data on all transactions over \$2,500, meaning that DoD now requires reporting of contract transactions exceeding \$2,500 on DD350 forms.² Some services had already begun doing so. The Army began reporting contract transactions valued at \$2,500 or more on DD350 forms in FY 2003, and the Marine Corps began in FY 2004.³ Now, through a machine-to-machine interface, the services and defense centers directly report their DD350 individual contract actions to FPDS-NG (Lee, 2005).

Several data items in the DD350 have had their coding structure completely revised in recent years. This makes some comparisons over time difficult.

¹ Previously, the data were sent to WHS/Directorate of Information Operations and Reports (DIOR). In December 2004, WHS/DIOR was realigned under the Defense Manpower Data Center within the Defense Human Resources Activity.

² Previously, DoD transactions between \$2,500 and \$25,000 were reported on DD1057 but not DD350 forms. DoD eliminated DD1057 beginning in FY 2005 and instructed the services and defense agencies to report transactions of \$2,500 or more on DD350 forms (Lee, 2005).

³ We observed many transactions valued below \$25,000 in the FY 2003 and FY 2004 data for the Army and in the FY 2004 data for the Marine Corps. We did not find many transactions valued below \$25,000 in the FY 2004 data for other services and defense agencies.

SIC to NAICS

NAICS has replaced SIC. NAICS was developed jointly by the United States, Canada, and Mexico to provide new comparability in statistics about business activity across North America. The NAICS codes first appeared in DD350 data in FY 2001. The U.S. Census Bureau introduced the NAICS code in 1997 and revised it substantially in 2002. Another significant revision is planned for 2007 and will initially focus on products of service industries, then on manufacturing products. For further information, please see U.S. Census Bureau (2006b).

Purchase Office Codes

The services and agencies have recently changed their purchase office codes from four to five characters to a six-character DoD Activity Address Code (DoDAAC). The Army changed in FY 2004 and the rest of DoD did so in FY 2005. The DoDAAC uniquely identifies a unit, activity, or organization that has the ability to requisition or receive materiel. Our analyses of FY 2003 data used the older purchase office codes.

Using the DD350 Data for Spend Analyses

The DD350 data were originally not designed for spend analyses. Accordingly, we supplemented these data with additional information. Thus, we describe some lessons learned on the caveats and limitations in using them for this purpose.

Parent Companies of Local Contractors

The DD350 data identify individual suppliers using a contractor ID number (DUNS⁴), company name, and address. Although many small, individual suppliers are involved in defense contracting, large corporations with multiple locations or divisions have each location or division individually named as a separate local contractor DUNS code in the DD350 data. Aggregating the DD350 data to individual contractors rather than parent companies would fail to reveal true spend totals with large corporations. The DD350 data also contain the DUNS code for the ultimate parent company of each contractor—i.e., the top level of the corporation—but lack any further information about that parent. The name of the parent company, along with other characteristics, such as the size of the parent's business (large versus small) must be obtained from outside sources. WHS/SIAD supplied RAND with the DUNS database corresponding in time (February 2004) to the public release of the FY 2003 DD350 data. Individual company Web pages also helped us verify proper linkages.

There are also errors in the DUNS codes in the DD350 data. In FY 2003, in the DD350 data, we found a local firm matched to Maersk as its ultimate parent. However, in the DUNS file, Maersk was linked to A. P. Moller Maersk as its ultimate parent, so that local firm ought to have had A. P. Moller Maersk as its ultimate parent. Our analysis corrects this mistake and

⁴ The D&B DUNS is a unique nine-digit identification code used to reference single-business entities, while linking corporate family groups together. It is an internationally recognized common company identifier in Electronic Data Interchange (EDI) and global electronic commerce transactions. For more on DUNS, see Dun & Bradstreet (2001).

uses the correct parent company, A. P. Moller Maersk. Because of the large dollar amounts involved, this correction changed the top 10 supplier list by moving each company up one rank for ranks three and below.

Type of Contractor

We observe inconsistent coding in the DD350 data for local contractor type (e.g., small or large, foreign entity) on many contracts that is used to determine small business status. We use DUNS data and apply type of contractor (e.g., small or large) to the parent company.

Business Rules for DD350 Data

We developed rules that mapped modes and categories of transportation to their business transactions and where their associated spending was recorded, which we call *business rules*. These rules helped us identify contract transactions that were recorded in both DD350 and PowerTrack data. They also helped us account for types of transportation spending of greatest interest to TRANSCOM (i.e., movement of things and people) and where it was recorded.

Transportation Actions

We analyzed only contract actions with PSC codes beginning with “V” which is the PSC group for transportation, travel, and relocation services.

Dollars

Dollars, including deobligations, are summed across contract actions.

Contracts

The number of distinct, 15-position, alphanumeric character contract numbers is counted across contract actions.

Parent Companies

Using the parent company code in the DD350 data ensures that our dollar results will exactly match the tabulations available on the WHS/SIAD Web site.

Small Business

We use an external data source for the type of business (small or large) of a parent company that corresponds to its lower, local contractors. We define *small business* as small, disadvantaged business and other small business. Our small business dollars do not match the WHS/SIAD tabulations for small business, because we do not apply the SBA restrictions—e.g., exclusion of Foreign Military Sales (FMS) companies.

Sole-Source Contracts

We determined the sole-source (or competitive) status of each contract action and considered a contract as sole source so long as it has at least one sole-source transaction. According to dis-

cussions with military service contracting personnel, the DD350 data element C6, number of offers solicited, provides the best single estimate of the sole source status of a contract action. We assessed other variables that correlated most closely to data element C6 to use in case C6 was missing. Our analyses estimated sole-source status by checking data fields in the following sequence:

- number of offers solicited (1 = sole source; 2 = competitive)
- extent competed (B or D = sole source; A or C = competitive)
- solicitation procedures (N = sole source; A, B, or C = competitive)
- number of offers received (1 = sole source; 2–999 = competitive).

If all of these variables were missing, then sole-source status was also considered missing.

Purchase Orders

Contract actions are flagged as purchase orders when the ninth character of the contract number is M, P, V, or W.

Set-Asides

Contract actions are flagged as set-asides when the extent competed is K.

PowerTrack Issues and Background

PowerTrack is an electronic payment system started in 1998 and operated by U.S. Bank.⁵ Carriers pay U.S. Bank a fee to get paid in an efficient and timely manner. Carriers register with PowerTrack and then use it to invoice the government for transportation shipments. If the amount of the carrier's invoice matches the information submitted by the DoD shipper, the carrier is automatically paid. Otherwise, the DoD shipper must reconcile the difference. DoD has set a goal of 95 percent of its transportation invoices being processed automatically by PowerTrack within three days (DoD, 2001a). DoD shippers and DFAS initiate the PowerTrack transaction and carrier invoice information finalizes it.

In 1999, DoD began using PowerTrack to arrange and pay for freight shipping as part of its mandate for business reengineering from the 1997 Quadrennial Defense Review (per DoD, 1997). Carriers registered with the system receive payment relatively quickly; DFAS pays U.S. Bank and other shippers on a longer schedule.

In FY 2003, PowerTrack had been implemented CONUS-wide for the most part, but a few OCONUS locations were also operating PowerTrack. PowerTrack will be implemented worldwide. OCONUS shipments are not the only kinds of transportation transactions missing from PowerTrack in the FY 2003 extract: GPC transactions are not included, and FAR contracts recorded in the DD350 and DD1057 that are not paid by PowerTrack are also not

⁵ "U.S. Bank Payment Systems Introduces PowerTrack" (1998). See also GAO (1999).

recorded here. In 2004, the DoD began testing the use of PowerTrack for the Families First program, which moves DoD service members, civilians, and families.⁶

PowerTrack Data Extract

On August 26, 2004, TRANSCOM provided us with two different types of PowerTrack extract files from U.S. Bank. The first extracts were two one-month samples of PowerTrack data, August 2001 and January 2004 made up of all 42 PowerTrack tables and a data reference.⁷ Many of the tables were not populated. The second extract was a special two-year sample that was created at the request of the Office of the Secretary of Defense (OSD) for the Defense Transportation Coordination Initiative (DTCI).⁸ This extract contained DoD freight transportation bill of lading (BOL) transactions paid through PowerTrack from June 1, 2002, through May 31, 2004, which corresponds to U.S. Bank's FY period. Our analyses use the data from October 1, 2002, to September 30, 2003, i.e., DoD's FY 2003. The data fields of the primary data source, the BOL file, include the name and location of the transportation carrier as well as the buyer (payer) of the service, the mode of service (e.g., air, water, land), the transaction cost, the piece count or quantity, the shipped item's weight and hazmat status, the pickup and delivery date and time, and the transaction's priority level.

Using PowerTrack for Spend Analyses

The data are constructed as a payment tool; thus, we prepared the data for analysis in several ways. First, the European currency, the euro, was converted to U.S. dollars using the average exchange rate for FY 2003 (0.882 euros per dollar) (Federal Reserve Bank, 2004). Second, later adjustments to billed amounts (surcharges, overpayments, and the like) were provided in a different data file called an *ebill file*. The ebill data we were given did not contain detailed information about the transaction that would allow us to link it directly to transactions in the main file; in other words, there was no unique data element identifier in the ebill data that matched a corresponding transaction in the main file. Instead, we imputed ebill adjustment dollars to the BOL file by matching by parent carrier, service or agency (such as DLA), and payer organization, which corresponds to a particular service or agency location (such as Defense Depot Hill Utah or DDHU), distributing dollars across transactions within a carrier/service/payer combination according to the size of each transaction relative to the total dollars in that combi-

⁶ PowerTrack is being used with Families First, DoD's program for moving HHG and personnel from one location to another. See TRANSCOM (2005a).

⁷ These first data extracts were collected during the Long Term Data Repository (LTDR) initiative in development in FY 2004. The 75-page reference data were titled "Functional Specifications for the PowerTrack Archival Process" (Steffey, 2004).

⁸ On October 13, 2004, Judy Mele at RAND received from Howard Steffey of TRANSCOM two discs of data labeled "U.S. Bank PowerTrack Data Extract." One disc contained data on a file called BOL. Another disc contained data on ebill information and BOL detail on cargo-related information.

nation. For example, if a carrier/service/payer combination had three transactions in the main file, with one transaction comprising 50 percent of the dollars and the other two transactions 25 percent each, then we allocated 50 percent of the ebill amount for that carrier/service/payer combination to the first transaction and 25 percent to each of the other two transactions.

Finally, we needed to link subsidiaries and companies to their parent organizations. PowerTrack data contain codes, which link parents and children. However, these codes are not consistent with the child-parent relationships recorded in the DD350 data, which use DUNS data.⁹ To make the child-parent company relationships consistent across the DD350 and PowerTrack data, we based parent company names on the DD350 and DUNS information. First, we manually matched carrier names in PowerTrack to DD350 child companies and associated parent companies in the FY 2003 DD350 data for PSCs Vxxx. Second, if companies were not recorded here, we then matched PowerTrack carrier names to the children company names in a February 2004 DUNS file that records parent and children companies.¹⁰ Third, if we could not match the carrier name to either the DD350 or DUNS data, we assumed that the local company was also the parent company. Through this method, we could find parent companies for PowerTrack transactions worth almost 99 percent of the dollars in PowerTrack.

We derived the size of the business from the DUNS data. We evaluated the small business status of each parent company from the DUNS data. We assumed that those carriers not found in the DUNS were small businesses. This assumption concerned only 4 percent of the total small business dollars or \$13.8 million out of \$346 million.

PowerTrack data provided shipping places of origination and destination, which allowed us to determine channels for each transaction. The data did not permit us to analyze spend by type of cargo carried. Key data fields were primarily recorded with little variation or description, e.g., “freight of all kinds or unknown.”

For many of the air transportation transactions, the PowerTrack data recorded the carrier name as “Air Mobility Command” with a top-level carrier “U.S. Government Carrier Assets.” AMC contracts many of its air requirements with commercial carriers whose names do not appear in the data.

One change that we made to some DD350 data but not to the PowerTrack data concerns transactions that are in both data sets. Our interviews with various data users revealed that USCs, TTCs, and RDCs are recorded in DD350 data and that some are paid by PowerTrack. Thus, dollars can be recorded in both data systems. The TTCs were a set of three-year transportation contracts that replaced guaranteed traffic negotiated tenders, managed by the U.S. General Services Administration (GSA) (Pagan, 2003). These FAR contracts, which were the

⁹ Upon inspection, the highest-level codes provided by the PowerTrack data appeared to be headquarters or subsidiary company names. For example, in PowerTrack several FedEx-related companies did not map to FedEx Corporation, whereas they did in the DD350 and DUNS data. Because we wanted to analyze the spend data at the highest, parent level, we were required to use DD350 and DUNS data to identify parent companies and their names.

¹⁰ These manual matches were based on string recognition and judgment. DUNS children and parent company names were both searched for similar PowerTrack carrier names.

first of their kind for purchasing ground freight transportation services, were long-term (three years) and held carriers accountable for prices and services.¹¹

We obtained contract numbers for the USCs, TTCs, and RDCs and subtracted them from the DD350 (PowerTrack data do not include contract numbers, so we could not isolate these contracts in those data). We found that USC and RDC carriers are in both data sets. Only one transaction of one TTC contract recorded nonzero dollars in DD350 data in FY 2003.

¹¹ The guaranteed traffic negotiated tenders program was based on rates for heavy freight traffic lanes that applied for up to six months and permitted carriers to walk away from the agreement without penalty. See “MTMC Changes Its Domestic Freight Contracting Process” (2002).

DD350 PSCs for Transportation and Related Services

Table D.1
DD350 PSCs for Transportation and Related Services

Code	Name
V002	Motor Pool Operations
V003	Packing/Crating Services
V111	Air Freight
V112	Motor Freight
V113	Rail Freight
V114	Stevedoring
V115	Vessel Freight
V119	Other Cargo and Freight Services
V121	Air Charter for Things
V122	Motor Charter for Things
V123	Rail Charter for Things
V124	Marine Charter for Things
V125	Vessel Towing for Things
V126	Space Transportation and Launch Services
V127	Security Vehicle Services
V129	Other Vehicle Charter for Transportation of Things
V211	Air Passenger Service
V212	Motor Passenger Service
V213	Rail Passenger Service
V214	Marine Passenger Service
V221	Passenger Air Charter Service
V222	Passenger Motor Charter Service

Table D.1—Continued

Code	Name
V223	Passenger Rail Charter Service
V224	Passenger Marine Charter Service
V225	Ambulance Service
V226	Taxicab Services
V227	Navigational Aid and Pilotage Services
V231	Lodging—Hotel/Motel
V241	Military Personnel Recruitment
V251	Civilian Personnel Recruitment
V301	Relocation Services
V302	Travel Agent Services
V999	Other Transportation, Travel, and Relocation Services

PowerTrack Shipment Modes

Table E.1
PowerTrack Shipment Modes

Mode	Description
A	Air
AF	Air Freight
AH	Air Taxi
AIR	AirFreight
ARG	Air Freight Guaranteed Traffic
ARO	Air Freight Other
BRG	Barge
BUS	Bus
DW	DriveAway
E	Expedited Truck
FL	Flatbed
GG	Multiple Origin and Destination, One Trailer
HHG	Household Goods
HI	Handle In
HO	Handle Out
HR	Hour
IM	Intermodal
J	Motor
LT	Less Than Trailer
LTL	Less Than Truckload
M	Motor Freight (Common Carrier)
MP	Motor Freight (Package Carrier)

Table E.1—Continued

Mode	Description
NP	Not Provided
PL	Pipeline
QS	Quarterly Storage
R	Rail
RF	Temperature Control
RT	Round Trip
S	Ocean
SC	Shipment Agent (Truck)
SHP	Ocean Vessel
SPA	Small Parcel Air
SPE	Small Parcel Express
SPS	Small Parcel Surface
SR	Special Round
TA	Towaway Service
TL	Truck Load
TT	Tank Truck
USP	U.S. Postal Service
V	Van
W	Inland Waterway
WP	Water/Pipeline Intermodal Move
X	Intermodal (piggyback)
ZZ	Unknown

Additional Data on DLA Transportation Purchases

DD350 data provide a broad global overview of large transportation purchases but include few smaller, and more typical, transportation purchases. PowerTrack data provide basic information on the typical smaller purchases but, until recently (and after the period for which data were provided to us), included few OCONUS shipments.

Data on DLA shipments provide a check on these two data systems and their coverage, including what might be in one and not the other or missing in both. Specifically, Manifest Print History (MPH) and Government Bill of Lading (GBL) data, provided to us by DLA's Office of Research and Resource Analysis, comprise another, independent source of data on DLA shipments. In this appendix, we compare MPH and GBL data on DLA shipments with DD350 and PowerTrack data on these shipments. We restrict our analyses to freight-related spend, because MPH and GBL data report only freight transactions. Because MPH and GBL data do not include shipments by water, we also restrict our analyses of DD350 and PowerTrack data to air and land modes as well. We also limit our analyses of DD350 and PowerTrack shipments to those made by defense distribution centers, because only such shipments appear in the MPH and GBL data.

DLA Freight Categories

Mode category	MPH	GBL	DD350	PowerTrack
<i><u>Air</u></i>				
	Air small package carrier	Commercial air freight	Air charter for things	Commercial air freight
	Air parcel post	Air freight forwarder	Air freight	Air freight
		AMC channel		Air guaranteed traffic
		Air parcel post		Small parcel air
<i><u>Land</u></i>				
	Surface small package carrier	Less than truckload	Motor charter for things	Expedited truck
	Surface parcel post	Truckload	Motor freight	Flatbed
		Scheduled truck		Truckload
		Rail		Less than trailer
		Driveaway / towaway		Less than truckload
		Surf parcel post		Motor freight
		Surface freight forwarder		Small parcel surface
		Van		Truck load

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This table summarizes specific classifications of air and land modes, as we consider them in this appendix, in MPH, GBL, DD350, and PowerTrack data. Different organizations developed the systems shown in this table for various purposes at different times. As a result, these categories, while similar, are not strictly comparable across data sources. Identifying and reconciling such issues is typically required in spend analyses.

As we discuss in the main text and seen in this table, DD350 and PowerTrack modes, while similar, are not identical. Here we also see that many mode codes within the MPH and GBL data are more general than those in DD350 and PowerTrack data. For example, although PowerTrack data include information on flatbed or expedited truck deliveries, GBL data show only truckload or scheduled truck delivery modes.

Categories within given data sets may also lack in precision or even differ without effective distinction. For example, MPH air shipments are those whose modes are recorded as air small package carrier and air parcel post, while MPH land shipments are surface–small package carrier and surface parcel post. The small package categories in the broader categories comprise the vast majority of shipments within them. The other categories, though differing in name, are also limited to packages of no more than 70 pounds.

How MPH/GBL Supplements DD350/PowerTrack Data

	\$m		Weight, millions of pounds	
	DD350/PT billed	MPH/GPL charged	DD350/PT billed	MPH/GBL charged
OCONUS Origination	4.4	43.3	0.6	155.9
Parcel Post and Surface Small Package	1.2	13.2	1.0	28.6
USPS, UPS, and World Airways	0.0	3.0	0.0	1.1
FedEx, Air Small Package, from DDSP or DDJC	0.0	22.2	0.0	14.2
Other	317.1	283.1	455.1	1,083.5
TOTAL	322.8	364.8	456.7	1,283.3
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.				

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DDC only, excluding water and AMC

In this table, we show categories of data present in the MPH/GBL that are missing or minimally represented in DD350 and PowerTrack data. For meaningful comparisons, we have dropped, as noted, data categories known to be missing from MPH/GBL data, such as those for water shipments. MPH/GBL data for which the mode is missing are not reflected in totals shown.

The categories in this table are listed in order of priority used to assign dollars that meet more than one category, so that there is no double-counting within a column. For example, the second row, showing parcel post and surface small package shipments, implicitly excludes such shipments originating OCONUS.

We look first at shipments originating OCONUS, which, traditionally, have not been included in PowerTrack data. There were \$43.3 million of such shipments in MPH/GBL data in FY 2003, weighing 155.9 million pounds, but only \$4.4 million of such shipments in DD350 and PowerTrack data, weighing 0.6 million pounds. Although this clearly represents a large category of shipments missed by analysis of only DD350 and PowerTrack data, it is not clear that further or future analysis of it is warranted, given that PowerTrack is being implemented for and is now documenting more of these shipments.

The second category listed in this table is for parcel post and surface small package shipments (not originating OCONUS). MPH/GBL data reported \$13.2 million in these ship-

ments weighing 28.6 million pounds in FY 2003. DD350 and PowerTrack data showed only \$1.2 million in such shipments weighing 1.0 million pounds.

The third and fourth categories shown in this table appear only in MPH/GBL data. There were \$3.0 million in shipments, weighing 1.1 million pounds, in MPH/GBL data made via the U.S. Postal Service (USPS), UPS, or World Airways (in addition to those made through such services originating OCONUS or by parcel post or surface small package modes). MPH/GBL data for FY 2003 also included \$22.2 million in shipments, weighing 14.2 million pounds, in FedEx and air small package shipments made from the distribution depots in Susquehanna, Pennsylvania (DDSP) or San Joaquin, California (DDJC).

Unlike the categories in this table, there were no clear patterns in other shipments. Put another way, although we could identify specific categories for more than \$75 million in shipments appearing in MPH/GBL data but not DD350/PowerTrack data, we were not able to identify specific categories associated with one but not the other in the very large other residual grouping.

Top Ten DLA Buyers by Dollars

	\$sM			Weight, millions of pounds		
	DD350/PT (a)	MPH/GBL (b)	(a) – (b)	DD350/PT (a)	MPH/GBL (b)	(a) – (b)
DDSP	326.9	113.1	213.8	179.2	323.7	–144.3
DDJC	64.8	67.7	–2.9	54.6	164.4	–109.9
DDDE	12.7	32.7	–20.0	10.0	112.9	–102.9
DDOO	17.8	15.6	2.2	22.5	33.6	–11.1
DDRT	14.0	16.3	–2.3	47.7	138.8	–91.1
DDOU	15.5	14.2	1.4	16.3	29.3	–13.0
DDWG	11.6	12.9	–1.3	11.7	21.1	–9.4
DDDC	9.6	9.6	–0.03	20.1	24.5	–4.8
DDAA	8.9	9.1	–0.2	29.8	67.3	–37.5
DSO	17.8	0.0	17.8	0.0	0.0	0.0
Other	114.9	74.1	40.8	189.9	369.8	–179.9
Total	614.6	365.2	249.4	571.8	1,285.8	–714.0
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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In this table, we show coverage of each data set for top DLA buyers of transportation services. The leftmost column shows DLA purchasers of transportation services. The \$sM columns show dollars that each purchaser spent through each data source we examine and the difference between these. The Weight, millions of pounds columns show data on weight in each of these sources. Again, data are limited to air and land shipments and exclude those by water; MPH/GBL data on shipments for which specific air or land mode information is missing are included in the table. Purchasers are ranked by the average they have in each source; e.g., DDSP is listed first because, on average, it had \$220 million in purchases through each source (\$326.9 million plus \$113.1 million divided by two sources).

For each purchaser except the Defense Subsistence Office (DSO), more information is available on shipments by weight in MPH/GBL data; in fact, no information on DSO shipment weight is available in either source. The DSO, now part of the Defense Supply Center (DSC) Philadelphia, is the only buyer in the list that is not a Defense Distribution Center (DDC). Other non-DDC buyers, such as DSC Philadelphia, defense fuel supply points, and defense energy support centers, are included in the other subtotal.

For six of the nine DDC purchasers listed in this table—including defense distribution depots in San Joaquin (DDJC); Europe (DDDE); Red River, Texas (DDRT); Warner Robins, Georgia (DDWG); San Diego (DDDC); and Anniston, Alabama (DDAA)—MPH/GBL has more data on shipments by dollars. For the remainder—including distribution centers in

Pennsylvania (DDSP); Oklahoma City (DDOO); and Ogden, Utah (DDOU)—it has less. In other words, MPH/GBL has more data for most of the top spenders but not for all. It also has only a small portion of the total spend for DDSP, the largest DLA purchaser of transportation services.

These analyses show that the two strategic distribution platforms had the most transportation spend and that more dollars were spent on the East Coast center (DDSP) than on the West Coast (DDJC). The top 10 buyers make up about four-fifths of spend recorded in each data source.

Top Ten DLA Air Carriers by Dollars

	\$M			Actions, thousands		
	DD350/ PT (a)	MPH/GBL (b)	(a) – (b)	DD350/P T (a)	MPH/GBL (b)	(a) – (b)
AMC	222.0	0	222.0	15	0	15
FedEx	68.5	72.0	–3.5	1,138	3,789	–2,650
DHL (ASTAR)	47.9	46.9	1.0	713	786	–73
CNF (Emery)	29.4	24.3	5.1	168	280	–111
North Amer. Air	21.5	20.6	1.0	5	5	–1
Bax Global	15.4	12.9	2.6	44	28	–15
Nat'l Air Cargo	10.7	10.5	0.2	3	2	1
Eagle Global	6.6	7.6	–1.0	21	18	3
Contrans Logistics	8	6	2	22	20	2
Pilot Holding Co.	7	6	1	15	17	–1
Other	6	16	–10	16	17	–1
TOTAL	443	221	222	2,162	5,287	–3,125
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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In this table, we show data for top DLA suppliers of air transportation services. The AMC is shown as the top supplier, due to its inclusion in PowerTrack data, as discussed in the main text.

The AMC is, by far, the largest provider of transportation services to DLA to appear in only one data source. Among other DLA transportation providers included in only one data source, World Airways is most prominent, selling \$2.3 million in transportation services to DLA in FY 2003 as recorded in MPH data. Other prominent air carriers listed only in MPH/GBL data include USPS and UPS.

Subtracting AMC data, there is very little difference between the two data sources; they both show just over \$220 million in purchases from leading air suppliers. There is also remarkable similarity between the data sources on leading suppliers. Excluding the AMC, the top seven suppliers of air transportation services in both data sources are identical.

Much of the spend for carriers listed in this table, particularly that for FedEx, DHL, and CNF, is by non-DDC buyers. These purchases are automatically excluded from MPH/GBL data, and account for differences between the two data sources for these suppliers.

Some ambiguities also appear in these data. We found about \$10 million of spending recorded in GBL with shipping mode by AMC channel and special assignment airlift but with land-based carriers. Furthermore, some of these records had matches in PowerTrack with motor shipping modes.

The difference in the number of transactions between sources for carriers such as FedEx, DHL, and CNF suggests that air small parcel shipments, which account for the largest share of transactions, that are counted separately by TCN in MPH may sometimes be grouped into a smaller number of transactions in PowerTrack. We could not, however, observe any pattern in the data that would confirm this. Any association of TCNs to an unrelated system such as that for lading numbers could not be discerned because none of the data sources has a format that could record such a relationship.

Top Ten DLA Land Carriers by Dollars

	\$M			Actions, thousands		
	DD350/ PT (a)	MPH/GBL (b)	(a) – (b)	DD350/P T (a)	MPH/GBL (b)	(a) – (b)
Eagle Global	18.1	18.8	–0.7	41	48	–7
FedEx	12.3	15.5	–3.2	69	3,293	–3,224
Atlas Van Lines	11.5	11.3	0.2	49	70	–21
Landstar Express	10.3	9.3	1.0	8	7	1
Overnite Express	6.3	6.1	0.3	53	51	2
CNF	5.5	6.9	–1.4	1	3	–1
Yellow Corp.	4.5	4.5	0.0	27	27	0
Crossroad M&S	4.3	4.4	–0.1	2	2	0
Greenvalley Trans	4.3	4.2	0.1	4	4	0
Trans Tech Leas.	3.7	3.7	0.0	4	3	1
Other	91.0	67.5	23.5	122	94	28
TOTAL	171.8	143.4	28.3	332	3,735	3,404
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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In this table, we rank top DLA suppliers of land transportation services by dollars in DD350 and PowerTrack data. As in the data for air carriers, these data show more dollars for shippers outside MPH/GBL, particularly for smaller shippers. Among larger shippers, differences between the two data sources by dollars are comparatively small. It is possible that many of the dollars shown here appear in both data sources.

Among the other purchases of land transportation services were \$38.2 million from non-DDC buyers not included in the MPH/GBL data. Excluding these purchases would bring the totals for each data set within \$10 million of each other.

Several smaller land carriers appear only in GBL data. These include “Rail Company” (which, we surmise, is a small domestic business), Ferroviasset, Fukuoka Unyu, On Time American, Adena Carrier, and J. B. Hunt. All but Rail Company had less than \$2 million in transportation sales to DLA in FY 2003; three had less than \$1 million in sales.

As with air transportation carriers, the numbers of transactions in each data source appear to indicate that FedEx transactions were reported as aggregated bundles in PowerTrack. Excluding FedEx transactions, the number of MPH/GBL actions was about double, rather than 10 times, the number of DD350/PowerTrack transactions.

Freight Spending by Channel

	CONUS to . . .		OCONUS to . . .		Channel not known	Total \$s M
	CONUS	OCONUS	CONUS	OCONUS		
MPH/GBL						
Air	\$86.6M	\$82.8M	\$1.2M	\$8.3M	\$42.5M	\$221.3M
Land	108.6	0.9	0.4	25.6	8.1	143.4
Total	195.1	83.7	1.5	33.9	50.5	364.8
PowerTrack						
Air	126.9	190.2	0.3	4.1	121.4	442.8
Land	165.7	1.2	0.0	0.5	4.3	171.7
Total	292.8	191.3	0.3	4.6	125.7	614.4
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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In this table, we analyze spend by data source for four major channels: CONUS-CONUS, CONUS-OCONUS, OCONUS-CONUS, and OCONUS-OCONUS. Because DD350 data do not include data on routes, they are not included in this table. Though all AMC shipments in PowerTrack were from CONUS-OCONUS, this table shows many, as coded in the original data, as being in an unknown channel.

The MPH/GBL data on OCONUS-to-CONUS shipments is limited to requisitions to CONUS customers filled from OCONUS distribution centers and redistributions from OCONUS to CONUS facilities. These are both somewhat rare occurrences, because it is less expensive to supply CONUS customers with goods from CONUS warehouses. These databases are not used to track retrograde movement or receipts of procurements. PowerTrack data do include retrograde movement as well as requisitions and redistributions, but, because of their limited implementation OCONUS, have very little data on shipments there.

MPH/GBL data show air shipments from CONUS split nearly evenly between CONUS and OCONUS destinations. PowerTrack data show more air shipments to OCONUS but far more dollars to both general destinations. Land shipments for both are dominated by CONUS-to-CONUS shipments, although MPH/GBL data do have a sizable portion of OCONUS-to-OCONUS shipments. MPH/GBL also show more OCONUS-to-OCONUS shipments by both land and air.

In sum, PowerTrack data provide greater coverage of dollars spent on shipments originating in CONUS, while MPH/GBL data have more information, albeit still somewhat limited, on shipments originating OCONUS.

Freight Weight by Channel (lbs)

	CONUS to . . .		OCONUS to . . .		Channel not known	Total weight
	CONUS	OCONUS	CONUS	OCONUS		
MPH/GBL						
Air	199.1 M	31.5 M	0.2 M	22.9 M	27.1 M	280.8 M
Land	852.8	1.3	0.8	129.6	17.9	1,002.4
Total	1,051.8	32.9	1.0	152.6	45.0	1,283.3
PowerTrack						
Air	101.5	47.1	0.1	0.5	50.2	199.4
Land	355.8	0.4	0.0	0.0	16.1	372.4
Total	457.3	47.6	0.1	0.5	66.3	571.8
NOTE: Percents and totals in each cell are rounded numbers and thus may not add. Other totals may not add due to multiple purchase offices using the same contract, multiple PSCs/FSCs on the same contract, or competitive and sole-source transactions on the same contract.						

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We also analyzed data on weight by channel. For most modes by channel, more weight was included in MPH/GBL data than in PowerTrack data. In particular, MPH/GBL data may provide more complete information on shipment weight in OCONUS, within CONUS, and on CONUS-to-OCONUS shipments made by land.

Although providing some more detail on shipments by weight, it is not clear that MPH/GBL data can substantially improve on overall insights regarding transportation spend available in DD350 and PowerTrack data. These data, as noted, are available only for a small subset of DLA purchasers, primarily DDCs that make shipments by air or land. They do offer detail not available in DD350/PowerTrack data on shipments made through FedEx or air small package, through USPS, UPS, and World Airways, through parcel post and surface small package, and, especially, for shipments with origin OCONUS. They offer slightly more detail for several top DLA buyers of transportation services, as well as for a few carriers. Given that their advantage is primarily in shipments originating OCONUS, however, and that PowerTrack can be expected to cover more OCONUS shipments with its implementation there, the modest advantage MPH/GBL data offer for analyzing some shipments is rapidly diminishing. Furthermore, given the limited types of shipments within MPH/GBL data, it appears that, even in FY 2003, DD350/PowerTrack data offered at least as many overall insights into transportation spend as could be realized from any other data source.

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