DEPARTMENT OF DEFENSE

Contract Finance Study

APPENDIX A

EXAMINATION OF THE FINANCIAL HEALTH OF THE DEFENSE INDUSTRY
BY THE UNIVERSITY OF VIRGINIA
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Examination of the Financial Health of the Defense Industry

for the

Under Secretary of Defense for Acquisition and Sustainment (USD A&S), Defense Pricing and Contracting

Updated
February 25, 2022

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About this publication:

This work was conducted by the University of Virginia Darden School Foundation for the Under Secretary of Defense for Acquisition and Sustainment (USD A&S), Defense Pricing and Contracting. The views, opinions, and findings contained in this report should not be construed as representing the official position of either the Department of Defense or the sponsoring organization.

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Executive Summary
Examination of the Financial Health of the Defense Industry

The publicly traded US-based corporations in the defense industrial base are, in aggregate, financially healthy. They are profitable. They generate substantial amounts of cash beyond their needs for operations or capital investment; the bulk is returned to shareholders so they can invest it elsewhere. They generate total returns to shareholders well in excess of what one might expect given their relative low risk to investors. Bankruptcies or other signs of financial distress are exceptionally rare. Strong financial performance was maintained even during periods of market turmoil.

The performance of the industry, in aggregate, has improved over the past 20 years. Operating margins (profit as a percent of revenues) for the Defense companies in our analysis have increased from a range of 7% to 9% to a range of 11% to 13%. This is driven more by an improvement at the bottom than by higher returns for companies already operating at the top. Returns on net assets at the corporate level have more than doubled over this period, as have cash-flow returns on net assets. Returns on the market value of equity have improved. Investor risk has declined even as total returns to shareholders have increased.

While it is difficult to find direct commercial peers to defense companies, the Defense companies in our database in recent years outperformed Commercial companies with similar operational profiles. While operating margins in Defense are lower, that gap is more than offset by lower asset and investment requirements, so that returns on assets in Defense exceed those of the Commercial analogs. Returns on the market value of shareholder equity are substantially higher in Defense than the Commercial analogs. Defense companies have higher total returns to shareholders compared to their Commercial analogs, or when compared to broad equity market indices such as the S&P 500. Finally, Defense companies have lower volatility (risk) in those returns to shareholders.

However, the Defense–Commercial comparison varies by broad industry sector. Defense companies in Platforms and Subsystems (e.g., aircraft, ships, vehicles, and spacecraft) substantially outperformed Commercial analogs from 2000 to 2010, though the gap has narrowed as performance in the Commercial analogs has improved. Defense companies in Electronic Equipment and Systems perform similarly to their Commercial analogs. However, for a period in the middle of the first decade of the 2000s, companies operating simultaneously in both defense and commercial markets (classified as Hybrid companies in our database) greatly outperformed other categories. Finally, Defense companies in Professional/Technical Services substantially underperformed their Commercial analogs with much lower profit margins, though the gap has narrowed as performance by the Commercial analogs has declined over time.

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1 As a convention, we will capitalize the words Defense, Hybrid, and Commercial when they refer specifically to the set of companies and business segments included in our analysis, as opposed to a more general description of a customer or market segment.
Caution should be applied in interpreting the results. There are challenges in making simple financial comparisons between defense companies and analogous commercial companies. There are few direct commercial peers for most defense businesses. Therefore, a broader set of commercial analogs needs to be considered and was added to our analysis. These will not be perfect matches. Publicly traded US defense companies are changing ownership as they are acquired by foreign companies or private investors. This reduces the ability to use data provided by the US Securities and Exchange Commission (SEC) for analysis. There are few “pure play” companies; most participate in multiple segments. Many are conglomerates where part of the company serves defense markets and others serve commercial markets. Industry structure has changed over time, making trend analysis difficult. There are also many “outliers”—exceptional results caused by one-time events—that can influence summary statistics if not considered carefully.\(^2\)

Finally, while performance comparisons can be made in the aggregate over time, it is difficult to extrapolate those results to individual companies. This is because performance within a category (Defense, Commercial, or a Hybrid of both) varies much more widely than the average differences among categories. How well you are run is more important than in which market segment you participate. The differences in performance are statistically significant only for total shareholder returns and for other measures of performance only in specific sectors in specific periods of time.

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\(^2\) Examples that affect this analysis of the defense industry include one-time write-offs of goodwill accumulated via acquisitions made years earlier, periodic restatement of funding requirements for defined-benefit pensions, charges to earnings reflecting expected changes in profit levels on multi-decade programs, and so on.
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1. Overview

1.1 Introduction

The US Department of Defense (DoD) relies heavily upon the technical, industrial, and managerial resources of the US defense industrial base. The primary component of that industrial base is commercial enterprises, many of which are large corporations whose stock is publicly traded and which, therefore, are required to file detailed financial information with the SEC. About 75% of DoD prime-contract awards in fiscal year 2019 were received by these publicly traded corporations.\(^3\)

The operational and financial success of those corporations is important to DoD. Their success ensures the continuation of viable suppliers able to sustain investment in physical assets, develop workforce talents, and invest in new technologies. Conversely, DoD is also keen to be as efficient as possible when acquiring services, systems, or equipment from those same corporations. It does not want to overpay, and it cannot always rely upon free-market principles of competition to provide this outcome. Therefore, a balance needs to be achieved.

The defense industry, like all industries, undergoes change over time and over market cycles. It is therefore appropriate from time to time to assess whether that balance—between affordability and industry viability—is positioned at the right spot. The starting point for such consideration is a comprehensive assessment of the financial performance of the defense industry, how that performance has evolved over time, and how it compares to more general performance of publicly traded corporations operating outside the defense marketplace.

1.2 Tasking

A team at the University of Virginia Darden School Foundation was tasked in three areas of analysis:

- Research, compare, and contrast the financial health of defense industry, hybrid, and comparable commercial companies.
- Determine whether there are significant differences in the health of defense, hybrid, and comparable commercial sectors and why.
- Perform a trend analysis of the defense, hybrid, and commercial sectors to determine whether financial health has improved, declined, or remained the same from 2000 to 2019.

The terms of reference stipulated that all analysis must rely upon data reported by companies to the SEC via annual 10-K filings. This necessarily restricted the analysis to publicly traded US-

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\(^3\) This is an estimate based on reported data on the top 100 recipients of DoD prime-contract awards in 2019. Each of the recipients was classified as to whether it is a publicly traded US corporation reporting data to the SEC.
based corporations. The terms of reference also stipulated that the analysis should be conducted over the interval between 2000 and 2019.

1.3 Methodology

The study created a comprehensive database of SEC-reporting companies participating in the defense market in the United States. In the end, almost 90 such companies were found to report data for at least five years during the 2000-to-2019 period. These were divided into three categories, in accordance with the study terms of reference:

- “Hybrid”: Between 25% and 75% of revenue related to US defense. The number of Hybrid companies reporting in any year ranged from 33 in 2008 to 19 in 2019.
- “Commercial”: Corporations with US defense businesses but with defense-related revenues less than 25% of total. The number of Commercial corporations with defense businesses ranged from 24 in 2006 to 19 in 2008. To this we added a representative set of other commercial companies serving similar industries, with similar capital structures and serving concentrated customer sets. We found 29 such companies.

To allow for more precise analysis, we also examined financial data at the business-segment level. Most of these corporations break down their financial performance into a handful of business segments, although only a limited set of financial data is reported. About 475 business segments were reported for these roughly 120 corporations at some point during the period 2000 to 2019, ranging from 222 in 2006 to 158 in 2019.

A primary benefit of examining data at the business-segment level is that they can provide a cleaner definition of a corporation’s overall defense posture. For example, General Dynamics fits our description of Hybrid at the corporate level, but at the business-segment level, we can more clearly align its business units with the Commercial category (Aerospace) and the Defense

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4 The analysis excludes privately owned companies (e.g., General Atomics, SpaceX) and foreign-owned companies (e.g., BAE Systems, Fincantieri) that do not file annual 10-K reports to the SEC. It also excludes nonprofit organizations such as Aerospace Corporation and Johns Hopkins APL. Finally, it excludes the substantial industrial and technical enterprises within DoD such as the US Navy Warfare Centers and the industrial capabilities at various sites such as Air Force repair depots, Army ammunition plants, Naval shipyards, NSWC Indian Head Division, and Watervliet Arsenal.
5 Companies with annual sales consistently under $20 million were excluded. Data for individual years that reflected exceptional events unrelated to the defense business (e.g., parent company bankruptcy) were also excluded. In both cases, the excluded observations are less than 1% of the overall set of observations.
6 Most companies do not break down sales at the level of detail required to define those only to DoD and FMS. They tend to bundle sales to DoD, the US Department of Homeland Security (DHS), and other US agencies, including those in the intelligence community. This forced us to use a slightly broader definition in the data gathering. Where customer-specific data are inadequate, the customer breakdown has to be inferred from business-segment financial data, and from self-reported data to annual surveys on the defense industry such as the Defense News Top 100 annual survey.
category (e.g., Marine Systems and Combat Systems). Similarly, the substantial defense operations of Boeing, Oshkosh, FLIR, and Harris (before the L3/Harris merger) are included in Defense at the business-segment level but are captured as Hybrids at the corporate level.

The broader sample in the business-segment database also allowed us to further divide that database into three broad industry sectors:  

- “Platforms and Subsystems”: Aircraft, spacecraft, combat vehicles, and naval shipbuilding. These industries are typified by very long program life cycles, infrequent competitions for new programs, very high barriers to entry, generally high fixed costs, and high capital investment. Many of these business segments have consolidated over the years and now have very few competitors.

- “Electronic Equipment and Systems”: C4ISR systems as well as stand-alone equipment for communications, sensing, and imaging; electronic warfare; and so on. These industries are typified by moderate program life cycles, more frequent competitions, high barriers to entry, high corporate research-and-development (R&D) spending, and moderate investments in fixed assets. While consolidation has taken place in these areas, a moderate number of potential competitors typically remains.

- “Professional/Technical Services”: IT services, facilities management, engineering services, and SETA/SE&I services. These sectors are characterized by frequent competitions, low barriers to entry, and relatively low requirements for R&D spending or investment in fixed assets. Consolidation is underway in this sector, but there is typically a large number of competitors in each area.

It might have been useful to disaggregate the corporate data along similar lines as well. However, this is not practical. First, the assignment to a single industry sector is not practical at the corporate level, given the breadth and diversity of many participants. Second, the resulting number of companies in each category would be too small to permit meaningful analysis, especially in more recent years.

While the databases are as comprehensive as one might construct from SEC-reported data, we are still dealing with a small sample, especially at the corporate level. Moreover, these types of financial data can vary for reasons beyond market fundamentals, creating outliers as a result of corporate restructurings, mergers, asset write-offs, reallocations of corporate overheads and identifiable assets, and so on. For this reason, the data—especially at the corporate level—are best viewed as indicative of broad trends and differences in performance, not applicable necessarily to any one corporation.

To minimize the effects of these outliers, some of our summary analysis averages performance over a five-year period. To best capture the broad industry trends, we use a weighted average

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7 Originally, the study terms of reference requested a breakdown to include aerospace, shipbuilding, and facilities/construction services. The number of reporting companies was inadequate to support this breakdown. The categories used here reflect a broader segmentation based on mutually exclusive, comprehensively exhaustive (MECE) principles.
to summarize data across industries, using corporate revenue or assets to weight the results. This avoids having small companies, perhaps only 1% the size of industry giants, distort aggregate results.\(^8\)

### 1.4 Measures of Performance and Sources of Data

We have used a range of financial measures to compare performance using data from annual 10-K filings, obtained through Wharton Research Data Services (WRDS), specifically the Compustat/IQ annual database of corporate financial information (Exhibits 1 and 2).\(^9\) Additional data from WRDS included the Beta Suite, used to calculate the cost of capital.

**Exhibit 1**

**Abbreviations for Primary Data Items**

<table>
<thead>
<tr>
<th>Corporate Database</th>
<th>Business-Segment Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>REVT</td>
<td>Total revenue</td>
</tr>
<tr>
<td>OP</td>
<td>Operating profit</td>
</tr>
<tr>
<td>NOPAT</td>
<td>Net operating profit after tax</td>
</tr>
<tr>
<td>NI</td>
<td>Net income</td>
</tr>
<tr>
<td>ICAPT</td>
<td>Invested capital (net assets)</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earnings before int., taxes, depr &amp; amort.</td>
</tr>
<tr>
<td>ACT</td>
<td>Current assets</td>
</tr>
<tr>
<td>LCT</td>
<td>Current liabilities</td>
</tr>
<tr>
<td>AT</td>
<td>Total assets</td>
</tr>
<tr>
<td>NI</td>
<td>Net income</td>
</tr>
<tr>
<td>DLTT</td>
<td>Long-term debt</td>
</tr>
<tr>
<td>SEQ</td>
<td>Shareholder equity</td>
</tr>
<tr>
<td>TEQ</td>
<td>Shareholders equity - total</td>
</tr>
<tr>
<td>OANCF</td>
<td>Net cash flow from operations</td>
</tr>
<tr>
<td>CAPX</td>
<td>Capital expenditures</td>
</tr>
<tr>
<td>CSHO</td>
<td>Common shares outstanding</td>
</tr>
<tr>
<td>PRCC_F</td>
<td>Closing share price (fiscal year)</td>
</tr>
<tr>
<td>PRCCM</td>
<td>Monthly closing stock price</td>
</tr>
<tr>
<td>MTRF</td>
<td>Monthly total return factor</td>
</tr>
<tr>
<td>YE</td>
<td>Year end</td>
</tr>
<tr>
<td>PRSTKC</td>
<td>Purchases of common &amp; preferred stock</td>
</tr>
<tr>
<td>WACC</td>
<td>Weighted-average cost of capital</td>
</tr>
<tr>
<td>XINT</td>
<td>Interested and related expense - total</td>
</tr>
<tr>
<td>XRD</td>
<td>Research and development expense</td>
</tr>
</tbody>
</table>

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\(^8\) The detailed appendices accompanying this report also present summary data using medians, which is an effective way of reducing the effects of outliers, but which also overrepresents small companies.

\(^9\) Our quality checks found data at the corporate level to be accurate, with the exception of data for Boeing in 2019, where Compustat had made adjustments to the numbers filed by Boeing. We chose to use the reported 10-K data after reviewing Compustat’s rationale for the revisions. These numbers were updated manually using the 2019 10-K filed by Boeing through the SEC EDGAR system. However, we found data at the business-segment level to contain numerous missing observations as well as restated data that would distort our trend analysis. For this reason, we had to recreate about half of the 4,000 data points in the business-segment database by direct manual examination of several hundred 10-K filings stored in the SEC EDGAR database.
A basic measure is operating margin, or return on sales (ROS), often expressed as “profit margin,” an accounting measure of profit generated as a percent of overall sales. However, ROS only tells half of the story about profit generation. The other half is asset turnover, the rate at which a corporation’s assets can generate sales. Some industries (e.g., grocery stores) have very low ROS but make up for it with higher asset turnover.

Multiplied, these two numbers drive return on net assets (RONA), which is a far more useful measure for looking at overall corporate performance. RONA is a measure of accounting profit generated as a percent of the assets that must be funded to generate those returns. (RONA is also known as return on invested capital [ROIC].) A related measure is cash-flow return on net assets (CFRONA), which captures a similar measure but uses as the numerator the amount of cash generated rather than accounting profit. Still another variant is free cash flow on net assets (FCFRONA), which captures the cash available after capital expenditures.

Note that while we can measure return on assets at both the corporate and business-segment level, the definition of assets is different at these levels. At the corporate level, our most commonly employed measure is net assets, or those assets that are funded by the company itself via long-term debt or shareholder equity. At the business-segment level, we are limited to the use of total identifiable assets, which are those assets (company funded or not) that the parent company chooses to identify with each of its business segments, as opposed to being held at the corporate level itself. At the business-segment level, return on assets measures how well an operating unit uses all of the assets at its disposal. At the corporate level, return on net assets also captures how efficiently a parent company manages the funding of its assets.

Traditionally, a corporation’s return on equity (ROE), using book value for equity, was seen as a useful measure of return to shareholders. However, this measure is also subject to fluctuation due to nonoperational considerations such as stock buybacks and asset write-offs, and it has
lost favor over time.\textsuperscript{10} Therefore, we primarily report the ROE data using market value of equity.

The ultimate measure of financial health in a publicly traded stock is arguably the total shareholder return (TSR)—a measure that includes both dividends received as well as changes in stock price. This must then be compared to the volatility in TSR, which measures the risks investors are being asked to undertake when investing in this stock.\textsuperscript{11} This relationship between returns and risk allows for comparison across different asset classes.

One other measure has been used in the past but has less applicability today. Economic value added (EVA) captures the level of profit generated by a company after deducting the costs required to finance the assets of the corporation—interest costs, corporation-borrowed money, and required return to shareholders on a corporation’s equity. However, because the book value of equity is subject to major anomalies as a result of stock buybacks, asset write-offs, and other factors, we have concluded it does not add materially to the analysis beyond the other measures already available.

An important decision in reviewing financial data is whether a year’s observation should reflect the performance as reported in that current year, or whether we should use a restatement of data for that year as reported in a subsequent annual report. For example, if a company in 2019 divests a major business, it is not uncommon for that company to subsequently restate previously reported results for 2018, as if the divestiture had already occurred in 2018. Thus, there could be two sets of data for 2018 in this case: the data for 2018 filed with the SEC in 2018 and the restated data for 2018 filed with the SEC in 2019.

We have chosen to use contemporary data only—not to use restated data issued in subsequent filings. The reason for this is that the use of restated data, while it may make sense when examining the performance of a single company over time, introduces substantial errors when comparing a broad set of companies. For example, if a company restates data for an earlier year to account for a divestiture, and the acquiring company does not restate data, then the performance of that divested entity is “lost” in the data. Likewise, if a company restates data for an acquisition, and the selling company does not restate the data, then that acquired business is counted twice. The cleanest way to build a database across multiple companies and over many years is to track the results at reported in that specific year, and that is the approach we have taken.

\textsuperscript{10} For example, stockholder equity in Lockheed Martin went from about $1 billion in 2011 to only $39 million in 2012, not because of sudden decline in operational performance but because the company reassessed its level of funding for defined-benefit pension plans payable over decades. This led ROE to grow to over 7,000\% that year. The following year, 2013, stockholder equity jumped back to almost $5 billion, and ROE declined to 61\%—despite an 8.6\% growth in profits and a reduction in total assets from 2012 to 2013 (which normally would have boosted ROE).

\textsuperscript{11} Investors in high-risk investments (e.g., high-tech start-ups) will typically demand a higher expected TSR to offset that risk. Investors in low-risk investments (e.g., US Treasury bonds) are content with a lower rate of return because the risk accepted by the investor is less.
A final methodological decision involves how to weight the individual company results to determine the overall weighted average of the group of companies in the full sample or a subset of that sample. We chose to use total revenue as the weighting criteria instead of the valid alternative of selecting a different weighting variable for different ratios. There were two primary reasons for this. The first follows from our intent to capture the broad performance of the industry as a whole, as cleanly as possible, as it is seen from the perspective of the Department of Defense. Since many other factors (e.g., financial strategy, ownership structure, and risk tolerance) factor into other potential weighting factors (e.g., net assets, equity, or total assets) we concluded that revenue would provide the purest basis for weighting when attempting to create a proxy for how the overall industry supporting the Department of Defense is performing. A second objective was to minimize the introduction of “noise” in the analysis. Use of weighting factors such as net assets or equity would introduce considerable noise in the aggregation process since those factors are more subject to one-time adjustments than is revenue.

1.5 Supporting Appendices

Attached to this Final Report are two appendices (provided as separate attachments) that provide detail in the construction of each database. “Appendix A-UVA Darden Final Report-CO6-Building the Corporate Database” describes the design, construction and demographics of the corporate-level database. This includes a list of the companies involved in the analysis and a list of excluded companies and observations with the supporting rationale for those exclusions. “Appendix B- UVA Darden Final Report-CO6-Building the Business Segment Database” provides the same information at the business-segment level.
2. Comparison of the Financial Health of Defense, Hybrid, and Comparable Commercial Companies

Defense companies are, as a group, healthy, and they compare favorably to Commercial companies. We make this comparison at several levels.

2.1 Aggregate Financial Performance

Over the past 20 years, Defense corporations have outperformed their Commercial counterparts in our database on every measure except operating margin, though Hybrid corporations outperform both Defense and Commercial corporations in many areas (Exhibit 3).\(^{12}\)

![Exhibit 3](image)

Exhibit 3

Comparison of Corporate Financial Performance by Category

Weighted Averages, 2000 to 2019

12 This analysis uses a weighted-average methodology based on corporate revenues. Thus, the results at Lockheed Martin count more than the results at Huntington Ingalls or Frequency Electronics. If, instead, the calculation is made based on unweighted-average performance, the average results for Defense exceed those for both Commercial and Hybrid in almost all categories.
We get similar results when considering the most recent five-year period (Exhibit 4). Commercial companies lag Defense corporations in every measure except operating margin. In most areas, the gap of Defense over Commercial has widened when only the most recent five-year period is considered.

Exhibit 4
Comparison of Corporate Financial Performance by Category
Weighted Averages, 2015 to 2019

We see slightly different results when looking at the business-segment level (Exhibit 5). Defense business segments (regardless of how their parent corporation is categorized) outperform Hybrid and Commercial business segments in all areas except ROS.
One can interpret these results as follows. Defense corporations and business segments have lower profit margins than their commercial equivalents but more than make up for this lower profit margin with higher asset turnover. In other words, the amount of investment required to generate those sales (and thus profits) is lower in Defense than it would be in the Commercial category. The advantage in return on assets (ROA) holds true both in profit terms (RONA) and in cash-flow terms (CFRONA).

### 2.2 Cash Generation and Application

Another measure of health relates to the level of cash generated in a business after all operating costs are funded (net operating cash flow). Management has discretion as to how it might deploy this cash. Some reinvestment in the business is required to expand, upgrade, or replace property, plant, and equipment. Cash can be returned directly to shareholders in the form of routine or special cash dividends. Cash can also be used to buy back shares, which has the effect of boosting share price. Companies can also choose to voluntarily pre-fund pension programs above statutory or actuarial requirements, though the cash used for these purposes is considered an operating use of cash and thus is taken out before net cash from operations.\(^\text{13}\)

We have examined the use of net cash from operations and have adjusted the number by adding back the known voluntary pre-funding of pension obligations where such funding has

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\(^{13}\) The mechanics of pension accounting are especially complicated for a major defense company. Financial accounting standards (FAS) based on generally accepted accounting principles (GAAP) coupled with statutory requirements result in one set of calculations around required funding of future defined-benefit obligations, and thus one set of required annual contributions. The implementation of cost-accounting standards (CAS) by DoD leads to a slightly different set of calculations, aligned with unique characteristics of that industry. An effort (“CAS Harmonization”) was executed to better align CAS standards with the updated requirements of the Pension Protection Act of 2006, but meaningful differences remain. Thus, in any given year, companies may be eligible for reimbursement of costs using CAS that are more or less than the obligations they have under PPA and GAAP for cash contributions to defined-benefit pension plans, and thus reported under FAS. While this should average out over the long term, it can lead to sizable annual discrepancies between FAS and CAS results.
been reported in 10-K filings.\(^\text{14}\) (Not all companies make such declarations.) The Defense corporations in our database generated $93 billion in this adjusted net operating cash. Only about 20% of that went for capital expenditures (Exhibit 6).

Defense companies spent the bulk of their adjusted net operating cash to return funds directly to shareholders via stock buybacks or cash dividends. It is important to note that this trend is not unique to the defense corporations in our database. Likewise, the burst in pension funding in this period was experienced across most industries.\(^\text{15}\)

The balance between investing (capital expenditures) and returning cash to shareholders (buybacks and dividends) has been lower in Defense (and Hybrids) than in the Commercial world (Exhibit 7). For every dollar used to return cash to shareholders in the form of dividends or stock buybacks, Defense corporations in our database spent $0.37 on capital expenditures in aggregate over the 2015-to-2019 period. For the Commercial companies in our data set, the corresponding number was $0.52. For the companies comprising the S&P 500 index, the corresponding number (for 2018 alone) was $0.59.\(^\text{16}\) (Defense in 2018 alone was $0.40.)

\(^\text{14}\) Adjusted net operating cash is the sum of net operating cash as reported on 10-K statements plus known discretionary or voluntary prepayments of defined-benefit contribution plans beyond that required by statute and actuarial requirements. (These prepayments are considered an operational use of cash.) Not all such prepayments are reported. Data for Lockheed Martin in 2018 are estimated: the company projected a required funding level of $1.6 billion, but ultimately contributed $5.0 billion in total, without breaking that into required and discretionary components as the company had done in earlier years. We have assumed that $3.4 billion was discretionary.

\(^\text{15}\) US companies were incentivized by the Tax Cuts and Jobs Act of 2017 to accelerate pension funding into 2017 or the first part of 2018 (to be credited against 2017 taxes), thus reducing the overall tax burden (since tax rates in 2018 were lower). This pattern of pension prepayments is seen across most major industries, not just in defense.

2.3 Equity Market Performance

The differences in performance persist when we move from accounting measures to the measures used by investors: ones that track performance in the stock market. For each of the five-year periods in the interval from 2000 to 2019, the Defense corporations generated superior average annual TSR than the Commercial companies (Exhibit 8). Defense corporations also outperformed three common corporate stock indices: Dow Jones Industrial Average, S&P 500, and the NASDAQ Composite. In all but the first period, the Defense companies generated higher returns than the Hybrid companies as well.

Exhibit 8

Compounded Annual Total Return to Shareholders
Defense, Hybrid, and Commercial Corporations versus Stock Indices
2.4 Risk-Adjusted Performance

The superior returns to shareholders by Defense corporations are even more apparent when adjusted for risk. One normally expects investors to demand higher returns for investments that come with higher potential risk (volatility), and we observe this relationship when comparing, for example, risk/returns for US Treasury Bills versus risk/returns for corporate equities in general. In our case, the returns generated over the past 20 years for Defense corporations exceed those for the Hybrid and Commercial corporations in our data set even though the risk of investments in a Defense corporation’s shares is less (Exhibit 9). The Defense data point is far above the line that more generally fits the return–risk relationship across our database categories and broader investment categories.

Exhibit 9

Risk versus Return for Defense and Peer Companies for 2000 to 2019
Compared to Generic Diversified Portfolio Components

17 Relatively, groups of companies serving the same markets—such as the Defense, Hybrid, and Commercial companies represented here—will typically have higher volatility profiles than broadly diversified equity indices such as US Large-Cap or Small-Cap stocks. The following indices, exchange-traded funds (ETFs), or mutual funds were used to calculate market returns and risk: Large-Cap Stocks (DLQIX), Mid-Cap Stocks (FMCSX), Small-Cap Stocks (VSEAX), International Equity (VHGEX), Emerging Markets Equity (ODMAX), Investment Grade Bonds (FBNDX), High-Yield Corporate Bonds (TGHYX), and Treasury Bills (VFISX). Other funds may give slightly different answers. These were chosen in part because they contain data going back to 1999.
The same is true of more recent years (Exhibit 10). From 2015 to 2019, the Defense companies in our database outperform the Hybrid and Commercial companies in TSR even though their risk over that period is less.

It is worth noting that, over time, the volatility of investments in Defense had fallen, with the noticeable exception of the period around 2008 when defense budgets were reduced, and as the US economy entered the Great Recession (Exhibit 11). (Volatility in the Commercial and Hybrid categories has also fallen, albeit not as much.) There are several potential explanations for the reduced volatility and risk of Defense stocks. Consolidation has led to fewer competitors in most industry sectors, which reduces general competitive risk. Returns to shareholders increasingly have been driven by stock buybacks, and these are at the discretion of corporate management and less driven by market risks. The business mix over time has shifted more toward services-related activities, which involve lower investment requirements than traditional platform sectors. Corporate financial management has no doubt improved over the past two decades.

Moreover, there are intrinsic aspects to the defense industry that result in lower risks to many participants. Defense contractors are typically reimbursed for product development through contract R&D. In contrast, commercial companies often put billions of dollars at risk years—or even decades—before they can expect to earn a return. For defense companies, even
independent R&D expenses can be recovered against existing defense contracts as part of overhead charges. Moreover, most defense markets are oligopolistic. While this may not result in higher margins (given cost-based pricing), it does significantly reduce the competitive vulnerability on major programs, some of which extend over many decades. While defense contractors may lack the opportunity for high margins (by commercial standards) on cost-plus contracts, they are generally protected against any unexpected cost increases, though contract margins might fall as costs increase depending upon the contract structure. The same is not typically true of their commercial peers, who rarely have an opportunity to pass along cost increases this easily to customers.

![Exhibit 11](image)

### 2.5 Industry Structure

Finally, there is another way to consider industry health in across the defense industrial base, at least from the perspective of the corporations and their investors. Over the period 2000 to 2019, while the industry structure has changed and companies have merged, downsized, and restructured, only two publicly traded companies in our data set (Allied Defense Group and Alabama Aircraft) have disappeared entirely due to financial challenges. Both of these were very small, with only peripheral roles in the DoD industrial base, and each was confronted with legal challenges and exceptional circumstances that contributed to their liquidation.\(^{18}\)

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\(^{18}\) For example, of the 155 business segment assigned to the Defense category operating at any point between 2000 and 2019, only 47 are still reporting business-segment data to the SEC as of 2021, including those that were spun off into separate publicly traded companies. Only two exited as a result of business failures. Thirty-six went away as part of internal corporate consolidation, and their results are no longer reported separately. Forty-four went away when consolidated with acquiring companies and are no longer reported separately. Finally, 26 still exist but no longer report data because they were acquired by foreign companies (19) or have gone private (7).
On the other hand, the industry has not seen major new entrants over the past 20 years. Several new companies (Exelis, Vectrus, Huntington Ingalls, Leidos, and SAIC) represent spin-offs from other companies and were operating well before 2000. Others represent companies that existed as private companies and then went public in this time (Booz Allen Hamilton). Our list of Defense companies does not include a single corporation that was not already operating in some form well before 2000.¹⁹

Finally, it is worth noting that an examination of the industry using only publicly traded companies excludes several important new entrants to the marketplace. Notably, Space Exploration Technologies Corp. (SpaceX), which remains at this point privately owned, has become an important supplier of launch services to the defense and broader national-security community. Palantir Technologies is another important supplier that was privately owned during the period of this analysis, though it has recently (in 2020) become publicly traded. Several new privately owned defense-oriented start-ups have also entered the marketplace, including Anduril Industries Inc., Carillon Technologies, and Rebellion Defense Inc.

¹⁹ Several Hybrid corporations became substantial defense suppliers from much smaller pre-2000 defense positions, including AeroVironment, Oshkosh Corp, iRobot, and Kratos Defense & Security Solutions. iRobot later divested its defense business.
3. Significance of Differences in Performance among Defense, Hybrid, and Comparable Commercial Companies

An immediate observation when looking at the data is the range of performance one sees across each of the categories of Defense, Hybrid, and Commercial. While the averages of each category might vary, the range of performance within each category outweighs the variation among them. Therefore, while Defense companies might outperform Commercial companies, the range of performance within Defense and within Commercial makes that difference a potential random outcome. How well you run your business and the competitive advantages you enjoy (or do not) may be more important than in which category you sit.

It is possible to apply a standard statistical test to see if the observed differences in two populations (in this case, for example, Defense versus Commercial) is sufficiently large relative to underlying variation that its occurrence is most likely not a random outcome.

3.1 Corporate Results

At the corporate level, considering data across the entire 20-year period, we see a significant difference in ROS between Defense and the other categories, with Defense being lower than Commercial or Hybrid (Exhibit 12). When it comes to RONA, Defense outperforms Hybrid during the period, but underperforms Commercial on CFRONA. However, Defense has a significant advantage in TSR and also has lower volatility (risk) than either the Commercial or Hybrid categories.

Exhibit 12

<table>
<thead>
<tr>
<th>T-Test Comparisons of Corporate Populations, 2000 to 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROS</strong></td>
</tr>
<tr>
<td>NOPAT ÷ REV &amp;</td>
</tr>
<tr>
<td>Black = Defense is higher and Red = Defense is lower</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Defense versus Commercial</th>
<th>Δ = (1.90)</th>
<th>Δ = (0.12)</th>
<th>Δ = (2.56)</th>
<th>Δ = 10.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>p = 0.000</td>
<td>p = 0.860</td>
<td>p = 0.004</td>
<td>p = 0.019</td>
<td>p = 0.036</td>
</tr>
<tr>
<td>Defense versus Hybrid</td>
<td>Δ = (1.10)</td>
<td>Δ = 1.46</td>
<td>Δ = 0.63</td>
<td>Δ = 6.29</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>p = 0.006</td>
<td>p = 0.034</td>
<td>p = 0.506</td>
<td>p = 0.280</td>
<td>p = 0.000</td>
</tr>
</tbody>
</table>

Areas shaded green indicate significantly different results (α = 0.05); Δ represents the average difference in the results (black = Defense is higher and red = Defense is lower). Note: this analysis does not assume clustering of standard errors at the corporate level. See Appendix A for results assuming clustering of standard errors.

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20 A t-test is a standard statistical tool used to test whether two samples originate from a single underlying population, by comparing the differences in the observed averages (means) of each sample to the underlying variations (standard error) in the data overall. The analyst establishes a null hypothesis—in this case, that the two samples represent the same underlying population—and then sets a threshold (α) at which the null hypothesis will
3.2 Business-Segment Results

It is important to recognize that we are looking at variations in performance across a 20-year period for a set of corporations that, even within a single category such as Defense, encompass very different business models, ranging from production of complex industrial products to provision of administrative services.

For this reason, it is helpful to disaggregate the results by industry sector (Exhibit 13). This has to be done at the business-segment level rather than at the corporate level because (1) we have a sufficiently large sample to allow disaggregation by industry sector and (2) the business segments typically fit into Defense, Hybrid, and Commercial categories far more precisely than the corporate data.

Exhibit 13

T-Test Comparisons of Business-Segment Populations, 2000 to 2019

<table>
<thead>
<tr>
<th>Platforms and Subsystems</th>
<th>Electronic Equipment and Systems</th>
<th>Professional/Technical Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROS (OPS ÷ REVTS)</td>
<td>ROA (OPS ÷ IAS)</td>
<td>CFROA (OPS ÷ (DPS − CAPXS) ÷ IAS)</td>
</tr>
<tr>
<td>Defense versus Commercial</td>
<td><strong>Δ=6.58</strong> p=0.0000</td>
<td><strong>Δ=(0.67)</strong> p=0.6613</td>
</tr>
<tr>
<td>Defense versus Hybrid</td>
<td><strong>Δ=(3.20)</strong> p=0.0000</td>
<td><strong>Δ=3.16</strong> p=0.0457</td>
</tr>
<tr>
<td>Commercial versus Hybrid</td>
<td><strong>Δ=(5.53)</strong> p=0.0000</td>
<td><strong>Δ=3.84</strong> p=0.0797</td>
</tr>
</tbody>
</table>

Areas shaded green indicate significantly different results (α = 0.05); Δ represents the average difference in the results

* black = Defense is higher and red = Defense is lower
** black = Commercial is higher than hybrid; red = Commercial is lower than Hybrid

Note: this analysis does not assume clustering of standard errors at the business-segment level. See Appendix B for results assuming clustering of standard errors.

The results indicate that across the entire period 2000 to 2019, business segments classified as Defense significantly outperformed their Hybrid and Commercial peers only in the Platforms and Subsystems industry sector. Defense business segments underperformed both Commercial and Hybrid peers in Electronic Equipment and Systems, though the difference was generally not be rejected. A typical threshold is α = 0.05, which translates, loosely, to the fact that we reject the null hypothesis only if such a conclusion is dependable at a 95% or higher probability. We have chosen to report the results without clustering errors. In Appendix A we also present the results after clustering errors.
statistically significant. Defense business segments also *underperformed* Commercial peers in Professional/Technical Services, and that gap was statistically significant.

However, upon closer examination of the Defense versus Commercial results, it becomes apparent that virtually all of that statistically different performance occurs in the first five years of this interval, a time when defense budgets were growing rapidly due to military operations in Afghanistan and Iraq (OEF/OIF), and when several commercial industrial markets, including commercial aircraft, were suffering after the terrorist attacks of 9-11 (Exhibit 14). Since 2005, while there are differences in performance at the business-segment level, the possibility of this being a random outcome cannot be ruled out.

### Exhibit 14

**T-Test Comparisons of Business-Segment Populations by Five-Year Interval**

**Defense versus Commercial**

<table>
<thead>
<tr>
<th>Five-Year Period</th>
<th>Platforms and Subsystems</th>
<th>Electronic Equipment and Systems</th>
<th>Professional/Technical Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ROS (OPS ÷ REVTS)</td>
<td>ROA (OPS ÷ IAS)</td>
<td>CFROA (OPS + DPS − CAPXS ÷ IAS)</td>
</tr>
<tr>
<td>2000 to 2004</td>
<td>$\Delta = 4.43$ p=0.0167</td>
<td>$\Delta = 14.99$ p=0.0042</td>
<td>$\Delta = 15.42$ p=0.0026</td>
</tr>
<tr>
<td>2005 to 2009</td>
<td>$\Delta = 1.80$ p=0.4420</td>
<td>$\Delta = 4.34$ p=0.2723</td>
<td>$\Delta = 3.29$ p=0.3808</td>
</tr>
<tr>
<td>2010 to 2014</td>
<td>$\Delta = 0.33$ p=0.8490</td>
<td>$\Delta = 3.82$ p=0.2542</td>
<td>$\Delta = 4.46$ p=0.1749</td>
</tr>
<tr>
<td>2015 to 2019</td>
<td>$\Delta = 0.43$ p=0.8468</td>
<td>$\Delta = 2.85$ p=0.5563</td>
<td>$\Delta = 3.52$ p=0.4485</td>
</tr>
</tbody>
</table>

*Areas shaded green indicate significantly different results (α = 0.05); Δ represents the average difference in the results (black = Defense is higher and red = Defense is lower). Note: this analysis does not assume clustering of standard errors at the business-segment level.*
4. Trends in Performance over Time

4.1 Overview
The period from 2000 to 2019 encompassed a number of tumultuous events, affecting defense as well as commercial markets. The terrorist attacks on September 11, 2001, led to a major rebound in spending on national security, while at the same time, many commercial industrial markets (including commercial aircraft) suffered substantial declines. Defense spending then declined sharply after 2008, while simultaneously, commercial markets suffered through the worst economic downturn since the Great Depression. Defense budgets then continued to decline in the early 2010s even as commercial markets rebounded.

The defense industry also went through major changes in this period. A number of corporations that had operated in both defense and commercial worlds divested either their commercial or defense units, resulting in more focused portfolios in either the defense or commercial world, but increasingly less distributed across both. Consolidations continued in the legacy defense industry. Market growth after 9-11 enticed a large array of non-US companies to enter the US market, often via acquisition. Finally, activist investors often acquired significant shareholdings in smaller defense companies, forcing them to restructure or shift emphasis in defense markets.

Attempts to capture the shifts in this industry over time are thus challenged. The number of companies classified as Defense filing 10-K reports declined almost by half during this period. Changes in corporate structure make trend analysis complicated: only six Defense companies reported data each year from 2000 to 2019. The number of equivalent Hybrid companies is only 14 and several of these are very small.

There is an analytical challenge as well in summarizing data for Defense, Hybrid, or Commercial companies. A simple averaging of results across companies over-weights small companies: Mercury Systems is barely 1% the size of Lockheed Martin. Use of medians rather than averages (means) reduces the level of distortion but still over-weights small companies. For these reasons, our default mechanism is to summarize a group of companies using weighted averages. The downside here is that results can be highly affected by events at one company, such as Lockheed Martin in Defense or Boeing in Hybrid.

4.2 Operating Margins (Return on Sales)
As reported earlier, operating margins (ROS) in Defense corporations are typically lower than for the Commercial corporations in our data set (Exhibit 15). Over time, the gap has narrowed, especially as performance of Defense and Hybrid companies has improved, with margins growing from a 7% to 9% range to a 10% to 12% range over the period.
It is also possible to assess operating profit at the business-segment level, though the definition of operating profit is different (pre-tax at the segment level versus post-tax at the corporate level), as is the definition of assets (total identified assets at the segment level versus company-funded assets at the corporate level). At this level, Defense business segments show improving performance and outperform Commercial until 2009, at which point they slightly underperform Commercial (Exhibit 16). The Hybrid business segments outperform both.
How to explain this inconsistency between corporate-level results and business-segment-level results? Part of this reflects slightly different definitions: the data at the business-segment level are before taxes rather than after taxes. Partly, this reflects the challenges with aggregation at the corporate level. For example, at the corporate level, Boeing Company and General Dynamics are both defined as Hybrid companies, but at the business-segment level, they are more precisely defined as encompassing major business segments within the Defense and Commercial categories, and in the case of General Dynamics, with no business segments defined in the Hybrid category. Therefore, the business-segment level provides more delineation and thus a more precise picture, especially of the Hybrid category used in the corporate-level analysis.

It is also true, however, that upon disaggregation by industry category, we see very different results that cannot be as easily gleaned from corporate-level data, due to both an insufficient number of data points and a far less precise ability to align companies with a specific industry sector due to their diversified nature.

In the Platforms and Subsystems industry category, Defense and Hybrid business segments have consistently outperformed Commercial analogs, primarily due to poor performance in those Commercial business segments from 2000 to 2010 (Exhibit 17). This is not surprising, given the double shock of the economic downturn in civil aviation after 9-11 and the broader negative impact of the Great Recession on commercial industry. However, even with the recovery in Commercial sectors in 2010 and after, Defense business segments still outperformed. Hybrid business segments performed better still.

Exhibit 17
Weighted-Average Return on Sales for Business Segments: Platforms and Subsystems by Category (OPS ÷ REVTS)

In contrast, in Electronic Equipment and Systems, both Commercial and Defense business segments have improved performance over the two-decade period with margins three to four
percentage points higher over that time (Exhibit 18). However, Hybrid business segments (which in this case include several from FLIR and Harris) had much higher margins during the period of high defense operational tempo from 2001 to 2010.

Exhibit 18

Weighted-Average Return on Sales for Business Segments: Electronic Equipment and Systems by Category (OPS ÷ REVTS)

The story is different in Professional/Technical Services (for which we did not define any Hybrid business segments), in which Commercial business segments consistently earn higher margins than their Defense counterparts (Exhibit 19). Still, Defense business segments have seen margins grow over this period.

21 The weighted-average return on sales statistics for the Hybrid category in Electronic Equipment and Systems are unreliable after 2016 due to small sample size. For example, there are only four data points in this sample for 2019 and they are dominated by one business segment (L3Harris Communication Systems) accounting for 58% of revenues in the sample.
The analysis of operating margins at the corporate level and business-segment level present similar findings in aggregate (Exhibit 20). In each case, margins have improved from about 8% early in the period to about 12% more recently. There are noticeable outliers in the segment data—these typically result from one-time corporate write-offs often captured at the business-segment level. But these write-offs are commonly “below the line” of operating profit at the corporate level and thus not in these corporate results for operating margins.
Because the data are “noisy,” it is useful to look at the results aggregated over five-year periods (Exhibit 21). This affirms the improvement in operating margins for Defense corporations and business segments. It also presents the somewhat conflicting message that, while at the corporate level, Defense margins are lower than their Commercial counterparts, at the segment level, that is only true for the past 10 years; prior to that, Defense business segments outpaced Commercial business segments (while Hybrids greatly outperformed both). It is important to remember that the Defense data at the corporate level exclude any part of General Dynamics, Boeing, Harris (prior to L3 merger), FLIR, or Oshkosh, whereas the business-segment data include the defense-focused parts of those corporations.

### Exhibit 21

**Corporate and Business-Segment Operating Margin over Five-Year Periods**

Operating Margins for Corporations by Category (NOPAT ÷ REV'T)

Operating Margins for Business Segments by Category (OPS ÷ REV'TS)

### 4.3 Return on Assets (ROA) and Return on Net Assets (RONA)

When it comes to RONA, however, we see a very different story (Exhibit 22). Defense corporations have seen significant improvements in performance over the 20-year period and begin to outperform Commercial corporations starting about 2008. Hybrid corporations are in the same range except for wild perturbations after 2017, driven primarily by results at Boeing.
As with operating margins, we are able to achieve greater resolution and precision by also considering data at the business-segment level, though the measure of assets in this case is slightly different and includes all assets, not just net (company-funded) assets. In aggregate, the business segments suggest that all three categories are similar in business-segment return on identifiable assets (Exhibit 23). Therefore, the far greater variation observed at the corporate level is driven more by how the operating assets are funded (there is less need for company funding in the case of Defense).
However, once again, the averaging across three different industry sectors disguises meaningful differences. In Platforms and Subsystems, the poor performance of Commercial business segments until 2010, observed when examining operating margins, is apparent once again when looking at return on identifiable assets (Exhibit 24).

Exhibit 24
Weighted-Average Return on Identifiable Assets for Business Segments: Platforms and Subsystems by Category (OPS ÷ IAS)

Exhibit 25
Weighted-Average Return on Identifiable Assets for Business Segments: Electronic Equipment and Systems by Category (OPS ÷ IAS)

In Electronic Equipment and Systems, the Hybrid business segment distorts overall results with extraordinary returns in 2007 and 2008, again driven primarily by FLIR and Harris (Exhibit 25).

22 The statistics for the Hybrid category in Electronic Equipment and Systems are unreliable after 2016 due to small sample size.
If we remove Hybrids from the comparison, we find that Defense business segments in this sector underperformed Commercial analogs until 2009. Even though return on identifiable assets has declined since 2016 for Defense business segments, the recent levels are still several percentage points higher than the early part of the sample interval.

Finally, in Professional/Technical Services, Defense business segments have seen improved performance, with returns up three to five percentage points (Exhibit 26). However, the gap with Commercial has narrowed even more, primarily because the Commercial segments have seen returns on identifiable assets decline substantially, from a range of 25% to 35% in the first period to 10% to 15% in the past few years.

Exhibit 26
Weighted-Average Return on Identifiable Assets for Business Segments: Professional/Technical Services by Category (OPS ÷ IAS)

There is an inconsistency in the data on ROA between the corporate and business-segment databases. Results at the corporate level show an increase over time. Results at the business-segment level show extremely high values in the early years, with a slow decline since 2010. For the period 2000 to 2007, the aggregate results of Defense business segments are substantially higher than the similar results at the corporate level, and that pattern is reversed after 2017 (Exhibit 27).
There are multiple factors leading to these different results. Most importantly, there are many major companies participating in Defense (Boeing, General Dynamics, Harris, Oshkosh, and FLIR) that are included in the business-segment database for Defense but not included in the corporate database for Defense—they are instead classified at the corporate level as Hybrids.

Beyond this, the analysis at the corporate level measures operating profit after tax; for the business-segment level the measure is before taxes. Finally, the asset measure used at the corporate level includes only those assets financed through debt or shareholder equity; at the business-segment level, the asset measures include all assets identified with each business segment, regardless of how they are financed.

One can illustrate the impact of these differences. First, the high results at the business-segment level from 2000 to 2003 are driven almost entirely by extremely high returns on assets reported for Boeing’s Aircraft and Weapon Systems segment. This declined in 2004 not because profits fell but because the identifiable assets attributed to this segment were substantially revised upward as part of a broader business-segment redefinition. Boeing’s defense businesses are included in our business-segment analysis but not in the corporate analysis.

Similarly, the high performance at the segment level from 2004 to 2007 is driven primarily by the high performance of defense businesses at Harris, Oshkosh, FLIR, Boeing, and General Dynamics—none of which are counted as Defense at the corporate level. Finally, the higher corporate performance in 2018 and 2019 is explained almost entirely by large positive profit adjustments taken by Raytheon and Lockheed Martin at the corporate level—and thus not included in their business-segment results—reflecting differences in financial accounting (FAS) and government accounting (CAS) for costs associated with defined-benefit pension plans.
Over time, there has also been a shift in how total assets within Defense corporations are funded (Exhibit 28). The percentage funded by debt or equity has declined from about 60% before 2008 to about 50% after. There has been a similar though smaller decline for Hybrid corporations (which includes both Boeing and General Dynamics). In contrast, for our Commercial analogs, the percentage has increased. Whereas Defense corporations typically had to fund a greater percentage of assets than Commercial analogs from 2000 to 2007, they now have to fund a smaller number.

Exhibit 28
Weighted Average of Invested Capital as a Percentage of Total Assets, by Category (ICAPT ÷ TA)

This has the effect of boosting RONA (NOPAT ÷ ICAPT) at the corporate level beyond the gains in profitability alone. This impact is not captured at the business-segment level, for which net assets are not reported, only total assets identified for each business segment. The higher results in aggregate for segment data also reflect the fact that companies often do not allocate all assets to business segments; some are held at the corporate level. The remaining differences can be explained by the fact that our defense business segments include several significant businesses of Boeing, General Dynamics, Harris, FLIR, Oshkosh and Textron that are not in the Defense corporate results (because those companies are classified as Hybrids).

We see a similar result when reviewing data over summary five-year periods (Exhibit 29). For the reasons cited above, corporate returns on company-funded assets (return on invested capital) have risen far more rapidly than the actual operating performance of business segments would suggest. This is especially true in the Hybrid category, in which results are driven during the last five-year period by exceptionally strong results at Boeing.
4.4 Cash-Flow Return on Net Assets (CFRONA)

The superior performance of Defense versus Commercial is seen, at least in recent years, in the area of CFRONA at the corporate level. (A slightly different measure of cash-flow return on assets must be employed at the business-segment level.) Defense corporations have doubled performance in this measure over the past two decades (Exhibit 30). The results of Hybrid companies are distorted by Boeing’s gyrations in cash flow between 2006 and 2007 and after 2016.
We are also able to discern a crude measure of cash flow at the business-segment level. Rather than net assets, we are looking at returns on all identifiable assets attributed to a business segment. Rather than net operating income after tax, we are looking at pre-tax operating income at the business-segment level. We subtract capital expenditures from operating income and add back charges for depreciation and amortization to estimate cash flow.

This analysis suggests that, when aggregating over all industry sectors, cash-flow returns as a percentage of identifiable assets have trended downward in recent years (Exhibit 31).
Why the decline over the past six years in the cash-flow return on identifiable assets for Defense business segments? It is driven primarily by a major increase in the identifiable assets attributed to these segments, which were up over 35.4 percent between 2013 and 2019. Operating profit also increased, but only by 8.5 percent during that period. Additionally, even less of that operating profit translated to cash flow since capital expenditures (which do not reduce operating profit but do consume cash) rose over 110 percent while offsetting depreciation and amortization expenses (which decrease operating profit do not consume cash) were up only 3.3 percent.

This significant increase in identifiable assets is explained in part by the accumulation of goodwill. Goodwill is accumulated when one company acquires another and the price paid for that company exceeds the recorded book value of those acquired assets, which is often the case. There were several major acquisitions over this period: Lockheed Martin acquired Sikorsky, Northrop Grumman acquired Orbital ATK, and Harris acquired L3 Technologies.

It is notable that the reduction in cash-flow return on identifiable assets is most striking in the relevant business segments of Lockheed Martin and Northrop Grumman. When Lockheed Martin acquired Sikorsky, it added about $2.8 billion in goodwill to the assets of the relevant business segment. The acquisition of Orbital ATK by Northrop Grumman added $6.2 billion in goodwill to the latter's books.

There are other reasons for the decline observed in Defense business segments, and these vary by industry sector. In Platforms and Subsystems, cash flow as a percent of identifiable assets for Defense business segments declined from peaks in the early 2000s, while performance in Commercial business segments recovered during that period (Exhibit 32). However, Defense still outperforms Commercial across all but a handful of years.

![Exhibit 32](Image)

The primary cause for the decline in Platforms and Subsystems over the past decade, as explained above, is the large increase in reported assets for the major defense business segments, most notably at Lockheed Martin and Northrop Grumman. There are other factors as
well. For example, Ball Corporation stopped reporting asset data for its Aerospace segment, which had traditionally had very strong results. Thus, the results for Ball Aerospace vanish from the sample starting in 2015 and this absence drags down the average. Other Defense business segments in this industry sector that had traditionally outperformed the average regressed to the mean over this period.

For Electronic Equipment and Systems, we see the same extreme performance by Hybrid business segments in 2007 and 2008 observed earlier, followed by the convergence of all three categories from 2012 (Exhibit 33).

![Exhibit 33](image)

Finally, in Professional/Technical Services, the trends in cash-flow return on identifiable assets match those in ROA, with a slightly improved performance in Defense business segments converging with a steady decline in Commercial business segments (Exhibit 34). Because of the size of this industry sector in the database, the decline in Commercial Professional/Technical Services brings down the overall Commercial numbers for average across all industry sectors seen in Exhibit 31.

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23 The statistics for the Hybrid category in Electronic Equipment and Systems are unreliable after 2016 due to small sample size.
When reviewing the results over five-year intervals, we see another case where corporate results and business-segment results differ (Exhibit 35). Corporate CFRONA has improved over time at the corporate level but our analogous measure been flat or slightly declining at the business-segment level. The same explanation applies here as it does for ROA: the corporate level only includes assets funded by the company (long-term debt and shareholder equity), whereas the business-segment level includes all assets, however funded, that are attributed to each segment by the parent corporation. The rise at the corporate level, especially in Defense, is driven in large part by a reduced need for the Defense corporations to fund their assets via long-term debt or equity. Less demanding working-capital requirements as compared to those in the Commercial category (addressed below) contribute to this reduced need.
One area in which Defense and Hybrid companies differ from their Commercial analogs is in the requirements for working capital (Exhibit 36). Working capital, as a percent of revenues, is substantially higher in the Commercial category than in Defense or Hybrid, even as the latter two have seen slightly higher working-capital requirements since 2008. Note that the two spikes in working capital in 2002 and 2017 for Defense both relate to accumulation of cash on Northrop Grumman’s balance sheet, not to fund ongoing business operations but to support acquisitions (TRW in 2002, Orbital ATK in 2017).
4.5 Risk/Return for Shareholders

Defense companies have improved their TSR after 2010 and now outperform Commercial corporations in our data set (Exhibit 37). Because of the volatility in annual results, the exhibit below displays a three-year moving average of the annual data.

Conversely, the annual volatility of returns for companies in all three categories has declined since 2009, with Defense corporations demonstrating slightly lower volatility than Commercial and Hybrid corporations (Exhibit 38).
Exhibit 38
Weighted-Average Volatility in Total Shareholder Returns by Category ($\sigma (\%\text{change}(\text{PRCCM \times MTRF})) \times (\text{V12})$)

- Defense
- Hybrid
- Commercial

Years:

- 2000
- 2001
- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
5. Conclusions

5.1 Summary of Findings

The US defense industry, as captured in this data set, is healthy and financially successful. Its performance, in the aggregate, has improved over the past two decades. Return on sales and return on net assets have increased substantially over this period. Working-capital requirements are far less than those of analogous Commercial corporations. Defense now, in aggregate, outperforms its Commercial counterparts in almost all measures of basic financial performance except return on sales.

The gains over time reflect a more consistent and improving standard of performance. Variations in performance have declined over time. Average performance has improved as low-performing business segments and corporations improve performance to levels closer to those of their best-performing peers. It has not been driven by a major improvement in performance for corporations and business segments already performing at the highest levels.

From an investor’s standpoint, the Defense corporations outperform substantially their Commercial and Hybrid counterparts on risk-adjusted performance. The improvements could be explained by several factors: a more attractive marketplace, improved contracting terms and conditions, inherently lower risk associated with defense contracting, or superior financial and operational management by corporate leaders.

The story does vary by industry sector. Commercial business segments in Platforms and Subsystems produced very weak aggregate performance from 2000 to about 2010 and have since improved, but still underperform their Defense counterparts, which have seen modest gains in performance on their own. In Electronic Equipment and Systems, gradually improving performance in Defense has brought it within reach of Commercial counterparts, though the phenomenal performance of Hybrid business segments in 2007 and 2008 stands out. In contrast, Defense business segments in Professional/Technical Services far underperform relative to Commercial analogs, though the gap has narrowed.

Finally, it is important to note the inherent limitations of any broad analysis of financial performance in the defense industry. The number of reporting companies and business segments is relatively small and declining over time. In particular, any analysis within industry sectors (e.g., Electronic Systems and Equipment) is compromised by the absence of a large sample, especially after 2015. It is also difficult to assemble a perfect set of commercial analogues, both because many defense industries lack publicly reporting commercial peers (e.g., shipbuilding) and because those peers that do exist are often embedded in much larger and diverse companies. Finally, performance variations within each category (Defense, Hybrid, Commercial) far outweigh the observed differences between any two categories. This means that results observed in the aggregate may not apply to any specific company or business segment within that group.
5.2 Potential Areas for Further Investigation

The analyses in this report are based, as directed, primarily on published financial statistics in annual 10-K filings. The analyses have generally exhausted the insights available using these financial statistics. However, there are at least four additional areas of potential investigation that might complement these analyses.

**Topic 1: Correlate observed financial performance with the changes in contract mix over time for each corporation or business segment in the database.** Study questions include:

- Has the mix shifted between competed contracts and sole-source contracts over time and does that explain changes in performance?
- Do shifts in contract terms and conditions, especially those related to profit margin (fixed-price, cost-plus-award-fee, cost-plus-fixed-fee, etc.), correlate with performance trends? For example, there was a surge in profit margins seen in Harris, FLIR, Oshkosh, and others during the peak period of rapid acquisition during OIF/OEF. Is that surge explained by changes in contract terms and conditions; for example, a shift to FAR Part 12 commercial pricing or to sole-source procurements?
- Does the use of contract-award data to identify levels of concentration in defense markets explain profit margins or investment requirements?

**Topic 2: Expand the data set used in this current study to include non-US companies (many of which are substantial suppliers to the Department of Defense.)** We would propose a similar approach as the one used for this analysis. This would require harmonization of non-US accounting standards to match those in the SEC database.

**Topic 3: What is the role of pension funding in the observed financial performance of the defense industry?** Considerations include:

- The differences between CAS and FAS accounting can be substantial: potentially billions of dollars in any given year. The CAS Harmonization effort has not completely eliminated these differences.
- Defense companies (and others) have been allocating cash to voluntary or discretionary pre-payments of defined-benefit pension plans. These numbers can also amount to billions of dollars per year. However, they are embedded in operating results, and may potentially obfuscate true company health in the area of cash-flow generation and use.

It might be useful to have a more complete analysis of these factors. This would require access to the Form 5500 reports filed annually with the Pension Benefit Guaranty Corporation.

**Topic 4: Assess the degree to contract size might affect profit margins for defense businesses, specifically the extent to which a business’s contracts are subject to application of the Truth in Negotiating Act correlates with profit margins.** Areas of exploration might include:

- Conduct analysis of contract awards to determine to what extent these typically fall below the TINA thresholds for provision of cost data needed by the government for cost analysis and determination of price reasonableness.
• Subsequently assess whether companies that have large portions of their revenue generated from contracts below the TINA threshold also have unusually high profit margins.

Exploration of all of these additional topics would, of course, require significant effort and would also require the allocation of prime contract awards to individual business segments, most likely based on location and work content. A limitation of these analyses would be that it would only apply at the prime contractor level.
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DEPARTMENT OF DEFENSE

Contract Finance Study

APPENDIX B

EXAMINATION OF THE FINANCIAL HEALTH OF THE DEFENSE SECTOR

BY THE UNIVERSITY OF TENNESSEE
Examination of the Financial Health of the Defense Sector

A Report

from
The University of Tennessee*

for
The Under Secretary of Defense for Acquisition and Sustainment Pricing and Contracting

January 18, 2022

WARNING - This contains technical data whose export is restricted by the Arms Export Control Act (Title 22, U.S.C., Sec 2751, et seq.) or the Export Administration Act of 1979, as amended, Title 50, U.S.C., App. 2401 et seq. Violations of export laws are subject to severe criminal penalties. Disseminate in accordance with DoD Directive 5230.25.

* Research Team Members: Bruce Behn, PhD; John Cho; James Cody; Alex Miller, PhD; James Wansley, PhD, and Lynn Young, all of the University of Tennessee Haslam College of Business.
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1.0 Introduction

Its defense industry is one of several industries critical to the well-being and security of any nation. As a free market economy, the US is reliant on the health of its Aerospace and Defense (“A-D”) Industry base as a critical determinant of national security. We face adversaries that have much more direct command and control authority over their industry bases, but in our free market economy, industry typically pursues investment opportunities based on the health of the industry and the attractiveness of investment opportunities in it, not on directions from government. If the US is to remain competitive and secure, its A-D Industry must be healthy and must see continued investment in defense as a financially attractive alternative.

To date, when the Department of Defense (“DoD”) assesses the financial health and attractiveness of its industry base, it has tended to rely on a narrow set of accounting measures such as fees and allowable profits, with Return on Sales (= Net Profit / Sales) (“ROS”) possibly being the most intuitive and widely used accounting measure of firm profitability. This measure is a useful starting point, but it offers only one perspective, and it may not be the most important perspective if DoD seeks to understand how attractive government contracting is seen from industry’s perspective.

Industry does look at accounting measures such as ROS, but industry also is much more likely than government to evaluate government contracting from a broader financial perspective. As detailed below, industry uses DuPont Analysis, Accounting Ratio Analysis, and Shareholder Value Added as three complementary frameworks for assessing performance. Industry bases its commitment to, and plans for, investments in defense on this much broader set of considerations. Since US industry is free to make business decisions independent of government needs, if the DoD wants to ensure a strong and competitive A-D Industry base, it must start from a common understanding of the health and attractiveness of that Industry shared with the corporations comprising it. In other words, government must view the health of the A-D Industry from the same set of perspectives adopted by corporate decision makers. The purpose of this research is to help DoD understand and assess the relative health and attractiveness of A-D contracting based on a broader set of financial measures than it has historically considered.
2.0 Research Objectives and Methods

This report is organized around the five objectives DoD set forth for this research:
A. Determine if there are significant differences in the health of A-D firms vs several comparison groups and, if so, why;
B. Determine through trend analysis how the health of the A-D Industry has changed from 2000-2019;
C. Identify the measures of financial health most impacted by government contract financing and the timing of resulting cash flows;
D. Structure this work to create an easy-to-use and repeatable model the government can use to repeat the study in the future; and
E. Have a steady stream of reports, debriefs, and dialogues that allows the sponsor to remain informed of progress and problems and provide input on refining plans as the research unfolds.

In addressing Objective E, we provided the sponsor a steady stream of monthly updates on preliminary findings. As a result of the findings in these preliminary reports, the sponsor approved a revision to Objective A above. Preliminary analysis indicated that comparisons between other industries and the A-D Industry as a whole were not going to be as useful to the sponsor as comparisons between large and small defense contractors within A-D. This discovery required us to move from the New York University (NYU) Stern School of Business data sets we had originally proposed to use in completing this research to Compustat data. The Stern data sets only provide industry-level analysis so we could not do comparisons of subsamples within A-D. With Compustat, we were able to look at individual firm data and create subsamples of larger and smaller firms. Both the individual firm data and data comparing the largest defense contractors to the rest of the industry became important additions to the research as it progressed.

The Compustat data set is “a comprehensive market and corporate financial database published by Standard and Poor's, covering thousands of companies worldwide, with info dating as far back as 1950. Compustat is a leading source of intelligence for financial market professionals, investors, and academics.”

The Compustat data sets provide historical data for individual firms, but the data is “raw”, and the researcher must curate new data sets containing the ratio data needed for each research question. We have used Compustat to build new data sets which we are providing to the sponsor as a catalog of spreadsheets, along with a list of all firms in our data set, as well as a data dictionary defining each variable. (See the Attachment of this report for information on how to access these electronic files.)
In curating data sets, decisions must be made as part of “cleaning up” the raw data. To provide the most meaningful data set possible for the sponsor’s questions, we did the following:

1. **Selecting Firms:** We identified all firms in the Compustat data base with a Standard Industrial Classification code of 20101010, the code for Aerospace-Defense.

2. **Controlling for Very Small Firms:** We removed very small firms. Any firms that had annual sales of less than $10 million in any given year were removed from the data set entirely. This adjustment left us with 49 firms, all of which are listed in the electronic attachments to this report.

3. **Depicting Trends:** DoD wanted changes in Industry health traced over two decades, from 2000-2019. Once the data set was built, we had to decide how to chart trends over this period. Specifically, we considered simply charting Median Firm Ratio values over time. Calculating a Median Firm Ratio entails determining each firm’s individual ratio as described above, and then reporting the median of those individual ratios. An alternative is to calculate Sector Total Ratios by summing all numerator and denominator values for all the firms in a given sector (in our case, two sectors, the ten largest firms and the rest of the Industry – see below) and then using those sums to calculate a single ratio for each sector as a whole. There are uses for both Median Firm Ratios and Sector Ratios. In this particular study, we found that Sector Total Ratios were more instructive than Median Firm Ratios, and that is the basis of most of the charts presented. However, the data sets provided make it readily possible to replicate this study using Median Firm Ratios.

4. **Comparing Sub-Sectors:** The original plan was to compare data from the A-D Industry to other industries identified in the NYU Stern data sets. We pursued that plan during the first three months of our work, but the results were not all that enlightening or useful, and the sponsor agreed with our recommendation that we should shift our analysis to the Compustat data and compare the largest ten firms in the Industry to the rest of the Industry. The A-D Industry is highly concentrated, with the four largest firms accounting for approximately 50% of all sales in our population of 49 firms, and with the largest 10 firms accounting for approximately 80% of all sales in our population (see Figure 1. below). Given this level of concentration, understanding the largest firms in this Industry is critically important to DoD. Furthermore, as we report below, there are important differences in the behavior of large and small firms in this Industry.
5. Framing the Analysis: The assignment of assessing the financial health of the A-D Industry is very broad. We explored the widest range of possible perspectives. In the end, we feel that the most credible and useful approach for DoD is to mirror Industry’s own efforts to assess its financial health.

For example, in 2007, Textron Corporation’s board of directors launched and initiative to assess the company’s performance and financial health relative to other firms in the A-D Industry. Within the company’s Controller’s Office, the work was assigned to Anna Amphlett, a financial analyst with an MBA in Finance degree from the Stanford Business School. In 2009, right in the middle of the period we are studying, Amphlett’s work was documented in a detailed case study prepared by Professor Graeme Rankine of the Thunderbird School of Global Management at Arizona State University. That case study is now publicly available from the case clearinghouse at Harvard Business School Publishing.

Textron’s approach was a straightforward application of two basic financial analysis tools, DuPont Analysis and Accounting Ratio Analysis. Such in-house use of these frameworks by a leading A-D firm indicates that these approaches have good face validity as credible approaches to assessing the financial health of A-D firms. We adopted both of these approaches in our analysis for DoD. Our use of DuPont Analysis is straightforward and in keeping with industry practice. To facilitate use of the Accounting Ratio Analysis we present, we have organized it to parallel the analysis presented by ReadyRatios, a free online source of ratio analysis by firm and by industry. This website uses accounting data and ratio formulas in compliance with the International Financial Reporting Standards (IFRS) and
Generally Accepted Accounting Principles (GAAP). It has detailed information on the calculation, meaning, and use of each ratio. The website has an Industry Benchmarking feature that presents accounting ratio analysis for the last five years broken down by major industry groups. To make it easy to compare our ratio analysis of the A-D Industry to analysis of comparable industries, we have adopted ReadyRatios framework and definitions. In the attachment to this report, we offer examples of the types of comparative analysis that can be done using ReadyRatios.

In addition to DuPont Analysis and Accounting Ratio Analysis, we have assessed A-D firms with a third framework that is also widely used by industry, Shareholder Value Added (SVA). Assessing SVA is a useful complement to accounting-centered DuPont and Ratio Analysis. SVA emerged as a complementary framework in the eighties and nineties in an attempt to more directly capture the impact of firm performance on shareholder wealth. While DuPont and Ratio Analysis reflect an accounting perspective, SVA goes beyond this to look at returns from a shareholder’s perspective. SVA entails consideration of all costs of production, not just those measured in GAAP, including the risk-adjusted cost of the capital incurred by the firm, costs not normally included in DuPont or Accounting Ratio Analysis. We provide more explanation of SVA later in this report.

The complete set of frameworks and metrics used in the remainder of this report are summarized in Table 1. Section 3, which constitutes the bulk of our report, uses the frameworks and metrics in Table 1 to address the Research Objectives A-C set forth above. (Research Objective D is addressed in the Attachment. Research Objective E was addressed with monthly progress reports already delivered to the DoD sponsor of this research.)
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Table 1: Frameworks and Metrics Covered in this Report
3.0 Results

We present our results in three parts:

A. Dupont Analysis
B. Accounting Ratio Analysis
C. Shareholder Value Added Analysis

DuPont Analysis

At its simplest level, DuPont Analysis decomposes ROE into three factors: ROS, Asset Turnover, and Leverage (also known as Equity Multiplier). We applied DuPont Analysis to the Industry as a whole and then to each of the ten largest A-D firms individually. In each case, we present four charts, ROE, ROS, Asset Turnover, and Equity Multiplier. We will define and discuss each metric as these charts are first introduced in our analysis of the Industry. From there, we look at how trends in the three factors shape the trends observed in ROE for both the largest 10 firms and the rest of the Industry as groups, as well as for each of the ten largest firms individually.

1) Industry Level DuPont Analysis

In Figure 2 on the next page, we present a DuPont Analysis for the two sub-samples of firms compared throughout our research, the Top 10 in any given year, and the Rest of Industry for those same years. We discuss the results of the DuPont Analysis applied at this sector level, and then replicate the DuPont Analysis for each of the Top 10 firms individually.
Figure 2: DuPont Analysis on Aerospace-Defense Industry

Examination of the Financial Health of the Defense Sector
2) **Return On Equity**\(^\text{12}\)

DuPont chose ROE as its overall measure of firm performance for two reasons.

First, ROE measures returns relative to the equity in the business held by shareholders and shows the firm’s ability to turn its owners’ investment into profits. In other words, ROE is a measure of the return investors are getting for their money.

Second, ROE consolidates into a single overall measure of financial performance information from the income statement (Return on Sales), and links it to information on the balance sheet by measuring utilization of assets (Asset Turnover) and capital structure (Assets/Equity). An important application of DuPont Analysis is to use these high-level measures as pointers indicating where to dig deeper in searching for the factors that are contributing to, or detracting from, a strong ROE. (In our DuPont Analysis, we use only the top three contributing factors to ROE. We look at lower-level drivers of performance in our Accounting Ratios section.)

Chart 2A shows that prior to 2003, the largest firms had a slightly lower ROE than the rest of the Industry, but since then, the largest firms have steadily increased their ROE while the rest of the Industry has been relatively flat. The largest difference between the two sectors was in 2018, when the largest firms had a sector ROE of 40%, while the rest of the Industry reported a sector ROE of 15%.

We now turn to each of the three high-level factors determining ROE as a way of understanding what has caused these trends in ROE.

3) **Return on Sales**\(^\text{13}\)

ROS is a ratio calculated as Net Profits/Sales. Arguably the most intuitive measure of profitability, ROS simply looks at how much profit is generated by each dollar of sales. Perhaps because of this intuitive appeal, a contractor’s ROS is most frequently used by DoD to assess financial performance and profitability.

However, there is an important limitation to this use of ROS as an overall measure of success. It focuses simply on the spread between sales and expenses. It does not take into consideration the firm’s asset base or its capital structure. It measures how well a firm controls its expenses, but not how efficiently it manages its assets or how leveraged the firm is. ROE is a product of ROS, Asset Turnover, and Leverage, and to understand firm performance, one needs to consider all three factors, which was DuPont’s original insight in developing its analysis.
Chart 2B shows that ROS in A-D dipped in the 2001-2003 timeframe (possibly due to the widespread economic fallout from the 9-11 terrorist attacks). The Industry improved its ROS from 2003-2007, and ROS has been relatively stable since then, hovering around 6-7%. As we will see, ROS is the most stable of the three contributing factors to ROE. The relative stability of ROS may be tied to the fact that it is also the contributing factor to ROE most closely watched by DoD.

4) **Asset Turnover**

The Asset Turnover Ratio is calculated as Sales/Assets, and it measures the efficiency with which a firm uses its assets to produce and support sales. If firms A and B both have $100M in sales, but A is able to generate and support this level of sales with only $80M invested in assets while B generates the same sales with $125M invested in assets, it is obvious A is much more efficient than B in the use of assets. Firm A has an Asset Turnover Ratio of 1.25 (=100/80), meaning that every dollar invested in assets is able to support $1.25 in sales. Firm B has an Asset Turnover Ratio of .80 (=100/125), meaning that for every dollar invested in assets, it is only able to support $.80 in sales.

This ratio varies considerably across industries with capital intensive industries (like hotels and cruise lines, telecommunication firms, and mining) requiring very large investments in assets to generate sales compared to industries with low investments in assets (such as computer software, services, and data processing). However, within a single industry, this ratio can also vary across time as efforts are made to gain efficiencies in wringing more sales out of fewer assets.

As shown in Chart 2C, the A-D Industry made a significant effort to improve its efficient use of assets in using principles of Lean Manufacturing starting in the 1990s with the goal of “doing more with less.” Asset Turnover for both the Top 10 and the Rest of the Industry both peaked at about 1.00 in 2008. Since then, the asset efficiency of both sectors has steadily declined to around .70. (Although it is beyond the scope of this study, Asset Turnover in both groups had a sharp drop to below .60 in 2020.)

One might argue that this trend is driven by large amounts of goodwill added to the balance sheets of A-D firms that have been increasingly active in mergers and acquisitions.† Big increases in goodwill, a non-productive asset, would be expected

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† The label for this account (goodwill) can be confusing as it means something very different in accounting than in normal use. Goodwill is an accounting adjustment that measures the excess in the purchase price of an acquisition over the book value of the purchased assets on the previous owner's books. It is only created by acquisitions.
to adversely impact asset turnover. Figure 3 depicts the growth in goodwill as a percent of total assets over the twenty years studied. While it has clearly increased as expected, it does not appear to be explaining the declining Asset Turnover reported in Chart 2C – at least it doesn’t explain the trends for Asset Turnover in the Top 10. In Figure 3, Goodwill/Assets for the Top 10 peaked in 2007, a particularly active year for mergers and acquisitions, and fairly steadily declined after that. We would expect decreases in the percent of assets tied up in non-productive uses like goodwill to lead to improvements in Asset Turnover, yet the decline in Goodwill/Assets starting in 2007 coincides with a decline in Asset Turnover. This evidence suggests that while Lean and related initiatives were undertaken to accomplish more with less, in A-D it appears the Industry is trending in the opposite direction.

[Figure 3: Goodwill / Total Assets]

5) Leverage

In the simplest terms, firms finance their investments in assets using either shareholders’ equity or borrowed money (debt). To the extent the firm uses money borrowed from lenders and bondholders rather than equity invested by shareholders, we say that the firm is leveraged. Think of it this way: investors put in a fraction of the total funds invested in a firm, but they are entitled to the profits generated by the entire firm, so the impact of their investment is increased by leverage associated with borrowing.

\[^{†}\] We are plotting medians instead of sector ratios because of the extreme variance in the size of acquisitions. Medians dampen the effect of these outliers in our charts.
Firms measure leverage several ways, and all ways express the extent to which shareholder equity is leveraged by the use of debt. In the DuPont Analysis, leverage is measured as Assets/Equity, which is also sometimes called the Equity Multiplier. To see how this measures the leveraging or multiplying effect of debt on returns on equity, consider this simple example. Assume two firms, A and B, both have $100M in assets and generated $5M in profits. Having $100M in assets means they both also have a total (debt + equity) of $100M since the most basic accounting formula of the balance sheet is that assets on the left-hand side of the sheet must equal, or be balanced with, (debt + equity) on the right-hand side of the sheet.

Assume that Firm A has $80M in debt and $20M in equity, and Firm B has debt of $60M and equity of $40M. Firm A’s leverage (its Equity Multiplier) would be $100/20 = 5.0, while Firm B’s Equity Multiplier would be 100/40 = 2.5. We would say Firm A is more highly leveraged and is making greater use of “other people’s money” to finance the business. The implication is that investors in Firm A see their dollars of equity invested in the business go further than the equity investments of shareholders in Firm B. In other words, shareholder equity in Firm A is multiplied (or leveraged) more than in Firm B by Firm A’s greater use of debt. Firm A has an ROE of 25% (=5M/$20M) while Firm B has an ROE of 12.5% (=5M/$40M), reflecting Firm A’s greater leverage and higher Equity Multiplier.

Chart 2D has two main messages. First, increased use of debt to leverage shareholder investment has occurred across the Industry as a whole – including both the largest 10 firms and the rest of the Industry. Second, the trend has been much stronger in the largest firms.

As one would expect, the largest firms are taking advantage of the historically low interest rates (detailed later in this report as Figure 6) to increasingly rely upon debt for their financing (See Figure 3). As shown in the Figure 3 below, over the twenty years of this study, as a group, the Top 10 sub-sample has seen its debt triple while the book value of shareholders’ equity has remained virtually unchanged.\(^8\)

\(^8\) Unlike the book value of shareholders’ equity, the market value of investors’ holdings in the company has not remained largely unchanged – it has risen considerably. The book value of shareholders’ equity for the 49 firms in our study only increased from $71 Billion in 2000 to $110 Billion in 2019. Meanwhile, the market value of equity, or the firm’s market capitalization (equal to the firm’s stock price per share multiplied by the number of shares outstanding), increased from $179 Billion in 2000 to $760 Billion in 2019. For our analysis, the book value of shareholders’ equity is a more appropriate measure of equity than market capitalization for two reasons. First, the DuPont Analysis is built around shareholders’ equity and the math entailed in that analysis depends on using accounting data and not market valuations. Second, market capitalization reflects stock prices, and the stock market as a whole is driven by numerous broad influences that cannot be tied back to any one industry or firm, making it less useful for the analysis at hand.
Accounting Ratio Analysis

As explained in Section 2.0 on methods, to facilitate comparisons across industries, we adopted the format and definitions for ratio analysis used by ReadyRatios.com. Consequently, our ratio analysis is presented in this order:

1. Solvency
2. Liquidity
3. Profitability
4. Activity

1) Solvency
Figure 6: Solvency Ratios in A-D Industry
a) Debt Ratio

The Total Debt/Total Assets ratio, also known as the Debt Ratio, is one of several leverage ratios indicating the extent to which the business is financed with borrowed funds.

In some cases, the Debt Ratio is a meaningful measure of financial risk. A ratio of 1.0 means the company owns the same amount of liabilities as its assets – in other words, all its financing is in the form of debt. A ratio of less than one means that least in terms of their book value, a firm would be theoretically able to dispose of all their assets to pay off their debts if need be. These are extreme examples, and while smaller firms have a higher Debt Ratio than larger firms, both groups have Debt Ratios well below 1.0, indicating very low risk of default on debt.

So, if the industry is not in risky territory in terms of a Debt/Asset ratio nearing 1.0, what is the relevance of the ratio? While the Debt/Asset ratio can measure the downside risk of defaulting on loans, it is also a measure of the upside potential to use other people’s money to “leverage” the investment made by shareholders. This is especially true when the cost of debt (i.e., interest rates) is falling as it has been for the last several years as shown in Figure 6 below. With predictable levels of Industry revenues and profits tied to long-term government and airline contracts, it would make sense that the Industry would take advantage of the low interest rates to leverage shareholder investments, which they clearly are doing, as discussed next.

b) Debt to Equity Ratio

The Total Debt/Shareholders’ Equity ratio, or simply the Debt/Equity ratio, is another leverage ratio, but unlike the Debt/Assets ratio which uses total assets as its denominator, the Debt/Equity Ratio uses shareholders’ equity. As such, it is a simple and intuitive means of assessing how much a firm’s capital structure leans toward debt or equity financing.

As discussed above, at some level, more debt means increased risks of default, so at some point, additional debt will raise the cost of borrowing. But more debt relative to equity also means the use of shareholders’ equity is reduced, so returns on shareholders’ equity (ROE) are improved. Additionally, the interest cost of debt is almost always cheaper than the opportunity cost of equity, so increased use of debt generally lowers the weighted average cost of capital (WACC), meaning the firm can now afford to take on projects that were otherwise unattractive. (To
anticipate Section 3.C below, a firm meets its goal of producing shareholder value by investing in programs where ROIC > WACC.)

Given the declining cost of debt relative to equity shown in Chart 7A, we would expect to see the Debt/Equity ratio lean more toward greater use of debt. This trend is clearest in data for the Top 10, as seen in dollars debt versus the book value of equity in the Top 10 sector depicted in Chart 7B. In percentage terms, at the beginning of the twenty-year period we studied, total liabilities were about twice as large as shareholder equity in the Top 10. Twenty years later, total liabilities were more than 500% larger than shareholder equity.

This is an extraordinary shift in the capital structure of the largest firms in the Industry, and we do not feel it can be entirely explained by lower costs of debt. The increasing Debt/Equity ratios shown in Figure 6B reflect another force at work as well. The largest firms in the Industry have greatly increased their use of stock buybacks. Every share bought back reduces shareholders’ equity and increases the Debt/Equity ratio. In several cases, the largest A-D firms have bought back so many shares the book value of their shareholders’ equity has been reduced to near – or even below – zero. This phenomenon really distorts the Debt/Equity ratio since in any ratio, as the denominator approaches zero, the quotient approaches infinity. This is a complicated subject that deserves its own treatment, and we discuss buybacks in detail later in the report.
c) Interest Coverage Ratio

The Interest Coverage Ratio (ICR), also known as Times Interest Earned, is used to measure how well a company can pay the interest on its debts.\textsuperscript{18} It is calculated as (Earnings before Interest and Taxes / Interest Expense). ICR is most commonly used by lenders to determine the riskiness of lending to a given company, but it could also be used to assess the risk of a supplier defaulting on its debt. Chart 6C shows the Industry has a strong ICR, and even though debt is increasing, in the Top 10, its ICR is still improving.
2) Liquidity

**Current Ratio**

- Top 10
- Rest of Industry

**Quick Ratio**

- Top 10
- Rest of Industry
Figure 8: Liquidity Ratios in A-D Industry
There are three related measures of liquidity, all measuring the extent to which a firm has resources on hand sufficient to cover liabilities expected to come due in the short term.

The Current Ratio, also known as the Working Capital ratio, measures how well a corporation can meet its current obligations (those due within the year) using its current assets. Current obligations include short-term debt and accounts payable. Current assets include cash, marketable securities, inventories, and accounts receivables. A ratio of less than 1.0 means the firm cannot settle its obligations coming due this year with assets currently available to it. On the other hand, a very high Current Ratio suggests the firm is not being efficient in its cash management.

The Quick Ratio, also known as the Acid Test, is a measure of how well a firm can meet its short-term obligations using its most current (near cash or “quick”) resources. It is calculated as \( \frac{(\text{Current Assets} - \text{Inventories})}{\text{Current Liabilities}} \).

The Cash Ratio measures the extent to which a firm can pay off its current liabilities using just its funds on hand. It is calculated as \( \frac{(\text{Cash and Cash Equivalents})}{\text{Current Liabilities}} \).

As shown in Figure 8, when it comes to measures of liquidity, the Rest of the Industry is more conservative than the Top 10. This result is to be expected as creditors and lenders are generally more cautious about doing business with smaller firms. However, the levels of liquidity for both the larger and smaller firms in the Industry are well within the range of normal.
3) Profitability

9A: ROE (Net Income/Equity)

9B: ROA (Net Income/Assets)
Figure 9: Profitability in A-D Industry
a) **ROE**

We first covered ROE under the DuPont analysis, but since it is also included in the standard set of Accounting Ratios, we are repeating a summary of those comments here for completeness and reader convenience.

Chart 9A shows that prior to 2003, the largest firms had a slightly lower ROE than the rest of the industry, but since then, the largest firms have steadily increased their ROE while the rest of the industry has been relatively flat. The largest difference between the two sectors was in 2018, when the largest firms had a sector ROE of 40%, while the rest of the Industry reported a sector ROE of 15%.

b) **ROA**

Return on Assets is measured as Net Income / Total Assets. It is a measure of how efficiently a firm uses all its resources to produce a profit. Chart 9B is a good depiction of a pattern that shows up in several charts documenting how the financial performance of the A-D Industry has changed over time. After a period of decline post 9-11, the Industry had several years of steady improvement in its ROA, up to 2007, at which time performance gains went into a holding pattern, a pattern we see repeated in other profitability metrics.

c) **Gross Margin Ratio**

Gross Margin Ratio is a profitability ratio, but rather than looking at “bottom line” or net profit, it looks at gross margin (also referred to as gross profit), which is sales minus the costs tied directly to the production of the goods sold. Gross margin leaves out shared operating expenses, interest expenses, taxes, and usually any extraordinary expenses.

Gross Margin Ratios vary greatly across industries depending on what percentage of the industry’s expenses are tied directly to producing items sold. For example,

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**The exact values for Gross Margin reported by corporate data service depends heavily on the algorithms used for collecting costs to include in COGS. For example, Compustat usually excludes extraordinary and non-recurring items, while other data sources sometimes include them. This research is focused on trends rather than exact values in any given year, and when we compared gross margin trends over time calculated both ways, we found that while the exact values differed somewhat, the overall trend lines were very similar.**
imagine operating a retail bank holding customers’ deposits and savings accounts. There are large fixed costs to build and operate the bank, but the incremental expenses tied to an additional customer’s deposit would be essentially zero, so the gross margin would be nearly 100%. Now imagine running a construction business that rented all the equipment needed for each job. In that case, almost all the labor, materials, and equipment costs could be tied to specific jobs, and gross margins would be correspondingly low. And in fact, ReadyRatios reports the 2019 median gross margin for Depository Financial Institutions was 97.4% and the gross margin for Heavy Construction Industry was 12.6%.

These characteristics suggest that the best use of Gross Margin Ratios is to compare firms from the same industry, as well as the same industries across time, as we have done here. What we find is that the Gross Margin Ratios for the A-D Industry have been remarkably stable for the past 20 years. The Top 10 have margins consistently lower than the rest of the Industry, but we would not immediately conclude they are less efficient than the rest of the Industry. Rather, we think this probably reflects that the largest firms in this Industry have a different type of operation than the smaller firms, and simply look at performance of each across time. In other words, in the type of cross-sectional analysis we are doing, Gross Margin Ratios may be a better indicator of the underlying type of operation rather than the efficiency of that operation.

d) Operating Margin Ratio††

The Operating Margin is calculated as (Earnings Before Interest and Taxes / Sales), a.k.a. EBIT/Sales. EBIT is the profit a firm has after paying its variable costs of production (like wages, materials, etc.) but before paying non-operating expenses (like interest and taxes). Across the A-D Industry, this measure of profitability improved modestly over the twenty years studied.

e) ROS

[Material on ROS was presented earlier under DuPont Analysis and is repeated here under the Accounting Ratio section for completeness and reader convenience.] ROS is a ratio calculated as Net Profits/Sales. Arguably the most intuitive measure of profitability, ROS simply looks at how much profit is generated by each dollar

†† Accounting ratios are not always consistently labeled or defined. For example, ReadyRatios equates Operating Margin and ROS and defines them both as EBIT/Sales. It is more common to calculate ROS as Net Income / Sales as explained earlier in the discussion of DuPont Analysis. For internal consistency, we are defining ROS as Net Income/Sales and measuring Operating Margin as EBIT/Sales.
of sales. Perhaps because of this intuitive appeal, a contractor’s ROS is most frequently used by DoD to assess financial performance and profitability.

The trendlines for ROS resemble the pattern for ROA describe above. ROS in the A-D Industry dipped in the 2001-2003 timeframe, possibly due to widespread economic fallout from the 9-11 terrorist attacks. The Industry improved its ROS from 2003-2007, and ROS has been relatively stable since then, hovering around 6-7%. As we saw earlier under the DuPont analysis, ROS is the most stable of the three contributing factors to ROE. Its relative stability may be tied to the fact that is also three contributing factors most closely watched by DoD.
4) Activity

The Activity Ratios offer a more detailed look at the efficiency with which a firm uses its assets. In keeping with ReadyRatios, we have presented these ratios in terms of “days,” so efficiency is being measured in how long it takes for a given set of assets to
turn over. For example, a firm with an Inventory Turnover (Days) of 90 holds its inventory an average of 90 days. For the three activity measures in Figure 10, more days means it takes longer for the processes at work to take place, meaning the firms are not working as efficiently as firms with fewer days. While most of these trend lines lack any clear movement, there is certainly no evidence that the Industry is improving its efficiency on these dimensions, and several of the measures are slightly worse. It is fair to say that despite widespread efforts to improve operating efficiency, the A-D Industry is not a best-in-class benchmark industry for efficiency on these three dimensions.

Shareholder Value Added

Recall that we have opted to go one step beyond the approach commonly used by industry as illustrated by Textron and ReadyRatios to add an additional analysis for “shareholder value added,” or SVA. Assessing SVA is a useful complement to the DuPont Analysis and Accounting Ratio analysis, both of which rely exclusively on accounting data. SVA looks at returns from the shareholders’ perspective and takes into consideration all costs of production, including the cost of the capital incurred by the firm, a cost not normally reported in accounting statements.

SVA is measured as (Return on Invested Capital – Weighted Average Cost of Capital) or (ROIC-WACC). ROIC measures how well a company is using its capital to generate profits.21 WACC measures the cost of the capital tied up in the business.22 Comparing the “spread” between the two is a means of measuring the success of a corporation in creating shareholder value.23 If the rate a company pays out for its investment in capital (its WACC) is greater than the return on capital invested (ROIC), for every dollar of investment, the company incurs greater costs than it earns. The more that ROIC exceeds WACC, the more every dollar invested in the firm generates returns in excess of the cost of the investment.24 So, the “spread” between ROIC and WACC is a very meaningful measure of how much value is created, the primary financial goal of the firm.25

As shown in Figure 11, SVA across the A-D Industry declined steadily in 2001-2003.‡‡ Then, in a pattern we’ve seen earlier in other measures of profitability, SVA for the Top 10 steadily improved until 2008, rising from around 5% to 12%, and it has

‡‡ Note we are plotting the Median values here rather than the Sector Total presented in most of the figures in this report. Calculating WACC requires use of Beta coefficients for each firm individually, and these betas cannot be properly summed to form some sort of “total Beta coefficient” for the sector. Therefore, we calculated the WACC for each firm, and then plotted the median for the distribution of firms in the two sectors being compared.
continued to hover around 12%. Meanwhile, SVA for the Rest of the Industry hovered in the 4-6% range.

![Figure 11: Shareholder Value Added in A-D Industry](image)

It is important to note that these numbers are not returns on capital. They are returns on capital *in excess of the cost of capital*. The cost of capital, WACC, takes into consideration the explicit cost of debt (interest expense) as well as the implicit cost of equity (shareholders’ opportunity cost). Theoretically, a firm should be willing to invest in any opportunity that offers a ROIC greater than the firm’s WACC. Consider this example:

Assume Firm Z has a WACC of 10%, reflecting its actual cost of debt, its estimated cost of equity, and the proportion of equity and debt the firm has chosen to finance its assets. The estimation of equity cost looks at what return investors could reasonably expect from firms equally as risky as Firm Z, and treats the opportunity cost of not investing in those alternative investment opportunities as the opportunity cost shareholders incurred when they invested in Firm Z. If Firm Z can invest the firm’s capital to generate a return of 15%, this return more than covers the cost of capital, implying it is a return beyond what shareholders could reasonably expect if they pulled their money out of Firm Z and invested it elsewhere. That is why we say ROIC-WACC is a measure of Shareholder Value Added – it is a measure of how well shareholders do investing in Firm Z versus alternatives elsewhere.

As long as Firm Z can generate ROIC greater than WACC, theoretically, investors will want to leave their money in Firm Z because the firm is producing a return better than
investors could reasonably expect to get elsewhere. Additionally, new investors would be attracted to Firm Z because of the high returns. Theoretically shareholders will be better if Firm Z does not pay a dividend or buy back any stock. Why would shareholders want Firm Z to transfer money to the shareholders when Firm Z is doing better than investors could reasonably expect to do elsewhere? In fact, from a strictly theoretical perspective, the only time we would expect a firm to pay dividends or buy back stock is when they could not invest the capital involved in opportunities that would generate returns greater than WACC. If Firm Z cannot do as well as its investors could reasonably expect to do elsewhere, then it certainly makes sense to pull funds out of Firm Z, transfer them to its shareholders, and let the shareholders invest the funds where returns are better.

That is NOT what is going in the leading A-D corporations. Stock buybacks by the Industry leaders peaked in 2015, as shown in Figure 12.
That year the Top 10 produced a median ROIC that was 13.5 percentage points above their median WACC as shown in Figure 10. For reference, the median WACC for the Top 10 in 2015 was 4%, as shown in Figure 13 below, so the median ROIC must have been 17.5%. In other words, as a group, the 2015 returns on invested capital in the Top 10 were more than 4X their median cost of that capital, and yet rather than invest in their businesses, the Top 10 as a group pulled record levels of cash out of their operations and transferred it to shareholders.
Granted, 2015 was an unusually glaring example, but there have been repeated instances where the largest A-D firms have opted to pay dividends and buy back stock rather than invest the funds back into operations. We have detailed elsewhere\textsuperscript{26} that Boeing alone pulled $64 billion of cash out of the business to pay dividends and buy back its own shares in the decade leading up to the first 737 crash in 2018.

But Boeing was not alone. From 2008-2019, the period in which SVA for the Top 10 ranged from a very strong 10\%-14\%, they collectively pulled $274 billion in cash out of their combined operations and transferred the cash to shareholders in the form of dividends and share buybacks. These withdrawals took the form of $111 billion in dividends, and $163 billion in stock buybacks.
What this series of charts shows is that repeatedly, the largest firms in the A-D Industry have opted to pull cash out of their operations, and transfer it to owners, even when the firms were profitable and producing attractive returns for shareholders. Economic theory would suggest that the higher the SVA a firm is able to produce, the more it should be interested in investing in the business and the less it should be interested in pulling cash out of the business to be transferred out to its owners as dividends and buybacks. These charts indicate that exactly the opposite appears to be happening in many cases. In other words, the trends over the twenty years we studied show that in many cases, as SVA increases, firms use the increased returns as an opportunity to increase their dividends and buybacks. It appears that when SVA improves, rather than encouraging the firm to invest more, it is instead viewed as allowing the firm to afford to pull more cash out of the firm.

For the most part, the leaders of this Industry apparently do not see the improving SVA as a reason enough to increase investment in their businesses. In the final section of this report, we speculate on reasons why this is happening.
4.0 Hypotheses For Further Research

Basic economic theory suggests firms tend to reinvest funds in the business when expected returns are greater than the opportunity cost of capital, and they tend to distribute funds to shareholders (through dividends or share buybacks) when expected returns are less than the cost of capital. As we have seen, the largest firms in the A-D Industry are not behaving in the manner predicted by this economic theory. They are distributing funds to shareholders even though they are consistently reporting returns to investment greater than their cost of capital.

While this research is focused on the A-D Industry upon which DoD depends for its defense industrial base, we should point out that this phenomenon is not limited to A-D firms. In fact, the behavior of A-D firms is part of a much larger pattern. Across all industries, over the past decade, US corporations have transferred well over $1 trillion dollars annually to investors through dividends and buybacks. In one of the earliest criticisms of this behavior, William Lazonick, economics professor at the University of Massachusetts Lowell, found that between 2003 and 2012, the S&P 500 spent 54% of their earnings on buybacks and 37% on dividends, leaving “very little for investments in productive capabilities.”

Similar to findings in this study of A-D firms, research on the broader economy suggests that the big changes are related to buybacks more than dividends. A study of 610 US firms over three decades found that prior to 1994, buybacks were typically less than 1% of their assets, but from 2015-2020, they averaged 4.1%. This same study reported that while buybacks had soared, dividends had held relatively steady at around 2% of assets, but capital investment had fallen from 7.4% in the 1990s to 4% in 2015-2020, while R&D had dropped from 3% to 2.3% in the same time periods.

There is little evidence that this trend is slowing. In 2021, the firms in the S&P 500 set records for both stock repurchases and dividends. If current trends continue, share repurchases in these companies will soon top $1 Trillion per year.

So, while this phenomenon is not limited to A-D, the A-D Industry is so critical to national defense that it warrants its own look by DoD. While research definitively explaining the patterns we have documented in A-D is beyond the scope of this study, in our closing section, we offer six hypotheses as to why this might be happening.

Market Signaling – A well-established theory of dividends suggests a corporation’s decisions to pay dividends conveys information about future earnings expectations. If the signal conveyed is taken to be positive, then the theory suggests share prices
should rise. However, there is evidence that the impact of market signaling is tied to the life cycle stage of the firm (a topic discussed separately below). Dividends declared for firms in the late growth or early maturity stage are more likely to be interpreted as signs of good things to come. But dividends declared in the late maturity or decline stage are more likely to indicate the company is running short of good investment opportunities and is “cashing out.” In any case, all this theory is more closely tied to dividend policy than to stock buybacks, and in our research, dividends were relatively stable, while buybacks increased significantly, which makes one question market signaling as the primary driver of the observed behaviors.

**Tax Benefits** – This hypothesis applies primarily to buybacks. Dividends are subject to ordinary income tax, while buybacks of shares held for more than a year would be subject to the lower capital gains rate. If the share buybacks are financed through debt, a deductible expense, there are additional tax advantages. This hypothesis is more useful in explaining why a firm might opt to buy shares than pay dividends, but it doesn’t really explain why the firm is transferring cash to investors rather than investing in the firm.

**Managing Leverage** – Of the two sources of cash available to corporations, equity and debt, equity is the more expensive. Debt is generally considered less risky since lenders have the protection of (1) a contract specifying repayment, and (2) standing in bankruptcy courts, and therefore debt can be acquired at rates lower than equity. This being the case, the weighted average cost of capital is normally lowered by reducing the percent of funding through equity and shifting funding toward debt (especially true in recent years as interest rates have been historically low). When all else is equal, when a firm buys back its shares, it reduces shareholders’ equity, and lowers its WACC, and therefore, share buybacks can be viewed as a strategy for reducing a firm’s cost of capital by increasing its leverage. (When a firm is leveraged so much it risks bankruptcy, we would expect to see increases in debt leading to higher costs of equity, but with the manageable levels of leverage and high levels solvency reported earlier in our ratio analysis for A-D firms, this should not be a factor in the firms studied here.) One must ask to what end is the firm seeking to manage leverage and reduce its WACC. Theoretically, lowering WACC would allow firms to expand by taking on what were previously only marginally profitable ventures. But, given the large spreads between ROIC and WACC in A-D today, it seems evident that this spread is not the constraint on reinvesting.

**Transaction Costs** – Perhaps there are costs beyond WACC that are effectively narrowing defense contractors’ “spread” between their costs and returns of investing. DoD has been highly critical of itself in terms of the added costs of doing business with
the government. Unique processes, added layers of oversight and approval, non-commercial systems and standards, restrictions on global sourcing – these are just a few of the many well-documented obstacles that come with defense contracting. DoD has a long history of concerns for these sorts of problems spurring an ongoing stream of efforts related to improved acquisition processes, a recent example being the call for a “zero-based” approach to acquisition regulation. Such problems with defense acquisition raise the effective hurdle rate for the Industry, as they take the WACC associated with normal operations as a base, and add on additional costs to reflect the challenges associated with defense contracting. This could be a logical explanation for why A-D firms have a long record of operations in which ROIC was considerably larger than WACC, but still opted to not invest aggressively in growing their defense business. To the extent this hypothesis holds true, we would expect capital to migrate toward investment opportunities that lack these additional costs. This could also help explain why diversified corporations like IBM, General Motors, Ford, Chrysler, and Texas Instruments have sold or closed their defense contracting divisions.

Life Cycle Effects – Life Cycle Theory suggests that, when it comes to reinvesting versus distributing cash, firms follow a predictable pattern over the life cycle stages of birth, growth, maturity, and decline. Early in this life cycle, firms are hungry for cash to invest in the growing business. Later, as growth slows, cash flows exceed needs, and the firm begins returning cash to investors. Eventually, as the firm declines, all equity is withdrawn from the firm and distributed to its (former) owners. There is research supporting this hypothesis, but frankly, the theory holds best when it is applied to single-industry (or even single product) firms. The logic behind portfolio management in diversified corporations is that as one product or business unit matures, its increased cash flows can be redirected to emerging opportunities in other business units within the corporation. All the largest A-D firms are diversified, and within the broad A-D Industry, there remain many rapidly growing areas hungry for investment. So, it is difficult to speak of A-D as being a single industry – surely battleships and spaceships are at different points along their own life cycle curves. Diversified defense contractors should still have options to invest in growth areas, the commercialization of space being an obvious example. There are plenty of new A-D ventures aggressively investing in space. In 2020, investment in space-related ventures reportedly poured in at the rate of $150 million per week. Virtually all this venture funding is going to nontraditional contractors, and it appears to many industry observers that the older, established defense contractors are not investing in this opportunity with the same fervor as a host of new start-ups. In lists of the most innovative firms in space technology, there are no mentions of established A-D contractors. Many of the leaders in the new space race are commercial endeavors as opposed to government
contractors. As an editorial in *Space News* began, “The commercial market is now driving almost all innovation in space technology.”44 This sea change of suppliers is not restricted to space. Industry observers report that work in artificial intelligence, connected devices, novel power systems, autonomous platforms, virtual reality, synthetics, and robotics are all being advanced more by newcomers than established defense contractors, and they expect this trend to only grow and strengthen in the coming years.45 By one count, there were 245 new military technology startups in the US in 2021.46 All this suggests we may be observing a deflection point in the natural evolution of an industry as one generation of defense contractors is replaced by the next generation.47

**Executive Compensation** – While legalized in 1982 by the Reagan Administration, stock buybacks did not really take off until a 1992 tax bill capped corporate tax deductions for executive compensation at $1 million, while leaving open a loophole for “performance pay” tied to stock options and/or ownership. As a result of that change, it’s typical for the senior executives in US corporations to have two-thirds of their compensation in the form of stocks and stock options. The leading A-D contractors appear to be right on track with this trend. [www.salary.com](http://www.salary.com) details the C-Suite compensation of US corporations, and they report that in 2019, the annual compensation for the CEOs of the eight largest defense contractors averaged $15.6 million, $10.7 million (or 68.6%) of it taking the form of stock or stock options.48 Note, this is for one year – it does not reflect the accumulated holdings of the company’s stock in the CEO’s personal portfolio. As a group, the CEOs of the largest five defense contractors held $319 million in their employer’s stock as of the end of 2019.49 And if this doesn’t focus executive attention on stock performance enough, many of these same corporations also tie executive cash bonuses to metrics directly impacted by dividends and buybacks such as Total Shareholder Returns or Earnings Per Share. All of this works to create tremendous incentives for executives to improve stock prices. As discussed earlier, dividend increases and share buybacks have been associated with improving stock prices and may be attractive alternatives to investing those funds in the business in hopes of improving earnings, and thereby increasing the stock’s price.

We close by reiterating that all six of these ideas are merely hypotheses. If the DoD wants to establish a more definitive understanding of what explains large defense firms opting to pull cash out of their profitable enterprises rather than invest in them, further research will need to be done.
5.0 Attachments – Guidelines for Replicating / Extending this Research

This report was submitted electronically along with three supporting documents, a list of firms included in the study as of 2019, a dictionary of variables referenced in the research, and a spreadsheet of all data reported upon in the final analysis.

Among these three resources, it is possible to replicate the research presented here, and it should also be straightforward to update this research by adding additional years of data.

We also refer the reader to ReadyRatios as a user-friendly option for comparing A-D firm to the Rest of Industry using standard accounting ratios. This website provides five years of rolling data on all major publicly traded US firms. All firms are classified by industry, making comparisons between industries easy. On the pages that follow, Exhibit 1 presents several screen captures of a ReadyRatios report on Boeing as an example of the data easily accessed at https://www.readyratios.com/.
Exhibit 1 – ReadyRatios Screen Captures Illustrating Boeing

**Boeing Company (The) (BA) financial analysis and rating**

Comparison analysis based on SEC data

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Boeing Company (The)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry (SIC)</td>
<td>3721 - Aircraft</td>
</tr>
<tr>
<td>Latest report</td>
<td>12/31/2020 (filed 2/9/2021)</td>
</tr>
<tr>
<td>Revenue</td>
<td>$58,158 million (ranked #4 out of 93 companies in the industry)</td>
</tr>
<tr>
<td>Assets</td>
<td>$152,136 million (ranked #4)</td>
</tr>
</tbody>
</table>

**Financial position and performance**

<table>
<thead>
<tr>
<th>Compared with Industry ratios</th>
<th>Change during the year</th>
<th>Compared with all industry ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>much worse</td>
<td>Improved</td>
</tr>
<tr>
<td></td>
<td></td>
<td>worse</td>
</tr>
</tbody>
</table>

**Financial ratios benchmarking**

<table>
<thead>
<tr>
<th>Financial ratio</th>
<th>Compared with industry ratios (37 - Transportation Equipment)</th>
<th>Compared with all industry ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvency Ratios</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt ratio</td>
<td><img src="image" alt="Graph" /> 1.12 0.59</td>
<td><img src="image" alt="Graph" /> 1.12 0.61</td>
</tr>
<tr>
<td>Debt-to-equity ratio</td>
<td><img src="image" alt="Graph" /> Negative equity</td>
<td><img src="image" alt="Graph" /> Negative equity</td>
</tr>
<tr>
<td>Interest coverage ratio</td>
<td><img src="image" alt="Graph" /> -5.71 -0.23</td>
<td><img src="image" alt="Graph" /> -5.71 1.22</td>
</tr>
<tr>
<td>Liquidity Ratios</td>
<td></td>
<td></td>
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<tr>
<td>Current Ratio</td>
<td><img src="image" alt="Graph" /> 1.39 1.88</td>
<td><img src="image" alt="Graph" /> 1.39 1.94</td>
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### Examination of the Financial Health of the Defense Sector

<table>
<thead>
<tr>
<th>Ratio</th>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Ratio</td>
<td>0.32</td>
<td>0.32</td>
</tr>
<tr>
<td>Cash Ratio</td>
<td>0.29</td>
<td>0.29</td>
</tr>
</tbody>
</table>

#### Profitability Ratios

<table>
<thead>
<tr>
<th>Ratio</th>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit margin</td>
<td>-20.4%</td>
<td>-20.4%</td>
</tr>
<tr>
<td>ROE (Return on equity), after tax</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>ROA (Return on assets)</td>
<td>-8.3%</td>
<td>-8.3%</td>
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</table>

#### Activity Ratios

<table>
<thead>
<tr>
<th>Ratio</th>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset turnover (days)</td>
<td>458</td>
<td>899</td>
</tr>
<tr>
<td>Receivables turnover (days)</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

#### Resulting Score

-1.1

#### Additional Ratios (not used to calculate the resulting score)

<table>
<thead>
<tr>
<th>Financial ratio</th>
<th>Compared with industry ratios (37 - Transportation Equipment)</th>
<th>Compared with all industry ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability Ratios</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross margin</td>
<td>-9.8%</td>
<td>-9.8%</td>
</tr>
</tbody>
</table>
Examination of the Financial Health of the Defense Sector

**Auditor’s conclusion**

We have conducted a comparative analysis of the balance sheet and the income statement of *Boeing Company* (The) (hereafter – the “Company”) for the year 2020 submitted to the U.S. Securities and Exchange Commission (SEC). The primary business activity of the company is Aircraft (SIC code 3721). During the analysis we have compared the key financial ratios of the company with the average (median) values of those ratios calculated for the specific industry sector and for all industries. The averages are calculated using the data from financial statements for the year 2020 submitted to the SEC through the Electronic Data Gathering, Analysis, and Retrieval system (EDGAR). By comparing each of the eleven key metrics with the median value, we have made a generalized conclusion about the quality of the financial condition of the company. Calculations and summary conclusions are made in a computerized way using software and methods developed by Consulting financial and analytical company Ankon.

As a result of the analysis of the key financial ratios of the company, we have established the following. The financial condition of Boeing Company (The) in 2020 is much worse than the financial condition of half of all companies engaged in the activity “Aircraft.”

A similar result was obtained when comparing the financial performance of the Company with the average ratios of all companies. The financial position of Boeing Company (The) is worse than that of most listed companies that submit financial statements to the U.S. Securities and Exchange Commission.
6.0 References

7 “Shareholder Value Added Definition,” https://www.accountingtools.com/articles/what-is-shareholder-value-added.html
11 “Economic Profit (or Loss),” https://www.investopedia.com/terms/e/economicprofit.asp
12 “Return on Equity,” https://corporatefinanceinstitute.com/resources/knowledge/finance/what-is-return-on-equity-roe/
13 “Return on Sales (ROS)” https://www.investopedia.com/terms/r/ros.asp
15 Industry gains from Lean were documented by MIT’s Lean Aerospace Initiative, http://dspace.mit.edu/bitstream/handle/1721.1/7520/Summary+of+Research+Conducted+by+the.pdf?sequence=1
22 “Weighted Average Cost of Capital (WACC)” https://www.investopedia.com/terms/w/wacc.asp
23 "Shareholder Value Added (SVA)" https://www.investopedia.com/terms/s/shareholdervalueadded.asp
26 Discussed in more detail in “Examining Free Cash Flow in the Defense Sector,” A Report from the University of Tennessee for the Under Secretary of Defense for Acquisition and Sustainment Pricing and Contracting, 2022
33 “Mind the Buybacks, Beware of the Leverage,” https://www.bis.org/publ/qtrpdf/r_qt2009d.htm
36 “Attracting and Retaining the Best of the Private Sector,” Defense Business Board, 2014
41 “Investors are Placing big Bets on a Growing Space Economy,” https://www.washingtonpost.com/technology/2021/09/05/space-finance-bubble-investors/
47 “As Tech Startups Catch DoD’s Eye, Big Investors are Watching,” https://www.defensereviewsmsrm/cultural-clash/2020/01/30/as-tech-startups-catch-dods-eye-big-investors-are-watching/
48 https://www.salary.com/business/compensation-data/ Note the site does not report executive salaries for BAE Systems or Bombardier.
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DEPARTMENT OF DEFENSE

Contract Finance Study

APPENDIX C

EXAMINING FREE CASH FLOW IN THE DEFENSE SECTOR
BY THE UNIVERSITY OF TENNESSEE
Examining Free Cash Flow in the Defense Sector

A Report

from

The University of Tennessee*

for

The Under Secretary of Defense for Acquisition and Sustainment Pricing and Contracting

January 18, 2022

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* Research Team Members: Bruce Behn, PhD; John Cho; James Cody; Alex Miller, PhD; James Wansley, PhD, and Lynn Young, all of the University of Tennessee Haslam College of Business.
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*Examining Free Cash Flow in the Defense Sector*
1.0 Introduction

One of the most commonly heard sayings in Corporate America is “Cash is King.” That is because cash is essential for operating a business.¹ Every bill paid, every investment made, every paycheck, every dividend mailed – they are all done with cash. Cash is very much the lifeblood of a corporation. Yet, for the most part, the government does not look closely at cash flows when evaluating or seeking to understand industry.

For example, the Department of Defense (DoD) and industry do not always use the same approach to measuring the profitability of government contracting. The government typically focuses on accounting measures such as fees and allowable profits, with Net Profit / Sales (or ROS) possibly being the most intuitive accounting measure of firm profitability. Industry looks at these accounting measures too, but industry is much more likely than government to also evaluate a program from a financial perspective, using cash flows instead of accounting profits to measure performance – again, reflecting the dictum of “Cash is King.”

Profits and cash flow are both important, but for different reasons. Profits, or measures of profitability like ROS, measure how much revenue is left over after a firm pays all its expenses. There are two important limitations in its use as a performance measure. First, it doesn’t take into consideration how much the firm had invested in assets in order to generate the sales. Second, profits per se, can’t be spent. The funds a company have to invest and spend are cash, not profits. Granted profits are a major source of cash, but there are lots of other factors that determine the firm’s cash flows and how much cash it has on hand at any given time, so distinguishing between profits and cash flow is still important. For example, a firm can be profitable and still have a negative cash flow, and a firm can have a positive cash flow and be unprofitable.²

The government needs to better understand the implications of evaluating cash flow instead of accounting profits for two reasons.

First, if the government is focused on accounting measures of profitability, but industry is focused on financial measures of cash flow, the contract negotiation process may be inefficient and may be “leaving money on the table.” Based on accounting measures of profit, the Aerospace-Defense (A-D) Industry can build a strong argument that its margins are already “squeezed.” According to the data sets compiled by the NYU Stern School of Business, in 2019, the A-D Industry reported ROS of 7.25% while the average for all US industry as tracked by Stern was 7.71%. But, as stated above, profitability and cash flow are different, and knowing the average ROS for defense firms tells us very little about cash flows in defense contractors. And, since cash flow is so critical to the operation and health...
of industry, the DoD needs to better understand the levels of cash flow in defense contractors.

Beyond this, the government needs to understand the connections between cash flows and an A-D contractor’s willingness to invest its cash in a manner supportive of national security. In other words, the government needs a historical analysis of how A-D firms have used their cash to enhance capabilities (through investments in R&D and capital expenditures) or provide returns to investors (through dividends and stock buybacks.) In this report, we look twenty years of data on A-D contractors to see how their cash flows have changed over time and to document their use of cash. This work is guided by the research objectives listed below.

### 2.0 Research Objectives

The Sponsor’s statement of objectives for research sets forth these objectives:

a. Determine the most realistic means of comparing the A-D industry to various other groups of corporations.

b. Use these means to compile a data base spanning 2000-2019.

c. Use the resulting dataset to assess the extent to which cash flows in A-D firms has increased or decreased over time compared to other US industries.

d. Document changes in how A-D firms utilize cash flow across time and relative to other US industries (with special emphasis on R&D and other uses of cash flow affecting the strength of DoD’s industry base).

In Section 3, which constitutes the bulk of this report, we present and discuss results related to each of these objectives.

### 3.0 Results and Discussion

#### 3.1 Research Objective A:

*Determine the most realistic means of comparing the A-D Industry to various other groups of corporations.*

#### 3.2 Research Objective B:

*Use these means to compile a data base spanning 2000-2019.*

We initially recommended use of data sets already curated by the New York University (NYU) Stern School of Business as the most realistic means of completing the desired analysis. The Sponsor agreed, and for the first three months of our research, we pursued answers to the objectives set forth in Section 2 using the Stern data. Results were decidedly mixed.
The Stern data only reports averages for industries as a whole – data for individual firms is no longer available from this source. There are two problems associated with this. First, averages are highly susceptible to influence by outliers, making them difficult and/or unreliable to interpret. Second, once questions arise from looking at industry averages, we could dig no deeper in answering the questions using individual firm data.

Therefore, in agreement with the Sponsor, we made a mid-course correction and moved our analysis from Stern to Compustat. Standard and Poor describes the data set as follows: “Compustat is a comprehensive market and corporate financial database published by Standard and Poor's, covering thousands of companies worldwide, with info dating as far back as 1950. Compustat is a leading source of intelligence for financial market professionals, investors, and academics.”

The Compustat data sets provide historical data for individual firms, but the data is more “raw” and the researcher has to create new data sets containing the ratio data needed for the research question. We have used Compustat to build new data sets which we are providing to the Sponsor as data files. These files contain a list of all 49 firms in our data set as of 2019, a data dictionary defining each variable referenced in this report, and a spreadsheet containing our raw data and all calculated variables. (See the attachment to this report for more details.)

Archiving large data sets require a number of key decisions and actions. To provide the most meaningful possible data set for the Sponsor’s questions, we did the following:

1. **Selecting Firms:** We identified all firms in the Compustat data base with a Standard Industrial Classification code of 20101010, Aerospace-Defense.
2. Because of the level of mergers and acquisition in this industry, it is impossible to create a single stable data set of firms that covers the twenty years studied. Therefore, we essentially built the data set year-by-year for the twenty years. In other words, our research depicts a 20-year history of the industry, not a 20-year history of select firms.
3. **Controlling for Very Small Firms:** We removed very small firms. Any firms that had annual sales of less than $10 million in any given year were removed from the data for that year.
4. **Median Firm vs Sector Ratio Values:** In conjunction with the Sponsor, the research team explored which measures of central tendency were most representative and useful in reporting our findings. Specifically, we considered reporting the Median Firm Ratio values versus Sector Ratio values. Calculating a Median Firm Ratio entails determining each firm’s individual ratio, and then
reporting the median of those individual ratios. A Sector Ratio is measured by summing all numerator and denominator and using those sums to calculate a ratio for the sector. There are uses for both Median Firm Ratios and Sector Ratios, so rather than limit the research to one option, we report on both and highlight whichever is most appropriate for each question being addressed.

The original plan was to compare data from A-D to other industries identified in the Stern data sets. We pursued that plan during the first three months of our work, but the results were not all that revealing or useful, and when we moved the research to Compustat data, the Sponsor agreed that we should shift our focus to comparing the A-D Industry as a whole to other industries, to comparing the largest ten firms in the A-D Industry to the rest of the A-D Industry.

This Industry is highly concentrated, with the four largest firms accounting for approximately 50% of all sales in our population of 49 firms, and with the largest 10 firms accounting for approximately 80% of all sales in our population. (See Figure 1.). Understanding the largest firms is critically important to DoD. Furthermore, as we report below, there are important differences in the behavior of the largest firms versus the rest of the population studied that need to be recognized by government policymakers.

![Figure 1. 4-Firm Concentration Ratio and Share of Market Held by Top 10](image-url)
3.3 Research Objective C:

*Use the resulting dataset to assess the extent to which cash flows in A-D firms have increased or decreased over time.*

In addressing this research objective, we measured cash flows in several ways. First, we considered both Cash Flow from Operations and Free Cash Flows.\(^4\) Cash Flow from Operations (CFFO) is the cash generated from normal and ongoing operations. Free Cash Flow (FCF) is Cash Flow from Operations before interest payments on debt obligations and after subtracting out any Capital Expenditures (CapEx) which is cash the firm invested in long-term fixed assets such as property, plant, and equipment. We looked at CFFO and FCF both in raw dollar amounts and as ratio measuring them relative to Total Assets. And finally, we look at all these data for the Ten Largest A-D firm in compustat in each given year to the Rest of Industry in that same year. We begin presentation of our findings by reporting the raw amounts of cash flow.
These charts report that in absolute nominal dollars, both the Top 10 and the Rest of Industry saw cash flows generally increasing over the 20 year period of our study. We measured cash flow two ways. Since we are not reporting these measures of cash flows relative to any measure of scale, they largely reflect changes in the total dollar volume of the Industry. In Figure 3 we look at these measures of cash flow adjusted for the value of the investment made in these businesses, measured as total assets. Relative to the investment in assets by these firms, cash flows have not grown over the twenty years of our research, but there are distinctions to the patterns for the largest firms in the Industry and the Rest of Industry.

After recovering from the economic aftermath to the 9-11 terrorist attacks, the Top 10 saw their cash flows relative to investments in assets peak in the 2004-2007 time period. After that, their cash flows relative to investments have generally trended downward.

For the Rest of Industry, their cash flows relative to assets have generally been lower than the ten largest firms in the Industry, and they have been relatively flat across the entire twenty years we studied.

We now turn to what is arguably the most important research objective in this study, an analysis of changes in how A-D firms have used their cash.
Figure 3: Historical Cash Flows / Total Assets
3.4 Research Objective D:

Document changes in how A-D firms utilize cash flow across time and relative to other US industries (with special emphasis on R&D and other uses of cash flow affecting the strength of DoD’s industry base). (Note: As explained previously, this objective was later modified by the Sponsor to compare large and small defense contractors rather than comparing defense contractors as a group to other industries.)

The focus of this research objective is tracking uses of cash that affect the strength of DoD’s industry base. We identified four, two which are generally viewed as putting money back into the business to strengthen it, and two which entail pulling money out of the business. Internal R&D (or IR&D) and capital investments (Capital Expenditures) are generally seen as two uses of cash that strengthen the business. Dividends and Stock Buybacks pull cash out of the business and transfer it to stockholders, who are generally assumed to then invest the funds elsewhere. In the following analysis, we look at each of these four uses of cash separately, and then as a group.

3.4.1 Internal R&D Spending

![Graph showing IR&D/Revenue (Medians) from 2000 to 2019 for Top 10 and Rest of Industry.](image)
IR&D for defense contractors is generally an allowable, reimbursable cost whether incurred as a direct cost (R&D contracts) or indirectly (IR&D charged to contracts as part of G&A cost). Figure 4 reflects trends in A-D internal R&D spending as reported in the Compustat data base. There are significant challenges in interpreting Compustat data on R&D for the A-D Industry because of two factors: 1) the variability in how companies disclose R&D numbers and 2) only company-funded R&D that is not allocated to Cost of Good Sold appears on the income statement (which are the numbers reported by Compustat and used in our analysis). We can use recent data for Raytheon Technologies and Lockheed Martin (drawn from their most recent respective 10-K reports as quoted in the sidebar) to highlight these points.

While $2,582 million appears on the Raytheon Technologies 2020 income statement as R&D expense, the 10-K notes accompanying the income statement point out that the corporation also had customer-funded R&D expenditures of $4,111 million in 2020. In other words, Raytheon Technologies actually spent $6,693 million ($2,582 + $4,111) on R&D in 2020, but only $2,582 million of that was self-funded and reported in Compustat. To further complicate things, there is no way to know if additional company-funded R&D expenses were allocated to customer contracts as part of the general and administrative overhead costs and generally recoverable on customer contracts such as those with the U.S. Government.

Lockheed Martin on the other hand does not separately disclose company funded R&D expenses on its income statement. The company explains “Company-funded R&D costs are allocated to customer contracts as part of the general and administrative overhead costs and generally recoverable on our customer contracts with the U.S. Government.” The
footnotes also state that approximately $1.3 Billion of R&D expenses have been charged to COGS annually in 2020, 2019, and 2018.

As these two examples illustrate, the data on internally funded R&D is “fuzzy” at best. Things get even fuzzier if the corporation has been involved in mergers and acquisitions and added divisions that report R&D differently, as illustrated by Raytheon Technologies discussion of Pratt & Whitney, Collins, and Rockwell M&A activities.

Despite these challenges, we feel R&D is too critical to the high-tech A-D sector to ignore – especially since the sponsor specifically identified R&D as something to be studied in addressing Research Objective 3. While every mindful of the issues raised in the paragraphs above, we are depicting the data IR&D as reported by the financial statements covered in Compustat. While overall trends may be useful indicators of changes in the Industry as reported above, we urge care be used in interpreting data for individual firms. Analysis of individual 10-K reports such as those excerpted on the following page may be useful but goes beyond the scope of the current research.

There are two observations from the overall trends that can be made with confidence. First, the ten largest firms in any given year spend more on IR&D as a percent of their Revenues than the Rest of Industry. Second, IR&D as a percent of Revenues has trended downward for both sectors. As shown in Figure 4B, as a group, the Top 10 its highest IR&D/Revenue in the first year of the study, 2000, at 4.3% and its lowest in 2018 at 2.7%. For the Rest of Industry group, the sector total high was 3.6% in 2003 and the low was 2.2% in 2013.

If we translate these percentages into dollar terms and adjust for inflation, we can begin to see the implications of these trends. For example, if the Top 10 in 2019 had spent 4.3% of its revenues on IR&D as did the Top 10 in 2000, in dollar terms, that would have been an additional $8.5 Billion inflation-adjusted dollars of IR&D in that year alone. 6 To put that number in perspective, the cost to develop Boeing’s 777 is often used as a development cost benchmark for aircraft, and its development costs were documented to be approximately $5 Billion. 7
Excerpts from Corporate 10-K Reports

Raytheon Technologies’ 2020 10-K Footnotes on Research and Development:
Company-sponsored research and development costs, including those costs related to the Company’s portion in connection with cost-sharing arrangements, are charged to expense as incurred and recovery on these cost-sharing arrangements is recorded as a reduction to research and development expense as earned. Customer-sponsored research and development projects performed under contracts with customers are accounted for as contract costs and reported as cost of sales on the related revenue generating contracts.

Research and Development ($ millions)

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2019</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company-funded</td>
<td>$ 2,582</td>
<td>$ 2,452</td>
<td>$ 1,878</td>
</tr>
<tr>
<td>Percentage of net sales</td>
<td>4.6 %</td>
<td>5.4 %</td>
<td>5.4 %</td>
</tr>
<tr>
<td>Customer-funded</td>
<td>$ 4,111</td>
<td>$ 2,283</td>
<td>$ 1,517</td>
</tr>
<tr>
<td>Percentage of net sales</td>
<td>7.3 %</td>
<td>5.0 %</td>
<td>4.4 %</td>
</tr>
</tbody>
</table>

Customer-funded research and development costs are included in cost of sales in our Consolidated Statement of Operations. Research and development spending is subject to the variable nature of program development schedules and, therefore, year-over-year fluctuations in spending levels are expected. The increase in company-funded research and development of $130 million in 2020 compared to 2019, was primarily driven by $0.6 billion related to the Raytheon Merger on April 3, 2020, partially offset by lower expenses of $0.3 billion across various commercial programs at Pratt & Whitney and $0.2 billion across various commercial programs at Collins Aerospace, both principally driven by cost reduction measures in response to the current economic environment primarily due to COVID-19. The increase in company-funded research and development of $574 million in 2019 compared to 2018, was primarily driven by $0.5 billion related to the Rockwell Acquisition. Excluding this impact, Collins Aerospace company-funded research and development increased $0.1 billion driven by higher expenses across various commercial programs. The increase in customer-funded research and development of $1,828 million in 2020 compared to 2019, was primarily driven by $1.7 billion related to the Raytheon Merger on April 3, 2020. The increase in customer-funded research and development of $766 million in 2019 compared to 2018, was primarily driven by $0.8 billion related to the Rockwell Acquisition.

Lockheed Martin 10-K (2020) Footnotes on Research and Development:
We conduct research and development (R&D) activities using our own funds (referred to as company-funded R&D or independent research and development (IR&D)) and under contractual arrangements with our customers (referred to as customer-funded R&D) to enhance existing products and services and to develop future technologies. R&D costs include basic research, applied research, concept formulation studies, design, development, and related test activities. Company-funded R&D costs are allocated to customer contracts as part of the general and administrative overhead costs and generally recoverable on our customer contracts with the U.S. Government. Customer-funded R&D costs are charged directly to the related customer contract. Substantially all R&D costs are charged to cost of sales as incurred. Company-funded R&D costs charged to cost of sales totaled $1.3 billion in each of 2020, 2019 and 2018.
3.4.2 Capital Expenditures

The amount firms invest cash in new or improved fixed assets like property, plant, and equipment is reported in as Capital Expenditures (or CapEx). In Figure 5, we chart CapEx relative to sales.

Two observations are worth noting. First, the larger firms spend relatively less on capital expenditures than the Rest of Industry. This is to be expected given economies of scale.8
Second, capital expenditures relative to sales have been remarkably stable for both the large firm and small firm samples in our research. As sectors, the Top 10 have fairly consistently invested 2-3% of sales in CapEx, while the same number for the Rest of Industry has fairly consistently been 3-4%. It should be noted that capital intensity varies tremendously across industries depending on the nature of their means of production. For example, a software development company has relatively low fixed assets/sales while a shipyard has relatively high fixed assets/sales. Since capital intensity is a function of the type of production in which an industry engages, we would expect to see greater differences across industries than across years within an industry, and our findings reflect this.

3.4.3 Dividends

The financial returns an investor earns are measured as Total Shareholder Returns (TSR). The TSR for a given period is a function of changes in stock prices from the beginning to the end of the period plus any dividends paid during the period. In other words, dividends are an important source of returns to shareholders. However, any funds transferred to shareholders as dividends are funds that are no longer available for investing in the firm and its future.

We measure the firm’s emphasis on payments to shareholders as dividends (or as buybacks as discussed in the next section) by measuring what percent of the firm’s Free Cash Flow it used for that purpose. Below we also measure Dividends relative to Sales, as we did for IR&D and CapEx, but dividends are a discretionary use of cash, and like payments to creditors, and interest payments, it is paid out of Free Cash Flow. Therefore, it is useful and appropriate to look at trends in dividends relative to Free Cash Flow.

As we can see from Figure 6, the A-D Industry has increased its annual dividends over the twenty years covered by this research. The trend is clearer in the Top 10 sector. The firms in our Rest of Industry group pay lower dividends, and in fact, most of them do not pay any dividends, which explains why the median values plotted for Rest of Industry in chart 6A are consistently 0%. However, among those firms in that group that do pay dividends, the amounts are increasing as reflected in the sector totals reported in chart 6B.

To put this trend of increasing dividends in perspective, in 2000, the industry (Top 10 + Rest) paid dividends of $3.2 Billion, and in 2019, it paid dividends of $16.6 Billion, an increase of more than five-fold. To put this increase in perspective, the combined sales of the A-D firms in Compustat were $237 Billion in 2000 and $469 Billion in 2019, an increase of less than two-fold.
Figure 6: Historical Trends for Dividends
3.4.4 Stock Buybacks

Stock buybacks entail firms transferring cash to their shareholders not for dividends, but in exchange for shareholders’ shares in the company. This purchase takes the shares out of circulation, and this decrease in the shares outstanding is recorded on the firms’ balance sheet by reductions in cash and the book value of shareholders’ equity.

Stock buybacks typically provide several short-term benefits to shareholders:

- Because buybacks reduce the number of shares outstanding, as long as total earnings are at least flat, earnings per share increase.
- Assuming the price-earnings ratio for the firm’s stock (its stock price per share divided by the firm’s earnings per share) remains unchanged, the mathematical improvement in earnings per share will lead to a similar mathematical increase in share price.
- Similarly, assuming the firm’s market capitalization (the value the market places on the firm as a whole) is not affected, individual shares will be traded at a higher value since each share now represents a larger piece of the corporation.
- Assuming the total amount paid out in dividends is not reduced, when the number of shares outstanding is reduced, each remaining shareholder will see an increase in annual dividends per share.
- Between the two major sources of raising capital, debt and equity, equity is the more expensive option, so when a firm reduces its equity, assuming there were not similar reductions in debt, its Weighted Average Cost of Capital (WACC) falls, which improves its Shareholder Value Added (SVA).

However, since the cash used to buy shares is now in the hands of the shareholders, it is no longer available for management to use in investing in the firm’s future. For this reason, stock buybacks are controversial. Rather than investing funds to expand or improve operations, a firm buying back stock is pulling cash out of the firm and giving it to owners. Legal and economic scholars have criticized the practice as has the business press. In an editorial critical of this “maneuver,” Forbes wrote, “It’s a rare C-suite that has continued to invest in new, creative growth rather than pick the low-hanging fruit of easy money to be made through financial maneuvers.”

In fact, stock buybacks were largely illegal until 1984. Before then, under the Securities Exchange Act of 1934, the large scale repurchase of shares was seen as a form of stock market manipulation. In 1984, the SEC reversed itself and made large-scale buybacks legal, arguing that buybacks would lead to higher share prices, and therefore benefit investors across the board. There continue to be calls for buybacks to once again be prohibited by law. And indeed, Federal stimulus payments associated with the
coronavirus came with the restriction that the funds could not be used to buy back shares, but critics of buybacks argue this is too little too late after the tremendous emphasis placed on buybacks in the prior decade or so.

This increased emphasis on buybacks is very evident among the largest firms in A-D. Twenty years ago, it was very rare for A-D firms to buy back their own shares. Today, it is very common, as shown in Figure 7 where we track buybacks as a percent of Free Cash Flow.

The emphasis on buybacks is much stronger in the Industry’s largest firms. In fact, the median value for the firms in our Rest of Industry group is virtually flat at 0% since so many of the firms in this group do not buy back any stock. This is in sharp contrast to the Top 10 firms in any year, as shown in chart 6A. In the Industry’s largest firms, buybacks became a major use of cash flows, peaking in 2015, when the Top 10 used an amount totalling nearly 130% of their combined Free Cash Flows to buy back stock. If firms were using more cash to buy back shares than the amount of cash the firms generated, the implication is that funds were being borrowed to finance share buybacks, and in fact, the business press reports that by the end of the period covered in our research, more than half of all stock buybacks were financed with debt.
Figure 7: Historical Trends for Share Buybacks
3.4.5 Combined Dividends and Buybacks

Figures 6 and 7 have shown that both dividends and buybacks have become major uses of cash in the largest defense contractors. Both of these practices entail pulling funds out of the corporation and giving them to shareholders. When the combined amount of cash pulled out of a firm is greater than the cash generated by the firm, it is said to be “eating its seed corn,” alluding to the practice of pioneer farmers to staunchly protect their seed corn held back to plant next year’s crop. Eating the seed corn means damaging future prospects by overconsuming critical resources for the short term benefits they offer.

This practice has grown in popularity since 1989 when General Electric first made headlines for buying back $10 Billion of its own shares as “a better way to generate value for shareholders than taking a ‘wild swing’ on an acquisition or investing in new technology.” Many economists and market observers have pointed out that over the past decade or so, many of the largest, most mature US corporations have been eating their seed corn and predict dire consequences. Other argue that used properly, pulling cash from a corporation and transferring it to owners is a sound practice and even an inevitable part of the natural cycle of birth, growth, maturity, and decline. Regardless of the reasons for it, the practice is widespread; in 2019 alone, corporations globally spent $1.2 Trillion in buying back their own shares.

To get a sense of how big an issue this is in A-D in particular, in Figure 8 we have added together annual dividends and buybacks and compared their total to the total Free Cash Flows generated by defense contractors.
Figure 8: Historical Trends in Dividends+Buybacks Combined

Chart 8A compares the combined totals of cash pulled out of the Top 10 defense contractors in any given year and compares it to the total Free Cash Flow for these same firms combined. There are several noteworthy observations.
First, prior to 2008, pulling more cash out of the firm than the firm generated was virtually unheard of. The exception was 2001 when the 9-11 terrorist attacks crippled the economy as a whole and was especially ruinous for aerospace firms with any commercial operations. But, starting in 2008, the situation changed. From 2008 onward, the total cash pulled out of the Top 10 in any given year was greater than the Free Cash Flows the firms produced more times than not (7 out of 12 years). The peak year was 2015 when the Top 10 for that year pulled a combined amount of cash for dividends and buybacks equalling 178% of their combined Free Cash Flow.

Second, of the two means of pulling cash from the firm, the use of buybacks has grown much more rapidly than the use of dividends. In fact, as shown in chart 8A, the growth in dividends has been remarkably steady over the 20 years of this study. Meanwhile, the use of buybacks has grown dramatically, and what was once a rare use of cash has recently become a larger use than dividend payments in most years.

Third, this phenomenon is largely limited to the largest firms in the Industry. As shown in Chart 8B, the Rest of Industry only pulled out more cash than it generated in one year, 2014, and even then the difference was very small. For the most part, the Rest of Industry is producing considerably more cash than it is pulling out.

However, it is important to note the relative size of the Top 10 and the Rest of Industry sectors in this study. Recall that as shown in Figure 1, the Top 10 firms in the Industry generated 83.9% of total Industry sales in 2019. Given their importance to Industry and to national defense, it is important to take a more detailed look at the extent to which the individual firms in the Top 10 have been eating seed corn.

In Figure 9, we replicate the summary data captured in Figure 8 but in Figure 9, we report the data for each of the ten largest firms in our sample as measured by total revenues in 2019. As depicted in charts 9A-9J, there are important differences between firms in this regard, but a detailed analysis of individual firms is beyond the scope of this study. However, one overall conclusion stands out. Every one of the largest 10 firms in the Industry had at least one year in which more cash was pulled out of the firm for dividends and buybacks than was generated by the firm, and most of these firms had several such years.
Examining Free Cash Flow in the Defense Sector
Examining Free Cash Flow in the Defense Sector

9C: RAYTHEON TECHNOLOGIES CORP

$Millions

9D: GENERAL DYNAMICS CORP

$Millions

Dividends
Buybacks
Free Cash Flow
Examining Free Cash Flow in the Defense Sector
Examining Free Cash Flow in the Defense Sector
Examining Free Cash Flow in the Defense Sector

* Huntington Ingalls first became a reporting entity in 2009.

Our data only go through 2019 to avoid confounding effects of the global COVID pandemic. However, it is worth noting that increased dividends and share buybacks are still very much in the news. For example, in the fall of 2021, Lockheed Martin announced that it would raise its dividends 8% and buy back another $5 Billion of its own shares.23 In

Figure 9: Data on Uses of Cash Flow in Each of 2020 Top 10 Firms
In fact, there is evidence that COVID has actually added to the practice. The DoD began a program to accelerate a higher percentage of payments for incurred cost in Spring of 2020 as part of the Federal efforts to address the economic hardships associated with COVID. According to Forbes magazine, DoD paid its “top defense contractors” $4.6 Billion under this program in the first quarter of 2021. That same quarter, these contractors bought back a combined $4.8 Billion of their own shares, compared to only $4.6 Billion of their stock buybacks in all of 2020. The Biden Administration’s Build Back Better initiative would tax corporations 1% on all share buybacks. The largest defense contractors bought back $11.1 Billion of their own shares in 2021, so a 1% tax would amount to $111 Million, about the cost of a single F-35B.

Comparing Investments and Withdrawals

To this point, we have largely discussed funds being invested back into the firm (as IR&D and Capital Expenditures) and funds being withdrawn from the firm (as Dividends, and Share Buybacks) separately. In this section, we compare investments and withdrawals.

In Figure 10, we combine IR&D+CapEx and compare those investments in the business to withdrawals from the business in the form of Dividends+Buybacks. To adjust for the underlying growth in the industry, we track all of this relative to Sales and relative to Assets. To depict differences in trends for the largest firms versus the rest of the industry, we build separate charts for each sector, and then combine them to create charts for the industry as a whole.
Examining Free Cash Flow in the Defense Sector
Examining Free Cash Flow in the Defense Sector
In a nutshell, what these charts show is that for the past twenty years, investments in the underlying businesses comprising the A-D sector have been slowly declining, while withdrawals from those businesses in the form of Dividends and Stock Buybacks have risen considerably. For whatever reason, the industry is opting to pull funds out of its firms rather than investing in them. We conclude this report with discussion of why this might be happening, and what the implications of this trend both for the firms and for national defense.
Examining Free Cash Flow in the Defense Sector

Closing Discussion

As the literature referenced in this report show, there are many observations about why the leaders in A-D are frequently pulling more cash out of the business than the business is generating as Free Cash Flow and the potential consequences of doing so. A detailed treatment of these actions is beyond the scope of this study, however, as a concluding section of this report, we can offer a few points about why it might be happening and its implications.

First, we can speculate on why firms are pulling more cash out of firms than the firms generate has become widespread in the Industry. One likely reason as noted in the quote about GE’s pioneering use of this “financial engineering” tactic, dividends and buybacks are easier and surer ways of generating shareholder value than investing in increasing or improving the firms competitive capabilities and creating shareholder value from improved earnings. This behavior is especially true when the cost of debt is near all-time lows. If dividends and buybacks are a surer way of delivering value to shareholders, then this point probably does not go unnoticed by senior corporate executives who are increasingly compensated with stock and/or stock options. This phenomenon creates an incentive for corporate executives to look on “financial engineering” favorably, and it’s not a surprise that research shows CEO stock ownership affects Total Shareholder Returns.

Second, we can speculate about the potential implications if a firm, or this case, an entire economic sector, fairly consistently “eats its seed corn”. One of the obvious questions to ask about the longer-term implications is what happens when the firm stops the larger-than-normal cash transfers to shareholders. For example, what happens when interest rates rise making borrowing more expensive? Or perhaps the corporation buys up all or virtually all its publicly traded stock, making any further buybacks impossible? The value shareholders derive from stocks “propped up” with buybacks have been viewed as a sort of addiction to everything from a “sugar high” to so-called “Corporate Cocaine.” What happens when the so-called “Buyback Bubble” bursts? If stock prices plummet, raising capital through any new issue of stock becomes more expensive since a greater portion of the firm must be sold to raise the same amount of capital.

Another obvious question about the longer-term implications of the giants of A-D eating their seed corn has to do with national defense and security. When a firm pulls cash out of its operations and transfers it to its shareholders, it may be good for the shareholders, but is it good for the firm or its customers? Again, we can turn to a pioneer in the extensive use of buybacks for examples. GE pulled over $50 Billion to buy back more than two billion of its own shares over a decade, money that many observers say could have been spent strengthening its various struggling businesses. After a decade of billions spent
on buying back shares, GE saw its share price drop sharply as the corporation entered into a long series of efforts to restructure several divisions, including layoffs measured in the tens of thousands.\textsuperscript{38}

This pattern of emphasizing dividends and share buybacks at the expense of corporate operating capabilities is the theme of, “Flying Blind: The 737 MAX Tragedy and the Fall of Boeing” by Bloomberg investigative reporter Peter Robison.\textsuperscript{39} From our research, we know that Boeing pulled nearly $64 Billion out of the corporation (dividends + buybacks) and transferred it all to shareholders in the decade leading up to the first 737 MAX crash in 2018 and a second crash the next year. Robison attributes this outcome to decisions made by a series of corporate leaders (many of which came from GE) that placed “financial engineering” aimed at generating wealth for shareholders above aeronautical engineering aimed at producing the best possible aircraft. Others have observed similar patterns across several of the largest A-D firms.\textsuperscript{40}

While this research is focused on the A-D Industry upon which DoD depends for its defense industrial base, we should point out that this phenomenon is not limited to A-D firms. In fact, the behavior of A-D firms is part of a much larger pattern. Across all industries, over the past decade, US corporations have transferred well over $1 trillion dollars annually to investors through dividends and buybacks.\textsuperscript{41} In one of the earliest criticisms of this behavior, William Lazonick, economics professor at the University of Massachusetts Lowell, found that between 2003 and 2012, the S&P 500 spent 54% of their earnings on buybacks and 37% on dividends, leaving “very little for investments in productive capabilities.”\textsuperscript{42}

As found in this study of A-D firms, research on the broader economy suggests that the big changes are related to buybacks more than dividends. A study of 610 US firms over three decades found that prior to 1994, buybacks were typically less than 1% of their assets, but from 2015-2020, they averaged 4.1%. This same study reported that while buybacks had soared, dividends had held relatively steady at around 2% of assets, but capital investment had fallen from 7.4% in the 1990s to 4% in 2015-2020, while R&D had dropped from 3% to 2.3% in the same time periods.\textsuperscript{43}

There is little evidence that this widespread trend of increased dividends and buybacks is slowing. In 2021, the firms in the S&P 500 set records for both stock repurchases and dividends, and forecasts are for more of the same in 2022.\textsuperscript{44} So, while this phenomenon is not limited to A-D, the A-D Industry is so critical to national defense that it warrants its own look by DoD.
The US depends upon its industrial base to develop much of the technology, products, and services that constitutes our national defense. But, under our economic system, US corporations are free to chose how they go about creating value for shareholders, even if that means eating their seed corn. However, we face near-peer adversaries that have much greater direct control over their industrial bases. Today those countries are starting to field military capabilities superior to those in the US.45 This is a trend with tremendous implications for national security, and it is very appropriate that one of the three main lines of effort in the US National Defense Strategy is focused on how DoD reforms its approach to business.46
4.0 Facilitating DoD’s In-house Research

The DoD Sponsor for this research requested the research team provide data and guidance the government would find useful in interpreting / replicating this study. The requested data and guidance are being provided electronically to the same individuals who receive the monthly briefings: Capt. Kevin Ward (Contracting Officer), Ms. Sara Higgins (Contracting Officer’s Representative), Ms. Janice Muskopf, and Mr. Phil McManus. The data consists of three electronic files:

1. A list of the 49 firms included in research data base as of 2019.
2. A spreadsheet containing raw data from Compustat reported in our research.
3. A dictionary defining variables used in this research referencing variable labels used by Compustat.

With these files, the government should be able to replicate this study in-house and keep the research updated annually. Our research team will also remain available through April 17, 2022, to advise the government on use of these files.

5.0 References

5 Cash flows were down sharply in some of the largest A-D firms in 2020 due to the impact of COVID on air travel. The twenty-year period we were asked to study specifically avoided 2020 because of these extraordinary circumstances. While our charts and analysis do not include 2020 data, the data set we have provided to the Sponsor does include 2020 so the research can be extended to include the COVID era if so desired.
6 Actual 2019 IRD spending for the Top 10 was $11 billion nominal, or 2.8% of sales. Had IR&D as a percent of sales equaled the 2000 percentage rate of 4.3%, 2019 spending would have been $16.7 billion nominal, or $5.7 billion more than actual spending in nominal numbers. The US government official CPI inflation adjustment factor from 2000-2019 is 48.5% and applying that adjustment to the $5.7 billion nominal difference gives an inflation adjusted amount of $8.5 billion.
7 “Boeing Eyes Development Cost Cuts,” https://apnews.com/article/11558320225e5c1191d67e98d4ac923029
8 “Economies of Scale,” https://www.investopedia.com/terms/e/economiesofscale.asp
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10 “How do Cost of Debt and Cost of Equity Differ?”
12 “The Dangers of Buybacks: Mitigating Common Pitfalls,”
13 https://hbr.org/2020/01/why-stock-buybacks-are-dangerous-for-the-economy
14 “Stock Buybacks are Banned. Let it Be a Trend,”
https://www.forbes.com/sites/petergeorgescu/2020/05/13/stock-buybacks-are-banned-let-it-be-a-trend/?sh=543cb3cb6530
15 “Seven Reasons Stock Buybacks Should be Illegal,” https://www.yahoo.com/now/7-reasons-stock-buybacks-illegal-172253787
16 “Coronavirus Stimulus Package to Include Curbs on Shareholder Buybacks,”
https://www.wsj.com/articles/coronavirus-stimulus-package-to-include-curbs-on-share-buybacks-11585160044
17 “Stock Buybacks Banned. But the Damage is Done,”
18 “More than Half of All Stock Buybacks are now Financed by Debt. Here’s Why That is a Problem.”
https://fortune.com/2019/08/20/stock-buybacks-debt-financed/
20 “Eating The Seed Corn- The Fed’s Calamitous Corruption Of Corporate Finance,”
21 “Are Buybacks Really Shortchanging Investment?” https://hbr.org/2018/03/are-buybacks-really-shortchanging-investment
22 “The Dangers of Buybacks: Mitigating Common Pitfalls,”
23 “Lockheed Martin Raises Dividends by Nearly 8%, Buybacks by $5 Billion,”
24 “Defense Department Payment Plan Enriching Contractors Who Are Upping Stock Buybacks,”
25 “Defence Firms Could Have to Pay Millions Under Propose Buyback Tax,”
26 “Why Would a Company Buy Back Its Own Shares?”
https://www.ft.com/content/1aaac576-e9bb-11e4-a687-0014feab7de
Examining Free Cash Flow in the Defense Sector
DEPARTMENT OF DEFENSE

Contract Finance Study

APPENDIX D

EXAMINING FREE CASH FLOW IN THE DEFENSE SECTOR

BY GEORGE MASON UNIVERSITY
DOD CONTRACT FINANCING / COST AND PRICING STUDY
Call Order 01

“Examining Free Cash Flow in the Defense Sector”
Revised Final Report

April 14, 2022

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Summary

Our project had three research questions. In defense contracting in the United States, over the period 2000 through 2019, at the industry and firm level,

A. Did free cash flow (FCF) increase or decrease over time?
B. For what was FCF being used, and did that change over time?
C. Was there a relationship between FCF and independent research and development (IR&D) spending?

Our research sponsors specifically directed that we use a particular sample: at least 25 firms which earned at least 25 percent of their 2019 revenue from the Departments of Defense and Homeland Security, and the National Aeronautics and Space Administration. From these restrictions, we developed an unbalanced panel of 29 qualifying firms. For informing policy towards a range of defense contractors of different sizes, in some tests, we normalized FCF and its uses as margins (dividing by revenue) to avoid outsized effects from the largest firms. To avoid endogeneity, we modified FCF (denoted FCF*) with the adding-back of IR&D spending for those models involving IR&D as a dependent variable. We paid particular attention to the specific method of calculating changes in operating working capital (OWK). Then, across the time period in question, with this sample, we obtained the following results:

A. Across the industry, FCF margins gradually increased, but slightly, with considerable variation. The effect depends highly on an outlier and the last two years of the time series. The result is insensitive to our specific formulation of changes in OWK.

B. We can say little about the specific uses of FCF or FCF margins, as the results are quite sensitive to the particular formulation of changes in OWK.

C. Modified FCF (FCF*) showed a statistically significant relationship with levels of IR&D spending, but not with all calculations of OWK. FCF* did not show a statistically significant relationship to percentages of (margins in) IR&D spending.

The findings of considerable non-dependence of IR&D spending on FCF* are consistent with classic finance theory, specifically the Modigliani-Miller Theorem. The sensitivity of the relationships involving FCF to the specific formulation of OWK arguably constitutes a finding on all its own.
Theory and Methods

The sources and uses of cash are a required statement for all publicly traded US firms, but the uses of free cash flow (FCF) are often not separately reported. As a rough financial measure of profitability on a cash basis, FCF is generally calculated as

$$FCF = EBIT \cdot (1 - \text{effective tax rate}) + \text{D&A} - \Delta \text{OWK} - \text{ReqCapEx}$$

where

- $EBIT$ is earnings before interest and taxes
- $D&A$ is depreciation and amortization
- $\Delta \text{OWK}$ is changes in operating working capital
- $\text{ReqCapEx}$ is capital expenditures required for the current activities of the firm

Initially in our work, we calculated operating working capital as inventories plus receivables less payables, as this formulation would closely reflect the operational activities of a firm that would generate cash, rather than accounting for it. Later in our work, we altered our definition to consider how our results could be sensitive to this specific formulation.

As proceeds of the activities of the firm, FCF has multiple possible uses, including payments to shareholders (in dividends and buybacks), payments to debt-holders (in interest and principal), acquisitions of other firms (when accomplished at least in part with cash), discretionary capital expenditures, and (independent) research and development spending. The first two uses reward investors today; the latter three invest for the future.

The notion that cash flows may affect firms’ decision-making dates at least to the writings of Joseph Schumpeter around the time of the Second World War.\(^1\) Where capital markets are imperfect, or informational asymmetries significant, firms may need to rely on their own internal funds for financing investments. In contrast, the Modigliani–Miller Theorem of 1958 holds that the value of a firm should be independent of its choice of financing, whether externally through debt or equity, or internally through reinvestment. Firms should thus be indifferent as to how they source their cash for any purpose.\(^2\) This suggests that we should not find a strong relationship between FCF and specific means of investment for the future, namely acquisitions or IR&D spending.

Since its formulation, Modigliani–Miller has provided a starting point for discussion of practical finance, because the theorem assumes a world without corporate taxes, informational asymmetries, transaction costs, bankruptcy costs, or agency costs. Of course, the

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comparative tax advantage of debt in the United States indicates a preference for financing through debt.\textsuperscript{3} Further, informational asymmetries, agency costs, and perceived costs of a possible bankruptcy could indicate a preference for internal financing of external opportunities. Research into actual sensitivity of investment to cash flows has indeed constituted “one of the largest empirical literatures in corporate finance.” The recent literature has generally found that R&D investment has remained correlated with internal cash flow, even as other investments have depended less upon it.\textsuperscript{4} Notable differences can be seen in firms of differing size, age, and domicile.\textsuperscript{5}

The possibility of agency costs begs the question of whether the level of R&D is economically optimal—for the firm, certainly, but also for its customers or the world as a whole—and whether the returns to that R&D have changed over time.\textsuperscript{6} Consistent with such concerns over agency costs, whatever over-investment there may be seems concentrated in firms with the highest levels of FCF.\textsuperscript{7} Managers at R&D-intensive firms with engineering cultures—say, defense contractors—may prize such spending more than their investors do, and may be able to obtain funds internally with less oversight. At the same time, in some markets, including defense contracting, customers often fund R&D externally, providing spillovers into the capabilities of the firm, which could partially substitute for the firms’ independent, internally-funded R&D.\textsuperscript{8}

We might thus ask whether changes in FCF at defense contractors in particular might lead to changes in spending on external opportunities, and particularly independent R&D. Early in our work, considering the theory described above, we theorized that any effect we found would be slight, though positive.

In the interests of informing policy towards a range of defense contractors of different sizes, we often interpreted FCF as FCF margins, to avoid outsized effects from the largest firms. In our

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\textsuperscript{6} For a pessimistic view, see the working paper by Ann Marie Knott and Carl Vieregger, “Does R&D Drive Growth?” 2019, available at \url{http://dx.doi.org/10.2139/ssrn.2382885}.


\textsuperscript{8} There is a long literature on these issues. For a classic article, see Larry H. P. Lang, René M. Stulz, and Ralph A. Walkling, “A Test of the Free Cash Flow Hypothesis: The Case of Bidder Returns,” \textit{Journal of Financial Economics}, vol. 29, no. 2, 1991, pp. 315–335.
regression models, we routinely checked for autocorrelation with Breusch-Godfrey tests,\textsuperscript{9} heteroskedasticity with Studentized Breusch-Pagan tests,\textsuperscript{10} and cross-sectional dependency with Pesaran CD tests for unbalanced panels.\textsuperscript{11} Where we found these problems, we adjusted our findings with the use of robust standard errors: Newey-West for heteroskedasticity and autocorrelation, and Driscoll-Kraay for cross-sectional dependency. We undertook our statistical tests in the programming language R, and checked the important results in the statistical application Stata 17.

\section*{Sampling, Data, and Heuristics}

Our sponsors requested that we study publicly-traded firms which had undertaken at least 25 percent of their business with the US Department of Defense (including through its Foreign Military Sales program), the Department of Homeland Security, and the National Aeronautics and Space Administration in the single year 2019. (We call these defense-related sales.) Our sponsors also sought a study which reached back to at least 2000, but that excluded 2020 from the time interval under consideration, to eliminate the adverse economic effects of the recent pandemic. Finally, they were also interested in how the behavior of these firms differed from those which conducted at least 75 percent of their business with those three customers.

We note that firms such as these can earn large sums from contracted research from these three customers, and that the US Defense Department itself is by far the single largest source of these funds globally. We thus sought a panel of US-domiciled firms, to focus on the effects of this surfeit of customer funding. We describe these internally-funded R&D activities as \textit{independent} R&D, or IR&D, in a way similar to the terminology of the Defense Department itself. Finally, we sought firms generally still extent as independent entities to make the observations more relevant to formulating policy. This led to a sample of 29 firms over 20 years. We will hereafter refer to them with their stock symbols (shown parenthetically).

\textbf{AAR (AIR)}, Aerojet Rocketdyne (AJRD), Aerovironment (AVAV), Boeing (BA), Booz Allen Hamilton (BAH), CACI (CACI), Comtech Telecommunications (CMTL), Cubic (CUB), Curtiss-Wright (CW), General Dynamics (GD), Huntington Ingalls (HII), Kaman (KAMN), KBR (KBR), Kratos Defense & Security (KTOS), L3 Harris Technologies (LHX), Leidos (LDOS), Lockheed Martin (LMT), Maxar Technologies (MAXR), Mercury Systems (MRCY), National Presto (NPK),


Northrop Grumman (NOC), Optex Systems (OPXS), Raytheon (RTN), SAIC (SAIC), Teledyne Instrument Electronics (TIKK), Transdigm Group (TDG), Vectrus (VEC), Viasat (VSAT), and VSE (VSE).

We obtained our data substantially from the Compustat database, but checked and back-filled with analyses of the management discussions in the firms' annual financial statements. (We are conveying data files with both the raw Compustat figures and our corrections.) We encountered several limitations in data-gathering. Not all firms existed as independent entities in all those years, as some emerged through public offerings, and some disappeared through mergers. Some fields were simply not available for some firms in all years, and the annual reports were not always enlightening. Thus, our panel held not 580, but 497 observations, and was unbalanced over time.

In our sample of defense contracting firms, FCF margins varied widely within any given year. The standard deviation of FCF margins was nearly always greater than the mean in any given year, indicating high variability. An alternate way to view this relatively large dispersion is at the 25th and 75th percentiles in any given year. The 25th percentile was generally around 1 to 2 percent, while the 75th percentile was generally around 8 to 9 percent. The bottom of the distribution indicates that defense contracting can be a challenging business in any given year. In every year, at least one firm produced negative FCF margins. At the top of the distribution, defense contracting was an appealing business, as the best firm in any given year produced FCF margins generally around 30 percent. Overall, however, defense contracting was not a high-cash-margin business, as only 25 percent of firms in any given year produced FCF margins greater than 8 or 9 percent.

At the firm level, FCF margins varied widely as well. For any individual firm, over these two decades, defense contracting was a challenging business: 22 out of the 29 firms produced negative FCF margins in at least one year. TIKK and VSAT had negative median values for FCF margins overall. The average median FCF margin across firms was only 5.43 percent. BAH, GD, and RTN experienced remarkably stable business in FCF margins, as indicated by their relatively low standard deviations. In contrast, CMTL and TIKK produced highly variable margins.

One firm has been very successful in producing FCF margins: TDG. Its median exceeded 30 percent, and in its worst year exceeded 13 percent. TDG’s business has been remarkably stable, with 25th and 75th percentiles in FCF margin performance of 28.13 and 33 percent. The firm has had the highest FCF margin of our sample in all but three years of the time series: 2000 (before it was traded publicly), 2001, and 2019. However, the margin was not so fully available to shareholders, due to the firm’s rather leveraged balance sheet and accompanying interest burden.

Descriptive statistics are provided by firm in our accompanying files.
Results under our Initial Formulation of OWK: Trends in FCF

We modeled our problem as simple time-series regression equations on a panel of $i$ firms. King-Wu tests indicated the presence of individual effects. Hausman tests indicated that both fixed-effects and random-effects models would be consistent, so we chose random-effects models, as they are more efficient:

$$ FCF_{it} = \alpha + \beta t + (\nu_{it} + \mu_i), \text{ and} $$

$$ (FCF/Revenue)_{it} = \alpha + \beta t + (\nu_{it} + \mu_i). $$

For the test of FCF levels, Breusch-Godfrey and Studentized Bruesch-Pagan tests found autocorrelation and heteroskedasticity, which required application of Newey-West robust standard errors as heteroskedasticity- and autocorrelation-consistent (HAC). Then, across the industry, as represented by our sample, we found that FCF did not show a statistically significant increase over time. In any case, the correlation coefficient was remarkably small: $R^2 = 0.01$. This indicates that the progress of time explains little of the variation of FCF at the industry level.

FCF margins, however, did show a statically significant increase over time: about 0.21 percent per annum from 2000 through 2019. The correlation coefficient was slightly higher, but still remarkably small: $R^2 = 0.03$. Heteroskedasticity, autocorrelation, and cross-sectional dependence were not an issue for FCF margins, though the results held with robust as well as conventional standard errors. However, the panel contains some serious outliers. Excluding the final two years (2018 and 2019) from the time series reduced the overall calculated increase, in both models, to just six basis points per annum. Excluding a high-margin outlier of the year 2001 has a similar effect. For all these reasons, we advise against drawing strong conclusions about the growth of FCF margins.

The firm-level models were similar, but for single firms, and with many fewer observations (not more than 20) for each regression:

$$ FCF_t = \alpha + \beta t + \nu_t, \text{ and} $$

$$ (FCF/Revenue)_t = \alpha + \beta t + \nu_t. $$

Thirteen firms showed statistically significant increases in FCF across the time period: AJRD, CACI, CW, GD, KAMN, LHX, LMT, MAXR, NOC, NPK, RTN, TDG, and VSEC. Two showed statistically significant decreases in FCF: VEC and VSAT. Four firms showed statistically significant increases in FCF margins: CACI, CW, KAMN, and LHX. Two showed statistically significant decreases in FCF margins: the same VEC and VSAT.

The distinction between FCF and FCF margins is important for crafting policy with respect to individual suppliers. Increases in FCF without increases in FCF margins suggest that a firm increased its revenues over time, but not its cash-basis profitability. Increases in FCF margins without increases in FCF suggest that a firm became rather more profitable on a cash basis.
Comparable increases or decreases in both suggest a simple scaling up or down of the business as a whole.

**Results under our Initial Formulation of OWK: Uses of FCF**

We cannot definitively categorize any uses of funds for a specific activity as a use of FCF *per se*. Monies are fungible. Any activity can be undertaken with internally generated cash, but also with externally generated cash—through issuance of debt or equity. Debt and equity are sometimes raised for specific purposes, and this is often mentioned in annual reports. It is not always mentioned, however, so we did not attempt to systematically study this across our sample. Rather, we sought to determine through regression analysis the degree to which corporate activities could be associated with FCF or FCF margins. After accounting for omitted variable bias, we found only one statistically significant, convincing relationship with a dependent variable.

We did find a few more seemingly significant relationships. For one, in these models, across the industry, as represented by our sample, and in a univariate model, levels of FCF were *negatively* associated with levels of long-term debt reduction. Specifically, a $1 million increase in the FCF was associated with a $240K decrease in long-term debt reduction. (We found no similar result scaled for revenues.) A Hausman test indicated that a random-effects model would be inconsistent, leading to our selection of a fixed-effects model. A King-Wu test indicated significant effects by individual firms, leading to our use of a one-way fixed-effects model. The presence of autocorrelation, heteroskedasticity, and cross-sectional dependence drove our use of Driscoll-Kraay standard errors, which are robust to all three problems. The p-value of 0.0138 indicated rejection of the hull hypothesis at the 0.05 percent level, and the correlation coefficient of 0.05 indicated weak explanatory power.

Regardless, this unexpectedly negative result drove us to consider omitted variable bias, and namely of the other major sources of cash: issuance of equity and long-term debt. In a multivariate model, for FCF levels, King-Wu and Hausman tests prescribed a one-way fixed-effects model, considering individual effects:

\[
\text{LTDebtRedux}_{it} = \alpha_i + \beta_{\text{FCF,}i} \cdot \text{FCF}_{it} + \beta_{\text{EI,}i} \cdot \text{EquityIssue}_{it} + \beta_{\text{DI,}i} \cdot \text{LTDebtIssue}_{it} + \epsilon_{it}
\]

A Pesaran CD test showed no cross-sectional dependence, so we chose Newey-West HAC standard errors. The results shown in the table below. The statistical significance of the overall multivariate model was very high, and particularly on the issuance of long-term debt. Firms are primarily funding their repayment of long-term debt by issuing new long-term debt. These roll-overs made great sense as interest rates declined over the period in question to historically low levels. Notably, the significance of the coefficient for FCF disappeared, as the effect of FCF was subsumed within that of the other two independent variables.
Further, in these models, across the industry, as represented by our sample, and in a univariate model, FCF was also negatively associated with spending on acquisitions: a $1 million increase in the former was associated with a $177K decrease in the latter. King-Wu and Hausman testing indicated two-way fixed-effects model. The presence of autocorrelation, heteroskedasticity, and cross-sectional dependence again drove our use of Driscoll-Kraay standard errors. The p-value of 0.0130 indicated rejection of the hull hypothesis at the 0.05 percent level, and the correlation coefficient of 0.04 again indicated weak explanatory power.

We thus again considered omitted variable bias with the other major sources of cash. King-Wu and Hausman tests prescribed a one-way random-effects model, considering time:

$$\text{Acquisitions}_{it} = \alpha + \beta_{\text{FCF},it}\text{FCF}_{it} + \beta_{\text{EquityIssue},it}\text{EquityIssue}_{it} + \beta_{\text{LTDebtIssue},it}\text{LTDebtIssue}_{it} + (\epsilon_{it} + \lambda)$$

We found problems of autocorrelation, heteroskedasticity, and cross-sectional dependence in the model, but chose Newey-West HAC standard errors, as Driscoll-Kraay standard errors are not well-documented in random-effects models. The results show a weak but statistically significant association with long-term debt reduction, but no association to note with FCF:

Across the industry, as represented by our sample, FCF margins were also negatively associated with acquisitions as a fraction of revenue: a single percentage-point increase in FCF margins (e.g., from 5 to 6 percent) was associated with a 0.71 percentage-point decrease in acquisitions divided by revenue. A Hausman test indicated that a random-effects model would be inconsistent, leading to our selection of a fixed-effects model. A King-Wu test again indicated significant effects by individual firms, leading to our use of a one-way fixed-effects
model. A Breusch-Godfrey test similarly again indicated autocorrelation. We found no problems, however, with cross-sectional dependence, leading to our use of Newey-West HAC standard errors. The p-value of 0.0001 indicated rejection of the null hypothesis at the 0.01 level, and the correlation coefficient of 0.10 indicated modest explanatory power.

Once more, unexpected results suggested a check with a multivariate model. For margins, the aforementioned tests prescribed a one-way fixed-effects model, considering the effects of individual heterogeneity, again with Newey-West HAC standard errors, and the results shown:

\[(\text{Acquisitions/Rev})_t = \alpha_i + \beta_{\text{FCF}}(\text{FCF/Rev})_t + \beta_{\text{EI}}(\text{EquityIssue/Rev})_t + \beta_{\text{DI}}(\text{LTDebtIssue/Rev})_t + \epsilon_{it}\]

| Acquisitions/Rev. | Coefficient  | Std. error  | T-value | Pr(>|t|) |
|-------------------|--------------|-------------|---------|----------|
| FCF/Revenue       | -0.630215    | 0.165994    | -3.7966 | 0.0001661|
| LTDebtIssue/Rev.  | 0.099197     | 0.056197    | 1.7652  | 0.0781914|
| EquityIssue/Rev.  | 0.053961     | 0.157727    | 0.3421  | 0.7324166|

R-Squared: 0.17314, Adjusted R-Squared: 0.11802
F-statistic: 7.42295 on 3 and 164 DF, p-value: 0.00010813

Here, the statistical significance of FCF margins remained, even after loading the model with alternative (revenue-adjusted) sources of cash. The coefficient on FCF margins in the multivariate model changed slightly (from –0.71 to –0.63), and the overall correlation coefficient increases slightly (from 0.10 to 0.17). The result was robust to dropping the observations from TDG and NOC (see below).

The effect is clear, comparatively strong, and of modest explanatory power. However, these archival data thus far suggest no clear explanation, and the finding is inconsistent with Modigliani- Miller. We theorize that in any given year firms with higher than average FCF margins may view their external investment opportunities (and particularly acquisitions) negatively, ascribing higher expectations to their internal investment opportunities, on the basis of their current performance. After all, top managers should have more and better information about internal opportunities than external ones. In that case, as additional capital available for investment, increased FCF is likely to be invested in internal projects that offer greater certainty, vice external projects that offer less certainty. The primary means of investing in external opportunities is through acquisitions. The effect may differ form that of the economy as a whole because the FCF margins from defense contracting are comparatively stable, and perhaps seemingly difficult to improve upon acquisition. Therefore, information asymmetries are likely to result in internal over external investing when additional capital is available for investment through increased FCF.

At the firm level, in considering levels of FCF, the specific findings varied widely, though rather more firms showed positive than negative relationships between FCF and the uses of FCF:
The result for acquisitions and TDG is singular and salient. We speculate that the firm’s below-investment-grade debt rating makes its ongoing acquisition campaign easier and cheaper to fund internally.

Across the industry, in our study of the uses of FCF over time, Hausman and King-Wu tests indicated one-way random-effects models for each of the five uses in levels, and for four of the five tests in margins. A pooled model was indicated for share repurchases scaled by revenue, but this did not produce a statistically significant result. All the significant results were in the one-way random-effects models:

\[ \text{Use}_{it} = \alpha + \beta_{t} + (\epsilon_{it} + \mu). \]

We found statistically significant increases across the industry in dividends ($23 million per annum), stock repurchases ($32 million per annum), and interest payments ($2 million per annum). Scaled by revenue, we found statistically significant increases in dividends (0.15 percent per annum) and interest (0.04 percent per annum).

At the firm level, by levels, findings again varied widely, though far more firms showed positive than negative progressions in the volumes of their uses of FCF:

<table>
<thead>
<tr>
<th>USE OF FCF</th>
<th>STATISTICALLY SIGNIFICANT POSITIVE RELATIONSHIP</th>
<th>STATISTICALLY SIGNIFICANT NEGATIVE RELATIONSHIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACQUISITIONS</td>
<td>TDG</td>
<td>NOC, LMT</td>
</tr>
<tr>
<td>DIVIDENDS</td>
<td>AIR, CW, GD, KAMN, LHX, LMT, NOC, NPK, RTN, TDG, VSEC</td>
<td>—</td>
</tr>
<tr>
<td>INTEREST PAYMENTS</td>
<td>CACI, CMRL, CW, KAMN, LHX, MAXR, TDG</td>
<td>VEC, VSEC</td>
</tr>
<tr>
<td>LT DEBT REDUCTION</td>
<td>CACI, TDG, VSEC</td>
<td>RTN, VEC, VSAT</td>
</tr>
<tr>
<td>SHARE REPURCHASES</td>
<td>CW, GD, HII, KAMN, LHX, NOC</td>
<td>VSAT</td>
</tr>
</tbody>
</table>

The use of FCF
In defense contracting, as in other industries such as pharmaceuticals, R&D activities can be funded externally or internally. Externally funded R&D constitutes revenue. Internally funded R&D is an item of (generally) expense or (sometimes) capitalized investment; most firms in defense contracting refer to this figure as company-funded or independent R&D. In this study, we are interested in spending on IR&D, and how FCF may influence that spending.

Most of the firms in our sample report at most a single figure for R&D on their annual statements, and sometimes only in the accompanying management discussion. While not separate items of revenue, in contracting with the US Defense Department, IR&D expenses are “generally recoverable” through reimbursable overheads on successful bids for contracts in the year in which they are incurred. This assumes that the bids are successful: if the firm wins less business than expected, it will under-recover its overheads; if more than expected, it will over-recover. This also assumes that the R&D expenses claimed are considered allowable under the Defense Federal Acquisition Regulation Supplement (DFARS), but this is generally

<table>
<thead>
<tr>
<th>USE OF FCF</th>
<th>STATISTICALLY SIGNIFICANT POSITIVE PROGRESSION OVER TIME</th>
<th>STATISTICALLY SIGNIFICANT NEGATIVE PROGRESSION OVER TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACQUISITIONS</td>
<td>CUB, MRCY, TDG, VEC</td>
<td>LDOS</td>
</tr>
<tr>
<td>DIVIDENDS</td>
<td>AIR, BA, CMTL, CUB, CW, GD, KAMN, KBR, LHX, LMT, MAXR, NOC, NPK, RTN, SAIC, TDG, TIKK, VSEC</td>
<td></td>
</tr>
<tr>
<td>INTEREST PAYMENTS</td>
<td>AIR, CACI, CMTL, KAMN, LHX, SAIC, TDG, VSAT, VSEC</td>
<td>RTN</td>
</tr>
<tr>
<td>LONG-TERM DEBT REDUCTION</td>
<td>CMTL, KAMN, MAXR, MRCY, TDG, VEC, VSAT, VSEC</td>
<td>RTN</td>
</tr>
<tr>
<td>SHARE REPURCHASES</td>
<td>BA, BAH, CUB, CW, HII, LHX, RTN, VSAT</td>
<td>LDOS</td>
</tr>
</tbody>
</table>

**Results under our Initial Formulation of OWK: the Influence of FCF on IR&D**

In defense contracting, as in other industries such as pharmaceuticals, R&D activities can be funded externally or internally. Externally funded R&D constitutes revenue. Internally funded R&D is an item of (generally) expense or (sometimes) capitalized investment; most firms in defense contracting refer to this figure as company-funded or independent R&D. In this study, we are interested in spending on IR&D, and how FCF may influence that spending.

Most of the firms in our sample report at most a single figure for R&D on their annual statements, and sometimes only in the accompanying management discussion. While not separate items of revenue, in contracting with the US Defense Department, IR&D expenses are “generally recoverable” through reimbursable overheads on successful bids for contracts in the year in which they are incurred. This assumes that the bids are successful: if the firm wins less business than expected, it will under-recover its overheads; if more than expected, it will over-recover. This also assumes that the R&D expenses claimed are considered allowable under the Defense Federal Acquisition Regulation Supplement (DFARS), but this is generally

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12 The federal government’s definition of “independent” R&D further requires that the work be undertaken without an agreement with another entity. This could, perhaps oddly, exclude R&D activities funded privately, but within corporate alliances. The volume of this work in defense contracting seems small, so on expert advice, we have chosen to ignore the distinction in our analysis. Discussion with Jennifer Eubank, The CPA Department LLC, 27 August 2021.

13 This is the particular language in Lockheed Martin’s annual report for 2019, and we have seen similar language in other reports.
Not all firms are equally enthused about IR&D spending, as overheads make bids less cost-competitive. Indeed, six of the firms in our sample reported no IR&D spending at all throughout the entire time period 2000 through 2019: AIR, BAH, NPK, OPXS, VEC, and VSEC. Two additional firms reported no R&D expense in the vast majority of years: in just a single year for KBR, and two years for CACI. In contrast, IR&D spending at Boeing ($63.8 billion) slightly exceeded that of all the other firms combined ($61.0 billion). This was clearly mostly to support Boeing’s work in airliners, most of the sales of which are not in defense.

As firms do undertake IR&D spending intended for opportunities outside defense contracting, we chose to roughly estimate their fraction devoted to activities inside defense contracting by factoring IR&D expense by percentage of defense sales. The object of our analysis was the decision-making of the firm, and the unit of our analysis was the firm-in-a-year, so we also normalized figures as a percentage of sales. To avoid endogeniety, we modified FCF (denoted as $\text{FCF}^\ast$) by adding back IR&D spending. King-Wu tests indicated significant effects from individual firms in the volumes, and from both firms and time in the margins. We thus chose a one-way fixed-effects model for levels, and a two-way random-effects model for margins:

\[ \text{IRD}_{it} = a_i + \beta (\text{FCF}^\ast)_{it} + \epsilon_{it}, \text{ and} \]
\[ (\text{IRD} / \text{Revenue})_{it} = a + \beta ((\text{FCF}^\ast)/\text{Revenue})_{it} + (\epsilon_{it} + \mu_i + \lambda_t). \]

We also theorized that changes in FCF* could supply additional cash available to management as an investment in IR&D, so we also calculated year-on-year differences, and compared these in the same time periods, in both dollar volumes and margins. King-Wu tests indicated no insignificant effects from time or individual firms in either comparison, so we used pooled regressions for both volumes and margins:

\[ \Delta \text{IRD}_{it} = a + \beta \Delta (\text{FCF}^\ast)_{it} + \upsilon_{it}, \text{ and} \]
\[ \Delta (\text{IRD} / \text{Revenue})_{it} = a + \beta \Delta ((\text{FCF}^\ast)/\text{Revenue})_{it} + \upsilon_{it}. \]

Pesaran CD tests indicated no cross-sectional dependence in any of the four models. This was expected, as defense contractors probably know little of the details, in advance of brief

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14 As one accountant with long experience in both government and industry told us, “I have never seen an unallowable R&D cost. I’m sure it exists. I’ve just never seen it.” Eubank, 27 August 2021. For the specific regulatory clause, see DFARS 231.205–18, “Independent research and development and bid and proposal costs.”

15 At the George Mason University and Defense Acquisition University Government Contracting Conference in November 2021, we directly asked Kevin Phillips, CEO of ManTech, why his firm did not spend more on independent research and development. He had a simple, public answer: in his comparatively low-margin market, his bids would no longer be cost-competitive. While this is but a single answer, from a firm not in our sample, our informal conversations with analysts of the industry have returned similar responses.

16 This was particularly important to avoid the otherwise outsized effect of Boeing on the analysis overall.
Breusch-Godfrey tests, however, indicated problems of autocorrelation with all. We thus chose Newey-West HAC standard errors for all four models.

Across the industry, after application of these robust standard errors, FCF*, FCF* margins, changes in FCF*, and changes in FCF* margins all showed no statistically significant relationships with IR&D or IR&D margins. Across the industry, we also found no significant relationships between IR&D and time-lagged FCF*, after shifting from a fixed-effects to a random-effects model, as indicated by a Hausman test.

Three firms showed statistically significant positive relationships between FCF* margins and IR&D spending margins: KAMN, MAXR, and MRCY, a notably heavy spender on IR&D. CMTL alone showed a statistically significant negative relationship. Eight firms showed statistically significant positive relationships between FCF* and IR&D spending overall: AJRD, CMTL, CW, GD, KAMN, KTOS, LHX, and MAXR. VSAT showed a statistically significant negative relationship. This suggests that management at some firms do choose FCF* as a specific source of funding for their IR&D projects. The effect is just not common across the industry.

In contrast to the finding with acquisitions, these findings are consistent with Modigliani-Miller: firms are not clearly making decisions about IR&D spending on the basis of the available FCF*, or how that FCF* changes from year to year.

**Sensitivity of Results to Boeing, and to our Specific Formulation of Working Capital**

After some helpful comments from our research sponsor, we investigated some unusual figures in our panel for Boeing, in the years 2018 and 2019. We considered how these outliers of Boeing’s unusual financial affairs of 2018 and 2019 could be influencing results.

We note that our main source for financial data was Compustat. The managers of Compustat’s databases do normalize some figures each year to reduce variations across firms, which may be employing different accounting treatments. In 2019, Boeing reported negative Earnings Before Interest and Taxes (EBIT), but Compustat records a figure $5.952 billion for the firm. This is due to differences in the Revenue figure from which expenses are deducted to reach EBIT. Boeing’s Income Statement from the 2019 10-K shows Revenue of $76.559 billion compared to $84.818 billion in Compustat. The difference is due to a $8.259 billion revenue deduction “for estimated potential concessions and other considerations to customers for disruptions and associated delivery delays related to the 737 MAX grounding.” Compustat published its figures without that deduction.

We dropped the 2018 and 2019 observations for the panel, and reran the industry level FCF regressions over time. The point estimate for FCF margins increased slightly, from 0.0021 per annum to 0.0023 per annum, and remained statistically significant at the 0.01 level. FCF levels increased meaningfully, from $16.64 million per annum to $26.44 million per annum, and the point estimate became statistically significant at the 0.001 level.
That closer analysis also led us to consider our specific approach to calculating Changes in Working Capital, and whether our results would be robust to alternative formulations.

For Boeing, FCF in 2018 in our panel is calculated as negative $10.216 billion. This large negative FCF figure is due to a change in the Operating Working Capital figure of $21.048 billion, which in turn is due to a reporting change by Boeing. In 2017, Boeing reported Inventories net of advances and progress billings ($44.344 billion), but in 2018, Boeing reported Inventories gross of advances and progress billings ($62.567 billion). Prompted by the impact of this varying accounting treatment at one firm between two years, we decided to investigate the robustness of our results to changes in working capital across our entire panel.

We considered four approaches from the finance literature on measuring working capital, including (4), the approach we used in our initial analysis, and which produced the preceding results:

(1) \[ \text{Current Assets} - \text{Current Liabilities} = (\text{Cash/Short Term Investments} + \text{Receivables} + \text{Inventories} + \text{Other Current Assets}) - (\text{Debt in Current Liabilities} + \text{Accounts Payable} + \text{Income Taxes Payable} + \text{Other Current Liabilities}) \]

(2) \[ (\text{Current Assets} - \text{Cash/Short Term Investments}) - (\text{Current Liabilities} - \text{Debt Included in Current Liabilities} - \text{Income Taxes Payable}) \]

(3) \[ (\text{Current Assets} - \text{Cash/Short Term Investments}) - (\text{Current Liabilities} - \text{Debt Included in Current Liabilities}) \]

(4) \[ \text{Inventories} + \text{Receivables} - \text{Payables} \]

Approach (1) is a classic and widely taught formulation. Approaches (2) and (3) are slight variations of each other. As noted in the table below, they produce figures for FCF which correlate to another closely. This is because income taxes payable are quite small on average across the firms in our sample. Approach (3) is perhaps the treatment most commonly found in traditional cash flow statements. Approach (4) is different because it is the most narrow, but

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17 See, for example, Eric L. Kohler, *A Dictionary for Accountants*. New York, Prentice-Hall Inc., 1952. This also happens to be the definition of Compustat's variable Working Capital.


20 Richard Frankel, “Managing Reported Operating Cash Flow: An Empirical Investigation of Fourth Quarter Working Capital Decreases and Benchmark Beating.” Working Paper, MIT Sloan School of Management, 2005. We also found support for this idea in the teaching notes of Aswath Damodaran, an influential finance professor at New York University’s Stern School of Business, and in the courseware of the Corporate Finance Institute.
should include the major operating assets of most firms. By excluding cash on hand, it avoids issues of endogeneity in the calculation of free cash flow. It is also, quite clearly, easy to calculate from financial statements. However, in our panel, Other Current Liabilities is the largest component on average with a relatively high standard deviation. This may be due to the importance of progress payments and advance billings in the business of military contracting.

**Correlation of Free Cash Flow under the Four Formulations of Changes in Working Capital across our panel**

<table>
<thead>
<tr>
<th>FCF #1</th>
<th>FCF #2</th>
<th>FCF #3</th>
<th>FCF #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCF #1</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCF #2</td>
<td>0.8329</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>FCF #3</td>
<td>0.8383</td>
<td>0.9970</td>
<td>1.0000</td>
</tr>
<tr>
<td>FCF #4</td>
<td>0.4036</td>
<td>0.5622</td>
<td>0.5635</td>
</tr>
</tbody>
</table>

The results for the trends in FCF and FCF margins are fairly insensitive to the specific formulation of Changes in Working Capital. Only with application of Newey-West standard errors does one of the slopes—for levels of FCF across the industry—lack significance.

**Sensitivity to Results for Changes in FCF and FCF Margins to the Specific Formulation of Changes in Working Capital**

<table>
<thead>
<tr>
<th>Form</th>
<th>Model</th>
<th>Slope</th>
<th>Conventional t-stat</th>
<th>Newey-West t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCF #1</td>
<td>One-way Random Effect</td>
<td>$46.92</td>
<td>4.29</td>
<td>3.40</td>
</tr>
<tr>
<td>FCF #2</td>
<td>One-way Random Effect</td>
<td>$32.01</td>
<td>4.16</td>
<td>3.55</td>
</tr>
<tr>
<td>FCF #3</td>
<td>One-way Random Effect</td>
<td>$31.96</td>
<td>4.23</td>
<td>3.63</td>
</tr>
<tr>
<td>FCF #4</td>
<td>One-way Random Effect</td>
<td>$16.64</td>
<td>2.10</td>
<td>1.71</td>
</tr>
<tr>
<td>FCF #1/Rev.</td>
<td>One-way Random Effect</td>
<td>0.0029</td>
<td>2.77</td>
<td>2.72</td>
</tr>
<tr>
<td>FCF #2/Rev.</td>
<td>One-way Random Effect</td>
<td>0.0022</td>
<td>3.26</td>
<td>3.02</td>
</tr>
<tr>
<td>FCF #3/Rev.</td>
<td>One-way Random Effect</td>
<td>0.0022</td>
<td>3.23</td>
<td>3.01</td>
</tr>
<tr>
<td>FCF #4/Rev.</td>
<td>One-way Random Effect</td>
<td>0.0021</td>
<td>3.88</td>
<td>3.09</td>
</tr>
</tbody>
</table>

However, the rest of our results shift considerably. Undertaking the same statistical analyses with just formulation (3) for changes in working capital, we obtain rather different results, at least with the univariate regressions. Several of our findings of statistical insignificance become significant when we change our approach to calculating Changes in Working Capital from formulation (4) to (3):
• FCF over time had a statistically significant point estimate of $31.96M per annum (95% CI = $14.65M to $49.26M) compared to a statistically insignificant point estimate of $16.64M per annum with formulation (4).

• FCF/Revenue over time had a statistically significant point estimate of 22 basis points per annum (9 basis points to 35 basis points) compared to a statistically significant point estimate of 21 basis points per annum with formulation (4).

• FCF appears to be related to Dividends, with a statistically significant point estimate of 0.1208 (0.0195 to 0.2220) compared to a statistically insignificant point estimate of -0.0142 with formulation (4).

• FCF/Revenue also appears related to Dividends/Revenue, with a statistically significant point estimate of 0.0355 (0.0002 to 0.0709) compared to a statistically insignificant point estimate of 0.0252 with formulation (4).

• FCF appears to be related to Share Repurchases, with a statistically significant point estimate of 0.3241 (0.0138 to 0.6344) compared to a statistically insignificant point estimate of 0.1145 with formulation (4).

• FCF/Revenue also appears related to Share Repurchases/Revenue, with a statistically significant point estimate of 0.2487 (0.0147 to 0.4827) compared to a statistically insignificant point estimate of 0.1670 with formulation (4).

• With Long-Term Debt Reduction, we found the opposite effect. FCF had a statistically insignificant point estimate of 0.1847 on Long Term Debt Reduction compared to a statistically significant point estimate of -0.2401 with formulation (4).

• FCF had a statistically significant point estimate of 0.1281 on Acquisitions compared to a statistically significant point estimate of -0.1771 with formulation (4). This rather removes our concern about the odd result of a negative correlation, as it may be an artifact of the specific definition.

• FCF/Revenue had a statistically insignificant point estimate of -0.1313 on Acquisitions/Revenue compared to a statistically significant point estimate of -0.7063 with formulation (4).

• Changes in Modified FCF appear related to Changes in IR&D, with a statistically significant point estimate of 0.0701 (0.0073 to 0.1329) compared to a statistically insignificant point estimate of 0.0699 with formulation (4).

On the other hand, we can also observe that our results are insensitive to the specific definition of Changes in Working Capital in only one of these ten analyses. As a result, we hesitate to draw firm conclusions about the effect of FCF on any specific use of cash.
APPENDIX E
EXAMINATION OF GOVERNMENT ACCOUNTING SYSTEM REQUIREMENTS
BY GEORGE MASON UNIVERSITY
DOD CONTRACT FINANCING / COST AND PRICING STUDY

Call Order 02

Examination of Government Accounting System Requirements

March 28, 2022

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Executive Summary

Accounting systems are an integral part of company operations, producing information for two primary use-cases: financial statements and managerial reporting. For publicly traded companies, the Generally Accepted Accounting Principles (GAAP) regulate the standards, terminologies, and methods used to prepare financial statements. It allows external parties to compare financial statements issued by public companies to make investment decisions. Managerial accounting (also known as cost accounting) focuses on the internal processes and helps managers make decisions within the company by illuminating activity costs, performance variances, and pricing decisions. In certain circumstance, GAAP guidance partially aligns with government requirements for managerial accounting such as for the percentage of completion method for longer-term contracts.

In support of the Office of Defense Pricing & Contracting’s Contract Financing/Cost and Pricing Study, George Mason University’s Center for Government Contracting examined government accounting system requirements and their impact on commercial company participation in defense contracts. The examination includes examining: (1) accounting systems and practices used in the commercial sector for large, small, private, and public companies; (2) differences between Generally Accepted Accounting Principles and government requirements; (3) the government’s requirements for accounting systems under range of contracting scenarios; and (4) a survey of commercial industry compliance costs related to government requirements on accounting systems, analyses of entry or exit, and instances of adapting existing systems to meet the requirements.

Companies involved with defense contracts may face four up to major sources of accounting system requirements: (1) Standard Form 1408: Preaward Survey of Prospective Contractor; (2) DFARS 252.242-7006: Accounting System Administration; (3) FAR Part 31: Cost Principles; and (4) 48 CFR 9904 Cost Accounting Standards (CAS). In general, the requirements involve identifying direct costs with contract orders, assigning indirect costs using a consistent methodology, and segregating unallowable costs that government will not pay for.

The four sources of accounting system requirements were decomposed into 41 separate requirements and compared against each other using researcher judgment. Of the 14 items listed in the Preaward Survey and the 18 items found in the Accounting System Administration, 12 were virtually identical to each other. While these requirements are essential to compliance, only three of them directly overlapped with the 19 items in CAS. The Cost Accounting Standards are more detailed and require more maturity of the accounting system. FAR Part 31 provides instructions for the determination, negotiation, or allowance of particular elements of costs and has 15 instances of overlap with CAS. Finally, these accounting system requirements are compared with GAAP where possible. The information is summarized in Table 2.

The accounting system requirements are mapped to contract types and methods of financing in Table 3. Only firm fixed price contracts awarded under Part 12, Acquisition of Commercial Products and Commercial Services, are exempt from all accounting system requirements. All but CAS are exempt from contracts using firm-fixed price no financing, fixed price performance-based payments, and fixed price economic price adjustment based on actual labor or material cost. CAS applies unless it meets one of the exemptions found in reproduced in Table 1, such as for small businesses or fixed price contracts with adequate price competition. CAS, however, is usually required when the government negotiates a sole source effort with a large contractor.
Other government requirements with accounting system implications including the Truth in Negotiations Act, Forward Pricing Rates, Earned Value Management System, and the Cost and Software Data Reports. These requirements were generally created to mitigate problems stemming from asymmetric information and have their own thresholds for applicability. Often, the requirements drive accounting detail (such as to lower levels of a Work Breakdown Structure) and drive reporting workflow (such as submission to particular formats). Table 4 describes the additional requirements. More research is required, however, on accounting system impacts from other DFARS-required business systems including estimating systems, purchasing systems, material management systems, and property management systems.

Interviews with 10 subject matter experts in government and industry provided a mix of narratives on whether accounting system requirements represented a barrier to commercial company participation in defense contracts. Some found compliance to be a significant expense, particularly for small businesses. One estimate of the employee cost to become compliant with accounting systems requirements was $700,000. By contrast, others found accounting requirements to be indicative of good management at any commercial company. Moreover, compliance protected the government on cost reimbursable contracts and helped it obtain lower prices.

Not-for-attribution interviews with representatives from 12 companies provided perspectives on accounting system requirements and estimates of their costs. The companies, described in Table 5, ranged from small tech startups to giant professional services firms to industrial conglomerates. Nine implemented a compliant accounting system, and none performed cost-benefit analyses in advance. The decision to move towards accounting compliance largely depended on subjective factors related to the company’s commitment to growth in the defense sector.

Estimates of implementation and maintenance costs were often incomplete (Table 7), ranging from little additional effort to more than a dozen dedicated employees with unique software costs. One company with revenues of about $25 million decided to create a federal subsidiary after receiving several deficiencies in an audit of a time and materials contract from the Defense Contract Audit Agency. The total cost including consultants, employee time, and software was $1 million, or 4 percent of revenue. GMU researchers also estimated the cost of maintaining on-going compliance compared to prior accounting system costs for five companies. A wide-range of estimates resulted, from a low of zero to a high of 1.5 percent of revenue (Table 8). While numerous factors affect the cost of compliance, particularly the number and type of contracts, there seemed to be a correlation between accounting compliance cost and company size. Smaller companies incurred higher relative costs. The average compliance cost as a percent of revenue for the three companies over $200 million was 0.16 percent whereas the figure for the two companies under $25 million was 1.2 percent. Some of these costs may be recouped through indirect cost allocations.

Five companies reported not pursuing defense contracts due to the accounting requirements involved. In many cases, the decision to decline a contract was tangled with other compliance factors, particularly those having to do with sole source negotiation. Two companies did not have FAR/DFARS compliant accounting systems, and so could not accept any contracts with the requirement. They did not actively pursue defense contracts, and often presented a “take it or leave it” price for government to buy on a competitive firm fixed price or commercial item basis.
1.0 Introduction: Initial Report

Doing business with the U.S. government is a critical decision point for many companies because it is one of the largest customers in the world. According to USAspending.gov, Department of Defense (DoD: composed of the Army, Navy, Air Force, and other defense departments) contract obligations for products and services were $391.5 billion in fiscal year 2019. The purchasing power of the U.S. government represents a powerful incentive for a commercial company to enter the business-to-government (B2G) market.

Despite the attraction of becoming a federal contractor, many government contracts require firms to make significant transaction-specific investments in order to comply with federal regulations and oversight. These investments can include, for example, the implementation of an accounting system deemed compliant with certain government requirements. Many of these requirements focus on ensuring the proper allocation of costs related to government contracts, which in many instances is a distinct goal from compliance with the Generally Accepted Accounting Principles (GAAP) that guide high-level financial performance reporting. The government requirements related to cost accounting are captured in part by cost principles found in Part 31 of the Federal Acquisition Regulation (FAR), Standard Form 1408: Preaward Survey of Prospective Contractor accounting system criteria found in Part 252.242-7006 of the defense supplement to the FAR (DFARS), and the Cost Accounting Standards (CAS).

There are potential costs for engaging with the U.S. government as a customer, especially for new entrants into the B2G marketplace due to business system and unilateral audit requirements that do not exist in the commercial space. Direct costs can include the expense of installing and maintaining, for example, a FAR/DFARS compliant accounting system. Additional costs can include hiring additional staff or devoting existing staff time to new procedures, training employees to be familiar with government contracting (especially in the first few years), dealing with management issues arising from change in culture, and balancing the opportunity cost of foregone benefits from other clients if limited company resources are shifted to government contracts. Some research has indicated that firms likely struggle to extract benefits from this customer relationship until they reach a certain point where they have become government “purists” (high government customer emphasis) instead of just “tourists” (low government customer emphasis). The benefits from government contracting may be difficult to achieve given costs associated with requirements that do not exist or are not as prevalent in the commercial space. The Defense Contract Audit Agency (DCAA) Information for Contractors manual advises that “prospective contractors may have no work that requires the same type of accounting system required for Government work. A prospective contractor may not want to install a new, more detailed accounting system unless awarded a contract.”

Despite the concerns expressed by some government agencies and commercial companies, existing empirical evidence of accounting system requirements acting as a barrier for commercial companies to become federal contractors is relatively scarce. This remains an important issue because “a healthy manufacturing and defense industrial base and resilient supply chains are essential to the economic strength and national security of the United States.” This study intends to fill the void by examining how government accounting system requirements affect
commercial companies’ perceptions and decisions involving government contracting. This is accomplished with a comprehensive review of typical commercial company cost accounting practices, a review of the accounting requirements levied on government suppliers, a series of interviews with subject matter experts, and a series of semi-structured interviews involving DoD suppliers and other commercial companies.

The following report is divided into several main sections. Section 2 provides a general background on accounting information systems and the role they play in business operations. Section 3 focuses on how companies typically track and allocate project costs in the commercial sector, and the role that GAAP play in this regard. Sections 4 and 5 shift the focus to government requirements for cost accounting systems, specifically what they are, how they relate to one another, and when they are applicable under a range of contracting scenarios. Section 6 explains how government requirements differ from GAAP in both form and purpose. It provides an example of an explicit comparison between commercial and government requirements. Section 7 concludes the background investigation by describing two narratives that exist about whether governmental cost accounting requirements represent a true barrier to commercial company entry or participation in the B2G marketplace. Sections 8 and 9 provide the results of interviews conducted with commercial company representatives who speak about their experiences as DoD suppliers, costs of implementation and maintenance of compliant accounting systems, and whether they decline to pursue certain government contracts.

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1 For the purposes of this study, commercial companies are defined as companies that generate less than 25% of 2019 revenue from the Department of Defense (including Foreign Military Sales), NASA and DHS.
2.0 Accounting Systems: Background

This section provides a brief discussion on cost accounting systems to serve as background for the ensuing sections. It identifies the general framework of accounting systems and practices that enable commercial companies to accumulate and track costs. It also discusses a common rationale for implementing an accounting system that is widely applicable to commercial companies, including large, small, private, and public companies. Cost accounting information assists with several activities that underpin company performance, including profitability analyses, budget preparation, and internal management of operations. The section also discusses the circumstances when process order or job order accounting is utilized, and how costs can be determined as recurring or nonrecurring effort. Finally, the section concludes with a discussion of commercial sector accounting requirements found in GAAP which focuses on financial reporting for publicly-traded companies.

2.1 Accounting Information Systems

The accounting information system (“AIS”) has long been one of the most important information systems utilized by businesses.[7] A “complete” accounting system needs to be able to process routine business transactions such as sales, purchases, cash receipts, cash disbursements, payroll, and adjustments.[8] The AIS is an essential tool for assessing the results of operations and subsequent profit of a company; as such it should directly inform managerial decision-making. An AIS system is necessary for accurate product pricing, inventory valuation, income and profitability determination.[7] It should be able to identify and capture costs at such a level that can provide input for financial reporting, help set realistic targets and goals, and measure profitability and company success. Accounting information influences both the broad control of management and the evaluation of individual projects.[9]

An AIS includes many subsystems such as order entry and sales, billing accounts receivable and cash receipts, inventory, general ledger, and cost accounting.[10] The two major subsystems are: (1) a cost management information system, which is used to provide information about costs of services and/or products for internal managerial decision-making, planning, and control purposes, and (2) a financial accounting information system, which is used to prepare financial statements for external users (e.g., balance sheet, income statement, and statement of cash flows). The cost management information system should ideally be integrated with Enterprise Resource Planning (ERP) operational systems that can incorporate both financial and non-financial information into various management reports (e.g., sales reports). Setting up or modifying an AIS involves costs in terms of system development and employee time and effort, as well as organizational training. The decision to implement an information system is somewhat of a subjective cost/benefit exercise[7] and likely varies based on the size of the firm and whether it is privately held or publicly traded.[11] However, web-based software such as QuickBooks Online, ePeachtree, Microsoft Dynamics 365 for Finance and Operations, and Intacct enable small businesses to implement systems with operating capabilities on par with systems used by Fortune 500 companies. In addition, ICAT (Indirect Cost Allocation Tool) Systems can be used in conjunction with QuickBooks to satisfy government requirements for FAR/DFARS compliant accounting.

The cost management information system (CAIS) itself has two subsystems: (1) a CAIS, designed to assign costs to individual products and services; and (2) an operational control information
system used to provide information about manager and employee performance, different product
designs, customer needs, and other activities of the business.[10] The major functions of a CAIS are
typically structured on either: (1) job-order costing; or (2) process-order costing. Both types of
costing methods have different ways of tracking costs, and the choice of method is typically based
on the types of products or services provided by a company. We will discuss both costing methods
in the following section but will focus on job-cost systems since they are more relevant to the later
discussion of cost-reimbursement government contracts.

2.2 Process-Cost Systems

Process costing is conducted when many identical units, assumed to cost the same, are being
produced. This costing method is therefore best suited to those situations where a product is
manufactured continuously, such as fastenings, paint, and sheet metal. In these instances, there is
a continuous flow of raw materials through various processing departments, and the finished
output is relatively homogenous. Because the final products are not typically discrete jobs or units
but rather are equivalent units of production, there is no need to track information at an individual
product level. Therefore, instead of capturing costs for individual jobs, costs are captured for each
process or department. Process costing typically accumulates costs at an aggregate level to achieve
a total cost of production and then allocates that cost proportionately to the total output at the end
of an accounting period. Most accounting principles and activities involving cost transfers are the
same for both process-cost systems and job-cost systems.

2.3 Job-Cost Systems

Job-cost systems, or job-order accounting systems, are more likely to be utilized in specific
situations, such as when a customer has contractually agreed to reimburse a company for all costs
charged to a specific job. Job-order systems are also “ideal for situations where goods and
services are produced based on a specific order, to customer specifications, or in unique
batches.”[12], Chapter 19 Job costing is critical in instances where different types of production, labor,
materials, and overhead are being applied to different projects. For example, businesses like
landscapers, construction companies, printing companies, and automobile repair shops are more
likely to use job-order costing systems.[13] The “job-shop” nature of the production process
necessitates a system that will provide information on the costs of individual jobs. Although job
costing is typically used in manufacturing settings where tangible products are produced, it is also
relevant for service, not-for-profit, and governmental environments. “Jobs” may be more abstract,
(e.g., number of fire call responses), and direct inputs may become less significant relative to
overhead costs. For example, a costly hospital visit bill received by a customer reflects much more
than the direct cost of items consumed (e.g., a pill) but also reflects heavy administration,
documentation, and billing overhead costs.

Job costing accumulates costs for individual units or small productions batches; this is especially
helpful for custom-made machines or projects involving services with specific labor. Job costing
accumulates the costs of individual jobs related to three sources: direct materials, direct labor, and
overhead (which includes indirect materials, indirect labor, among others). All three categories of
costs represent cost drivers, which are factors that are viewed as causing costs to be incurred within
an organization (e.g., labor hours, machine hours). Job-cost systems assign those costs (direct
materials, direct labor, and manufacturing overhead costs) to each activity or job independently.
Overhead costs are typically assigned to different cost pools and then allocated to various open jobs at the end of the accounting period.

Job-cost systems must be designed to track a variety of costs or be integrated with other systems that can do so. Direct material costs are tracked on a materials requisition form showing what materials are put into production on various jobs. Direct labor costs are tracked on a report documenting time spent on each job and other tasks (e.g., timesheet). Manufacturing overhead costs, or indirect product manufacturing costs include items like depreciation, repairs, maintenance, heating, lighting, vehicle expenses, liability and workman’s compensation insurance, continuing education, small tools and equipment expenses. It is generally difficult to track their specific usage for each job or to assign them to individual output items. Therefore, these costs are usually allocated using a predetermined application rate which is then reviewed for accuracy at the end of the accounting period. Because overhead is usually first applied to jobs based on an estimated rate, adjustments to cost-of-goods-sold account are often made at the end of each reporting period based on actual overhead costs. The purpose of job-cost systems is to ascertain the total dollar value of all jobs and amount of costs attributable to each job, if only for billing and collection.

2.4 Recurring vs. Nonrecurring Costs

In the commercial world, the recurring costs are typically defined as costs that are incurred at regular intervals by a company and are anticipated, not just once or even multiple times at irregular intervals. Some examples of recurring costs for companies include rent and/or mortgage payments, utilities, communications bills, salary, and in many instances, software subscriptions. Multiple recurring costs can exist for a single asset as well. For example, in the instance of vehicles, some recurring costs likely include license and registration costs, subscription costs for on-vehicle equipment, insurance, fuel, and preventative maintenance. These types of costs can be further divided into subcategories according to a company’s business needs; for example, between those related to general expenses and administrative expenses. However, the distinguishing feature of most recurring expenses is that they cannot easily be attributed to a specific job or product line of the business; a new roof covers all operations within a building and cannot easily be linked to any single project being conducted in that building. Non-recurring costs are those costs that are incurred at irregular intervals and are not generally anticipated. For example, restructuring charges inclusive of severance pay and factory closings are non-recurring costs.

This commercial view of recurring costs as a function or periodicity stands in contrast to the common usage of recurring and nonrecurring costs in the context of defense contracting. FAR 17.103 defines recurring costs to be “costs that vary with the quantity being produced, such as labor and materials.” The Data Item Description for the Contractor Cost Data Report provides a similar definition of recurring costs: “Repetitive elements of development, investment, and sustainment costs that may vary with the quantity being produced or maintained, irrespective of system life cycle phase and appropriation.” Similarly, Defense Acquisition University’s glossary of terms defines recurring costs as “Costs for items and services that reoccur, especially at regular intervals. Recurring costs are incurred each time a unit of equipment is produced, such as direct labor and direct materials.” This includes activities like fabrication, assembly, procurement of raw materials, and so forth. By contrast, nonrecurring costs do not vary with the quantity being produced. This includes product design activities, tooling, testing, data, and so forth.
While commercial and government usage of the term recurring and nonrecurring overlap to the extent that quantity production often implies the periodicity of costs, there are important distinctions. In defense contracting, it is often direct costs are accumulated according to recurring and nonrecurring. The concept does not often apply to indirect costs which are allocated to contracts based on direct costs. While in commercial sector, both direct costs and indirect costs could be subject to the recurring and nonrecurring costs classification. The distinction between direct costs and indirect costs is also fluid and determined by the choice of cost object. For example, salaries for product engineering may be a recurring cost from the perspective of a commercial contractor because it is anticipated and occurs every pay period. From a defense contracting standpoint, product engineering salaries are nonrecurring because once they develop the product specifications, the costs will no longer be incurred when the program enters full-rate production. Similarly, employee health insurance cost is a recurring expense for commercial companies, while these costs are neither recurring or nonrecurring in the defense context. Health insurance costs, like other fringe costs, are allocated to labor and it is the activities performed by the labor which determines whether it is recurring or nonrecurring.

The reason the Department of Defense uses its unique terminology is because it often funds Engineering and Manufacturing Development efforts. Government officials want to know how much of the costs will persist to support cost analyses of the follow-on production efforts for budgeting and contract pricing. In most commercial purchases, nonrecurring engineering is not paid for directly by the customer but rather amortized across the production run.

### 3.0 Commercial Accounting Systems and Practices

This section focuses on what guides accounting practices in the commercial sector and how company public/private status, size, and industry likely play a role in determining what practices and systems are utilized. First, the potential use of cost data will be reviewed as it relates to internal
operations and external reporting. The impact of Generally Accepted Accounting Principles (GAAP) on company financial reporting will then be discussed. Next, an example of how companies calculate Cost of Goods Sold and report the cost of inventory will be presented. Finally, specific questions regarding when certain accounting practices are more likely to occur (e.g., when a job order accounting system is employed and at what level costs are typically tracked) will be detailed. This section provides insight into what might be considered baseline practices for commercial accounting and the use of cost data in commercial company activity.

3.1 Internal and External Use of Cost Data

Cost accounting information helps to determining total product costs, which in turn enables the preparation of financial and other reports needed to run a business. Financial statements like a balance sheet, income statement, statement of cash flows, and retained earnings statement are often required for investors and creditors to assess the financial health of a business. In addition to being relevant for external reporting, the same data that inform company-wide financial statements are also useful for internal reasons.[18]

Information gleaned from a cost accounting system helps inform managerial decision-making involving ongoing operations, planning, and control. Unit cost data provide insight into the business consequences of different pricing strategies. It can help identify performance issues requiring managerial attention. Accurate costing also helps to determine levels of competitive pricing to be included in bids and proposals for additional contracts. Historical costs often serve as the basis for future projections of firm performance and budget preparation. They are also useful for establishing production and acquisition objectives within a strategic plan.

Knowledge of the cost of production also helps assign responsibilities appropriately to each unit of activity within the business (e.g., each cost center). For example, line managers in a manufacturing context may only be accountable for the costs within their direct control, namely those involving quantity of materials used and number of labor hours worked by their immediate staff. In contrast, other business units would likely be responsible for the cost of raw materials (purchasing department), wages (human resources department), and machinery depreciation (accounting department).

3.2 Generally Accepted Accounting Principles (GAAP)

The GAAP are a commonly recognized set of principles, rules, and procedures meant to govern corporate accounting and financial reporting for U.S. publicly traded companies.[19] The principles are developed and jointly updated every year by the Financial Accounting Standards Board (FASB), responsible for standards for public and private companies and not-for-profit organizations, and the Governmental Accounting Standards Board (GASB), responsible for standards for state and local governments. The rules originated after the Great Depression and were initially promulgated by predecessors of the FASB and GASB. The Financial Accounting Foundation (FAF), established in 1972, is currently the private-sector, not-for-profit organization responsible for overseeing the operations of the FASB and the GASB. In 2009, the Accounting Standards Codification (ASC) organized thousands of previously issued GAAP rules, making it the only source of authoritative U.S. generally accepted accounting principles recognized by the FASB, with regular updates in the form of Accounting Standards Updates.[20] Recently the
Securities and Exchange Commission (SEC) reaffirmed that the FASB is the designated private-sector standard setter.[21]

The purpose of GAAP are to ensure consistent and accurate financial reporting by companies with publicly traded stocks so that investors are furnished with the information necessary to make investment decisions. GAAP include guidance on what items should be recognized in financial statements (e.g., assets, liabilities, revenues, and expenses), what amounts of those items should be included, how those items should be aggregated and presented, and what additional information should be disclosed for users of those financial statements.[22] For example, GAAP require the precise matching of expenses with revenues for the same accounting period. They also require that underapplied overhead relating to idle facilities, wasted material, the allocation of fixed production overhead, and so forth, be charged to Cost of Goods Sold (COGS) in the current period. Standards such as these ensure that accounting information is recorded and reported consistently so that investors and the public can compare the financial statements of companies and be assured of their veracity.

U.S. securities law requires publicly-traded companies to follow GAAP principles and procedures, although private companies may adhere to its precepts as well for both economic and non-economic reasons. As noted in the previous section, all commercial businesses, regardless of size or public/private designation, have similar functional needs for an accounting system and accompanying set of standard rules. A company’s accounting system should support managerial decision-making, provide internal controls, and allow for adequate reporting to external authorities. It can also provide cost information that may be useful for establishing product or service pricing and for establishing appropriate levels of profit to ensure continued survival. This is the manifestation of the assumption that economic self-interest is the sole driver of accounting-related decisions, dubbed Positive Accounting Theory (PAT).[23] According to the originators of PAT, “the only accounting theory that will provide a set of predictions that are consistent with observed phenomena is one based on self-interest.”[24, pp. 300–301] This view takes as granted that organizations are constrained by their external environment, especially by other entities on whom they depend for resources. Thus, companies have very real incentives to establish a working accounting system, both for internal control reasons and to meet external requirements for obtaining resources.

Non-economic factors such as organizational values, politics, and institutional norms can also play an important part in explaining a relatively high level of homogeneity in accounting systems and accounting practices throughout the commercial sector.[25] There is institutional pressure that encourages conformity when requirements or standards are promulgated by professional external organizations like the FASB. Mimetic pressure,[26] the pressure for companies to adopt prevailing best practices, is especially strong as they relate to accounting standards.[25],[27] Private companies may also accrue other non-economic benefits from complying with GAAP even though only publicly traded ones are required to do so. For instance, GAAP compliance is a signal to potential investors that the company is legitimate and has credible operational infrastructure. Several empirical studies have found support for considering institutional pressures in addition to PAT to provide a more complete explanation for observed accounting and auditing practices.[27]-[29]
When considering non-economic rationale, it is also important to note that even if GAAP are adopted for external financial reporting purposes, it is possible that GAAP information is not used in making financial management decisions (e.g., budgetary decisions).\textsuperscript{[25]} It may be a bit of a myth that GAAP improve financial management practices; instead, it may be more of a symbol of legitimacy meant to signal sound fiscal management practices and rational decision-making even if it does not lead to greater, actual efficiency.\textsuperscript{[25]} For example, GAAP adoption is often sold as a means of improving a company’s credit rating.\textsuperscript{[11]} and corporate executives often lobby Congress for changes to standards that will merely allow them to present a picture of more favorable revenue and earnings performance.\textsuperscript{[30]} However, despite numerous sensitive and controversial pronouncements over the years, GAAP have largely embodied the desire for transparent and ethical financial reporting.

3.3 Cost of Goods Sold and Cost of Inventory

Commercial firms accumulate and track cost data in some organized way by means of an accounting system. First, firms accumulate in various categories the costs of different types of materials, different classifications of labor, the costs incurred for supervision, and so on. Next, the accumulated costs are assigned to designated cost objects, such as the different models of a product. Then, firms trace direct costs, which include direct materials and direct labor, to different cost objects, as well as allocating indirect costs to cost objects following some allocation method. For example, a simple method is to use a unit-level measure as cost-allocation base or a refined method using multi-level activities as cost-allocation bases.

Depending on their business sectors, commercial firms may have different types of inventory and thus different way of reporting the cost of inventories. Manufacturing-sector companies typically have three types of inventory: direct materials inventory, work-in-process inventory, and finished-goods inventory. Merchandise-sector companies only have merchandise inventory. Service-sector companies do not hold substantial inventories of tangible products. Depending on the process of production, inventoriable costs may include direct materials, direct labor, and manufacturing overhead costs. Inventoriable costs go through the balance sheet asset accounts of direct materials inventory, work-in-process inventory, and finished-goods inventory before entering the income statement as the expense item Cost of Goods Sold. The calculations for the total amount of COGS and inventory should be same between companies that report revenue and profits on a percentage of completion basis and those that do not, although the timing of recognition differs between percentage-of-completion basis and completed-contract basis.

3.4 Percentage of Completion Accounting Method

The Generally Accepted Accounting Principles align with government requirements for cost accounting in certain circumstances. The most relevant to this study is Percentage of Completion (PoC), an accounting method used to record revenue, expenses, and gross profit associated with long-term contracts that span for more than one accounting year. It is based on an evaluation of the percentage of work completed for a project, often on a monthly basis.\textsuperscript{[31]} Revenues and costs incurred to-date can be realized based on in-work progress rather than when the payment is due from a customer, thereby representing an exception to the GAAP realization principle. Additionally, many government contracts are governed under Internal Revenue Code section 460,
which requires the PoC method for contracts with long periods of performance or that require construction and manufacturing.\[32\]

The PoC method contrasts with the completed contract method whereby revenues and costs of a project are only recognized once the project is completed. The PoC method calculates the revenue and costs based on the portion of work completed on a project even if the final completed product has not been delivered. Large construction and engineering contracts often utilize the PoC method for revenue recognition given their tendency to span multiple tax years.\[33\] Small contractors with gross receipts under $25M for the previous three years who are completing small projects to be completed within two years are permitted to use the completed contract method. The PoC method helps companies to avoid incurring an outsized tax burden at the end of a major contract and allows for more steady and reasonably accurate income measurement over a contract period.\[33\]

Companies can use one of three methods for estimating the completion percentage of a project; two of these methods rely on input measures and one relies on output measures. The input methods are cost-to-cost method, which is based on costs incurred (expenses incurred divided by total estimated cost), and efforts-expended method, which is based on efforts expended such as labor hours or materials consumed (e.g., man hours divided by estimated total man hours). The output method is units-of-delivery method, which is based on the number of smaller batches, units, or components that have been delivered (in the case where it is possible to identify distinct deliverables in a contract).\[34\]

GAAP guidance prior to the reporting period beginning December 2018 relied on industry-specific guidance; for example, Topic 605-35 detailed the acceptable methods for revenue recognition on construction projects.\[35\] Since that time, FASB aligned its guidance across industries as well as with other rule-setting organizations (e.g., International Financial Reporting Standards Foundation) with ASC 606: Revenue from Contracts with Customers.\[36\] ASC 606 expanded the scope to all customer contracts except those contracts for which other more specific guidance is provided in the ASC (e.g., leases, insurance contracts).\[37\] ASC 606 also shifted the focus from contract value and duration to instead consider projects in light of “performance obligations” and “transfer of control.” “Performance obligation” is defined in the ASC Master Glossary as:

“A promise in a contract with a customer to transfer to the customer either: (a) a good or service (or a bundle of goods or services) that is distinct (b) a series of distinct goods or services that are substantially the same and that have the same pattern of transfer to the customer.” was cited in [38]

Contracts may have multiple performance obligations, and contractors need to identify and allocate a value to distinct performance obligations within each contract. The value is determined by the transaction price the customer expects to pay for the obligation; in other words, the probable standalone price of each distinct good or service. The contractor also needs to determine when transfer of control occurs, whether at a single point in time (presumably at contract completion) or over time. Transfer of control is when the customer has obtained control of the good or services (e.g., when the legal title has transferred from the contractor to the customer), or when the customer has begun to consume benefits from the work in progress. Transfer of control can occur over time in those instances where the customer receives and consumes benefits as the contractor performs
work, when an asset is newly created or an existing asset under the customer’s control is enhanced by the contractor, or when the contractor cannot make alternative use of the asset beyond the scope of the contract.\[39\], \[40\] If control is transferred over time, then PoC accounting remains the most appropriate accounting method. As well, the options for calculating percentage completion are similar under ASC 606 as they were under Topic 605-35, so much of the previous guidance remained practically relevant. However, it has been suggested that significant accounting systems changes, especially for small or mid-sized entities, may still be required to properly capture and track information needed to comply with ASC 606 guidance for accounting and disclosure.\[37\]

In summary, the PoC accounting method allows for revenue and costs to be recognized based on earned progress of the overall project, but only if it is reasonably certain that the entire contractual obligation will eventually be met and that payment from the customer will be received. As well, a company’s accounting system would need to be capable of estimating the total value of the performance obligations contained in a contract (including profitability) and to be able to accurately measure progress toward project completion.

The ability to measure, assign, and allocate costs resembles the functionality needed by companies that are expected to perform on government contracts with certain cost accounting requirements. In particular, the assignment of direct costs to a contract and consistent allocation of indirect costs are required for the PoC method. The government concept of segregating unallowable costs, however, is not found in GAAP. The government requirements are detailed in the Section 4.0.

### 3.5 Commercial Sector Accounting Practices

The following attempts to summarize the above literature review of cost accounting information systems, the purpose of cost data, and the impact of GAAP requirements on (mostly) publicly traded companies. This section is also informed by interviews with government and commercial sector subject matter experts conducted as part of the background research into commercial cost accounting practices.

First, there appears to be two major purposes for the implementation and use of a cost accounting information system:

1. To assist in management and internal controls, managerial decision-making, planning, establishing profitability, encouraging operational efficiencies, and other similar efforts. These are functional, business operations reasons that likely exist regardless of other considerations or factors like company size or industry.

2. To provide information that informs reporting requirements such as revenue recognition and matching for GAAP compliance, financial statements for external parties, and satisfies audits related to contractual obligations such as government cost accounting requirements.

Following from this dual purpose of cost data, several general observations can be made based on a review of literature and insights gleaned from interviews with government and commercial industry subject matter experts.
1. There are no strict requirements on private companies for how to track and assign costs. Absent any external contract monitoring mechanisms or loan covenants, companies are likely to track and assign costs only to whatever level is deemed necessary for internal control purposes, to satisfy loan covenants, or to determine profitability.

2. If a company is publicly traded or financed with loan covenants that require financial audits, this likely requires more complicated higher-level reporting to the SEC, banks, and other lenders. Public companies must follow GAAP, but GAAP mostly addresses financial reporting and does not contain strict guidance on how to track costs. It is important to note that even if GAAP is adopted for external financial reporting purposes, it is possible for GAAP information to not be used in making financial management decisions (e.g., budgetary decisions). Similarly, some private companies may follow GAAP or have controls in place if only to present a good image to external parties.

3. The larger the company, the more likely it will have more detailed costing (generally speaking) if only for management purposes. Similarly, larger companies are more likely to have complex software in place and/or track costs to a finer level for management purposes. If a company is larger, one would expect them to already have a more robust cost accounting system in place, or one that is more easily customizable to handle specific additional requirements in the future. Also, a larger company is more likely to be publicly traded and therefore require such a system to assist in financial reporting.

4. The nature of the business matters for tracking costs (e.g., services vs manufacturing, maturity of the industry). Job order systems are more often used for custom manufactured products or professional services than they are used by manufacturers of commodities or innovative technology companies. In the same vein, different business models in different industries will also influence the level of cost tracking that is performed.

5. Existing commercial cost accounting systems may or may not be sufficient for government contracting; this was a matter of dispute among the SMEs interviewed for this study. This will be discussed in greater detail in the Dual Narratives section.

In summary, the level of detail with which companies track and assign costs, how useful it is to assign costs to projects, and the use of job-costing systems is highly variable. Industry type, publicly traded status, and company size are all key factors. Some patterns can be observed; for instance, in the manufacturing sector there is an increased likelihood of using job-order accounting or an accounting system capable of drilling down to a fine level of detail on costing. However, every company likely operates differently based on their unique history, management needs, and contracting requirements. Several SMEs noted specific examples of companies that did not perform extensive cost accounting because they could determine the profitability of their services or products without detailed job order accounting. For these companies, it was not necessary to implement a highly granular accounting system in order to cost every component of a product, or to assign staff hours to specific projects, in order to adequately recognize the profitability of the overall business. This point was also reinforced by later interviews with two companies that do not have a FAR/DFARS compliant accounting system (Companies #9 and #12).
Operational functions that require an accurate assessment and allocation of costs to jobs drive the adoption of AISs among commercial companies more so than regulatory requirements. Private commercial companies are not beholden to any accounting system requirements beyond what is needed to satisfy their own functional business needs and possibly a few external stakeholders due to loan covenants. They may adopt commonly accepted accounting standards for non-economic reasons such as to promote an impression of legitimacy or in response to institutional forces like mimetic pressure. For publicly traded firms, GAAP compliance is mandatory, but the requirements are limited to those accounting issues that impact external financial reporting. The next section will detail more fully the cost accounting requirements imposed on government contractors.
4.0 Cost Accounting System Requirements

The Department of Defense expects contractors to demonstrate best practices that are supported by FAR/DFARS compliant business processes and systems in order to be awarded major contracts. DCAA performs audits made necessary by DoD contract requirements and provides additional accounting and financial advisory services to DoD departments. DCAA is responsible for accounting system reviews involving pre-award activities such as accounting system surveys, price proposal audits, and forward pricing rate audits as well as post-award services such as incurred cost audits and Cost Accounting Standards compliance and adequacy reviews. The timing of DCAA audits is guided largely by the type of contract that will be awarded. Most audits involving firm-fixed price contracts take place during the proposal stage, whereas audits of flexibly priced contracts such as cost-reimbursable and time-and-materials/labor-hour contracts are generally audited after those costs are incurred.

A FAR/DFARS compliant accounting system is common vernacular for describing an accounting system and associated set of policies and procedures that would be deemed compliant with federal requirements following a DCAA audit. The specific attributes of an accounting system that would be deemed adequate or acceptable (per the specific requirement) are outlined in a variety of government statutes and referenced in the DCAA audit manual. The primary concern behind the existence of many of these regulations is with how costs are classified, segregated, allocated, and reported by government contractors.

Generally, compliance means that the accounting system is capable of tracking different types of costs separately and that all accounting-related policies and procedures are documented and strictly followed. For example, a compliant accounting system would need to be able to identify and report on allowable costs, unallowable costs, direct costs, indirect costs, pooling of indirect costs, procurement costs, billing costs, and labor costs. Criteria for accumulating indirect costs into homogenous pools need to be identified, as well as a logical and consistent rationale for how indirect costs pools are allocated to cost objectives. An internal control system or auditing process needs to be in place, and written statements or flow diagrams including descriptions of the personnel involved need to accompany the system.

The following section begins with a brief review of the primary federal regulations related to accounting system requirements. This consists of a description of what the requirement means for a contractor’s accounting operations, the circumstances when the requirement applies, and when a contractor is exempt from the requirement. The final part of this section will depict how the accounting requirements compare to one another. The regulations to be reviewed include the following:

- Standard Form 1408 – Preaward Survey of Prospective Contractor
- 48 C.F.R. §252.242-7006 – Accounting System Administration
- Federal Acquisition Regulation (FAR) 31 – Contract Cost Principles and Procedures

4.1 Standard Form 1408: Preaward Survey of Prospective Contractor

Standard Form (SF) 1408 is a checklist used by cognizant administrative contracting officers and DCAA auditors to assess the adequacy of a prospective contractor’s accounting system prior to
contract award.\textsuperscript{[5]} It is a part of a broader preaward survey process initiated by FAR 9.106 that evaluates a prospective contractor’s ability to perform based on considerations of technical, production, and financial capability. SF 1408 also meets the requirements of 44 U.S.C 3507.

Fourteen attributes of an adequate accounting system are listed in the checklist; for example, “Segregation of preproduction costs from production costs” and “Identification and accumulation of direct costs by contract.” In cases where a prospective contractor does not yet have a FAR/DFARS compliant accounting system in place, an operable accounting system must be developed and be ready to be implemented prior to the contractor incurring any costs on a prescribed government contract. A contractor will submit the completed SF 1408 checklist along with its proposal to be eligible for award. See Appendix \textsuperscript{5} for a copy of the SF 1408 checklist.

As described in FAR 9.106, a preaward survey is “normally required only when the information on hand or readily available to the contracting officer, including information from commercial sources, is not sufficient to make a determination regarding responsibility.” The only restrictions on a contracting officer’s ability to request a preaward survey are contracts anticipated to be below the simplified acquisition threshold or contracts that involve the acquisition of commercial items. All other contract situations may trigger the preaward survey if the contracting officer is unable to make a responsibility determination.

The SF 1408 preaward survey request is almost always triggered by a cost-reimbursable contract. FAR 16.301-3(a)(3) states that a cost-reimbursement may only be used when the “contractor’s accounting system is adequate for determining costs applicable to the contract or order.” Other factors that may trigger the SF 1408 preaward survey including situations described in the FAR that require an “adequate accounting system.” These include progress payments (FAR 32.503-3(a)(2)), price redetermination (FAR 16.205-3(b), FAR 16.206-3(b)), and certain fixed price incentive contracts (FAR 16.403-1(c)(1), FAR 16.403-2(c), FAR 16.402-1). Time & Materials contracts are also likely to require an SF 1408 preaward survey because reimbursement is made on actual labor hours and material costs (FAR 16.601(b)).

<table>
<thead>
<tr>
<th>Required:</th>
<th>Optional:</th>
<th>Exemptions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAR 16.301-3(a)(3)</td>
<td>FAR 9.106</td>
<td>FAR 9.106-1(a)</td>
</tr>
<tr>
<td>Cost-reimbursable contracts</td>
<td>At contracting officer's discretion</td>
<td>Below Simplified Acquisition Threshold Commercial Items</td>
</tr>
</tbody>
</table>

\textbf{Applicability – SF-1408 Preaward Survey of Prospective Contractor-Accounting System}
4.2 48 C.F.R. §252.242-7006: Accounting System Administration

The Defense Federal Acquisition Regulation Supplement (DFARS) is a set of regulations that implement and supplement the FAR within the context of DoD contracts. They are codified in Chapter 2 in Title 48, Code of Federal Regulations. According to the Federal Register,[43] the DFARS contain requirements of law, DoD-wide policies, delegations of FAR authorities, deviations from FAR requirements, and significant policies/procedures.

In 2012, DoD amended the contract clause contained in 48 C.F.R. §252.242-7006 to define an acceptable accounting system and to provide the 18 criteria for acceptability (See Appendix 6 for the list of criteria). DFARS 252.242-7006(a)(2) defines an accounting system in part as a “Contractor's system or systems for accounting methods, procedures, and controls established to gather, record, classify, analyze, summarize, interpret, and present accurate and timely financial data for reporting in compliance with applicable laws, regulations, and management decisions.” This clause also alludes to possible subsystems of an accounting system built to handle specific areas such as indirect and other direct costs, compensation, billing, labor, and general information technology. It defines an “acceptable” accounting system as one that complies with a variety of general criteria such as “proper segregation of direct costs from indirect costs” so that there is reasonable assurance that cost data are reliable, the risk of allocations and mischarges are minimized, and the contract allocation and charges are consistent with billing procedures.[44]

DCMA or the Cognizant Federal Agency is responsible for approving or disapproving contractor business systems, including the accounting system. DCAA conducts the accounting system review in accordance with the DFARS clause and issues a report to the Administrative Contracting Officer.[45] According to DCAA audit guidance, accounting system reviews are a part of broader contractor business audits that are to be performed every three years unless an earlier review is warranted due to significant changes in the contractor’s accounting system or if significant deficiencies or material weaknesses are identified by real-time audits.[44] Many of the requirements in DFARS 252.242-7006 overlap with the SF 1408 preaward survey, although more extensive compliance is required to be declared acceptable and free of significant deficiencies as the result of a system review.[46] For instance, an audit typically includes contractor system demonstrations and walk-throughs by the applicable contractor personnel, and the accounting system needs to handle additional processes like requiring approval and documentation of adjusted entries, management reviews and internal audits of compliance, and reconciliation of subsidiary cost ledgers to the general ledger.

Applicability – DFARS 252.242-7006 Accounting System Administration

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**Required:**

DFARS 242.7503
- Cost-reimbursable
- Time & Materials
- Labor-hour
- Progress payments
- Incentive contract

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4.3 **Federal Acquisition Regulation Part 31**

The FAR is the principle set of rules that executive branch agencies of the U.S. federal government use when purchasing goods and services. FAR Part 31 is the section that details which costs incurred by a contractor are reimbursable by the government and how these costs should be accounted for while executing a government contract.

According to FAR 31.201-2, a cost is considered allowable (i.e., reimbursable) when it is deemed reasonable (i.e., prudent for business), allocable (i.e., relevant to the job), meets the terms of the contract, and complies with GAAP rules that are appropriate to the circumstances or, if applicable, meets CAS standards. The bulk of FAR 31 consists of a list of costs that are expressly unallowable for government contracts, such as entertainment, lobbying, fines/penalties, and advertising (see Appendix 3). The concept of unallowable costs is a unique one to government contracting and is typically not a concern in the conduct of commercial practice. FAR 31 requires that a commercial company’s accounting system be able to distinguish between allowable and unallowable expenses in order to charge them (or not) in appropriate circumstances. Therefore, FAR Part 31 is important to a contractor for two reasons; inappropriately charging costs that are unallowable may result in penalties for the contractor, and failing to report possibly reimbursable costs may reduce a contractor’s profit margin. In addition to defining unallowable costs, FAR 31 also defines many terms related to direct and indirect costs used in the SF 1408 preaward survey and DFARS 252.242-7006 accounting system administration.

FAR Part 31 is applicable in the cases of fixed-price contracts, subcontracts, and modifications to contracts and subcontracts whenever cost analysis is performed, or when a fixed-price contract clause is included that requires the determination or negotiation of costs (FAR 31.102). It is also applicable in cases of cost-reimbursable contracts and subcontracts, and most cost-reimbursable sections of time-and-materials contracts (FAR 31.103). Additionally, FAR 31 is used to determine reimbursable costs under a few scenarios such as negotiating indirect cost rates, determining pricing under terminated contracts, revising pricing on fixed-price incentive contracts, setting price redeterminations, and setting other pricing changes (FAR 31.103).

It is worth noting that there is some overlap between the concept of “unallowable” costs and “nondeductible” costs, the latter of which is utilized by the Internal Revenue Service (IRS) to identify expenses that cannot be subtracted from a company’s income before it is subjected to taxation. This can be seen by cross-referencing FAR31.205: Unallowable Selected Costs with IRS Publication 535: Business Expenses. Several items can be identified that are both unallowable and nondeductible: taxes, capital expenses, fines, entertainment, lobbying and political activity. At least one item is both allowable and deductible: memberships in professional or trade organizations. At least one item is deductible but unallowable: business advertisement. The focus of this report will remain on “unallowable” costs as they exist in FAR Part 31.

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**Applicability – FAR 31**

**Required:**
FAR 31.102/31.103
- Cost-reimbursable
- Time & Materials
- Labor-hour
- Fixed price (where cost analysis or cost determination is required)
4.4 Cost Accounting Standards

The CAS are designed to ensure that contractors measure, assign, and allocate costs consistently over the life of a government contract.\[52] The CAS are codified in Chapter 99 of Title 48 while FAR 30.201-4 requires the appropriate clauses (FAR 52.230) to be included in a government contract. The existing 19 standards were issued by the Cost Accounting Standards Board (CASB) between 1972-1980 and are legally binding on all executive agencies, their contractors, and their subcontractors. CASB is located in the Office of Federal Procurement Policy (OFPP) under the Office of Management and Budget (OMB). CASB was established as an agency of Congress in accordance with a provision of Public Law 91-379.\[5\] The standards cover a variety of areas involving cost accounting, such as calculating estimated costs, pension contributions, depreciation, personal compensation, setting indirect costs, and ensuring costs are not double-counted. CAS has been described in our SME interviews as a stricter set of rules compared with and GAAP and other government requirements.\[49], \[50] See Appendix 1 for a more complete description of each CAS requirement and its purpose.

Negotiated contracts are one of the primary targets of CAS. A negotiated contract is considered any contract that is awarded through an acquisition process other than sealed bidding procedures (FAR 14.101(d), FAR 15). A negotiated contract is subject to full, modified, or other types of CAS coverage unless it is deemed exempt for one of the reasons listed in 48 C.F.R. 9903.201-1(a) (see Table 1). There are several additional categories of contracts and subcontracts that are exempt from some or all CAS requirements (contained in 48 C.F.R. 9903.201-1(b)). Exemptions can be based on the contractor (e.g., small businesses, nontraditional contractors) and the contract itself (e.g., sealed bids, fixed price contracts based on adequate price competition).

There are two levels of potential compliance—full CAS coverage and modified CAS coverage—that are primarily triggered by the dollar value of the contract.

*Modified CAS compliance:*

Contractors subject to modified CAS compliance are required to adhere to only four of the 19 CAS, specifically 401, 402, 405, and 406 (FAR 30.201-4 Contract clauses requires the insertion of relevant contract clauses, in this case one contained in FAR 52.230-3: Disclosure and Consistency of Cost Accounting Practices). In general, modified CAS coverage does not commence until a single contract of $7.5 million (the “trigger” contract) is received by a contractor’s business unit. Thereafter, modified CAS coverage applies to any single covered contract valued between $7.5 million and $50 million, as well as any other prospective non-exempt contract valued over the threshold for certified cost or pricing data.\[53] Modified CAS-coverage is in place until the combined value of CAS-covered contracts received by the business unit exceeds $50 million, at which point full CAS coverage activates.

*Full CAS coverage:*

Contractors subject to full CAS coverage are required to adhere to all 19 Cost Accounting Standards, to disclose their cost accounting practices, and to follow those practices consistently throughout the life of the CAS-covered contract(s).\[5\] Full CAS coverage applies to a contractor business segment or unit that has received a single CAS-covered contract award of $50 million or more, or that has received $50 million or more in net CAS-covered awards during its preceding cost accounting period. Contractors are required to submit a disclosure statement using Form
CASB DS-1, “Cost Accounting Standards Board Disclosure Statement Required by Public Law 100-679” or, for educational institutions, Form CASB DS-2, “Cost Accounting Standards Board Disclosure Statement Required by Public Law 100-679 Educational Institutions.” The disclosure statement details the contractor’s methods or techniques for measuring, assigning, and allocating costs, and its adequacy is judged first by the cognizant administrative contracting officer and then reviewed by DCAA.

The full set of rules for determining the applicable type of CAS coverage are contained in 48 C.F.R. 9903.201-2, represented graphically in a flowchart issued by the DCAA (see Appendix 2).

**Table 1: CAS Exemptions**

<table>
<thead>
<tr>
<th>Exemption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sealed bid contracts</td>
</tr>
<tr>
<td>2. Negotiated contracts and subcontracts (including interdivisional work orders) less than the Truth in Negotiations Act (TINA) threshold, as adjusted for inflation (41 U.S.C. 1908 and 41 U.S.C. 1502(b)(1)(B))</td>
</tr>
<tr>
<td>3. Contracts and subcontracts with small businesses</td>
</tr>
<tr>
<td>4. Contracts and subcontracts with foreign governments or their agents or instrumentalities or, insofar as the requirements of CAS other than 9904.401 and 9904.402 are concerned, any contract or subcontract awarded to a foreign concern</td>
</tr>
<tr>
<td>5. Contracts and subcontracts in which the price is set by law or regulation</td>
</tr>
<tr>
<td>6. Contracts and subcontracts authorized in 48 C.F.R. 12.207 for the acquisition of commercial items</td>
</tr>
<tr>
<td>7. Contracts or subcontracts of less than $7.5 million, provided that, at the time of award, the business unit of the contractor or subcontractor is not currently performing any CAS-covered contracts or subcontracts valued at $7.5 million or greater</td>
</tr>
<tr>
<td>8. Subcontractors under the NATO PHM Ship program to be performed outside the United States by a foreign concern</td>
</tr>
<tr>
<td>9. Firm-fixed-price contracts or subcontracts awarded on the basis of adequate price competition without submission of certified cost or pricing data</td>
</tr>
<tr>
<td>10. In cases where the prime contract is exempt from CAS under any of the exemptions at 9903.201-1 any subcontract under that prime is always exempt from CAS.</td>
</tr>
</tbody>
</table>

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1 The first covered contract over $7.5 million initiates modified CAS coverage, while $50 million or more total CAS-covered contracts initiates full CAS.
4.5 Comparison of Accounting System Requirements

The following table (Table 2) shows the areas where an accounting system requirement is either similar to another requirement or is directly referenced in another set of requirements. For example, FAR 31 is directly referenced in the system criteria subsection of DFARS 252.242-7006(c)(12) where the latter states that a contractor’s accounting system must be capable of excluding “from costs charged to Government contracts of amounts which are not allowable in terms of Federal Acquisition Regulation (FAR) part 31.” Besides direction references to other requirements, other instances of overlap may represent references to definitions or required clauses. The table was constructed by first pulling the language for each of set of requirements discussed above. Then the research team used their expert judgment to categorize all components of the sets of requirements and decide where overlaps existed. In cases of near-duplication of a contractor system requirement, only one instance using the version with the simplest language is listed. This table is best understood from the perspective of a contractor required to implement an accounting system.
## Table 2: Comparison of Accounting System Requirements

<table>
<thead>
<tr>
<th>Category</th>
<th>Contractor System Requirements</th>
<th>SF 1408</th>
<th>DFARS</th>
<th>Modified CAS</th>
<th>Full CAS</th>
<th>FAR 31</th>
<th>GAAP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unallowable</strong></td>
<td>Accounting for unallowable costs</td>
<td>2h</td>
<td>12</td>
<td>405</td>
<td>405</td>
<td>31.201-2, 31.201-6, 31.205</td>
<td></td>
</tr>
<tr>
<td><strong>Consistency</strong></td>
<td>Consent in allocating costs incurred for the same purpose</td>
<td>4</td>
<td>17</td>
<td>402</td>
<td>402</td>
<td>31.201-1</td>
<td>FASB Concept Statement 2, APB 4, APB 20</td>
</tr>
<tr>
<td><strong>Cost &amp; Price</strong></td>
<td>Adequate, reliable data for use in pricing follow-on acquisitions</td>
<td>3.b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Billing</strong></td>
<td>Billings reconciled to the cost accounts and comply with contract terms</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clauses</strong></td>
<td>Cost accounting information, as required by contract clauses concerning limitations of cost (FAR 52.232-20), limitation of funds (FAR 52.232-22)</td>
<td>3.a</td>
<td>15.i</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost accounting information, as required by contract clauses concerning allowable cost and payment (FAR 52.215-7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15.i</td>
<td></td>
</tr>
<tr>
<td><strong>Policies &amp; Process</strong></td>
<td>A sound internal control environment, accounting framework, and org. structure</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>Principle of Permanence of Methods</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approval and documentation of adjusting entries</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Management reviews or internal audits of the system to ensure compliance with the Contractor's established policies, procedures, and accounting practices</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Period</strong></td>
<td>Fiscal Year</td>
<td>406</td>
<td>406</td>
<td>31.203(g)</td>
<td></td>
<td>Principle of Periodicity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monthly</td>
<td>2.g</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Direct vs. indirect</strong></td>
<td>Logical and consistent method for allocating indirect costs to the intermediate and final cost objectives</td>
<td>2.e</td>
<td>4</td>
<td>418</td>
<td>418</td>
<td>31.201-4, 31.203(a)</td>
<td></td>
</tr>
<tr>
<td><strong>Allocation</strong></td>
<td>Readily calculate indirect cost rates from the books of accounts</td>
<td>15.i</td>
<td></td>
<td></td>
<td></td>
<td>31.203(b-2)</td>
<td></td>
</tr>
<tr>
<td><strong>Segregation</strong></td>
<td>Proper segregation of direct costs from indirect costs</td>
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<td><strong>Contract</strong></td>
<td>Identification and accumulation of direct costs by contract</td>
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<td><strong>CLIN/Unit</strong></td>
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<td><strong>Labor</strong></td>
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<td>A labor distribution system that charges direct and indirect labor to the appropriate cost objectives</td>
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<td><strong>GAAP</strong></td>
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<td>Entire GAAP</td>
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<td>Is the accounting system in full operation?</td>
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## Table 2: Comparison of Accounting System Requirements, cont’d

<table>
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<td>Deferred Comp</td>
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<td>Adjustment and Allocation of Pension Cost</td>
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<td>Allocation</td>
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<td>Credits</td>
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Note 1: 31.205.11; 31.109(a); 31.201-8(c); 31.203(b); 31.203(c); 31.205-11(a); 31.205-11(g)(2); 31.205-11(h); 31.205-16(a); 31.205-16(c); 31.205-16(e)(2); 31.205-16(f)(2); 31.205-16(g); 31.205-16(g)(2); see 31.205-19. 31.205-52; 31.205-52(b); Subparts 31.2, 31.3, 31.6, and 31.7.

Note 2: ASC 330-10-05-2; ASC 330-10-05-3; ASC 330-10-30-1; ASC 330-10-30-2; ASC 330-10-30-12; ASC 330-10-30-14; ASC 330-10-30-15; ASC 330-10-30-3; ASC 340-30-25-7; ASC 608-10-05-3; ASC 608-10-05-4; ASC 360 Property, Plant and Equipment, GAAP Master Glossary Definition – Inventory

Note 3: ASC 105-10-70-2; ASC 105-10-20; ASC 110-10-05; ASC 110-10-15-5; ASC 110-10-15-4; ASC 110-10-15-6; ASC 110-10-15-3; ASC 110-10-15-2; ASC 805-10-05-1; ASC 805-10-05-2; ASC 805-10-05-3; ASC 805-10-05-4; ASC 805-10-05-5; ASC 805-10-05-6; ASC 840-10-20-30-1; ASC 840-10-30-1; FASB Statements on Accounting Concepts No. 6: FASB Statements on Accounting Concepts No. 6

Note 4: ASC 330-10-20; ASC 330-10-45-1; ASC 330-10-45-2(b); ASC 330-10-45-7 through 45-20; ASC 330-10-45-5; ASC 350-10-35-1 through 35-5; ASC 360-10-35-3; ASC 360-10-35-4; ASC 360-10-35-5; ASC 360-10-35-7; ASC 360-10-35-8; ASC 360-10-35-21; ASC 360-10-35-22; ASC 360-10-35-30; ASC 360-10-35-31 through 35-32; ASC 360-10-35-33; ASC 360-10-35-38; ASC 360-10-40-1; ASC 805-10-25-1; ASC 835-20-25-5.
5.0 Contract Scenarios

The government uses several contract types to provide flexibility in procuring a large variety of goods and services.[54] These contract types are tailored to the specific needs of the procurement involved in order to lower cost, speed up delivery, and lower risk. To address the accounting requirement placed on contractors, a brief outline of the contract types and their intended use is required to show the impact it has on the respective accounting system requirements.

FAR 16.102(a) states that “Selecting the contract type is generally a matter for negotiation and requires the exercise of sound judgment… The objective is to negotiate a contract type and price (or estimated cost and fee) that will result in reasonable contractor risk and provide the contractor with the greatest incentive for efficient and economical performance.”

Although there are several types of contracts, and hybrid contracts that can be constructed as needed, there are two main contract types; cost-reimbursed and fixed price contracts. Lesser used contract types include incentive contracts, time-and-materials, labor-hour, and letter contracts. Outside of the FAR the government has additional Other Transactional Authority (OTA). The discussion of OTA contracts is outside the scope of this research project. This section provides a more complete discussion on each of the following contract types:

CONTRACT TYPES TO BE ADDRESSED

| Fixed Price Commercial Items |
| Fixed Price Non-Commercial Items |
| Fixed Price with No Financing |
| Contract Financing |
| Performance Based Payments |
| Progress Payments |
| Other Fixed Price Contracts |
| Economic Price adjustment |
| Prospective and Retroactive Pricing |
| Fixed Price Level of Effort |
| Undefinitized Contract Action |
| Incentive Contracts |
| Incentive Contracts (Firm Target) |
| Incentive Contract (Successive Target) |
| Other Incentive Contracts |
| Cost Reimbursement |
| Time & Material and Labor-Hour |

In order to explain and cite the government and DoD accounting system requirements imposed on commercial companies doing business with the government, a wide spectrum of accounting
requirements associated with different possible contract types and circumstances must be discussed. On one side of the spectrum is Firm Fixed Price (FFP) contracts referenced in FAR 16.202-2 where there are few accounting system requirements and only under specific circumstances. On the other side of the spectrum are cost-reimbursement contracts referenced in FAR 16.3 which often requires the contractor to have an accounting system that tracks details according to government unique standards.

In this section, each of the contract types and subtypes are analyzed to determine the specified accounting system requirements placed on contractors bidding on, or performing contracts for, the government and DoD in particular. After a description of the purpose and use of each contract type the accounting system requirements is cited along with regulatory references. The preceding definition of an “approved” accounting system associated with DFARS 252.242-7006 will be applied to each of the contract types and subtypes.

### 5.1 Fixed Price Commercial

The Federal Acquisition Streamlining Act (FASA) of 1994 significantly improved the business-to-government contract environment by establishing acquisition procedures for commercial items. Prior to this, many commercial contractors refrained from selling goods and services to the federal government based on the significant additional costs and risks associated with the government-
unique specifications, auditing requirements, and other terms and conditions. In 1995 the FAR council implemented FASA by revising FAR Part 12 to contain policies and procedures applicable only to commercial times.

The use of commercial items allows the government, in some cases, to reap the benefit of lower prices due to competitive markets, economies of scale due to shared capital, and lowers the risk of managing parts obsolescence. The government also benefits by reducing the administrative burden needed to conduct an accounting review or to validate fair pricing under TINA. There is, however, a downside; purchasing commercial items means the vendor controls the item and the government has little say as to the performance or functionality of the commercial item outside what the contract stipulates. Over the past few decades, the government has been incentivized to purchase commercial items and Commercial Off the Shelf (COTS) products. Thus, there has been a steady increase in the desire to purchase commercial items.

For contractors, Government contracting for commercial items present positives. A substantial benefit of contracting for commercial items is it allows access to the federal marketplace to companies that would not otherwise be able to participate in procurement processes. Contractors also have a potentially larger customer base, thus increasing competition and driving down cost. They can use these larger volumes, pooling government and commercial customers, to negotiate better pricing with their suppliers. They also benefit in the contract itself through less onerous clauses, reduced compliance risk, and they have access to a greater number of goods and services to sell to the government. In discussion with SMEs on this topic it appears there is a consensus that selling commercial items is a significant benefit to the contractors because they are not held to cost accounting requirements which increases their administrative burden and reduces their opportunity for profit margins.
There are some possible difficulties to utilizing commercial item contracting, as highlighted in a July 14, 2000 document titled *Commercial Item Acquisitions* signed by both the Assistant Secretary of Defense for Command, Control, Communications and Intelligence and the Under Secretary of Defense for Acquisition, Technology & Logistics. In it the authors state that the price of a commercial item is often determined by marketplace factors not taken into account in traditional DoD cost models. This can result in a disconnect between how vendors price their products or services and government expectations for cost data. The document also noted that when traditional cost accounting data is not required, the number of competitive commercial offerings increase.[59] To help address potential issues regarding commercial items, the DoD has established the DCMA Commercial Item Group, published commercial item guidelines, and provided program managers with additional commercial item training.

FAR 2.101 requires that commercial products or services be established in a catalog, been sold or offered for sale to the general public, or the product has evolved from one offered to the public. However, the definition of the term “of a type” opens the definition of commercial even further. The contractor must demonstrate that the good or service offered to the government are of a type, or require routine modifications, offered for sale or sold to the general public. It does not have to be identical to the good or service sold to the public. Nor does the contractor have to offer or sell the good or service to the general public. The important thing is whether a contracting officer has made a commercial item determination for the product or service. The definition of commercial items from FAR 2.101 is provided in Appendix 6.

**Applicability.** While contractors selling commercial items to the government must comply with some government requirements, they are exempt from many of the accounting system requirements imposed on traditional non-commercial items. FAR 12.214 exempts all commercial item contracts from the Cost Accounting Standards. FAR 9.106-1(a) exempts all commercial item contracts from the SF 1408 preaward survey. The applicability of DFARS accounting system review and FAR 31 cost principles are often exempted as well from commercial item contracts except in specific circumstances.

Commercial items may only use the contract types found in FAR 12.207, namely firm-fixed price contracts or fixed price with economic price adjustment (commercial services may use T&M or labor hours contracts subject to certain conditions). Neither contract type by itself would incur any accounting requirements. However, one of the three types of economic price adjustment described in FAR 16.203-1(a)(2) is based on actual labor or material costs. While this does not trigger any accounting requirements, it does require insertion of the clause FAR 52.216-4 which includes the following statement, “The Contracting Officer may examine the Contractor’s books, records, and other supporting data relevant to the cost of labor (including fringe benefits) and material.” This requirement could add to workflow and reporting requirements associated with the existing configuration of the commercial accounting system, though, from a practical standpoint, this rarely happens.

Finally, although not a fixed price contract, time-and-materials and labor-hour contracts can also be used to purchase commercial items provided the contracting officer executes a Determination & Findings. T&M and labor-hour are the least preferred contract type for commercial items, useable if no other type is suitable and competition is available. In addition to triggering DFARS
252.242-7006 accounting system review, these commercial item contracts also trigger FAR 31 cost principles and the corresponding accounting system validations.

5.2 Fixed Price Non-Commercial

Fixed price contracts that do not use commercial item procedures are subject to a wider array of contract types and financing options which may trigger accounting system requirements. A discussion of each of these situations is provided in detail below.

5.2.1 Firm-Fixed Price with No Financing

FAR 16.2 defines firm-fixed price (FFP) contracts in the following way: “A firm-fixed price contract provides for a price that is not subject to any adjustment based on the contractor’s cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and resulting profit or loss. It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon the contracting parties.” The definition makes clear that when awarded based on adequate price competition, FFP are not subject to government accounting system requirements. A fair and reasonable price is set using factors such as competition and comparisons to prior purchases.

Contractors on FFP contracts may be subject to accounting requirements, however, in cases where there is not adequate price competition as defined in FAR 15.403-1. Unless other exceptions to certified cost or pricing data requirements apply above the TINA threshold, FFP contracts without adequate price competition must provide certified cost or pricing data. Moreover, non-competitive new work or modifications to the FFP above the TINA threshold contract require the submission of certified cost or pricing data. If applicable, contractors are also required to be compliant with Cost Accounting Standards.

Applicability. With very few exceptions, there are no specific accounting requirements for competitive firm-fixed price contracts with no financing. Government faces minimal risk and therefore does not require the contractor to have an accounting system to validate costs against except in the cases where there is not adequate price competition or when there is new or modified work.

5.3 Contract Financing

In certain cases, the government recognizes the need of contractor for cash prior to the delivery a final product. To accommodate this need, the government can offer financing. The intent of contract financing is to benefit the government and the contractor. For the government it is a useful working tool which expedites the performance of contracts as described in FAR 32.104(a)(1). For the contractor it assists in paying costs incurred during the performance of the contract without the need for higher interest payments associated with private-sector financing.

Contract financing is covered in FAR Part 32 and is defined as government authorized payment of funds to the contractor prior to acceptance of supplies or services. Contract financing does not include invoice payments, payments for partial acceptance, lease payments, or rental payments.
Payments of invoices on cost-reimbursement contracts are considered interim financing per FAR 32.001.

Financing helps fund the purchase and is intended to be self-liquimating through contract performance. This means agencies can use financing for working capital but not for the expansion of contractor-owned facilities or the acquisition of fixed assets, per FAR 32.105(a). There are several possible methods of contract financing for non-commercial items. Per FAR 32.102, these include advance payment, loan agreements, and payments for accepted supplies but the two most common forms of contract financing are performance-based payments (PBP) and progress payments.

5.3.1 Performance Based Payments (PBP) Financing

PBPs are a form of contract financing that allows payment based on objective, quantifiably measurable milestones rather than more traditional periodic payment. In a PBP context, when a contractor meets the criteria for a designated milestone, it receives the corresponding payment. Ethan Brown and Cara Wulf from the law firm McCarter and English explain, “For the uninitiated, PBPs are a mechanism available to the Government intended to encourage cash-strapped contractors to enter and flourish in the federal marketplace.”

PBPs are a customary contract financing method for various types of goods and services. They are based on performance rather than advance payments, partial payments, or progress payments (FAR 32.102 (a)(b)). Performance based payments are contract finance payment made of the basis of: (1) Performance as measured by objective or quantifiable methods; (2) Accomplishment of defined events; or (3) Other quantifiable results (FAR 32.102(f)). PBPs are fully recoverable in the event of default. However, they are not payments for goods or services, partial deliveries, or payment based solely on incurrence of costs or an incentive arrangement. PBPs must be tied to a basis of performance in quantifiable terms which can be measured.

Applicability. Section 831 of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2017, amended 10 U.S.C. § 2307(b) to: (1) establish a preference for performance-based payments for contractor financing, whenever practicable; (2) provided that, for a contractor to receive PBPs, its accounting system must be compliant with Generally Accepted Accounting Practices (GAAP); and (3) ensure that nontraditional defense contractors and other private sector companies are eligible for performance-based payments, consistent with best commercial practices.

On April 8, 2020, DoD amended the DFARS to: (1) permit all contractors that comply with GAAP to receive performance-based payments; and (2) remove prohibitions limiting PBPs to amounts not greater than costs incurred up to the time of payment. As a result, and in accordance with DFARS 232.1003-70 and 252.232-7015, the contractor’s financial accounting requirements are to be GAAP compliant to receive PBPs. This, however, does not affect how contractors perform cost accounting.

DoD established a PBP Analysis Tool with the intention of allowing the contracting officer to identify a “Win-Win” solution. The PBP Analysis Tool calculates the final cost to the Government and the financial value to the contractor under two scenarios (PBPs and Progress Payments).
cost to the Government is determined by adding the cost the government incurred by borrowing the funds used to pay the contractor. Therefore, “The financial value to the contractor is based on calculating the Internal Rate of Return (IRR) and Net Present Value (NPV) of the cash flows.” The intent of the tool is to lower the final cost to the Government while generating greater IRR and NPV for the contractor. The potential for improved cash flow has proven to be real and provides a unique opportunity for a financial Win-Win deal to be negotiated.

5.3.2 Progress Payment Financing

Another common form of contract financing is provided through progress payments. Using progress payments, the government provides interim financing to the contractor, allowing the government and the contractor to share the financial burden of the contract while the work is being performed.

A progress payment is a payment provided to the contractor based on the amount of work they have performed. It is usually based on a schedule of anticipated progress, either on a percentage of cost basis or percentage of work completed, which the contractor has achieved. There are two primary methods for the use of progress payments. The first is to provide an incentive to keep the contractor on schedule to prevent work being delayed until the end of the delivery period. The second is to provide the contractor with capital to continue operations on the contract.

The progress payment rate has varied over the years. Currently, the FAR rate is 80% for large business and 85% for small (FAR 232.501-1), while for DOD contracts, the rate is 80% for large, 90% for small, and 95% for small disadvantaged concerns. The total amount payable for fixed price contracts is limited to a specified percentage of the “contract price” which is defined as the current price plus any unpriced modifications for which funds have been obligated (FAR 32.501-3 a (1)). Specific cost-reimbursement portions of the contract (e.g., CLINs for travel and other direct costs) must be excluded from the contract price.

When a contractor requests progress payments, they must use Standard Form 1443 or something equivalent. Once a contractor submits a request for progress payments, “Contacting officers should normally approve requests for progress payments. However, the contracting officer may reduce or suspend progress payments if the contractor’s performance is not satisfactory in key areas including meeting terms and conditions of the contract… or if there is evidence of unsatisfactory accounting system or questionable financial stability.”\[61\]

**Applicability.** The references to the accounting system requirements are found in FAR 52.232-16(f) which states “The Contractor shall maintain an accounting system and controls adequate for the proper administration of this clause require.” This is further supported in 32.506-3(b)(1), “The contractor must comply with all material requirements of the contract. This includes the requirement to maintain an efficient and reliable accounting system and controls, adequate for the proper administration of progress payments.”

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2 Under Class Deviation 2020-O0010, Progress Payment Rates, defense progress payments were increased to 95% for small business and 90% for all other businesses.
While the exact standards are not specified in the FAR, the progress payment checklist found in SF 1443 and prescribed by FAR 53.232 provide an indication of the types of accounting information required, including incurred costs to the contract, estimated total cost, and eligible subcontractor financing or delivery payments. Moreover, the contractor may not earn progress payments on unallowable costs which requires adherence to FAR 31 cost principles for allowability. For contractors working with the Department of Defense, there is a further requirement under DFARS 252.7503(b), which requires the insertion of the clause 252.242-7006 accounting system administration for progress payments based on costs incurred or on a percentage or stage of completion. Finally, discussions with subject matter experts indicate that in most instances, contracting officers will request an SF 1408 preaward survey for progress payment financing.

5.4 Other Fixed Price

5.4.1 Economic Price Adjustment (EPA)

Fixed price with economic price adjustments is used when there is reasonable doubt about the cost over time in contracts which last and extended period of time. Another reason to use this type of contract is when there are circumstances which would normally be address by FFP contracts but there is too much uncertainty about the cost or cost drivers. These cost drivers could be market stability, resources availability or labor conditions.

There are three types of price adjustment under FP-EPA, adjustments made based on: (1) established prices; (2) actual increase or decrease in costs associated with labor or material costs; and (3) increases or decreases in specified labor or material cost standards or indexes, such as the Employment Cost Index or Producer’s Price Index. These adjustments can be the result of changes in labor, materials or resources cost, inflation, commodities price fluctuation, changes in bank interest rates or fluctuation in currently markets. However, only the second type of FP-EPA, based on actual labor or material costs, requires reference to accounting system information to determine the final contract price.

There are limits on FP-EPA as stated in FAR 52-216-4. No upward adjustment applies if the upward adjustment is not at least 3% higher than the current total contract price. And FAR 52.216-4(c)(4) puts an upside limit of 10% that can be charged to the government. As for the Government benefit, there is no downside limit which the government may benefit from by causing a reduction in cost.

Applicability. Only one type of FP-EPA triggers any kind of accounting system requirement, which is described in FAR 16.203-1(a)(2), adjustments based on actual costs of labor or material. This FP-EPA contract is required by FAR 16.203-4(c) to include the clause FAR 52.216-4 which states: “The Contracting Officer may examine the contractor’s books, records, and other supporting data relevant to the cost of labor (including fringe benefits) and material during all reasonable times until the end of 3 years after the date of final payment under this contract or the time periods.” While this clause does not require the contractor to maintain an acceptable accounting system or make any changes to the normal operations of the commercial accounting system, it could create additional workflow and reporting for the accounting department should the contracting officer choose to have such examination performed.
5.4.2 Prospective and Retroactive Price Redetermination

Price redetermination can happen in two ways: prospective priced redetermination (FAR 16.205), and retroactive price redetermination (FAR 16.206). This contract scenarios begins with a firm-fixed price effort for the initial period of performance but allows for redeterminations in subsequent periods of performance. A firm-fixed ceiling price contract with retroactive price redetermination is typically only used for research and development contracts estimated at the simplified acquisition threshold or less. When initially established at the outset a fair and reasonable firm-fixed price cannot be negotiated and that the amount involved and short performance period make the use of any other fixed-price contract type impracticable.

Applicability. Due to the potential for wide fluctuations in cost which could lead to a price redetermination the government must validate the impact on the contract costs. For this reason, FAR 16.205-3(b) and FAR 16.206-3(b) established that the contractor’s accounting system should be “adequate” for redetermination. FAR 31 cost principles also apply to this contract type as specified in FAR 31.103(b)(5). Finally, required FAR clause 52.215-2 allows contracting officer to inspect company accounting records.

5.4.3 Level of Effort (LOE)

Firm-fixed price level of effort (FFP/LOE) contracts are outlined in FAR 16.207. FFP/LOE contracts are used when work cannot be clearly defined but the level of effort desired can be identified and agreed upon at time of award. FFP/LOE is commonly used in research or exploratory development, and outcome-based education. FAR 16.207 requires the contractor to provide a specified level of effort over a stated period of time on work that can be stated only in general terms, and the government is to pay the contractor a fixed-dollar amount.

To utilize and FFP/LOE contract the LOE must be agreed upon at the time of the award. This must include a specific number of labor hours during a stated period of time. An LOE contract will describe the scope of work in general terms and the contractor will usually be required to submit a report which shows the results achieved with the level of effort. This type of contract is beneficial because the contractor must perform without increase in price or level of effort. However, there is no guarantee that desired results will be achieved. Because of this FFP/LOE contracts should only be used when the work to be performed cannot be clearly defined. Another consideration for the LOE contracts is that the desired results cannot be realistically achieved with less than the agreed upon effort to achieve with fewer hours.\[^{64}\]

Applicability. Where there is no specific regulatory language regarding the contractors accounting system requirements for FFP/LOE. However, the DCAA audit manual 6-10S1 Supplement - Billing System Examination Considerations for Contract Types states “Firm-fixed-price level of effort (FFP/LOE) contracts are classified as fixed price, but the data submitted on billings under such contracts closely resembles that submitted on time-and-materials (T&M) contracts in that profit is included in the direct labor billing rates… In reviewing billing systems at contractor locations having a significant volume of FFP/LOE work, treat these contracts as if they were T&M.” The time keeping requirements are specifically spelled out in detail in the DCAA auditor procedures for evaluating time keeping controls 6-405.2(b) in which the auditor must “Establish
the validity of the time records by observing the contractor’s time keeping system in operations. This includes observation and evaluation of the method for recording time and periodic physical observation of work areas.”

5.5 Undefinitized Contract Action (UCA)

According to DFARS 217.7401(3) an “Undefinitized contract action” means any contract action for which the contract terms, specifications, or price are not agreed upon before performance is begun under the action. Common forms of UCAs are letter contracts, orders under a basic ordering agreement and provisioned items order. When using a UCA the government must place a not-to-exceed limitation on the UCA action. DFARS 217.7404-4 limits the obligation to 50% of the not-to-exceed price before the contract has been definitized and requires contract definitization within 180 days. However, if a contractor submits a qualifying proposal before 50% of the not-to-exceed price has been obligated, the limitation may be increased to no more than 75% before definitization.

Applicability. One example of accounting requirements is found in DFARS 252.217-7027(b). If definitization is not reached by the target date, the contracting officer may use cost analysis methods found in FAR 15.4 and FAR 31 to determine a fair and reasonable price. Moreover, for contracts subject to the Truth in Negotiations Act, DFARS 217.7404-6(c) requires government to ensure the profit allowed in the final negotiated price reflects the requirements in 215.404-71-3(d)(2), which gives the instructions associated with DD 1547, “Insert the amount of costs incurred as of the date the contractor submits a qualifying proposal, such as under an undefinitized contract action.” In applicable cases, the contractor must accumulate direct costs according to the contract and allocate only allowable indirect costs compliant with FAR 31 cost principles.

5.6 Incentive Contracts

The Government may use incentive contracts as a means of providing the contractors with an incentive to perform efficiently or focus efforts on a specific prioritization of objectives. There are two categories of incentives, fixed price incentives and cost reimbursement incentives. Incentives are used when the required supplies and services can be purchased at a lower cost than would be offered in a FFP contract and when a formulaic pay arrangement can be designed to increase efficiency or increase technical performance objectives (FAR 16.401).

Applicability. Three FAR incentive type contracts (16.403-1, 16.403-2, and 16.402-1) also require an “adequate” accounting system as well as compliance with FAR 31 cost principles (FAR 31.103(b)(4)). These incentive types have price adjustment formulas that depend on the contractor’s costs and therefore rely on accounting system data.

Incentive contracts based on cost are required by DFARS 242.7503 to contain the clause DFARS 252.242-7006, Accounting system administration. In accordance with FAR 16.202-1, firm fixed price contracts remain firm fixed price when the award fee or incentive is based solely on factors other than cost. For example, performance incentives have a formula that depends on contractor behavior or product characteristics such as missile range or aircraft speed. Accordingly, use of these non cost-based incentives with firm fixed price contract types do not require an approved accounting system.
5.7 Cost Reimbursement

Cost-reimbursable contracts are issued when the government or the contractor cannot know enough about the true cost of the contract to establish a fixed-price type contract prior to the contract being signed. These contracts establish an estimate of total cost for the purpose of obligating funds and establishing a ceiling that the contractor may not exceed (except at its own risk) without the approval of the contracting officer (FAR 16.301-1). When cost contract types are used, the government accepts all the risk.

A cost-type contract, in theory, can be less expensive because the contractor does not have to increase the price of the contract to cover risk. Situations likely to contribute to risk premiums include when the work is sufficiently different from historical data factored into the bases of estimates, or when there are significant raw material inputs which exhibit price volatility. The cost-type contract may reduce the amount of risk factored into prices, but also require more government oversight of prime. Cost-type contracts are also useful when there is a high likelihood that there will be changes to the requirements which could increase the cost of the contract.

Until the Government imposed accounting system requirements, it lacked visibility into the actual cost of performance. Historically, this created situations where contractors had an opportunity to take advantage of the government by either charging more than they incurred or by misallocating the costs of other business activities to the government (Virginia Law Review, 1968). To alleviate this information asymmetry, the government has established several monitoring rules described below.

Applicability. All cost-reimbursable contracts are subject to the DFARS accounting system administration per DFARS 242.7503. Contractors received such contracts must demonstrate they have an adequate accounting system for determination costs applicable to the contract or order according to FAR 16.301-3(a)(3). This often triggers DCAA review under SF 1408 or a written verification from a prime contractor. FAR 31 cost principles also apply as prescribed in FAR 31.103(b)(1)(ii). Cost-reimbursable contracts may also be CAS-covered unless otherwise exempted per 48 CFR 9903.201-1(b).

5.8 Time & Material (T&M) and Labor Hour Non-Commercial

Time-and-Materials (T&M) contracts provide for acquiring supplies or services on the basis of direct labor hours at specific fixed hourly rates that include wages, overhead, general and administrative expenses and profit, and the actual cost of materials (FAR 16.601(b)). A time and materials contract may be used only when it’s not possible at the time of placing the contract to estimate accurately the extent or duration of the work or to anticipate costs with any reasonable
degree of confidence. This opens the government to risk because (1) there is no incentive for cost control because the contractor's profit is tied to the number of hours worked, and (2) the government cannot be sure the labor category delivered is the one proposed.

“Federal agencies have used time-and-materials (T&M) contracts to purchase billions of dollars in services… These contracts are risky because the government bears the risk of cost overruns. T&M contracts constitute a high risk to the government. The contractor provides its best efforts to accomplish the objectives of the contract up to the maximum number of hours authorized under the contract. Each hour of work authorizes the contractor to charge the government an established labor rate which includes profit. These contracts are considered high risk for the government because the contractor’s profit is tied to the number of hours worked."[67]

**Applicability.** T&M contracts are subject to DFARS accounting system administration per DFARS 242.7503, and to FAR 31 cost principles per FAR 31.103(b)(1)(ii) except for materials priced on the basis other than cost. Government surveillance of T&M contracts are covered under FAR 16.601(c)(1). It states, “a time and materials contract provide no positive profit incentive to the contractor for cost control or labor efficiency, therefore appropriate government surveillance of contract performance is required to give reasonable assurance that efficient methods and effective controls are being used.”
Table 3: Contract Scenarios That Trigger Accounting System Requirements

<table>
<thead>
<tr>
<th>Contract Scenarios</th>
<th>Accounting System Requirements</th>
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<tbody>
<tr>
<td><strong>Fixed Price Commercial</strong></td>
<td></td>
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<tr>
<td>References</td>
<td></td>
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<tr>
<td>FAR 12</td>
<td></td>
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<tr>
<td>Comments</td>
<td>Exempt from all accounting system requirements unless paired certain types of financing, FAR 12.210, or incentives, FAR 12.207(d).</td>
</tr>
<tr>
<td><strong>Fixed Price Non-Commercial</strong></td>
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<td>References</td>
<td></td>
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<tr>
<td>FAR 16.202</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td>FAR 31.103(b)(6) requires commercial contractors be subject to FAR 31 for modifications or price changes, while 31.103(b)(3) requires FAR 31 for determining costs of terminated contracts.</td>
</tr>
<tr>
<td><strong>(Contract Financing)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>No Financing</strong></td>
<td></td>
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<tr>
<td>References</td>
<td></td>
</tr>
<tr>
<td>FAR 32.10; FAR 52.232-32; FAR 16.402-2; FAR 16.404; 10 U.S.C. 3301(b)(4)(A)</td>
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<tr>
<td>Comments</td>
<td>DFARS 232.1005-70(b) requires companies to comply with GAAP. DoD PBIB Analysis tool requires contractor to report contract expenditures. Found in Performance Based Payment Guide. Also, DFARS 232.232-7012 and FAR 52.232-32(c)(2) for Govt property titles require GAAP accounting.</td>
</tr>
<tr>
<td><strong>(Contract Financing)</strong></td>
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<tr>
<td><strong>Performance-Based Payments</strong></td>
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<td>References</td>
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<tr>
<td>FAR 52.232-16</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td>In most cases, pre-award survey SF 2403 will be required for progress payments. 232.503-66g(xi), SF 1443 Contractor’s Request for Progress Payments.</td>
</tr>
<tr>
<td><strong>Economic Price Adjustment</strong></td>
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<tr>
<td><strong>Based on actual labor or material cost</strong></td>
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<tr>
<td>References</td>
<td></td>
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<tr>
<td>FAR 16.203-1(a)(2)</td>
<td></td>
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<tr>
<td>Comments</td>
<td>FAR clause 52.216-4(d) states that “the Contracting Officer may examine the Contractor’s books, records, and other supporting data relevant to the cost of labor (including fringe benefits) and material.”</td>
</tr>
<tr>
<td><strong>Retroactive or Prospective Price Redetermination</strong></td>
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<td>References</td>
<td></td>
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<tr>
<td>FAR 16.205-3(b); FAR 16.206-3(b)</td>
<td></td>
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<tr>
<td>Comments</td>
<td>FAR clause 52.215-2 allows contracting officers to inspect company accounting records.</td>
</tr>
<tr>
<td><strong>Level of Effort</strong></td>
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<td>References</td>
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<tr>
<td>FAR 16.207</td>
<td></td>
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<tr>
<td>Comments</td>
<td>Requires an adequate timekeeping system per DCAA DCAA Manual 7640.1, Chapter 6-1081.</td>
</tr>
<tr>
<td><strong>Uninfringement Contract Action (UC4)</strong></td>
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<td>References</td>
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<tr>
<td>FAR 16.603; DFARS 217.74</td>
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<tr>
<td>Comments</td>
<td>For TINA-covered contracts, DFARS 217.7404-6(c) requires government to ensure the profit allowed in the final negotiated price reflects the requirements in 215.404-71-3(d)(2).</td>
</tr>
<tr>
<td><strong>Incentive Firm Target Cost Incentive</strong></td>
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<tr>
<td><strong>Incentive Successive Target Cost Incentive</strong></td>
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<td>References</td>
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<tr>
<td>FAR 16.403-1; FAR 16.403-2; FAR 16.404-1; FAR 16.404-2; FAR 16.404-3; FAR 16.404</td>
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<tr>
<td><strong>Other Incentive Contracts</strong></td>
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<tr>
<td>References</td>
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<tr>
<td>FAR 16.404</td>
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<tr>
<td>Comments</td>
<td>Final price determination not based on accounting costs.</td>
</tr>
<tr>
<td><strong>Cost Reimbursable Non-Commercial</strong></td>
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<td>References</td>
<td></td>
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<tr>
<td>FAR 16.3; FAR 9.105-1(b); FAR 9.106-4(a); FAR 52.215-2</td>
<td></td>
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<tr>
<td>Comments</td>
<td>Cost reimbursement is prohibited for commercial items contracts, per FAR 16.301-3.</td>
</tr>
<tr>
<td><strong>Time &amp; Material (T&amp;M) and Labor-Hour Non-Commercial</strong></td>
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<tr>
<td>References</td>
<td></td>
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<tr>
<td>FAR 16.104-1; FAR 16.601; FAR 16.602; FAR 52.215-2; DFARS 210.601</td>
<td></td>
</tr>
<tr>
<td>Comments</td>
<td>When price analysis allows T&amp;M/H to use commercial procedures (FAR 12.207), contracts are exempt from CAS. When materials are priced on the basis other than cost, FAR 31 cost principles do not apply, per FAR 31.104(b)(11)(b).</td>
</tr>
</tbody>
</table>

1. Pre-award survey (including SF 1408) may be required at the contracting officer’s discretion except fixed-price below simplified acquisition threshold and commercial items (FAR 9.106-1).
2. FAR 31 cost principles also applies to all fixed-price contracts subject to cost analysis or fixed-price contracts containing a clause that requires the determination or negotiation of costs, per FAR 31.102, as well as contract terminations.
3. Modified or full Cost Accounting Standards (CAS) coverage will apply unless exempted, see requirements and thresholds found in Title 41 §1502 and 48 CFR 9903.201-1.
4. Terminations with settlement of payment require additional accounting information provided in SF 1438 or SF 1439, see FAR 49.165, and settlement proposals greater than $2M require submission of certified cost or pricing data (FAR 49.105(c)(15)) as well as an audit (FAR 49.107(a)). Commercial item terminations are covered in FAR 12.403. In cases of settlement based on cost, FAR 31 cost principles apply (discussed further in FAR 31.205-42).
5.9 Other Requirements with Accounting Systems Implications

The following requirements also affect how a contractor may operate an accounting system. These requirements have implications for how an accounting system is set up to meet certain objectives, utilize accounting system data, or report costs to meet the above requirements.

5.9.1 Truth In Negotiations Act (TINA)

TINA was originally passed by Congress in 1962 due to series of failures to abide by existing fair pricing rules by contractors. This law requires contractors to submit certified cost or pricing data if a procurement’s value exceeds the specified threshold. TINA requires contractors to submit cost or pricing data to the government and certify that it is current, accurate, and complete. There are exceptions to the law. TINA does not apply to firm-fixed price contracts with adequate price competition, when purchasing commercial items, when prices are set by law, or when the contractor is granted a waiver. The original TINA threshold in 1962 was set at $100,000. Between the years of 1962 and 2015 the threshold periodically increased to $750,000 and in June 2018 Congress authorized a substantial increase in the threshold limit to $2 million.

There are cases where TINA applies and CAS does not, such as for negotiated contracts greater than $2 million and less than $7.5 million. All small businesses are exempt from CAS, but not from TINA. In these cases, TINA could drive some accounting system requirements in practice. FAR 15.404-1(a)(3) states that “Cost analysis shall be used to evaluate the reasonableness of individual cost elements when certified cost or pricing data are required.” The condition of cost analysis associated with certified cost or pricing data in effect requires the contractor to produce cost accounting data to support pricing. This triggers FAR 31 cost principles, even for FFP contracts with no financing. For example, a small business that includes alcohol as part of its sole source proposed costs would not have this cost recognized by the contracting officer as an allowable cost in the negotiation of the contract price.

Finally, there is the workflow and processing associated with pulling existing accounting information to support TINA compliance and getting it certified. Formatting and submission instructions are detailed in FAR 15.403-5 and includes Table 15-2.

5.9.2 Other Than Certified Cost or Pricing Data

Contracting officers still have a responsibility to assess price reasonableness even when TINA does not apply, particularly in negotiated contracts. FAR 15.403-3 describes how contracting officers should require “submission of data other than certified cost or pricing data” from offerors if other sources are inadequate to support a cost realism analysis. The definition of “Data other than certified cost or pricing data” is found in FAR 2.101 which includes the following statement. “Such data may include the identical types of data as certified cost or pricing data…but without the certification.”

The FAR requires contracting officers to investigate several forms of price analysis before requesting pricing information from the contractor. Requesting cost data is a last resort, such as for commercial “of a type” items that the contractor has never sold on the commercial market. FAR 15.404-1(b)(2) lists seven price analysis techniques by which the Government can make a fair and reasonable price determination. FAR 15.403-3(c)(2)(ii) states that “The contracting officer
shall, to the maximum extent practicable, limit the scope of the request for data relating to commercial items to include only data that are in the form regularly maintained by the offeror as part of its commercial operations.”

However, if the cost or pricing data is not sufficient to determine price reasonableness, the FAR 15.403-1(c)(3)(ii)(C) allows the contracting officer to request “information on labor costs, material costs and overhead rates.” This cost information may not be available at all companies. Even if the contractor follows FAR 31 cost principles, such as segregating direct from indirect and unallowable costs, it does not assure that the contractor will have estimates of product costs readily available. When the contractor’s existing cost accounting does not sufficiently perform job or process costing, as may be the case for small businesses or software companies, the lack of product cost information could impact negotiations. SMEs interviewed for this research study gave anecdotal evidence that accounting systems can be a tacit requirement for producing the kind of information contracting officers expect to see. This friction incentivizes the contractor to start collecting product costs to improve future negotiations with the government.

One subject matter expert in the commercial sector indicated there were few instances where government needs more cost information than the contractor is able to provide from its accounting system. “Other than” certified cost or pricing data are most often required for commercial items that have not been sold yet or are still developmental. Anecdotally, this expert found that contracting officers do not accept pricing data and prefer cost data instead.[48] This viewpoint was repeated by a government SME who provided an example. There is an aircraft mission system used in the commercial world to track, record, and lock-in on property. This basic commercial item needed substantial modifications for military use, such as longer range and operations in night or adverse weather environments. The commercial item was therefore “of a type,” but the pricing offered to the Department of Defense was 25-fold greater than the basic commercial version. In this situation, the contracting officer was compelled to ask for cost information to understand the price difference.[68]

5.9.3 Cost Monitoring Program/Forward Pricing Rates

The Cognizant Federal Agency must establish Cost Monitoring Program (CMP) for all contractors whose sales to the Government, during the contractor’s next Contractor Fiscal Year (CFY), are expected to exceed $200 million based on costs incurred or negotiated based on projected costs as outlined at DFARS PGI 242.302(a)(S-75)(c)(1)(i)(A). The CMP may be optionally established for contractors whose sales are less than $200 million in other than firm fixed-price and fixed-price with economic price adjustment contracts; or significant government business exists and is specifically directed by the head of the contracting activity, in accordance with FAR 42.1701.

Negotiation of forward pricing rates (FPRs) may be requested by the contracting officer, the administrative contracting officer, or the contractor. Normally, FPRs should be negotiated only with contractors having a significant volume of government contract proposals. In the process, the contractor must submit a forward pricing rate proposal (FPRP) that is compliant with the adequacy checklist found in DFARS Table 215.403-1.

When certified cost or pricing data are required, FAR 15.407-3 requires offerors to describe any forward pricing rate agreements (FPRAs) in each specific pricing proposal to which the rates apply.
and to identify the latest cost or pricing data already submitted in accordance with the FPRA. Although the FPRA process drives a fair amount of contractor workflow, it usually does not require adding detail to the accounting system or prescribed formats.

5.9.4 Earned Value Management System

Earned Value Management Systems (EVMS) are not accounting systems, but they have implications for accounting systems. The DoD’s EVMS Implementation Guide states that “the accounting system is critical to ensuring EVM performance data is reliable and auditable.”[69, p. 40] The EVMS requirements outlined in American National Standards Institute/Electronic Industries Alliance Standard 748 (ANSI/EIA-748) do not specifically require conformance with Cost Accounting Standards or other regulations. However, the EVMS Implementation Guide states that “All financial transactions are expected to be documented, approved, and recorded properly in the financial accounting system on a consistent and timely basis in accordance with Generally Accepted Accounting Principles (GAAP) and applicable Cost Accounting Standards (CAS).”[69, p. 40] For example, charging material from inventory in Guideline 21 requires conformance with the CAS #411.[70]

ANSI-EIA-748 Guidelines 16 through 24 largely ensure that cost data is accurately collected for comparison to budgets and performance. EVMS may drive additional accounting effort than other government accounting requirements discussed above. For example, Guideline 17 requires accounting for actual costs at more detailed levels including the Work Breakdown Structure, while Guideline 20 requires accounting for unit or lot cost as well as recurring or nonrecurring.[70] This can cause a proliferation of charge numbers necessary for tracking costs to specified objectives, such as recurring labor costs associated with the landing gear of a particular aircraft tail number.[71]

DFARS 234.201 requires all cost or incentive contracts and subcontracts valued at $20 million or more to insert the clause 252.234-7001 and 252.234-7002. Contractors must submit monthly reports from the EVMS which must comply with the guidelines in the ANSI/EIA-748. This requirement is optional for cost or incentive contracts valued at less than $20 million based on contract risk. It is also optional for firm-fixed price contracts in extraordinary circumstances when a waiver is obtained per PGI 243.201(1)(iv).

For cost or incentive contracts and subcontracts valued at $50 million or more ($100 million or more under DoD Class Deviation 2015-O0017), the contractor shall have an EVMS that has been determined by the Cognizant Federal Agency (CFA) to comply with the guidelines in ANSI/EIA-748, as required by DFARS 252.234-7001. One consulting company that specializes in EVMS found that it can take up to three years for the CFA to complete the 16-step certification process.[72]

5.9.5 Cost and Software Data Reports

Section 2334(g) of U.S. Code Title 10 provides the Director of Cost Assessment and Program Evaluation (DCAPE) the authority to collect contract cost data on acquisition programs greater than $100 million in then-year dollars. The Cost and Software Data Reporting (CSDR) system serves as the primary source of contract cost data for defense acquisition programs to support cost estimation. The thresholds which trigger CSDR reporting are described DoD Instruction 5000.73, with additional context detailed in DoD Manual 5000.04-M-1. CSDR
requirements are contained in the DFARS clauses 252.234-7003 and 252.234-7004 as prescribed in 234.7101. Post-award reviews of contractor compliance with the CSDR system are prescribed in DFARS 242.503-2.\[73\]

The conditions for CSDR requirements are based on a combination of the program’s classification and the contract’s size. All Acquisition Category I and II programs are subject to the CSDR requirement provided the contracts breach additional thresholds. All Information System and Middle-Tier of Acquisition programs greater than $100 million in then year dollars are also subject to the CSDR. Finally, CSDR approval authority may also subject any other high-interest or high-risk programs greater than $100 million to the CSDR requirements.

Provided program applicability to the CSDR, there are also contract thresholds. CSDRs apply to all contracts and subcontracts which breach the thresholds, including non-FAR contracts like OTAs. For most formats, the threshold is $50 million. For high interest areas like software and middle-tier of acquisition, it is $20 million. The specific requirements inserted into contract solicitations are outlined in the CSDR plan (DD Form 2794) developed by the representatives of the program office, the service cost agency, DCAPE, and the defense cost and resources center. There are a total of 13 submission formats and associated Data Item Descriptions that could be required via the CSDR Plan.\[74\] Four excel submission formats (DD Forms 1921, 1921-1, 1921-2, and 1921-5) are being phased out and replaced by two machine-readable file format specifications associated with DI-FNCL-82162 and DI-MGMT-82164.

The CSDR’s requirements overlap with those of EVMS and FPRs but are tailored to the needs of cost estimation. As specified in the CSDR plan, contract cost actuals are often reported at a lower level of the Work Breakdown Structure than EVMS requirements alone. DFARS 252.234-7003(b)(2) requires the contractor to “Demonstrate how contractor cost and data reporting (CCDR) will be based, to the maximum extent possible, upon actual cost transactions and not cost allocations.” However, if the contractor chooses to accumulate costs at a higher level, it must show the allocation to lower level WBS items when submitting the newer CCDR format DI-FNCL-82162. The contractor’s labor and material categories are also required, along with assignment to standardized DoD categories. CLIN, unit or lot, and end item are other categories of contract cost reporting.

For software-intensive efforts, labor hours from the timekeeping system are required at a level lower than the WBS, including by release, computer software configuration item, and software activity type (e.g., detailed design, code & unit test). Maintenance and repair efforts also have to track the cost of maintenance events (e.g., depot level repairable) by location, WBS, end item, and lot, as well as the cost of each repair part by part number, action, WBS, and function.

The only CSDR requirement that is not contract focused is the Contractor Business Data Report, DD Form 1921-3. It has an Excel format, but most of the data requirements overlap with a Forward Pricing Rate Proposal. Additional types of information include direct costs for the top 10 DoD programs. The annual 1921-3 report is due 60 days after the close of each contractor fiscal year for each business unit that has $250 million of more of CSDR requirements.
5.9.6 Services Contract Reporting

Services contracts governed by FAR Part 37 have to adhere to two primary reporting requirements that affect the accounting system. Service Contract Act reporting found in FAR clauses 52.304-14 and 52.304-15 for indefinite-quantity vehicles is required by FAR 4.17 for the prime and first-tier subcontractors. All cost reimbursement, time and materials, and labor-hour contracts with awards above the simplified acquisition threshold are required to report the cost and labor hours of services contracts. All fixed-price service contracts greater than $500,000 also have to report. Similarly, DoD Manpower Service Contract Reporting is still being written into the DFARS but comes from Section 2330a of U.S. Code Title 10. All service contract awards, except indefinite-quantity vehicles, greater than $3 million are required to report cost and labor hours down to the first-tier subcontractors.\[75\]

5.9.7 Transactional Data Reporting

The General Services Administration also requires contractors to report their sales for each government-wide indefinite-quantity vehicle. This includes federal supply schedules and government-wide acquisition contracts.\[76\] One subject matter expert said that the requirement does not necessarily affect the accounting system if sales are tracked in customer relationship management (CRM) tools.
# Table 4: Other Requirements with Accounting System Implications

<table>
<thead>
<tr>
<th>Practical Requirements</th>
<th>Reference</th>
<th>Threshold</th>
<th>Drives accounting detail</th>
<th>Drives workflow &amp; reporting</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Systems to Mitigate Asymmetric Information</strong></td>
<td>Title 10 §2306a; FAR 15-403-1; FAR 15-403-4</td>
<td>$2M or more of negotiated, non-commercial contracts and subcontracts; or $2M or more of modifications to a competitively awarded contract.</td>
<td>TINA does not create any accounting system requirements, but to support cost analysis (15-404-1) the contractor may have to tailor the accounting system if individually priced items are not tracked.</td>
<td>FAR 15-403-5 provides instructions for submitting certified cost or pricing data.</td>
<td>Similar to above, but without a required format or certification process. Non-commercial modifications to a commercial item over $2M or 5% of the contract requires certified cost or pricing data. Exemptions: Head of procuring activity provides a waiver, adequate price competition (any contract type), and if prices are set by law/regulation. Preference for commercial items is to use price analysis first before requesting information from the company, which may result in cost data.</td>
</tr>
<tr>
<td>“Other than” certified cost or pricing data</td>
<td>FAR 15-403-3; FAR 15-404-1(a)(4); FAR 15-404-1(b)(2)</td>
<td>If contracting officer cannot determine price reasonable using price analysis above.</td>
<td>Same as above.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Monitoring Program &amp; Forward Pricing Rates (FPR)</td>
<td>DFARS 242.302(a)(S-75)(x)(u)(x)(A)</td>
<td>$200M or more in sales for next contractor fiscal year.</td>
<td></td>
<td></td>
<td>FPRP takes analysis and time per FPR adequate checklist (DFARS 215-403-1). FPRP/RA process can take 6 months, and may include a DCMA audit. Same as above.</td>
</tr>
<tr>
<td>Optionally required</td>
<td>FAR 42.1701</td>
<td>Less than $200M in sales for next contractor fiscal year.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earned Value Management System (EVMS)</td>
<td>DFARS 224.201; DFARS 252.234-7001/7002; PGI 243.201</td>
<td>$20M or more of cost or incentive type. Optional: $20M or more of incentive type. Less than $20M for cost or incentive type.</td>
<td>Accounting by WBS, unit or lot, cost type, R&amp;NR. Monthly reporting of lower level cost actuals as part of the Contract Performance Report.</td>
<td>DCMA compliance review has a 16 step process (DCMA INST 201). Process may take up to three years.</td>
<td>Accounting must be done at the Central Account level, but is often done for Work Packages. Optional for extraordinary circumstances of risk. CFA certification raised from $50M in DoD class deviation 2015-O0017, Standard surveillance covered in DCMA Manual 2301-01.</td>
</tr>
<tr>
<td>EVM certified by Congriment Federal Agency (CFA)</td>
<td>DoD Class Deviation 2015-O0017</td>
<td>$100M or more of cost or incentive type.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost and Software Data Reports (CSDR)</td>
<td>Title 10 §2334(g); DoD 5000.71; DoDDM 5000.04; DFARS 234.71</td>
<td>Program Thresholds: (1) ACAT I and II, (2) All Info system &amp; MTA programs &gt; TYS100M, (3) Optional: All other programs &gt; TYS100M.</td>
<td></td>
<td></td>
<td>CSDR requirements established based on type of acquisition program (Adaptive Acquisition Framework) and program size, as well as contract size/contract (detailed below). Non-FAR and commercial items are not exempt from CSDR.</td>
</tr>
<tr>
<td>Contractor Cost Data Report</td>
<td>DF-FNCL-42162</td>
<td>All contracts and subcontracts (including non-FAR) greater than $150M or greater than $20M for high interest contracts (MTA contracts required at month).</td>
<td>Cost and hours by end item (and unit trial number if required), WBS (may be at a lower level than for EVMS), resource categories, and MTA contracts required at month.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contractor Business Data Report</td>
<td>DF-FNCL-41765C</td>
<td>Contract requirement when the business unit has $250M or more of CSDR planning authority.</td>
<td>Similar data as FPRP, but includes direct costs to be broken out by top 10 DoD programs and revenue reporting.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance and Repair Data Report</td>
<td>DM-MGMT-82163</td>
<td>All maintenance contracts more than $50M at the discretion of CSDR planning authorization.</td>
<td>Requires cost and labor hours by lot, end item, WBS, location/or maintenance event (depot level repairable). Also, cost of repair parts by part number, action, WBS, and functional working group.</td>
<td>Frequency of reporting specified in the CSDR plan.</td>
<td>Format prescribed according to 6 excel tables. The “FlexFile” along with the “Quantity” (DM-MGMT-82160) reports are replacing legacy formats found in DoD Forms 1921, 1921-4, 1921-2, and 1921-5.</td>
</tr>
</tbody>
</table>

(43)
**Table 4: Other Requirements with Accounting System Implications, cont’d**

<table>
<thead>
<tr>
<th>Service Contract Reporting</th>
<th>Reference</th>
<th>Threshold</th>
<th>Drives accounting detail</th>
<th>Drives workflow &amp; reporting</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Contract Act Reporting</td>
<td>FAR 4.1703; FAR 4.1705; FAR 52.204-14; FAR 52.204-41</td>
<td>All cost reimbursement, T&amp;M/LH service contracts above the SAT, as well as all fixed-price service contracts above $500K</td>
<td>Provides total cost and labor hours by contract. Also required for fixed-price contracts to provide their labor hours (not cost). Contractor reporting to SAM outlined in OSD memorandum, “Revised Department of Defense Contractor Manpower Reporting Initiative,” dated Oct 16, 2019.</td>
<td>Exempt. Orders below the simplified acquisition threshold.</td>
<td></td>
</tr>
<tr>
<td>Service Contract Reporting (DoD Manpower)</td>
<td>Title 10 §230a</td>
<td>All service contract awards, except IDVs, greater than $5M in obligations and disbursements.</td>
<td></td>
<td>DFRARS rule is being written to require manpower reporting.</td>
<td></td>
</tr>
</tbody>
</table>

**General Services Administration (GSA)**

<table>
<thead>
<tr>
<th>Transactional Data Reporting</th>
<th>Reference</th>
<th>Threshold</th>
<th>Drives accounting detail</th>
<th>Drives workflow &amp; reporting</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSAR Alternate I, 552.234-74</td>
<td>All Federal Supply Schedule, Government-Wide Acquisition Contract, or other Governments-Wide IDVs.</td>
<td>Annual report to SAM, Requires tracking sales by contract.</td>
<td></td>
<td>Does not necessarily affect accounting system if tracked and reported in other ways such as customer relationship management tools.</td>
<td></td>
</tr>
</tbody>
</table>

**Definitions:**
- ACAT = Acquisition Category
- CSCI = Computer Software Configuration Item
- FFP = Firm-Fixed Price
- FPRA = FP Proposal Recommendation Agreement
- GAAP = Generally Accepted Accounting Principles
- IDV = Indefinite Delivery Vehicle
- MTA = Middle Tier of Acquisition, DoD I 500.80
- NR = Nonrecurring
- OA = System for Award Management
- SAT = Simplified Acquisition Threshold
- T&M/LH = Time & Materials/Labor-Hour
- WBS = Work Breakdown Structure

(44)
6.0 GAAP and Government Accounting Requirements

U.S. securities law requires publicly traded companies to follow GAAP principles and procedures. Government requirements for contractor accounting systems explicitly require general GAAP compliance in two circumstances. First, when undergoing a SF 1408 preaward survey, and second, in a fixed price performance-based payments contract scenario where a clause requiring GAAP compliance is required by DFARS 232.1005-70(b). More specific aspects of GAAP compliance are found in FAR 31.2 cost principles such as allocating indirect costs according to base periods that align with fiscal year and the allowability of taxes if accrued in accordance with GAAP.

GAAP differ in purpose and scope from many of the existing government contractual requirements related to cost accounting. GAAP are focused on businesses’ high-level financial performance, whereas most government accounting requirements are focused on the proper allocation of costs to individual government contracts. The purpose of GAAP is to provide commercial firms a standard basis for recognizing costs in financial statements, which in turn enables the public and investors to look across companies and evaluate them in a consistent manner. The purpose of cost accounting standards is to make sure government contractors appropriately charge costs to contracts by measuring, assigning, and allocating costs consistently over the life of a contract. Due to their differing purposes, the prescriptions of both sets of standards are also different. For instance, GAAP do not require contractors to allocate their costs (such as overhead expenses) to specific contracts, which is central to most government accounting requirements. In addition to having different purposes, GAAP and government requirements also differ in scope. GAAP can change year-to-year and a company needs to abide to them for that given year whereas many government standards require compliance for the life of a given contract. Hence contractor efforts required to remain compliant with each set of requirements are distinct.

Since they are designed differently, government accounting standards provide benefits to the U.S. government above and beyond anything afforded by assurances of GAAP compliance. First, as noted by one federal government SME interviewed for this study, defining and removing unallowable costs from a contract has the effect of reducing the overall costs of contracts.\[11\] Second, certain government requirements like CAS enable the government to recover increased costs due to accounting practice changes and contractor failure to comply with CAS standards or disclosed practices. This limits the government’s exposure to any increases in contract cost. Third, government requirements facilitate an easier comparison of proposals and contracts from one contractor to another, thereby assisting the acquisition process.

Several risks to the government for modifying or eliminating cost accounting requirements have been noted in previous documents.\[53], [77\] One risk to the government for not maintaining CAS compliance measures would be to lose the right to contract price adjustments due to a contractor’s failure to comply with the required practices.\[77\] Another concern noted in the same document was that contractors may strategically use the broader FAR or GAAP criteria to justify realloacting costs between cost-type government contracts and other contracts. Additionally, many of the CAS include requirements for contactors to maintain written records of accounting practices, without which it would be more difficult for government auditors to cite a contractor for noncompliance with disclosed practices.
Despite their differences, there have been efforts to reconcile GAAP with government requirements. Arguably the most significant effort to do so has been conducted by CASB since it was directed to do so in Section 820 of the National Defense Authorization Act for Fiscal Year 2017. Section 820 included an explicit provision for CASB to ensure that cost accounting standards used by Federal contractors rely on commercial standards and accounting practices and systems “to the maximum extent practicable.” CASB was also directed to report on its actions taken to conform CAS with GAAP and to minimize the burden on contractors while protecting the interests of the Federal Government.

As noted by a GAO report issued in 2020, CASB has generally been meeting its legislative requirements. CASB has taken initial steps by producing two Staff Discussion Papers, publishing an Advance Notice of Proposed Rulemaking, and responding to public comment on their initial efforts. As part of their first Staff Discussion paper, CASB made an initial assessment of the conceptual nature of the 19 CAS rules and their potential for overlap with GAAP (see Appendix 4). The Board prioritized the cost accounting standards that were deemed to have the greatest possibility of overlap with GAAP and have therefore focused initial conformance efforts on cost measurement and assignment of costs to accounting periods.

6.1 Example of comparing GAAP to FAR 31 and CAS 411

There is an inherent difficulty in reconciling line-by-line multiple sets of requirements designed to address different concerns, a point reinforced by some of the public comment on CASB’s first Staff Discussion paper. As mentioned above, CAS deal specifically with the proper measurement, assignment, and allocation of contract costs whereas GAAP are concerned with financial reporting. Also, GAAP have been revised significantly since its inception whereas most of CAS have remained static since their original promulgation in 1972-1980. This makes any comparison between these two sets of requirements a moving target, and it can be potentially outdated even within a year’s time. Finally, some of the statutes differ from one another only in level of detail or specificity, but not in content. For example, CAS provides far greater detail in many instances than does GAAP or even other federal government regulations such as FAR 31 on the same topic. A closer comparison between 48 C.F.R. 9904.411 (hereafter abbreviated as “CAS 411”), GAAP, and FAR Part 31 will serve to illustrate this difficulty.

CAS 411 is titled Accounting for Acquisition Costs of Material and provides criteria for the accounting of acquisition costs of material and the use of inventory costing methods during the life of a contract. The standard was initially published May 5, 1975, in 40 FR 19425 and later amended in 1992 (57 FR 34167). Among other things, CAS 411-50(b) delineates five acceptable inventory costing methods: first-in, first-out (FIFO), moving average, weighted average, standard cost, and last-in, last-out (LIFO). CAS 411-30(a)(6) and CAS 411-40(a)(7) provide specific definitions for two of those methods: moving average and weighted average cost, respectively. By comparison, GAAP does not describe in detail nor define specific inventory costing methods, merely referencing the use of an “average” method, and instead offers the general constraint that “the major objective in selecting a method [for inventory costs] should be to choose the one which, under the circumstances, most clearly reflects periodic income” (ASC 330-10-30-9). Similarly, FAR 31.205-26 only requires that the purchase costs of store materials used in the performance of a contract be captured by “any generally recognized method of pricing such material is acceptable if that method is consistently applied and the results are equitable” (FAR 31.205-26(d)). This
comparison illustrates how the CAS requirements are significantly more detailed than other rules concerned with the same topic, making any one-to-one comparison more complicated.
7.0 Dual Narratives

This section explores two narratives regarding government cost accounting requirements and whether they are a true barrier to commercial company participation in the B2G marketplace.

The preceding sections have detailed how government accounting requirements are more rigorous than GAAP because they require contract costing to a level that many commercial companies may not track otherwise. This observation was supported by subject matter expert interviews conducted with representatives from both commercial and government sectors. The observation that government requirements exert additional cost and effort on commercial companies does not seem in doubt. However, there are two distinct narratives expressed by the SMEs and found in existing literature as to whether these extra requirements represent a true barrier to entry. Most of the government SMEs believed the requirements were not overly onerous and were worthwhile to both government and its suppliers. Most of the commercial company SMEs differed in this perception; they felt that the accounting requirements were heavily considered as a negative factor in the decision-making processes of commercial companies seeking to become government contractors. Certain factors like size of company, industry type, and years of incumbency were mentioned as possible factors that can moderate how prohibitive the accounting system requirements may be for a new entrant.

When it created CASB in 1970, Congress directed that it “shall take into account the probable costs of implementation compared to the probable benefits” when setting CAS requirements. Indeed, some of the initial amendments to the requirements reflected this sentiment; for example, the creation of a modified-CAS level of coverage in 1977 that today requires compliance with only four of the 19 standards was done in this spirit. The intent and purpose of CAS and other similar cost accounting requirements remains clear. The outstanding question, and one that is characterized by two camps of thought with some theoretical basis and limited evidence for each, is whether the cost of compliance is overly burdensome and an actual barrier for commercial company participation in the B2G market.

Some evidence that cost accounting requirements represent a barrier to commercial company participation in government, and defense, marketplace include the following:

1. There is a healthy amount of evidence and public testimony from commercial companies, defense contractors, and professional and trade associations that have expressed this view over time. The Section 809 panel, a panel established to advise Congress on streamlining defense acquisition regulations, noted in the second of three volumes of its 2018 report that several independent studies had confirmed the existence of companies that declined pursuing Government contracts due to cost accounting requirements (in most cases, CAS-covered contracts). That same report also noted that despite substantial changes in what and how DoD conducts purchases, CAS have remained largely unchanged since the 1970s except for changes in monetary thresholds. In this report, the panel recommended that CAS program requirements be modernized considering the evolving nature of both the commercial marketplace and government acquisition practices. For instance, at the time that CAS were created most major defense contracts were for hardware and it may be difficult to apply to services or software purchases. Additionally, according to the report, the growing use of indefinite quantity and task order contracts has created
issues regarding coverage and cost impact that were unforeseen when CAS were created.\[86\] The report also commented that “DoD acquisition policies, procedures, and practices have evolved, and improvements in technology, business practices, and pricing policies have lessened the government’s contract cost accounting risks.”\[86, p. 114\] Finally, the report made several recommendations intended to make CAS requirements less of a burden on the defense acquisition supplier base, repeatedly referencing Congress’s original dictate that the probable costs of implementation should be compared to the probable benefits. It concluded that to varying degrees CAS-related requirements can impose systemic, financial, and administrative obligations on contractors, sometimes substantively as in the case of contract subject to full CAS coverage.\[86\]

Various government agencies and consulting reports have also reported that regulations such as CAS can create high entry barriers for companies looking to enter the B2G market. For example, a report titled Assessing and Strengthening the Manufacturing and Defense Industrial Base and Supply Chain Resiliency of the United States prepared by the Office of the Under Secretary of Defense for Acquisition and Sustainment, included bespoke accounting standards as one DoD business practice that may have a deleterious effect on the viability of the private sector supplier base.\[87\] A Defense Business Board study titled Innovation: Attracting and Retaining the Best of the Private Sector noted that many commercial companies are focused on GAAP compliance and are likely to eschew stricter and more costly DoD contracts with associated audit requirements. That same study stated that many companies are unable to make the business case for either replacing preexisting accounting systems or developing a parallel system in order to comply with federal requirements.\[88\] Empirical evidence from Government Accountability Office (GAO) reports have also reported on the probable negative impact of CAS-specific requirements on private sector operations and intentions to become federal contractors.\[84, 89\]

2. Short of outright withdrawal from the B2G marketplace, certain contractor behavior can serve as evidence that cost accounting system requirements are a burden. For example, many companies purposely create business segments devoted solely to government contracts that remain isolated from other business units in order to avoid exposure to Government requirements. This has been reported on in government documents,\[77, 89\] is reflected in CAS-specific consulting and training,\[90\] and was commented on during several SME interviews.\[11, 47, 48, 91–93\] At a minimum, compliance with government cost accounting requirements seems to require thoughtful reorganization or management by companies, which means additional resources have to be brought to bear.

3. There are unique things about government contracting like unallowable costs that are likely to not be addressed by default in existing commercial cost accounting systems.\[11, 47–49, 68, 92, 94\] Therefore, most existing commercial systems will require at least some modification to be deemed compliant with government requirements.\[48\] Only one SME expressed an opinion that existing commercial systems were likely to be sufficient for immediate application to government contracting work.\[47\] Additionally, although many packages like QuickBooks can be tweaked, they were not originally designed to be government-compliant, so there can be unforeseen issues with customization.\[95\] Finally, the accounting system likely does not exist in isolation of other business systems (e.g.,
time-tracking system, estimating system), so implementation efforts need to take into account the complexity of interrelated systems.\cite{11},\cite{47},\cite{49},\cite{94}

In contrast to the above narrative, there are clear benefits to the government and several counterpoints that cost accounting requirements do not truly represent a barrier for a commercial company becoming a government supplier.

1. There is a strong rationale that these cost accounting systems should be in place to reflect “good” accounting practices, and that good accounting systems increase the confidence in a contractor’s business operations and ability to perform. This sentiment was encapsulated in a Federal Register response to supplier comments about rules surrounding performance-based payments: “Systems that identify costs with the projects for which they are incurred (‘job costing,’ as a broad term) are not at all unique to Government requirements. It would be highly unlikely for a fiscally sound company to have no means of identifying the costs of performing a contract.”\cite{185}, p. 19684 To that end, every SME interviewed for this study made some comment regarding the necessity of a commercial company to track costs for GAAP compliance, internal management, or loan purposes distinct from any governmental requirements. Several SMEs felt that companies likely have existing systems in place to provide cost accounting info as it is critical for business matters like reliably estimating costs on future work.\cite{49},\cite{50},\cite{95} Some SMEs mentioned that the more rigorous standards would only apply to larger companies, and these companies are even more likely to have access to this information given their commercial standing. These SMEs felt that, for example, modified-CAS requirements are largely covered by FAR 31 requirements covering cost reimbursable contracts.\cite{49},\cite{50},\cite{92},\cite{94}

2. Many SMEs commented on various benefits to the government resulting from cost accounting requirements.\cite{11},\cite{48},\cite{49},\cite{68},\cite{94},\cite{95} One benefit of the rules was that they adequately resolved the initial problem for which requirements such as CAS were created. The oversight assures taxpayers that companies are not overpricing their products or not submitting inappropriate costs for reimbursement to the government; in essence, the rules ensure fairness and accountability.\cite{49},\cite{50} Several SMEs noted that companies can try to shift costs from fixed price contracts or other underperforming government contracts to cost-reimbursable contracts.\cite{11},\cite{49},\cite{50} These SMEs also stressed that the requirements help prevent cost accounting changes that would result in greater costs to the government. There are cost savings to the government resulting from price adjustments based on contractor unilateral cost accounting changes.\cite{49},\cite{50} It was also mentioned that cost accounting standards allow the government to compare the costs of production between companies during a competitive bidding process and assist in later evaluation of contractor performance on similar products and services.\cite{147},\cite{49},\cite{50} Finally, one SME felt that the very concept of unallowable expenses in effect represents a form of cost avoidance for the government.\cite{11}

3. Beyond noting the benefits for the government, many SMEs explicitly stated that cost accounting requirements were either a necessary cost or that they even benefit contractors in some fashion. Some SMEs mentioned that any costs related to these requirements should be considered necessary for engaging in the B2G marketplace, especially on a prime contractor level.\cite{49},\cite{50},\cite{68},\cite{94},\cite{95} One SME described in detail how she felt compliance
with the rules outweighed any original costs required to do so. Several SMEs noted the cash-flow advantage to companies who qualified for progress payments by providing cost-type data. Finally, there was a consistent refrain that the government is a reliable customer that always makes its payments, which in itself is beneficial to any commercial company.

Two final themes involving small businesses and technology companies were heavily represented in the SME interviews conducted for this study. These themes will be considered in the design of the original research to be conducted for the second half of this report.

First, there was a strong sentiment among many of the SMEs that cost accounting requirements are likely to exact a greater toll on smaller companies. Although some of the system costs may be reimbursable under a government contract, some of this capability (software, staff, expertise) likely needs to be in place prior to any award. One consultant who deals with small businesses seeking to become prime contractors remarked that these businesses often do not have written policies or documentation in terms of their accounting processes and procedures. Another SME working in government contracting commented that many small businesses have not had an accounting system audit performed in the past, and that there seems to be a perception that this review was required in order to be legitimately considered for prime work. Also, there are ancillary costs that necessarily accompany the cost of the accounting software system, especially in terms of human capital and staff expertise. Most small businesses do not have a accountant who has been specifically involved in government contracting. Finally, perhaps relevant to larger companies as well, there may also be negative implications for the management processes or culture of a company. One SME offered the example of a software development company that had declined a large contracting opportunity in part because the majority of their staff balked at the timekeeping requirements of logging work hours against a specific project.

Second, several SMEs noted that government accounting requirements probably indirectly promote incumbency if incumbent firms are better situated to possess important institutional knowledge and are more likely to have legacy systems that have been deemed complaint with government regulations. One consulting agency report noted that traditional aerospace and defense (A&D) industry firms likely have incumbency advantages based on years of government contracting, and as a result technology companies less experienced with government contracting may be more inclined to sell off-the-shelf commercial products rather than engage in long-term defense contracts. This might hurt efforts to attract new, innovative companies that have not previously been awarded government contracts. As noted in the Section 809 panel report, several independent studies have shown that the government has had trouble accessing important technologies because of supplier hesitancy to accept a CAS-covered contract. Another paper found a substantial decline in new companies supplying to DoD each year over the last decade, and that the majority of first time companies were not innovative commercial technology companies. It should be noted that a direct causal link between accounting requirements and substantial decline in new DoD suppliers has not been established. There are many other potential factors at play including procurement complexity, lengthy contract timelines, security clearance.
processes, and cybersecurity requirements.\textsuperscript{[87]} However, there appears to be a possibility that accounting system requirements may in part reduce the incentive to become a DoD supplier and therefore contribute to the decline in both first time suppliers and innovative commercial technology companies.
8.0 Commercial Company Interviews

Twelve semi-structured interviews with senior-level company representatives were conducted by GMU researchers over the course of two months. These companies were mostly identified through a combination of the researchers’ personal contacts and referrals, but also through company searches of USASpending.gov and SAM.gov data. The interviews focused on the experiences of the company representatives related to government contract work and accounting requirements and addressed topics such as the decision-making processes and costs of implementing a FAR/DFARS compliant cost accounting system.

Table 5 presents the interviewee and company information for the final interview sample of this study. One interview (Company #8) did not contribute to the study as the company was founded in March 2020 and had not yet been awarded or even pursued government contracting work. All the remaining 11 interviews informed the findings for the costs of accounting system compliance while only some of the interviews (especially Companies #9 and #12) were relevant to instances where companies declined government contracts.

The objective of the interviews was to understand the impact of government accounting system requirements on commercial companies, defined to be companies that derived less than 25 percent of 2019 revenue from the following customers: Department of Defense, Department of Homeland Security, or National Aeronautics and Space Administration. This definition encountered a number of difficulties. For example, Company #7 of our interviews reported 90-95 percent of revenue came from defense dollars, but only 15 percent was in prime contract awards and so it met the strict profile of commercial companies. Company #11 is another interesting case. They were able to win a large defense subcontract that represents a significant portion of total revenue. While prime awards represent zero percent of their business, 77-85 percent of revenue ultimately supports defense work. However, Company #11 does not see defense as a growth area, instead focusing on development and marketing on commercial customers. Rather than create a federal subsidiary, Company #11 runs a second accounting system specially for federal work to stay compliant.

Besides focusing on prime awards, the profile also focused on subsidiaries rather than parent companies. Five companies were subsidiaries, but only four existed in 2019. Company #2 is an information systems startup that was less than 10 percent government revenue in 2019. In 2020, they decided to set up a subsidiary directly targeting the federal sector and installed a FAR/DFARS compliant accounting system. Federal revenue in 2021 grew to be closer to 30 percent. However, DFARS 212.102 may exempt nontraditionals from contracts with CAS or TINA requirements. Company #3, a major professional services provider, created a subsidiary in 2015 focused not only on federal, but state and local government. DoD represents 16 percent of total subsidiary revenue, with DHS and NASA a marginal amount more. They run the same accounting system across the subsidiary. Company #6 is a majority defense contractor, as is its parent company. Company #1 is a large subsidiary with 24 percent government work that was bought by a conglomerate even more focused on government. By contrast, Company #9 has 80 percent of revenue in defense prime awards but is a subsidiary of a larger commercial conglomerate.

While Companies #6 and #9 did not meet the commercial profile, Company #9 was an important interview for the study. While 80 percent of their revenue came from defense customers, Company
#9 did not have a FAR/DFARS compliant accounting system. As a result, they decline to pursue defense contracts that contain the requirement.

Companies #4 and #10 are also majority defense contractors. The research team found it difficult to verify before talking to companies whether they met the commercial company profile or not. While the recruitment material included the study parameters, some companies were given by referral. Findings from these interviews will not be thrown out in the following discussion, but instead compared and contrasted to those that met the commercial company definition.

Company #8 does not meet the profile because even though it has less than 25 percent government contracts, it has not yet contracted with government at all and thus cannot be considered a supplier. It has not even started down the path towards compliance or their first federal contract. It thus provided no insight into their experience navigating accounting system requirements. The company responded to the interview because it has donated products to government in the past and wishes to do business in the future. It is weary, however, of entering through Small Business Innovation Research (SBIR) program because of perception among venture investors.

Companies #5 and #12 are both manufacturers who have supplied DoD customers for decades, but government represents less than 25 percent of their revenue. Company #5 is FAR/DFARS compliant throughout its business units. Only one business unit is CAS-compliant, and they acquired it along with the accounting system several years ago out of bankruptcy. The CAS-compliant business unit is the only one that handles defense prime contracts, the others perform on subcontracts only. Company #12 is not FAR/DFARS compliant and never intends to become compliant. They do not seek out federal contracts, preferring to let defense customers come to them with contracts that do not have accounting system requirements.
Table 5: Interviewee and Company Information

<table>
<thead>
<tr>
<th>Company</th>
<th>Company Representative Title</th>
<th>Industry</th>
<th>Company Size</th>
<th>% Revenue from DoD/DHS/NASA</th>
<th>Business Notes</th>
<th>Fits profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Director, Government Contracts*</td>
<td>Manufacturing</td>
<td>Large</td>
<td>24%</td>
<td>Experienced DoD supplier, bought by large govt-focused conglomerate.</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>President/GM &amp; Board Director</td>
<td>Information Technology</td>
<td>Small</td>
<td>less than 10%</td>
<td>New IT company, created govt subsidiary after 2019. This subsidiary helped the company grow proportion of revenue from federal contracts from 10% to 30%.</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Managing Director, Finance</td>
<td>Services</td>
<td>Large</td>
<td>16%</td>
<td>Experienced DoD supplier. Subsidiary created a few years ago for govt, including state and local.</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Vice President/CFO</td>
<td>Services</td>
<td>Small</td>
<td>60-80%</td>
<td>Experienced DoD supplier. No subsidiaries.</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>V.P. of Finance/CFO Senior Manager, Government Compliance</td>
<td>Manufacturing</td>
<td>Large</td>
<td>15-25%</td>
<td>Experienced DoD supplier. No subsidiaries.</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>Chief Financial Officer</td>
<td>Manufacturing</td>
<td>Large</td>
<td>50-77%</td>
<td>Experienced DoD supplier, bought by large govt-focused conglomerate.</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Services</td>
<td>Small</td>
<td>15%</td>
<td>Experienced DoD supplier. 90-95% of work goes to govt, but 80% is as a subcontractor.</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Position</td>
<td>Industry</td>
<td>Size</td>
<td>FAR/DFARS Compliance</td>
<td>Notes</td>
<td></td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>----------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Founder &amp; CEO</td>
<td>Information Technology</td>
<td>Small</td>
<td>0%</td>
<td>New IT company, wants to do business with DoD but is not mature enough to go after contracts yet. Donated products to govt customer.</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>Vice President, Contracts &amp; Legal</td>
<td>Manufacturing</td>
<td>Small</td>
<td>65-70%</td>
<td>Experienced DoD supplier, bought by large commercial conglomerate. Not FAR/DFARS compliant by choice.</td>
<td>No</td>
</tr>
<tr>
<td>10</td>
<td>Director of Accounting*</td>
<td>Services</td>
<td>Small</td>
<td>40-60%</td>
<td>Experienced DoD supplier. 90% DoD and Veteran's Affairs, both prime and sub. No subsidiaries.</td>
<td>No</td>
</tr>
<tr>
<td>11</td>
<td>Sr. Vice President of Finance &amp; Operations*</td>
<td>Information Technology</td>
<td>Small</td>
<td>0%</td>
<td>New IT company, one large DoD subcontract (77-85% of revenue), but sees commercial as its future.</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>Chief Financial Officer</td>
<td>Manufacturing</td>
<td>Small</td>
<td>Less than 25%</td>
<td>Experienced DoD supplier, 100% employee owned. Not FAR/DFARS compliant by choice.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

* Additional representative(s) from the same company were present in the same interview in addition to the one listed here.
The following sections will focus on the experiences of the nine companies that implemented an accounting system compliant with government requirements. The section begins with an overview of the cost accounting systems used by all the companies interviewed for this study. It contains general information regarding the types of systems used and perceptions of the efficacy of commercial accounting systems to handle processes required by government regulations. The next subsection contains information regarding the costs of a FAR/DFARS compliant cost accounting system (e.g., software licenses, implementation consultants, upskilling or hiring staff with government expertise), including estimates of cost as a percent of revenue. The final subsection includes descriptions of any cost-benefit decision making processes undertaken by the companies as they considered becoming government suppliers or specifically pursuing cost-type contract work. It concludes with observations of the additional utility of using a FAR/DFARS compliant accounting system for commercial work or a company’s broader business operations.

8.1 Accounting System Software

Nine of the 12 companies implemented an accounting system compliant with Government requirements. Of the remaining three companies, two (Companies #9 and #12) have developed in-house, proprietary systems that are not considered FAR/DFARS compliant. The third non-compliant company (Company #8) uses an off-the-shelf version of QuickBooks and was primarily focused on tax compliance.

The three companies that were not FAR/DFARS compliant ran their accounting systems the same way across their company and did not have any subsidiaries or parent companies. Compliant companies, by contrast, were more of a mixed bag. Two commercial companies created government-unique subsidiaries which had different accounting systems than the parent (Companies #2 and #3). Two other companies (Companies #1 and #5) had different accounting systems across their business units with varying levels of compliance. This is largely a consequence of mergers and acquisitions over time. Within a business unit, however, Company #5 ran their accounting systems uniformly across commercial and government work while Company #1 had special processes for federal work that did not use FAR 12 commercial item procedures. This outcome may reflect the fact that almost all federal contracts Company #5 received were firm-fixed price or fixed price EPA, while Company #1 received a wider range of contract types including cost-type. Company #11 has no subsidiaries or business units. It runs two accounting systems to maintain FAR/DFARS compliance. Their commercial work runs on NetSuite alone, while federal work runs on NetSuite and Unanet (specially licensed to handle timekeeping). Company #11, however, cautioned that they have not tested the workability of this dual system since they have not yet been awarded a cost-type contract where it is required.

Companies that derived more than 25 percent of their revenue from federal sources were more likely to run their accounting systems the same across federal and commercial work. All four companies that did not meet the definition of commercial for this study ran accounting systems the same across their company (Companies #4, #6, #9, and #10). Of the non-commercial cohort, only Company #9 was not FAR/DFARS compliant. Company #7 also ran their accounting system the same across federal and commercial work, and while they met the definition of “commercial” company for this study with just 15 percent prime contract awards, 90-95 percent of their total business ultimately services defense customers.
The small sample of companies interviewed for this study suggest there is not a single strategy for accounting system compliance, and indeed outcomes may be contingent on the unique history of each company. Companies whose customers are primarily federal are likely to deploy a FAR/DFARS compliant accounting system throughout their company and run it the same regardless of customer type. Company #9, however, is a glaring example of the opposite. It is not compliant at all. By contrast, companies that focus on commercial work have a few strategies available to them. First, create a government-only subsidiary. Second, create compliance within certain business units but not others. And third, maintain multiple accounting systems in the company and run FAR/DFARS compliant processes only for federal contracts requiring it.

Most of the companies have deployed a FAR/DFARS compliant accounting system specially designed to handle government accounting requirements, with Deltek Costpoint present in half of the companies. Five of the companies (Companies #3, #4, #7, #10, and #11) purchased their system to replace an existing commercial accounting system while one start-up company (Company #2) had decided to proceed at the outset with such a system. Two of the other companies inherited their compliant accounting systems through company acquisitions. One of these companies (Company #5) was using a previously developed in-house system while the other company (Company #1) had similarly chosen to retain the commercial accounting systems were already embedded in their multiple business units. Only one (Company #6) of the nine companies with FAR/DFARS compliant accounting systems was using a customized version of a commercial accounting system, in this case PeopleSoft. Interestingly enough, this company is a majority defense contractor and so is its parent.

Of the 11 companies that performed on defense contracts, eight incurred costs to implement a FAR/DFARS compliant accounting system. Company #5 reported that it did not incur additional costs to implement or even maintain their FAR/DFARS accounting system. It’s CAS-compliant business unit was obtained in a company acquisition, and so it did not know the cost involved with its implementation. Companies #9 and #12, on the other hand, do business with DoD without a government approved accounting system. Company #9 is a sole source provider of its product. Company #12 is not a sole source provider but is in a concentrated sector within the United States. Neither Company #9 nor #12 actively seek to bid on defense contracts, but rather let the customer come to them.

Several company representatives provided additional details about why their company had chosen to implement a specialized accounting system rather than attempt to modify an existing commercial system. Interestingly, none of the companies appear to have conducted an extensive cost-benefit analysis for implementing a new government-compliant accounting system versus adapting an existing system to meet government compliance. Rather, their respective decisions to use specialized government accounting software platforms were mostly grounded in prior, difficult experiences with using commercial systems for government contract work. For instance, one company representative provided extensive detail about the difficulty of getting CLIN-level detail and proper allocation of indirect costs out of their previous commercial system (PeachTree) (Company #7).

Two companies mentioned QuickBooks as their original cost accounting system that had to be replaced with software capable of handling government requirements. One of these companies
(Company #10) reported that QuickBooks was capable of being compliant earlier when the company only held three government contracts, but even so it required additional work to make it compliant. With the advent of more contracts it turned out to be too cumbersome to maintain. Another company reported that they had failed an earlier audit involving a Department of Energy contract; the experience highlighted to management that a new accounting system and set of policies was going to be required for future DoD work (Company #2). Finally, another company reported that they had initially shared an SAP accounting system with their parent company, but that over time all its systems and operations had to be firewalled from the larger organization in order to adequately handle more stringent levels of contract compliance (Company #3).

Unfortunately, the representative for the only company that modified a commercial system to be FAR-DFARS compliant (Company #6) was a new employee of that company and could not provide any details about that decision. He did, however, mention that while “[PeopleSoft] has CAS-compliant capabilities, it is just more effort to get out of it what you need for government reporting” and preferred the ease of using Deltek Costpoint software in a previous company.

**Table 6** below displays cost accounting system information for the companies included in this study. Details include what FAR/DFARS compliant cost accounting system is currently being used (if applicable), how the system was acquired, what the prior system was, whether the company is FAR/DFARS compliant, and business notes that provide additional context to the information.
### Table 6: Accounting Systems of the Companies in the Interview Sample

<table>
<thead>
<tr>
<th>Company</th>
<th>New Cost Accounting System</th>
<th>Acquired the system by…</th>
<th>Former System</th>
<th>FAR/DFARS compliant?</th>
<th>Business Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No Change</td>
<td>Company acquisition</td>
<td>Multiple (JD Edwards, Deltek, SAP)*</td>
<td>Yes</td>
<td>Has 10 or 11 different accounting systems at separate business units obtained through acquisitions, varying degrees of FAR/DFARS compliance. Any non-FAR 12 federal contracts must go through lengthy legal review, ensure compliance. Takes manual effort to perform job cost and comply with govt requirements.</td>
</tr>
<tr>
<td>2</td>
<td>Deltek Costpoint</td>
<td>Bought newly</td>
<td>Unknown</td>
<td>Yes</td>
<td>Created federal subsidiary that is FAR/DFARS compliant while the parent company focuses primarily on financial accounting. Company has not yet had to run their FAR/DFARS compliant system. Waiting until there's a large enough cost-type contract that makes business sense.</td>
</tr>
<tr>
<td>3</td>
<td>Deltek Costpoint</td>
<td>Bought newly</td>
<td>SAP</td>
<td>Yes</td>
<td>Accounting runs the same for all customers within govt subsidiary, but differently from parent company. Mostly competitive FFP &amp; T&amp;M contracts, 8% cost-type.</td>
</tr>
<tr>
<td>4</td>
<td>Deltek Costpoint</td>
<td>Bought newly</td>
<td>QuickBooks</td>
<td>Yes</td>
<td>Accounting run the same for all customers. Primarily a defense contractor. 95% FFP contracts, some T&amp;M. Avoids cost-type.</td>
</tr>
<tr>
<td>5</td>
<td>In-house</td>
<td>Company acquisition</td>
<td>In-house</td>
<td>Yes</td>
<td>Acquired business unit that does all prime contracts, is CAS-compliant. Other units are subcontractors to govt, are FAR/DFARS compliant. Mostly FFP and fixed price EPA contracts.</td>
</tr>
<tr>
<td>6</td>
<td>PeopleSoft</td>
<td>Converted existing system</td>
<td>PeopleSoft</td>
<td>Yes</td>
<td>Accounting run the same for all customers. Primarily a defense contractor. Prefer FFP with FAR 12, but 20% is cost-type development work. About 10% of work is CAS-covered.</td>
</tr>
</tbody>
</table>
Accounting run the same for all customers. Primarily a defense subcontractor. Work shifted over time from mostly cost-type to now mostly fixed-price with a little T&M. Excepts greater cost-type in future.

Does not run a cost accounting system, focuses on financial and tax reporting. Has not yet been awarded a govt contract.

Accounting runs the same for all customers. Primarily a defense contractor. Says 90% of product cost is "assumption." Does not accept any govt contract with accounting system requirements.

Accounting run the same for all customers. Primarily a defense contractor.

Runs accounting systems differently for govt customers, adds Unanet layer on top for timekeeping. Has not been used yet on a federal contract.

Accounting run the same for all customers. Does not accept any govt contract with accounting system requirements.

* The company representatives did not mention any instances of converting existing systems or purchasing other systems newly. All existing systems were kept in place after company acquisitions.

** The company will retain the former system to handle all accounting functions except timekeeping and indirect costs recording, functions which the new system will handle.
8.2 Costs of Implementation and Maintenance

This subsection addresses the costs reported by existing government suppliers for implementing and maintaining a government-compliant accounting system. First, costs as reported by company representatives are analyzed according to three categories: (1) Startup costs including initial configuration and consultants; (2) Employee costs stemming from increased staffing and higher compensation rates; and (3) Accounting system software costs. Second, the costs will be estimated as a percent of company revenue. Third, ancillary costs will be addressed including other concerns reported by company representatives that cannot be reported in terms of dollars or labor hours.

8.2.1 Estimated Cost of Compliance

In most cases, companies did not know the full cost of fulfilling government’s accounting system requirements. Eight out of nine companies that implemented a FAR/DFARS compliant system reported additional expense. Yet the bases of estimates varied from one company representative to another, often excluding various elements of cost. Table 7 below summarizes the additional cost of implementation and maintenance of an accounting system that meets government requirements relative to the prior system cost.
### Table 7: The Cost of Accounting System Compliance Compared to the Prior System

<table>
<thead>
<tr>
<th>Company</th>
<th>Startup Costs</th>
<th>Annual Employee Costs</th>
<th>Annual Software Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not available.</td>
<td>FAR 15 is bw 4 and 8 times greater administrative costs compared to FAR 12, includes compliance to six FAR/DFARS business systems.</td>
<td>Not reported.</td>
</tr>
<tr>
<td>2</td>
<td>$1 million first-year costs including consultants, employee salaries, and software licenses.</td>
<td>Had to hire govcon accountant with 30 years of experience and a contract hire as relief valve for staff accountant.</td>
<td>Not reported.</td>
</tr>
<tr>
<td>3</td>
<td>Not available.</td>
<td>Of 14 people in the accounting department ($2 million a year budget), 10 exist solely to satisfy govt requirements.</td>
<td>Not reported.</td>
</tr>
<tr>
<td>4</td>
<td>Not available.</td>
<td>One additional person to manage indirect costs.</td>
<td>Accounting system license cost four-times more than commercial.</td>
</tr>
<tr>
<td>5</td>
<td>Not available.</td>
<td>Little difference.</td>
<td>No additional cost.</td>
</tr>
<tr>
<td>6</td>
<td>Not available.</td>
<td>Not Reported. 15-20 total people in accounting compliance.</td>
<td>Not reported.</td>
</tr>
<tr>
<td>7</td>
<td>$100,000 and one year.</td>
<td>Small increase.</td>
<td>$100,000 additional cost for licenses.</td>
</tr>
<tr>
<td>8</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>9</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>10</td>
<td>$25,000 for consultants.</td>
<td>Not Reported. Total added cost reported at $150,000.</td>
<td>$32,000 for licenses.</td>
</tr>
<tr>
<td>11</td>
<td>$10,000 for consultants.</td>
<td>Not Reported.</td>
<td>$30,000 additional license costs on top of existing licenses that cost $36,000 annually.</td>
</tr>
<tr>
<td>12</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Monetary costs differ substantially based on multiple factors. This includes size of the company and the number of users, the business sector, the types of contracts they take on, whether they run job-cost systems for commercial customers, and other context specific to the company.

The wide range of accounting system costs also came out of our subject matter expert interviews. For example, SME # 8 estimated the additional employee costs to gear up for compliance was $700,000, not including the cost of the system or consultants. SME #1 was the Director of Government Accounting and Compliance for a large DoD contractor. He reported spending at approximately $100 million over the past two years on modernizing the accounting system. He said most of the large defense contractors have invested about the same but at a minimum the total cost is in the tens of millions.

It is difficult to find corroborating information in open sources. However, market research on FAR/DFARS compliant accounting systems provided additional details about configuration and licensing costs. The market research included looking at pricing sheets as well as informal discussions with software vendors. Most accounting system software are priced by the total number of employees at the company. Software vendors confirmed that the per license cost goes down marginally as the number of employees goes up. For a company with 50-60 employees, annual license costs per employee range between $400 and $700 whereas commercial accounting software counterparts are between $100 and $200 (often on the lower end). As for configuration costs, estimates range between $9,000 and $25,000 for a small company of 50-60 people.

These prices seem in-line with the information provided by company representatives. Two companies reported how the cost of a FAR/DFARS compliant accounting system compared to their prior or other commercial accounting systems. One company reported Deltek license costs of $531 per person per year for each of their 48 staff. However, the cost jumped to $710 person per year for 1099 workers. That same company also reported that their previous QuickBooks licenses (last held in 2018) had been roughly $120 person/year (Company #10). This is comparable to the other company that had also previously used QuickBooks; that company’s representative estimated that the licenses for their previous off-the-shelf commercial accounting software had cost about 25% of the licenses for specialized FAR-DFARS-compliant software (Company #4).

Several other companies offered additional cost estimates. One small, information technology company of 100-150 people reported Unanet costs of $30,000 a year and NetSuite costs of $36,000 a year but cautioned that they had only licensed the timekeeping module of Unanet for their business. A small services company (Company #7) with 200 staff estimated the cost for initial training, licenses, and start-up to be $100,000, with annual maintenance costs to be $100,000. This excluded additional costs of accounting staff effort within the company. Finally, a small, startup information technology company estimated $1 million for total costs over the first year of implementing a FAR/DFARS compliant accounting system, mostly for infrastructure, building technical connections to other business systems, hiring personnel with government experience, and getting expert advice from what he considers a “cottage industry.” (Company #2)

Multiple SMEs and company representatives reported the largest cost driver for contract compliance was the personnel needed to support compliance work and that this was driven by the contract type. A government SME stated, “For the most part, fixed price contracts do not trigger
the requirement, however, cost reimbursable contracts do. The most common is cost plus fix fee” (SME interview #9). This same relationships between cost and contract type were echoed by multiple contractor representatives. “We like to stay in the FFP contracts. There is a lot more maintenance in a cost-type contract.” (Company #4) The representative of Company #6, a large defense-focused firm, said that the personnel required for accounting compliance scales with cost-type contracts. “The volume of transactions and number of issues will be greater.” The Cost Accounting Standards were also a concern to him. “It’s a few, large CAS-covered contracts that drive all the work.” About 10 percent of their contract work was CAS-covered.

8.2.2 Additional Cost for Compliance as a Percent of Revenue

Determining the additional cost as a percent of annual revenue did not provide a consistent percentage due to many factors. In our sample of companies, revenue did not reliably correlate with additional costs of government accounting system requirements. As discussed above, the most significant drivers of additional costs for compliance appears to be the type of contract as well as number of employees. Additional cost variances were caused by the type of business and the number of accounting systems used by the company. Due to these complexities, none of the companies provided an estimate for the additional cost as a percentage of revenue. However, GMU researchers were able to calculate rough estimates for five companies.

Two companies were able to provide enough information to directly calculate the additional cost as a percentage of revenue, one for annual maintenance and one for implementation. To determine the additional cost for companies with less information we constructed a simple cost model. In this way we estimate the additional cost of maintaining a compliant accounting system as a percent of revenue for three more companies.

Company #10 is a small business with 40-60 percent of revenue derived from defense customers. The company provided both the current cost of their compliant system ($250,000) and their estimate for the total cost if they were not compliant and instead used software such as QuickBooks ($100,000). Both estimates included the software, employees, and all other costs. In this case, the additional cost of accounting compliance is $150,000, or 1.5% of their $10 million annual revenue. This is an on-going cost that the company incurs every year.

Company #2 is a small business with 10 percent of revenue derived from federal sources in 2019. The following year, they stood up a federal subsidiary that is FAR/DFARS compliant. They also believe it could be CAS-compliant if necessary. The representative reported that the initial rationale for creating a federal subsidiary was accounting compliance. The company went through a DCAA audit after receiving a T&M contract and received several deficiencies. The total cost directly related to accounting system in the formation of the subsidiary, including consultants, employees, and software, was $1 million and one year, or roughly 4 percent of the total parent company’s revenue in 2019. However, over the course of implementation in 2020-2021, the company grew its revenue, particularly in defense contractors. As a percentage of 2021 revenues, the implementation cost of accounting system requirements was just above 2 percent.

Company #5, a large manufacturer, stated it had little or no additional costs of complying with government accounting system requirements, or zero percent of revenue. This company primarily
worked on firm fixed price or fixed price EPA contracts. They had not taken on a cost-type contract in at least 10 years.

GMU researchers were able to calculate the additional cost as a percentage of revenue for three other companies by constructing a cost model. SME #6 and representatives from Companies #10 and #11 reported that the average wages for an accountant with no government accounting experience is approximately $100,000 per year and $150,000 per year for an accountant with government experience. For comparison, the Bureau of Labor Statistics reported in the May 2020 Occupational Employment and Wage Statistics survey that accountants and auditors make an average annual wage of $81,660 while the 90th percentile accountant/auditor earns $128,680. Moreover, the Employer Cost of Employee Compensation survey reports that 68.4 percent of an employee’s total compensation costs are covered by wages for management, business, and financial occupations. This means the total cost of an average accounting employee is nearly $120,000 (or $81,660 / 0.684). This helps validate the ballpark estimates provided in the conversations. The following analysis uses the rough annual estimates of $100,000 for a regular accounting professional and $150,000 for one with experience in government compliance. Moreover, accounting software costs detailed above suggest that FAR/DFARS-compliant software licenses are bought at roughly a $400 premium for every employee in the company on an annual basis.

Using the assumptions above to dollarize employee and software licenses costs, additional estimates of cost as a percent of company revenue are possible to calculate for annual maintenance costs of compliant systems. For example, Company #2 said they had to hire an accountant with 30 years of experience in compliance with government accounting (extra $50,000 per year), as well as a full-time contract hire as a relief valve for their staff accountant (extra $150,000 per year). With an estimated 30 individuals in the federal subsidiary, the additional software cost is roughly $12,000. Taken as a proportion of the parent company’s total revenue of $25 million in 2019, this represents 0.85 percent. While the company might want to prepare for growing defense contracts, it is worth noting that consultants may artificially increase demand for their services by driving excessive compliance. DCAA also provides information and consultation on accounting requirements through small business focal points.

Company #3, a large professional services company, had a revenue of roughly $10 billion in their government subsidiary. The company representative stated it had an additional 10 employees on staff solely devoted to federal accounting compliance, dollarized at $1.5 million a year. In terms of software license costs, the subsidiary employs roughly 75,000 individuals implying an additional license cost of $30 million ($400 per employee x 75,000). Together, the $31.5 million in additional accounting compliance costs represents 0.3 percent of revenue.

Company #4, a small services firm focused on sustainment activities for defense customers, reported requiring just a single additional employee to manage indirect costs ($150,000) and incurred four-times greater costs in software licenses per employee ($400 x 500 employees, or $200,000). The additional cost of accounting system compliance for government work is estimated at 0.18 percent of their $200 million revenue.
The estimated cost of accounting system compliance provides a wide range of estimates, from zero percent at Company #5 to 1.5 percent for Company #10. However, both companies on the higher end were both small companies. The three on the lower end were larger companies who have been supplying defense customers for many decades (Company #4 is classified small by the SBA thresholds but is still relatively large with more than $200 million). The information is shown in Table 8 below. As previously discussed, there are numerous other factors affecting the accounting compliance costs besides company size.

**Table 8: Estimates of the Additional Cost of Compliance with Government Accounting System Requirements as a Percentage of Revenue**

<table>
<thead>
<tr>
<th>Company</th>
<th>Type</th>
<th>2019 Revenue ($M)</th>
<th>Annual Maintenance</th>
<th>First-Year Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Not Commercial</td>
<td>$10</td>
<td>1.50%</td>
<td>--</td>
</tr>
<tr>
<td>2</td>
<td>Commercial</td>
<td>$25</td>
<td>0.85%*</td>
<td>4.00%</td>
</tr>
<tr>
<td>4</td>
<td>Not Commercial</td>
<td>$200</td>
<td>0.18%*</td>
<td>--</td>
</tr>
<tr>
<td>5</td>
<td>Commercial</td>
<td>$500</td>
<td>0.00%</td>
<td>--</td>
</tr>
<tr>
<td>3</td>
<td>Commercial</td>
<td>$10,000</td>
<td>0.30%*</td>
<td>--</td>
</tr>
</tbody>
</table>

* Estimated by dollarizing additional employee requirements at $150,000 per year and an annual accounting software premium of $400 per employee.

### 8.2.3 Compliance Considerations

**Technical modifications and manual effort**

More than half of the companies (Companies #1, #2, #3, #6, and #10) described “significant” additional resources that had to be diverted in order to make their FAR/DFARS compliant accounting system fully functional. Two other companies (Companies #4 and #5) acknowledged that although ongoing efforts to use the system were not labor-intensive or costlier than their commercial work, there had been substantial costs to implement the system along the lines described by the other companies. Importantly, both of those companies also reported that their systems and processes had been in place for over two decades.

The most frequent ancillary cost remarked upon by company representatives was the additional work to integrate the new FAR/DFARS compliant accounting system with other business systems (Companies #1, #2, #3, #5, and #6). This difficulty was not reserved for long-established companies with legacy business systems. The representative for the startup information technology company (Company #2) described the frustration of having to build an Application Protocol Interface (API) to make their accounting system properly connect with their travel management system (SAP Concur). This sentiment was similarly reflected in comments made by some of the other company representatives. For example, another company representative (Company #3) spoke about “Excel files being passed back and forth” between different departments and the
parent company because of the lack of proper systems integration ever since the subsidiary moved to their FAR/DFARS compliant accounting system in 2015.

The other major category of additional work involved the need to manually manipulate the data produced by the accounting system. Five companies (Companies #1, #2, #3, #6, and #10) commented that despite the specialized nature of their cost accounting system, additional manipulation of the resulting data was still required to be compliant for government work. As one of these company representatives phrased it, the “volume of transactions and potential issues are just greater, the complexity as well… [especially] with CAS, the audit scrutiny, the number of audits, will grow exponentially” (Company #6). Two of those same companies (Companies #1 and #2) also reported that extra work was required to properly incorporate the data with their GAAP-required reporting. Finally, several companies described challenges to roll-up or reconcile the information with their parent company or other business segments (Companies #1, #2, and #3).

**Staff and consulting personnel**

A few company representatives spoke of cost factors involving staffing that can accompany the technical tools required for government contracting work. These factors included needing additional staff or upskilling existing staff, hiring people with specialized government experience, and hiring consultants, especially during the implementation phase of a new accounting system.

Most frequently, company representatives spoke of needing more staff to handle government compliance. One company representative reported that on a previous job working for one of the company’s subsidiaries, saying “the staffing we had supporting our highly customized version of SAP was substantially greater than anything you would see on the commercial side” (Company #1). A representative for another company mentioned that “one thing for sure you need in a government environment is someone to manage your indirect rates, so that is probably one more person on your staff. If I had to follow CAS, I would need another person just to handle the disclosure statement” (Company #4). Another company representative reported having at least 10 people on staff directly interacting with government auditors that would not normally exist on their commercial side (Company #3).

One company (Company #4) that reported little present-day burdens associated with their accounting system said it took about a decade to develop the internal knowledge and culture for effective government work. The other company that had similarly reported no significant current burdens acknowledged that even though “there are no additional costs to respond to government standards because they have been adopted throughout the company, there is still a need to understand the government accounting process beyond the system itself,” resulting in additional new-staff training of six-to-twelve months to get up to speed on government-specific requirements (Company #5).

Sometimes, rather than requiring more staff or upskilling existing staff, some company representatives spoke of the necessity to hire people with specialized government experience. For instance, one company CEO acknowledged that due to the expected compliance requirements he searched longer, paid more, and hired earlier a controller with specific government accounting experience (Company #2). The Director of Accounting for Company #10 noted that the company would not have been able to successfully switch to a FAR/DFARS compliant system without her
20+ years of experience working for various Federal agencies (DCAA, State Department, and Internal Revenue Service). The representative for Company #6, who had previously worked as a government accounting compliance consultant, described the value of “expensive” staff like himself because he was knowledgeable at setting up organizational structures to minimize negative impacts on operations that can result from high levels of audit scrutiny. Although not every company commented on the potential difficulty of recruitment, only one company explicitly reported no difficulty with hiring people of a certain type or level of expertise in government accounting (Company #5).

Finally, several company representatives (Companies #1, #2, #10, and #11) mentioned the need to hire consultants to assist in the implementation of the accounting system and the accompanying policies and procedures. Two of these companies (Companies #10 and #11) mentioned that the consulting companies had been referred by their respective accounting system providers, with one company (Company #10) estimating the cost of the consulting team at half the total cost of implementation.

**Negative impacts on overall company operations**

More than half of the company representatives (Companies #1, #2, #3, #6, #7, and #11) spoke about how government accounting requirements can produce negative impacts on company operations or force a company to make decisions that it would not otherwise make. This was expressed in a variety of ways by different representatives, but most of the comments highlighted the practical differences between commercial work and government work more heavily focused on compliance.

One representative mentioned that his company (Company #1) was unable to “grow internal teams organically anymore” and that it was hard to get financing when using the same instance of an accounting system for both commercial and government contract work. Another representative in that same interview noted that many administrative tasks were streamlined more easily on the commercial side because they could be handled within other functions, but that it was not feasible to do this on the government contracts side. A representative for another company (Company #2) noted that the need to always maintain a focus on compliance slows down business cycles in general, and that the fear of doing the wrong thing (e.g., accidentally mischarging time, taking someone out to dinner, etc.) means that “there has been a significant portion of distraction cost and team labor to get adjusted.”

A few representatives (Companies #3, #6, and #12) noted that despite the benefits of running a company on a single system, this was a double-edged sword because it is hard to truly bifurcate operations in a hybrid company. One company representative characterized several managerial decisions (e.g., setting up two distinct procurement departments) as “not cost-effective, but done in order to maintain the separation… you sometimes have to make decisions in the business that you would not normally do; inefficiencies and redundancies can result, but it is necessary to maintain the firewall with the commercial business” (Company #6).

Another company operation that was highlighted as negatively impacted by government compliance requirements was timekeeping procedures. This arose as an issue for those companies that reported having an already established culture of not tracking staff time on specific projects.
Staff timekeeping issues was also mentioned as a key issue for the two companies (Companies #9 and #12) that have opted to not pursue government work that requires a FAR/DFARS compliant accounting system. For most of the companies that spoke on this issue, it revolved around explaining the business need of time-tracking to employees.

One company representative (Company #7) spoke about how timekeeping for government projects required extensive back-and-forth interactions between a manager and an employee to ensure it was 100% accurate even though most of the employees did not care about specific line items (in his words, “Blue-collar workers don’t like doing this”). He noted that even though white-collar staff were used to time tracking, previously blue-collar workers were accustomed to clocking in and out, not attributing time to jobs. Supervisors had been responsible for attributing time to jobs, but that process was no longer workable for government contracts. Everyone had moved onto Unanet timesheets. Before the move to Unanet, whenever the company wanted to subcontract on defense work with a prime contractor, it had to use the prime’s accounting system. “Timekeeping is the hardest piece.”

Another company representative (Company #11) spoke about the efforts to implement a culture of detailed time tracking in his current position. He also mentioned how it took years in a previous company to get people to properly track hours. He highlighted how his company’s government work included strict guidelines for tracking time that complicated his overall business operations, including no bulk tracking, not being able to log vacations in advance, and having to build additional approval steps into the process. Finally, in a lengthy segment of another interview, another company representative touched on both functional and cultural aspects that made timekeeping for government contracts more onerous:

“When we kick off a contract, we have to understand with a different level of care how to structure that contract so that it translates into revenue recognition, how to bucket and track costs against different CLINs, these are all different practices from the commercial market. I am not saying that commercial companies care less, but there is a different amount of traceability that is required. Even when it is not per se required, you still have to maintain that focus on compliance; you can’t just not flex the muscle, you still have to do it right. On the qualitative side, it has caused people to slow down their pace, because they are worried about doing something wrong…. You can see this cloud hanging over their heads sometimes, and I think this is a big piece of it.” (Company #2)

8.3 Cost-benefit analyses to become a Government supplier

As mentioned earlier, there was no example of a company having conducted an extensive cost-benefit analysis of implementing a new government-compliant accounting system versus adapting an existing system to meet government compliance. Similarly, and even more interestingly, none of the companies indicated that they had conducted a detailed cost-benefit analysis to become a Government supplier in the first place. Rather, their decision-making seemed to be characterized as a more subjective estimation of the value proposition of government work. Along these lines, many company representatives spoke about the importance of having either a particular “government” mindset or a strong commitment to compete in the B2G market. They also highlighted operational benefits derived from their FAR/DFARS compliant system and rigorous cost accounting practices that went beyond gaining the ability to engage in Government work.
Several companies mentioned that the nature of their work dictated the type of contract they would normally pursue. For example, a sustainment company (Company #7) mentioned that they often received equipment without knowing their condition in advance, which meant that cost-type contracts were most appropriate for their work. Alternatively, a manufacturing company (Company #5) mentioned that they operate in a mature industry and because cost-plus contracts are usually associated with early-stage developmental products, they don’t typically pursue them and that it had been ten years since their last one. A software company (Company #11) similarly mentioned that the majority of their contracts are “naturally fixed” price, and a management advisory firm representative (Company #10) described firm-fixed price contracts as the right balance of flexibility and firmness for their services.

Nearly all the representatives for the nine companies that implemented a FAR/DFARS compliant accounting system pointed out that their primary purpose in doing so was to gain access to the B2G market. Several of these companies (Companies #1, #2, and #7) mentioned the practical benefit that stable government work can often balance a bad year of commercial business, while others highlighted a cash flow advantage (Company #1) or support for developmental projects (Company #6). One of the companies (Company #7) had implemented their FAR/DFARS compliant system precisely because they realized they are losing work by not having the proper system in place. Another company representative described his thought process as follows:

“[This business] is a mix of leveraging what has worked really well for the parent company in commercial markets, but it is also meeting the customer where they are, which is not where the commercial markets are. In order to be most relevant, I think we have to work with specific customer groups, specific colors of money, and some of that will be in the cost-type world of FAR 15. And knowing that, we have to play a different game.” (Company #2)

Several company representatives cautioned that their approach to engaging in the B2G market was characterized by a careful strategy to pursue certain types of contracts only if it was deemed worthwhile. This will be dealt with in more detail in a later section.

8.3.1 A “Government” Mindset

Several company representatives described how being a government supplier requires a different mindset from being a commercial-oriented company. Comments made along these lines suggested that this often meant that company operations had to be looked at through the lens of what will satisfy government regulators. As described by one company representative, this was being able to see from the government’s perspective what would be considered “reasonable.” (Company #3) Another company representative characterized this as making sure they saw “eye-to-eye” with their contract officers and DCAA auditors (Company #1).

As part of this “government mindset” there was the idea that it required a deep level of commitment to be successful in the B2G market. This was alternatively expressed as either an express desire to work in the realm of cost-plus contracts or that following the rules was simply a necessary requirement of this realm. One representative noted that “It was an absolute business decision at the time that we were going to move into the government space and we needed to be able to do
that appropriately, [even] knowing that you were going to have to either educate the people you have or bring on the expertise that you need.” (Company #4)

A representative for one of the companies that reported no difficulties with accounting requirements because they had been adopted decades earlier was asked if he would have any issues as a new company in the market. His reply was illustrative of the sentiment expressed by many of the company representatives that this is what it takes to be a government supplier:

“My personal perspective would be ‘No, that would not be a deterrent’, as long as that's a desire of the way I wanted to position my organization and my company going into it. So, if I was about to start my own company, and I said I wanted to get into being a Defense contractor, my personal perspective would be, ‘Okay, here's the field, what are the rules that I have to play by and let me figure that out’. It would not deter me… [When we] take a step back and look at our organization as a whole, there's nothing that we haven't been able to overcome to continue to participate in expanding our Defense related business.” (Company #5)

The best example of this commitment is two companies (Companies #2 and #11), neither of which has yet performed on cost-type contracts, already having implemented a FAR/DFARS compliant accounting system in anticipation of the work. Although both companies have only performed on FFP government contracts or relied on commercial sales so far, they both felt it beneficial to prepare for cost-type work in the event an opportunity arose. As one company noted, “It was a cost of doing business. If we were serious about growth in the segment, at going after the largest addressable market that we could… we just said, ‘It is what it is’” (Company #2). The other company (Company #11) noted that while the costs were easy to measure and the possible benefits were harder to judge, they were being purposely proactive about implementing the system to engage in cost-type work.

8.3.2 Operational Benefits

Nearly all the nine companies acknowledged that they had reaped additional benefits from having a government-compliant accounting system that went beyond simply being eligible for certain government contracting opportunities. In fact, only one company representative (Company #6) explicitly said that there were likely no additional benefits beyond bidding on government work, while another representative (Company #7) equivocated by saying that although the accounting system and associated requirements probably contributed to better business operations on all contracts, the primary purpose of their system was for growth opportunities in the government contracting space. The remaining companies all spoke positively about how the more rigorous attention to costs and contract compliance had elevated the overall operations of the company.

Several company representatives (Companies #3, #4, #7, and #10) made comments indicating that many of the government accounting requirements do not demand more effort or information out of a company than it would otherwise want anyway. As one company representative described it, “The rules force you to have a granular understanding, but you would want to know the info internally anyway” (Company #3). Another representative (Company #10) noted that a company, especially one that used job-order accounting, would use the same type of accounting anyway. Another company representative (Company #2) acknowledged there was no more guesswork on
pricing products; he felt that his company had become “smarter at lower levels of the company about how we are creating value” for even non-governmental clients. This line of thought was also expressed by another company representative (Company #7) who felt the requirements forced their managers to consider the implications of change order costs in a more thoughtful way.

Other companies noted how they appreciated having the detailed cost information for internal profitability analyses and evaluating the financial status of specific projects. One company representative (Company #10) noted several specific benefits derived from her FAR/DFARS compliant system, such as having insight into indirect rates, making smarter decisions on pricing and costing on bids, and deciding on investments based on desired revenue levels. The representative for one of the companies (Company #11) that has not yet been awarded a government cost-type contract said he wished he already had this type of cost information to be able to perform client profitability analyses. Even one of the companies that have chosen to not implement a FAR/DFARS compliant accounting system still acknowledged the potential value to be gained from using a more precise cost accounting system. As that company’s representative characterized it, “most companies can get good operational benefits from the data, but we just don’t need as much of it as the government requires” (Company #12).

A couple companies also spoke of how operational benefits had gone even beyond the company itself to affect other business units or parent company operations. One company representative (Company #2) spoke of how their cost accounting procedures had helped inform the employee timekeeping practices of their parent company. Another company representative reported that their operational capabilities had exceeded those of their parent company, saying how while they had started to use cost data to perform internal profitability analyses their parent company was still seeking to develop their own capacity to do so (Company #3).

A final intangible benefit frequently mentioned in the interviews was that having a FAR/DFARS compliant accounting system signaled competency to both governmental and commercial clients (Companies #2, #3, #4, #6, #7, and #10). For some companies this was a necessary part of becoming a government supplier. As one company representative put it, “if we are going to be entrusted as a partner in this space, we have to be compliant. We have an obligation to do it the right way” (Company #2). This sense of providing customers with the sense that the company is “doing things the right way” was also explicitly mentioned by another representative (Company #6). Another representative phrased it as “the government relaxes when they see a [FAR/DFARS] compliant system in place” (Company #7). This sentiment was echoed by another representative (Company #10) who stated that having an accounting system capable of accumulating, segregating and reporting costs for all types of contracts gave confidence to their partners (larger prime companies) and government clients.
9.0 Government contracts declined or discontinued (SOO#5)

9.1 Common Characteristics for Declining Government Contracts

To determine any possible correlation between companies which declined or discontinued government contracts we assessed the characteristics of the twelve companies (see Table 5 above). Six companies stated they have not declined contracts due to FAR/DFARS compliance requirements (Companies #3, #4, #6, #7, #10, #11). Company #8 was in the initial stages of pursuing government contracts but had not considered FAR/DFARS compliance yet. Five companies reported either declining or not pursuing Government contracts in the past where accounting system requirements played a factor. Size and industry did not appear to be a common characteristic for declining government contracts based on the accounting system requirements alone.

- Company #1, a large manufacturing company, has declined contracts but made it clear it was due to more than just accounting system concerns. “The reason is more than cost; you have a risk of reputational harm if not compliant. Negative past performance can result in sanctions, making you unable to get financing. There is also more audit scrutiny. If DCAA finds something in one unit, it will look in all units. We want to be very careful.”

- Company #2, a small IT firm, reported turning down cost-reimbursable contracts due to a fear of failing a DCAA audit despite having recently put in a FAR/DFARS compliant system “We won’t pressure test a DCAA audit on low dollar contracts… For a $100,000 T&M or CPFF that feels like a one-off, the cost would be beyond the benefit.”

- Company #5, a large manufacturing firm, stated they have declined work due to the type of contract and low profitability. “We have turned down business for all of the above reasons... We absolutely decide on contracts based on contract type. FFP is very difficult for us in the steel industry because of the price fluctuations. When we price in the risk it makes us uncompetitive.”

- Company #9, a small services company, has not pursued contracts and has strategically chosen to not become FAR/DFARS compliant. “[It’s] too difficult to get involved with the federal government. We've made decisions not to proceed on certain programs, too high on the regulatory side, didn't make sense to us.”

- Company #12, a small manufacturing supplier, has not pursued contracts and has strategically chosen to not become FAR/DFARS compliant. “There are things we don’t get to quote or bid because we are not set up for that. I don’t know of any business we have said no to but we have said we won’t comply with certain standards. We are not aware of the business that has not come to us because of our limitations. We could go more aggressively towards it. Until we get to a point where the government accounting is not onerous were not going to consider it.”

(74)
9.2 **Company Information Sources and Strategic Approach**

The process companies used for deciding not to pursue government contracts was not well documented and relied more on strategy and general knowledge than on a quantitative cost-benefit analysis.

*Consulting Other Companies or Government Suppliers*

None of the company representatives specifically stated they consulted with other companies or suppliers before declining to pursue a contract. However, each representative we spoke with had a mix of prior experience and knowledge of other companies which influenced their decisions. One large manufacturing company referenced their competitor which did not pass an DCAA audit and as a result was denied financing for several years (Company #1). Losing financing on big contracts was a significant threat to their business strategy. The concern about failing a DCAA audit was shared by Company #2, a small IT company. They recently implemented a FAR/DFARS compliant system but had not gone after a contract which required it because they did not want to go through the process of auditability if the contract value was not high enough. “Is the juice worth the squeeze? Won’t pressure test a DCAA audit on a low dollar contract.”

*Consulting Industry Experts and Consultants*

None of the companies we spoke with specifically stated they chose not to pursue government contracts based on the advice of contracting experts or consultants. Rather, they based their decisions on internal decision-making processes. When asked if they consulted external sources one company stated clearly, “Not specifically, we are very confident in our assessment.” Conversely, Company #11, the strategy is simply to get any contract possible regardless of contract type. When referring to taking on cost-reimbursable work they commented, “They’re not ideal… [but] we’re a scrappy startup right now so we take those on.”

Company #9 chose not to comply with FAR/DFARS standards despite 80 percent of sales coming from defense customers. The representative estimated that “The company would have to be shut down and rebuilt from the ground up to satisfy those requirements, and one of them is the cost accounting system… When we switched to a new ERP system it felt like the sky was falling on us.” He valued the “lean workforce” at his company and “cross-training among engineers and manufacturing.” He believed that FAR/DFARS compliant timekeeping would upset the culture. “Don’t take time to track time.” Overall, he said that “Our hesitation is the unknown. We can’t know what will happen. It will really impact having two markets, our ability to design and develop.”

The second company, Company #12, which strategically decided not to become FAR/DFARS compliant stated the following:

“If we could snap our fingers and be government compliant, we might be more open to it. It’s the time tracking and recording the costs. I’ve seen it in other companies. It’s hard to bifurcate. They can be from anywhere to three to five times more effort. It just doesn’t make sense to have two sets of books. We would never consider it because we run so lean. We don’t have the back-office support that would be required… We could go more...”
aggressively towards it. Until we get to a point where the government accounting is not onerous were not going to consider it.”

9.3 Barriers to Entry for Small Companies

FAR/DFARS compliance makes a difference in strategy for small businesses. The concern for small businesses was brought up in the two rounds of interviews, first with the industry SMEs, and later with the contractors themselves. In the discussion about strategy, several companies voiced the concern that the FAR/DFARS compliance requirements are a significant hurdle for small businesses trying to enter the government contracting world. “The benefits depend on who you are. Small companies would have a lot of problems, very different. Once you cross the barrier, acquire the knowledge and the systems, it becomes workable, before that it’s very hard and confusing” (Company #4).

FAR/DFARS compliance takes a significant investment with no guarantee of contracts. One industry consultant we spoke with discussed the investment required to prime contracts with the government. Their conclusion was that many small businesses are only set up to be subcontractors specifically because they don’t have the accounting system and expertise. While some are happy with this situation others don’t understand the amount of investment required.

“It’s an issue for small subcontractors, they just never get to prime because they want to continue to operate with just a CEO, CFO, etc. They don’t want to put the infrastructure in place, to bring in or hire accountants, to understand their business and to help them grow their business. In my opinion, and based on my experience, the ones that know that were ready to move to large contractors. They put that infrastructure in place, they stopped outsourcing those accounting responsibilities and brought those people in to grow their business. I do see that in the ones that don’t do it, I see them not priming for 20 years because they want to operate with a skeleton staff.”[89]

In addition to investment, there is also a significant knowledge gap which prevents many small businesses from becoming government contractors. “I know small businesses that are interested in Cost Plus contracts but they don’t know how to start or who to turn to. It’s a lack of information.” [89]

Several of our SMEs and contractors referenced a more systemic bias against small businesses that have not been declared FAR/DFARS compliant. This issue was referenced by contractors and discussed at length with a government SME.

“I’ve seen primes that are not good or they don’t want to share with the subs. So, a lot of the small businesses are never growing. I also see a lot of primes who have to monitor subs, they don’t want to do that. They try to put that back on the government. If no one does it the sub gets hosed. Often there is no DCAA certified accounting system. … The smalls are losing some opportunity. I will also add, smalls will say the government will ask if the small has been audited by the DCAA. The reality is that a contractor can be awarded a contract without an audit but there are contracting officers who don’t award because it’s safer to go with a company that has been audited.”[88]
Company #4, a small business who has not declined to pursue a defense contract, also have to be concerned about cashflow and the speed of ongoing financing due to delayed audits.

“If you’re working a flexibly prided contract, it’s very hard to get square. You will bill the provisional and the actual will come later, sometimes it take the auditors years to complete it. If the government owes you a lot of money it could be very difficult for small businesses.”

A large manufacturer, Company #1, spoke on the strategy position of their small subcontract suppliers.

“We have a company that produces a product for us, and they are small. There's no value proposition for them from the full compliance oversight, the risk mitigation, and the amount of effort, and the time horizon. There’s not a value proposition, not only for them, but for the government, for the same product that they’ve been making for decades.”

An SME that worked with a venture-backed software startup described an instance where the company had to decline a nearly $3 million contract from a defense customer who insisted on using a cost-reimbursable contract. The company looked at setting up a subsidiary but decided not to and instead would self-fund the development of the product. One major concern was timekeeping, which was believed to “take away from high-quality collaborative work.” He said that “This collaboration flows down into projects, not projects flowing up into collaboration.”

Accounting system requirements, in his view, matched a “staff augmentation shop” rather than a software business model.

Discussions with SMEs and company representatives indicate that there is a knowledge gap in what it takes to become FAR/DFARS compliant. Obtaining the knowledge and investing in systems represents a real cost not only in dollars, but also time. A small IT company mentioned the “distraction cost” and losing an entire year on compliance that could have been devoted to product development. But if they were going to be “relevant” to defense customers, they recognize some contracts will be negotiated cost-type contracts. Certainly, accounting system costs represent an additional barrier to entry for small businesses—compliance is not free—but the costs are often not prohibitive and can be surmounted if company leadership is committed to growth in government contracts.
10.0 Conclusion

The George Mason University Center for Government Contracting, on behalf of OUSD/DPC, conducted a study to analyze government accounting system requirements and whether they create a barrier to entry for commercial companies. The examination included understanding: (1) accounting systems and practices used in the commercial sector for large, small, private, and public companies; (2) differences between GAAP and government requirements; (3) the government’s requirements for accounting systems under range of contracting scenarios; and (4) a survey of commercial industry compliance costs related to government requirements on accounting systems, analyses of entry or exit, and instances of adapting existing systems to meet the requirements.

Most accounting systems that satisfy commercial requirements or standards are not sufficient to be considered complaint with FAR/DFARS requirements without significant customization. Commercial-focused businesses, or segments of businesses, can operate in ways that are more flexible without having to worry about government cost accounting compliance. The difficulties associated with implementing a cost accounting system and distinct organizational framework that are deemed FAR/DFARS compliant may be too costly for a company to justify entering the B2G market. Many government contractors consider having a FAR/DFARS accounting system to be the cost of doing business with the DoD. To successfully grow government business, they must adopt a “government mindset.” However, there are also significant ancillary costs which impact company strategy and willingness to work in the B2G space. Engaging in the B2G market is therefore a cost-benefit exercise for commercial companies, and some companies may choose to not pursue government contracts if they deem the associated accounting requirements as too costly or otherwise onerous. However, no company performed a quantitative cost-benefit analysis and instead relied on subjective estimates as to the burdens or opportunities related to compliance.

The benefit each contractor receives from complying with FAR/DFARS rules differs based on the business type and perception. While most of the benefit from complying with FAR/DFARS requirements is derived from the opportunity to do additional work with the government, some companies found the FAR/DFARS compliant cost allocation requirements improved their non-government business as well. Despite the desirability of being a government contractor, many commercial companies may not be able to make the business case for any additional resources necessary to comply with accounting requirements. Quantifying the additional cost directly related to the a FAR/DFARS compliance requirements is difficult but estimates from the sample of company interviews indicates that the cost as a percent of revenue appears to be higher for small businesses. This, in addition to a general lack of understanding about the compliance requirements, represents a barrier to entry for new entrants into the B2G space.

Future research includes the impact of accounting system requirements on other DFARS-required business systems including estimating systems, purchasing systems, property management systems, and material management systems. Other Transactions agreements are another area of interest in terms of accounting system requirements. More remains to be understood in the difficulties encountered by companies using process-cost accounting systems for their commercial business as opposed to job-cost systems. Information technology is another area of difficulty where most of the company cost is in enterprise capabilities rather than the direct cost related to fulfilling particular customer orders. One SME said that he’s “never seen a software company identify the
cost of a license because the economics don’t work that way.” A final area for future research is the interaction between cost accounting and pricing practices.
11.0 Abbreviations and Definitions

Following are a list of abbreviations and terms used in the report.

- AIS: Accounting Information System
- AIT: Audit Issue Tracking
- ANPRM: Advance Notice of Proposed Rulemaking
- B2G: Business-to-Government
- CAS: Cost Accounting Standards
- CASB: Cost Accounting Standards Board
- CBAR: Contract Business Analysis Repository
- CLIN: Contract Line Item Number
- DCAA: Defense Contract Audit Agency
- DCMA: Defense Contract Management Agency
- DFARS: Defense Federal Acquisition Regulation Supplement
- DHS: Department of Homeland Security
- DoD: Department of Defense
- DUNS: Data Universal Numbering System produced by Dun & Bradstreet
- EVMS: Earned Value Management System
- FAR: Federal Acquisition Regulation
- FASB: Financial Accounting Standards Board
- FFP/LOE: Firm-Fixed Price, Level of Effort
- FIFO: First-In, First-Out
- FPR: Forward Pricing Rate
- GAAP: Generally Accepted Accounting Principles
- GAAS: Generally Accepted Auditing Standards
- GAO: Government Accountability Office
- GASB: Governmental Accounting Standards Board
- IDIQ: Indefinite Delivery, Indefinite Quantity
- LIFO: Last-In, Last-Out
- NAICS: North American Industry Classification System
- NASA: National Aeronautics and Space Administration, U.S.A.
- OFPP: Office of Federal Procurement Policy
- OMB: Office of Management and Budget
- OTA/OT: Other Transaction Agreements/Other Transactions
- PCM: Percentage Completion Method
- PIID: Procurement Instrument Identifier
- PSC: Product and Service
- TINA: Truth in Negotiations Act
12.0 Appendices
## 12.1 Appendix 1: 19 CAS and Their Requirements

<table>
<thead>
<tr>
<th>Cost Accounting Standard (CAS)</th>
<th>Requirement</th>
</tr>
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<tbody>
<tr>
<td>401. Consistency in Estimating, Accumulating and Reporting Costs</td>
<td>Requires that costs estimated in proposals be developed consistently with the practices used by the contractor in accumulating and reporting costs.</td>
</tr>
<tr>
<td>402. Consistency in Allocating Costs Incurred for the Same Purpose</td>
<td>Ensures that each type of cost is allocated only once and on only one basis to any contract or other cost objective.</td>
</tr>
<tr>
<td>403. Allocation of Home Office Expenses to Segments</td>
<td>Establishes criteria for allocation of home office expenses to the segments of the organization on the basis of a beneficial or causal relationship.</td>
</tr>
<tr>
<td>404. Capitalization of Tangible Assets</td>
<td>Establishes that the acquisition costs of tangible assets shall be capitalized based upon an established policy.</td>
</tr>
<tr>
<td>405. Accounting for Unallowable Costs</td>
<td>Facilitates the negotiation, audit, administration, and settlement of contracts. It contains guidelines on (1) identification of costs specifically described as unallowable, at the time such costs first become defined or authoritatively designated as unallowable, and (2) the cost accounting treatment to be accorded such identified unallowable costs to promote the consistent application of sound cost accounting principles covering all incurred costs.</td>
</tr>
<tr>
<td>406. Cost Accounting Period</td>
<td>Provides criteria for selecting the time periods to be used as cost accounting periods for contract cost estimating, accumulating, and reporting.</td>
</tr>
<tr>
<td>407. Use of Standard Costs for Direct Material and Direct Labor</td>
<td>Provides criteria: (1) under which standard costs may be used for estimating accumulating, and reporting costs of direct material and direct labor, and (2) relating to the establishment of standards, accumulation of standard costs, and accumulation and disposition of variances from standard costs.</td>
</tr>
<tr>
<td>408. Accounting for Costs of Compensated Personal Absence</td>
<td>Establishes criteria for measuring and allocating the costs of compensated personal absences to final cost objectives. These costs include compensation paid by contractors to their employees for such benefits as vacation, sick leave, holiday, military leave, among others.</td>
</tr>
<tr>
<td>409. Depreciation of Tangible Capital Assets</td>
<td>Provides criteria for assigning costs of tangible capital assets to cost accounting periods and for allocating such costs in an objective and consistent manner.</td>
</tr>
<tr>
<td>Cost Accounting Standard (CAS)</td>
<td>Requirement</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>410. Allocation of Business Unit General and Administrative Expenses to Final Cost Objectives</td>
<td>Provides criteria for the allocation of general and administrative (G&amp;A) expenses to final cost objectives and furnishes guidelines for the type of expense that should be included in the G&amp;A expense pool. It also establishes that G&amp;A expense shall be allocated on a cost input base that represents total activity.</td>
</tr>
<tr>
<td>411. Accounting for Acquisition Costs of Material</td>
<td>Provides criteria for the accounting of acquisition costs of material and includes provisions on using inventory costing methods. This standard does not cover accounting for the acquisition costs of tangible capital assets or accountability for government-furnished materials.</td>
</tr>
<tr>
<td>412. Composition and Measurement of Pension Costs</td>
<td>Provides guidance for determining and measuring the components of pension costs and establishes the basis for assigning pension costs to cost accounting periods. [CAS 413 addresses the accounting treatment of actuarial gains and losses and the allocation of pension costs to segments of an organization].</td>
</tr>
<tr>
<td>413. Adjustment and Allocation of Pension Cost</td>
<td>Establishes criteria for (1) measuring actuarial gains and losses; (2) assigning actuarial gains and losses to cost accounting periods; and (3) allocating pension costs to segments of an organization.</td>
</tr>
<tr>
<td>414. Cost of Money as an Element of the Cost of Facilities Capital</td>
<td>Provides criteria for measuring and allocating the cost of capital committed to facilities as an element of contract cost.</td>
</tr>
<tr>
<td>415. Accounting for the Cost of Deferred Compensation</td>
<td>Provides criteria for measuring deferred compensation costs and assigning those costs to cost accounting periods. It applies to all deferred compensation costs except for compensated personal absences (CAS 408) and certain pension costs (CAS 412).</td>
</tr>
<tr>
<td>416. Accounting for Insurance Cost</td>
<td>Provides criteria for the measurement of insurance costs, the assignment of such costs to cost accounting periods, and their allocation to cost objectives.</td>
</tr>
<tr>
<td>417. Cost of Money as an Element of the Cost of Capital Assets Under Construction</td>
<td>Establishes criteria for the measurement of the cost of money attributable to capital assets under construction, fabrication, or development as an element of the cost of those assets.</td>
</tr>
<tr>
<td>418. Allocation of Direct and Indirect Costs</td>
<td>Requires the consistent classification of costs as direct or indirect, establishes criteria for accumulating indirect costs in indirect cost pools, and provides guidance relating to allocating indirect cost pools.</td>
</tr>
<tr>
<td>419. Reserved (blank)</td>
<td>N/A</td>
</tr>
<tr>
<td>Cost Accounting Standard (CAS)</td>
<td>Requirement</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>420. Accounting for Independent Research and Development Costs and Bid and Proposal Costs</td>
<td>Provides criteria for the accumulation of independent research and development costs and bid and proposal costs and for the allocation of such costs to cost objectives.</td>
</tr>
</tbody>
</table>

Source: Reproduced in part from GAO-20-266, p. 21-23: Table 5
12.2 Appendix 2: CAS Coverage Flowchart

Source: DCAAM 7640.1, p. 17: Figure 8-1-1
### 12.3 Appendix 3: Selected Unallowable Costs, FAR 31.205

<table>
<thead>
<tr>
<th>Public relations and advertising</th>
<th>Interest and other financial costs</th>
<th>Rental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad debts</td>
<td>Labor relations</td>
<td>Royalties and other costs for use of patents</td>
</tr>
<tr>
<td>Bonding</td>
<td>Lobbying and political activity</td>
<td>Selling</td>
</tr>
<tr>
<td>Compensation for personal services</td>
<td>Losses on other contracts</td>
<td>Service and warranty</td>
</tr>
<tr>
<td>Contributions or donations</td>
<td>Manufacturing and production engineering</td>
<td>Special tooling and special test equipment</td>
</tr>
<tr>
<td>Capital cost of money</td>
<td>Raw materials and collateral items</td>
<td>Taxes</td>
</tr>
<tr>
<td>Depreciation</td>
<td>Organizational (business structure or reorganization)</td>
<td>Termination</td>
</tr>
<tr>
<td>Economic planning</td>
<td>Other business expenses (e.g., shareholder meetings)</td>
<td>Trade, business, technical and professional activity</td>
</tr>
<tr>
<td>Employer-employee related matters (e.g., employee morale, health, welfare, food service)</td>
<td>Plant protection</td>
<td>Training and education</td>
</tr>
<tr>
<td>Entertainment</td>
<td>Plant reconversions</td>
<td>Travel</td>
</tr>
<tr>
<td>Fines, penalties, and mischarging</td>
<td>Patents</td>
<td>Legal and other proceedings</td>
</tr>
<tr>
<td>Disposition or impairment of depreciable property or other capital assets</td>
<td>Precontract costs</td>
<td>Research and development (independent and grant sponsored)</td>
</tr>
<tr>
<td>Idle facilities and idle capacity</td>
<td>Professional and consultant service</td>
<td>Goodwill</td>
</tr>
<tr>
<td>Bid and proposal costs</td>
<td>Recruitment</td>
<td>Alcoholic beverages</td>
</tr>
<tr>
<td>Insurance and indemnification</td>
<td>Relocation</td>
<td>Asset valuations resulting from business combinations</td>
</tr>
</tbody>
</table>

Source: Adapted from FAR 31.205
12.4 Appendix 4: Potential Overlap Between CAS and GAAP

Source: GAO-20-266, p. 16
12.5 Appendix 5: SF1408-14e - Preaward Survey of Prospective Contractor (Section II)

<table>
<thead>
<tr>
<th>SECTION II - EVALUATION CHECKLIST</th>
<th>YES</th>
<th>NO</th>
<th>NOT APPLICABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Except as stated in Section I Narrative, is the Accounting System in Accord with Generally Accepted Accounting Principles Applicable in the Circumstances?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Accounting System Provides For:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Proper segregation of direct costs from indirect costs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Identification and accumulation of direct costs by contract.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. A logical and consistent method for the allocation of indirect costs to intermediate and final cost objectives. (A contract is final cost objective.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Accumulation of costs under general ledger control.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. A timekeeping system that identifies employees' labor by intermediate or final cost objectives.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. A labor distribution system that charges direct and indirect labor to the appropriate cost objectives.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Interim (at least monthly) determination of costs charged to a contract through routine posting of books of account.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Exclusion from costs charged to government contracts of amounts which are not allowable in terms of FAR 31, Contract Cost Principles and Procedures, or other contract provisions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Identification of costs by contract line item and by units (as if each unit or line item were a separate contract) if required by the proposed contract.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. Segregation of preproduction costs from production costs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Accounting System Provides Financial Information:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Required by contract clauses concerning limitation of cost (FAR 52.232-20 and 21) or limitation on payments (FAR 52.215-16).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Required to support requests for progress payments.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Is the Accounting System Designed, and Are the Records Maintained in Such a Manner That Adequate, Reliable Data Are Developed for Use in Pricing Follow-On Acquisitions?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Is the Accounting System Currently in Full Operation? (If not, describe in Section I Narrative which portions are (1) in operation, (2) set up, but not yet in operation, (3) anticipated, or (4) nonexistent.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12.6 Appendix 6: Commercial Product and Commercial Service Definitions

Commercial Product and Commercial Service, FAR 2.101 Definitions:

Commercial product means—

(1) A product, other than real property, that is of a type customarily used by the general public or by nongovernmental entities for purposes other than governmental purposes, and—
   (i) Has been sold, leased, or licensed to the general public; or
   (ii) Has been offered for sale, lease, or license to the general public;

(2) A product that evolved from a product described in paragraph (1) of this definition through advances in technology or performance and that is not yet available in the commercial marketplace, but will be available in the commercial marketplace in time to satisfy the delivery requirements under a Government solicitation;

(3) A product that would satisfy a criterion expressed in paragraph (1) or (2) of this definition, except for—
   (i) Modifications of a type customarily available in the commercial marketplace; or
   (ii) Minor modifications of a type not customarily available in the commercial marketplace made to meet Federal Government requirements. “Minor modifications” means modifications that do not significantly alter the nongovernmental function or essential physical characteristics of an item or component, or change the purpose of a process. Factors to be considered in determining whether a modification is minor include the value and size of the modification and the comparative value and size of the final product. Dollar values and percentages may be used as guideposts, but are not conclusive evidence that a modification is minor;

(4) Any combination of products meeting the requirements of paragraph (1), (2), or (3) of this definition that are of a type customarily combined and sold in combination to the general public;

(5) A product, or combination of products, referred to in paragraphs (1) through (4) of this definition, even though the product, or combination of products, is transferred between or among separate divisions, subsidiaries, or affiliates of a contractor; or

(6) A nondevelopmental item, if the procuring agency determines the product was developed exclusively at private expense and sold in substantial quantities, on a competitive basis, to multiple State and local governments or to multiple foreign governments.

Commercial service means—

(1) Installation services, maintenance services, repair services, training services, and other services if—
   (i) Such services are procured for support of a commercial product as defined in this section, regardless of whether such services are provided by the same source or at the same time as the commercial product; and
   (ii) The source of such services provides similar services contemporaneously to the general public under terms and conditions similar to those offered to the Federal Government;
(2) Services of a type offered and sold competitively in substantial quantities in the commercial marketplace based on established catalog or market prices for specific tasks performed or specific outcomes to be achieved and under standard commercial terms and conditions. For purposes of these services—

(i) *Catalog price* means a price included in a catalog, price list, schedule, or other form that is regularly maintained by the manufacturer or vendor, is either published or otherwise available for inspection by customers, and states prices at which sales are currently, or were last, made to a significant number of buyers constituting the general public; and

(ii) *Market prices* means current prices that are established in the course of ordinary trade between buyers and sellers free to bargain and that can be substantiated through competition or from sources independent of the offerors; or

(3) A service referred to in paragraph (1) or (2) of this definition, even though the service is transferred between or among separate divisions, subsidiaries, or affiliates of a contractor.
12.7 Appendix 6: 48 C.F.R. §252.242-7006(c): System Criteria

(1) A sound internal control environment, accounting framework, and organizational structure

(2) Proper segregation of direct costs from indirect costs

(3) Identification and accumulation of direct costs by contract

(4) A logical and consistent method for the accumulation and allocation of indirect costs to intermediate and final cost objectives

(5) Accumulation of costs under general ledger control

(6) Reconciliation of subsidiary cost ledgers and cost objectives to general ledger

(7) Approval and documentation of adjusting entries

(8) Management reviews or internal audits of the system to ensure compliance with the Contractor’s established policies, procedures, and accounting practices

(9) A timekeeping system that identifies employees’ labor by intermediate or final cost objectives

(10) A labor distribution system that charges direct and indirect labor to the appropriate cost objectives

(11) Interim (at least monthly) determination of costs charged to a contract through routine posting of books of account

(12) Exclusion from costs charged to Government contracts of amounts which are not allowable in terms of Federal Acquisition Regulation (FAR) part 31, Contract Cost Principles and Procedures, and other contract provisions

(13) Identification of costs by contract line item and by units (as if each unit or line item were a separate contract), if required by the contract

(14) Segregation of preproduction costs from production costs, as applicable

(15) Cost accounting information, as required
   (i) By contract clauses concerning limitation of cost (FAR 52.232-20), limitation of funds (FAR 52.232-22), or allowable cost and payment (FAR 52.216-7); and
   (ii) To readily calculate indirect cost rates from the books of accounts

(16) Billings that can be reconciled to the cost accounts for both current and cumulative amounts claimed and comply with contract terms

(17) Adequate, reliable data for use in pricing follow-on acquisitions

(18) Accounting practices in accordance with standards promulgated by the Cost Accounting Standards Board, if applicable, otherwise, Generally Accepted Accounting Principles
12.8 Appendix 8: Company Interview Guide

1. Approximately what percent of your business unit or company’s revenue is derived from DoD, NASA, & DHS sources? Would you say it is more or less than 25 percent?

2. Do you have a business strategy in terms of types of Govt contracts your company is willing to take on specifically due to the accounting requirements they may entail?

3. Has your company been required to implement an accounting system compliant with Government requirements? If no, skip the following sub-questions.
   a. When did you implement the Govt-compliant system? (year)
   b. Did you adapt an existing cost accounting system to become Govt-compliant, or did you purchase a new system?
   c. Was a cost-benefit analysis performed prior to purchasing a new system or adapting an existing system (whichever is applicable)?
   d. How does the cost of implementation and maintenance of the Govt-compliant system compare to the cost of your prior system?
   e. Are there other costs to implementing a Govt-compliant accounting system, such as impact to company culture or product development?
   f. Are there any other benefits to having a Govt-compliant system, such as greater cost control or enterprise efficiencies?

4. If you haven’t transitioned systems recently, what is the on-going cost of your Govt-compliant system?

5. Is the Govt-compliant accounting system also used for products and services that are not intended for government customers? If not, how do they differ?

6. Has your company declined or discontinued a government contract due to accounting system requirements?
   a. What cost-benefit analysis was performed to inform the decision?
   b. Did you consult with other commercial companies, Govt suppliers, or consultants?
13.0 References


(95)


[47] Commercial company representative, “SME interview #2.”

[48] Commercial company representative, “SME interview #5.”


When is an Fixed Price with Economic Price Adjustment Contract Used? | PM-by-PM.”


UpCounsel, “Cost Reimbursement Contract Advantages and Disadvantages.”


Government representative, “SME interview #4.”


[82] Cost Accounting Standards Board, “Notice on principles and other matters to guide conformance of the Cost Accounting Standards (CAS) to Generally Accepted Accounting Principles (GAAP),” Case Number CASB 2020-03, 2020.


[92] Commercial company representative, “SME interview #10.”

[93] Commercial company representative, “SME interview #11.”


(98)
[95] Commercial company representative, “SME interview #8.”


