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# The Excessive Profits of Defense Contractors: Evidence and Determinants

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Monterey, California. Naval Postgraduate School

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**8 February 2012**

**by**

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# Abstract

A long-controversial issue, one that divides academics, government officials, elected representatives, and the U.S. defense industry, is whether defense contractors earn abnormal or excessive profits at the expense of taxpayers. Using an innovative industry-year-size matched measure of excessive profit, we demonstrate three findings. First, when compared with their industry peers, defense contractors earn excessive profits. This result is evident when profit is measured by Return on Assets (ROA), Return on Common Equity (ROCE), and Profit Margin Ratio (PMR). The evidence of excessive profit is less consistent if profit is measured by Operating Margin Ratio (OMR). Second, defense contractors' excessive profit is more pronounced after 1992, consistent with the conjecture that the post-1992 significant industry consolidation enabled superior profitability due to both the improved bargaining power and increased political influence of the newly combined firms. Finally, defense contractors' excessive profitability increases with poorer corporate governance, as measured by the duality of the Chief Executive Officer (CEO) and the Chairman of the Board.



**Keywords:** Defense Contractors, Excessive Profits, Industry Consolidation, Corporate Governance

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His other DoD related research projects include the impact of contract types on cost efficiency, as well the cross-sectional variation of defense contracts performance.

Professor Wang has a PhD in Economics and a Master of Science in Statistics from Iowa State University, and a Bachelor of Science in Management Science from the University of Science & Technology of China.

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His Department of Defense and Department of the Navy research projects include: the Naval Industrial Improvement Program for the Undersecretary of the Navy; the National Industrial Security Program for the Departments of Defense and Energy and the Central Intelligence Agency; and the Financial Management Executive Program for the Assistant Secretary of Defense for Health Affairs. For several years, he has been engaged in classified research for various federal national security agencies and defense organizations.

Professor San Miguel earned a Ph.D. at The University of Texas at Austin. He is a Certified Public Accountant and a member of Beta Alpha Psi, Beta Gamma Sigma, and Phi Kappa Phi honorary societies. His memberships in professional societies include the American Institute of Certified Public Accountants, American Accounting Association (Life Member Award), Institute of Management Accountants, and The Institute for Operations Research and Management Sciences. He served as a member of the Business and Industry Executive Committee, Management Accounting Executive Committee, and the Accounting Education Executive Committee of the American Institute of Certified Public Accountants.

His articles have been published in *The Accounting Review; The Journal of Corporate Accounting & Finance, Journal of Cost Management; Accounting, Organizations and Society; The Journal of Enterprise Management; The Accounting Journal; The Quarterly Review of Business and Economics;* and *Omega: The International Journal of Management Science*. He is coauthor of *Introduction to Financial Accounting*, Harper & Row; and author of *Cases in Financial Accounting and Reporting*, published by Touche Ross Foundation and the Harvard Business School, and *Value Chain Analysis for Assessing Competitive Advantage,* published by the Society of Management Accountants of Canada. He completed "Strategic Impact of Enterprise Resource Planning," sponsored by the Financial Executives Institute. Professor San Miguel has also written many cases at the Harvard Business School and the Naval Postgraduate School. His current research interests are in strategic enterprise management, global financial reporting, and the impact of technology on strategic planning and control systems.

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# I. Introduction

A long-standing controversial issue that divides academics, government officials, elected representatives, and the defense industry is whether U.S. defense contractors earn abnormal or excessive profits at the expense of taxpayers. The Aerospace Industries Association (AIA), the premier association representing the nation's best known names in the aerospace and defense industries, has consistently insisted that "defense industry profitability lags significantly behind its industrial peers" (Sylvester, 2010). On the other hand, a General Accounting Office (GAO) report in the 1980s found that defense contractors normally earned a higher Return on Assets (ROA) than their commercial counterparts (Carrington, 1986). The primary metric used by AIA is operating margin, measured as operating profit (earnings before interest and tax or EBIT) as a percentage of sales. In 2009, the Institute for Defense Analysis (IDA) issued a U.S. Department of Defense (DoD)-sponsored report, *Defense Department Profit and Contract Finance Policies and Their Effects on Contract and Contractor Performance* (Arnold, Harmon, Tyson, Fasana, & Wait, 2009). The IDA report confirms that the operating margin of the defense industry is lower than that of other sectors. However, the profit is "adequate" to sustain defense industry firms because they enjoy a more favorable financing structure under which the firm has much less of its own capital invested.

One might expect that as a source of research that is more independent and relatively free from conflict of interest, the academic literature should provide more concrete and scientific evidence on this critical issue. Unfortunately, this is not the case. First, for whatever reason, there is a long history of avoidance of military-related research among academics. As a result, studies in this field are quite limited. Second, the already-limited studies on this topic stop in the 1990s, leaving a blank for almost two decades. Early evidence on the issue of excessive profits is mixed. For example, Weidenbaum (1968) argued that defense profits are excessive. Bohi (1973) used a sample of 36 defense contractors and concluded that "there is no

evidence for arguing that defense business is any more or less profitable than nondefense business in general." Agapos and Galloway (1970) stated, "There is almost no evidence that aerospace firms in contemporary America are able to reap unusually large or excessive profits" (p. 1103). Stigler and Friedland (1971) documented that the profit rates of the top defense contractors substantially exceeded those of comparable non-defense companies. In summary, there was no consensus among academics in the 1960s and 1970s.

The studies in the 1980s and 1990s were less divided in that, generally, they supported the proposition that defense industries earn higher profits than their non-defense peers (Carrington, 1986; Trueger 1991). For instance, Lichtenberg (1992) found that the ROA of defense contractors, as a whole, was 68–82% higher than that of non-defense contractors. Moreover, those firms with the most government contracts were almost three times as profitable as their benchmark firms. The major explanation of the excess profits of defense contractors is the cost-shifting hypothesis (Rogerson, 1992; Thomas & Tung, 1992). According to this theory, a typical defense contractor has two types of revenue. The first stream of revenue derives from the DoD products whose prices are cost based and, hence, are cost sensitive. The other source of revenue is from typical commercial products whose prices are competition based and, therefore, are cost insensitive. Rogerson (1992) argued that a firm with a combination of defense products and commercial products will have an incentive to shift the common overhead costs from cost-insensitive segments to cost-sensitive segments. Since government contracts typically are reimbursed based upon costs and, more importantly, the price is determined based on negotiation between the two parties and is often renegotiated, this cost-shifting strategy will effectively result in the firm's higher profitability.

The early evidence has been quite consistent with the cost-shifting hypothesis. For instance, Thomas and Tung (1992) found that pension plans were overfunded when employees worked on government contracts and those excess pension assets were withdrawn when employees worked on non-DoD products.

Rogerson (1992) not only documented the excess profitability of defense contractors, but also found that the defense product segments were significantly less capital intensive than less government-oriented segments, which is consistent with the cost-shifting hypothesis that predicts an input substitution effect (between capital and direct labor). Specifically, the cost-shifting theory conjectures that the defense product sector uses excess direct labor because the overhead allocation is traditionally based upon direct labor-based measures.

A more recent study casts doubt on the validity of the cost-shifting hypothesis. McGowan and Vendrzyk (2002) confirmed that defense contractors enjoyed excess profit from their government work, yet found no evidence of common overhead cost shifting. Specifically, they compared ROA among three types of segments within defense-contracting firms: (1) commercial segments, (2) government segments, and (3) mixed segments. The main testable hypothesis was the following: if the cost-shifting theory underlies the excess profitability of defense contractors, one would expect to see the highest profit in the mixed segment, where managers have the most opportunities to shift common overhead costs. Opposite to what was expected, McGowan and Vendrzyk (2002) found either that the government segments (not the mixed segments) significantly outperformed the other two segments or that there was no significant difference across the three categories, depending on the specific time period examined. The overall evidence suggested that unusually high profitability is more likely due to non-accounting explanations than to strategic cost allocation.

The objectives of this paper are twofold. First, we fill an almost two-decade-long gap in the literature. Specifically, using up-to-date data, we investigate whether defense contractors earn excessive profits. Our contribution to this goal is beyond a pure extension of the timeline. We employ an innovative measure of excessive profit based on a match of firms on three dimensions: industry, year, and size. This novel approach better captures the “excess” of the defense contractors’ profitability, if any exists. Second, given that we have found evidence supporting the existence of

defense contractors' excessive profits and lack of consensus on the explanation of these excessive profits, we provide alternative predictors of excessive profitability.

The remainder of the paper is organized as follows. In Section II, we describe our data. In Section III, we introduce our industry-year-size matched excessive profit and the empirical results and findings based on this measure. In Section IV, we hypothesize, and confirm, that industry consolidation after 1992 and corporate governance quality are two determinants of excess profits. We present our conclusions in Section V.

# II. Data

Using fedspending.org as the source, we first identified a list of the top 500 recipients (by dollar awarded) of defense contract awards for 2008. For each publicly traded company on the list, the stock ticker was used to merge with accounting data from the Compustat database. We were able to find a total of 112 public firms from this top 500 list. Table 1 reports the name, dollar awarded, rank, stock ticker, SIC code, and public stock exchange code for these 112 public firms.

**Table 1. The Main Sample: 112 Public U.S. Firms From the 2008 Top 500 List**

| Company Name | Contracted Dollars, 2008 | Rank | Stock Ticker | SIC Code | EXCHG (11=NYSE, 12=AMEX, 14=NASDAQ) |
|---|---|---|---|---|---|
| LOCKHEED MARTIN CORP. | $29,363,894,334 | 1 | LMT | 3760 | 11 |
| NORTHROP GRUMMAN CORP. | $23,436,442,251 | 2 | NOC | 3812 | 11 |
| BOEING CO. | $21,838,400,709 | 3 | BA | 3721 | 11 |
| RAYTHEON CO. | $13,593,610,345 | 6 | RTN | 3812 | 11 |
| GENERAL DYNAMICS CORP. | $13,490,652,077 | 7 | GD | 3790 | 11 |
| UNITED TECHNOLOGIES CORP. | $8,283,275,612 | 8 | UTX | 3720 | 11 |
| L-3 COMMUNICATIONS HOLDINGS | $6,675,712,135 | 9 | LLL | 3663 | 11 |
| KBR INC. | $5,997,147,425 | 10 | KBR | 1623 | 11 |
| NAVISTAR INTERNATIONAL CORP. | $4,761,740,206 | 11 | NAV | 3711 | 11 |
| ITT CORP. | $4,355,423,578 | 13 | ITT | 3812 | 11 |
| SCIENCE APPLICATIONS INTL CORP. | $3,885,932,047 | 14 | SAI | 7373 | 11 |
| GENERAL ELECTRIC CO. | $3,518,136,891 | 15 | GE | 9997 | 11 |
| COMPUTER SCIENCES CORP. | $3,230,197,590 | 16 | CSC | 7370 | 11 |
| HUMANA, INC. | $2,952,008,623 | 18 | HUM | 6324 | 11 |
| TEXTRON, INC. | $2,827,900,303 | 19 | TXT | 3721 | 11 |
| HEALTH NET, INC. | $2,438,349,117 | 21 | HNT | 6324 | 11 |
| URS CORP. | $2,402,033,979 | 22 | URS | 8711 | 11 |
| HEWLETT-PACKARD CO. | $1,938,638,634 | 26 | HPQ | 3570 | 11 |
| ALLIANT TECHSYSTEMS, INC. | $1,928,045,694 | 27 | ATK | 3480 | 11 |
| OSHKOSH TRUCK CORP. | $1,863,726,822 | 30 | OSK | 3711 | 11 |
| HARRIS CORP. | $1,841,470,263 | 31 | HRS | 3663 | 11 |
| BP P.L.C. | $1,733,031,788 | 32 | BP | 2911 | 11 |
| HONEYWELL, INC. | $1,721,547,997 | 33 | HON | 3728 | 11 |

| | | | | | |
|---|---|---|---|---|---|
| ROYAL DUTCH PETROLEUM CO. | $1,712,005,958 | 34 | RDS.A | 2911 | 11 |
| FORCE PROTECTION INDUSTRIES, INC. | $1,360,427,189 | 36 | FRPT | 3790 | 14 |
| CACI INTERNATIONAL INC. | $1,324,104,004 | 37 | CACI | 7373 | 11 |
| AMERISOURCE BERGEN CORP. | $1,298,059,841 | 38 | ABC | 5122 | 11 |
| ROCKWELL COLLINS | $1,290,813,364 | 39 | COL | 3728 | 11 |
| SHAW GROUP, INC. | $1,162,267,243 | 40 | SHAW | 8711 | 11 |
| VALERO ENERGY CORP. | $1,043,869,551 | 43 | VLO | 2911 | 11 |
| JACOBS ENGINEERING GROUP INC. | $951,295,410 | 45 | JEC | 1600 | 11 |
| VSE CORP. | $910,970,473 | 47 | VSEC | 8711 | 14 |
| MCKESSON CORP. | $903,799,326 | 48 | MCK | 5122 | 11 |
| CARDINAL HEALTH INC. | $856,333,988 | 50 | CAH | 5122 | 11 |
| DELL COMPUTER CORP. | $852,813,703 | 51 | DELL | 3571 | 14 |
| EXXON MOBIL CORP. | $836,548,150 | 52 | XOM | 2911 | 11 |
| MANTECH INTERNATIONAL CORP. | $655,579,972 | 61 | MANT | 7373 | 14 |
| FLIR SYSTEMS, INC. | $507,944,847 | 71 | FLIR | 3812 | 14 |
| GOODRICH CORP. | $487,753,671 | 73 | GR | 3728 | 11 |
| TETRA TECH, INC. | $472,960,770 | 77 | TTEK | 8711 | 14 |
| IBM CORP. | $438,446,918 | 81 | IBM | 7370 | 11 |
| PERINI CORP. | $436,363,793 | 82 | TPC | 1540 | 11 |
| FLUOR CORP. | $430,878,065 | 84 | FLR | 1600 | 11 |
| CERADYNE INC. | $417,616,849 | 86 | CRDN | 3290 | 14 |
| AECOM TECHNOLOGY CORP. | $380,250,228 | 91 | ACM | 8711 | 11 |
| AT&T INC. | $371,099,463 | 95 | T | 4813 | 11 |
| KRAFT FOODS INC. | $367,840,952 | 97 | KFT | 2000 | 11 |
| OWENS & MINOR INC. | $365,861,498 | 99 | OMI | 5047 | 11 |
| CUBIC CORP. | $354,623,567 | 102 | CUB | 3812 | 11 |
| GREAT LAKES DREDGE & DOCK CORP. | $324,475,211 | 113 | GLDD | 1600 | 14 |
| CATERPILLAR, INC. | $323,676,276 | 114 | CAT | 3531 | 11 |
| PROCTER & GAMBLE CO. | $321,983,149 | 115 | PG | 2840 | 11 |
| TYSON FOODS INC. | $319,486,334 | 117 | TSN | 2011 | 11 |
| VERIZON COMMUNICATIONS | $319,365,283 | 118 | VZ | 4812 | 11 |
| CHEVRONTEXACO CORP. | $310,558,853 | 122 | CVX | 2911 | 11 |
| SRA INTERNATIONAL, INC. | $297,913,799 | 128 | SRX | 7370 | 11 |
| GRANITE CONSTRUCTION CO. | $292,263,100 | 131 | GVA | 1600 | 11 |
| ACCENTURE | $288,517,607 | 132 | ACN | 8742 | 11 |
| JOHNSON CONTROLS, INC. | $285,123,825 | 134 | JCI | 2531 | 11 |
| GTSI | $271,996,636 | 141 | GTSI | 5045 | 14 |
| EXPRESS SCRIPTS | $215,750,049 | 162 | ESRX | 6411 | 14 |
| NCI INFORMATION SYSTEMS | $214,517,445 | 163 | NCIT | 7373 | 14 |
| CONOCOPHILLIPS | $206,348,789 | 167 | COP | 2911 | 11 |

| | | | | | |
|---|---|---|---|---|---|
| TYCO INTERNATIONAL LTD. | $202,567,751 | 172 | TYC | 9997 | 11 |
| COMTECH TELECOMMUNICATIONS CORP. | $202,082,670 | 173 | CMTL | 3663 | 14 |
| GENERAL MILLS, INC. | $200,017,932 | 176 | GIS | 2040 | 11 |
| TESORO HAWAII CORP. | $199,447,230 | 177 | TSO | 2911 | 11 |
| AEROVIRONMENT INC. | $192,462,098 | 182 | AVAV | 3721 | 14 |
| SIEMENS AG | $192,129,128 | 183 | SI | 9997 | 11 |
| AAR CORP. | $187,717,969 | 187 | AIR | 5080 | 11 |
| SYSCO CORP. | $179,074,006 | 195 | SYY | 5140 | 11 |
| REFINERY HOLDING CO., L P | $177,749,226 | 198 | WNR | 2911 | 11 |
| DEERE & CO. | $164,340,456 | 206 | DE | 3523 | 11 |
| VIASAT, INC. | $156,815,300 | 217 | VSAT | 3663 | 14 |
| TOTAL SA | $154,271,244 | 222 | TOT | 2911 | 11 |
| ORBITAL SCIENCES CORP. | $153,884,356 | 223 | ORB | 3760 | 11 |
| PEPSICO INC. | $149,527,183 | 231 | PEP | 2080 | 11 |
| UNISYS | $142,990,124 | 239 | UIS | 7373 | 11 |
| TELEDYNE TECHNOLOGIES, INC. | $134,222,291 | 254 | TDY | 3663 | 11 |
| BALL CORP. | $131,696,095 | 259 | BLL | 3411 | 11 |
| ELBIT SYSTEMS LTD. | $127,331,460 | 266 | ESLT | 7373 | 14 |
| CONAGRA, INC. | $125,264,234 | 270 | CAG | 2000 | 11 |
| ORACLE CORP. | $122,646,803 | 274 | ORCL | 7372 | 14 |
| GENERAL MOTORS CORP. | $120,929,817 | 279 | GM | 3711 | 11 |
| EATON CORP. | $117,792,917 | 286 | ETN | 3620 | 11 |
| UNILEVER NV | $112,089,508 | 292 | UL | 2000 | 11 |
| MOOG, INC. | $111,608,841 | 293 | MOG.A | 3728 | 11 |
| ALON USA LP | $111,102,800 | 296 | ALJ | 2911 | 11 |
| COCA-COLA ENTERPRISES INC. | $93,991,833 | 343 | CCE | 2086 | 11 |
| XEROX CORP. | $91,275,424 | 356 | XRX | 3577 | 11 |
| JOHNSON & JOHNSON | $89,990,235 | 363 | JNJ | 2834 | 11 |
| AMERICAN APPAREL INC. | $89,975,062 | 364 | APP | 2300 | 12 |
| CAMPBELL SOUP CO. | $88,645,010 | 367 | CPB | 2030 | 11 |
| PHILIPS GLOEILAMPENFABRIEKEN | $83,662,212 | 387 | PHG | 3600 | 11 |
| INTERMEC CORP. | $83,566,808 | 388 | IN | 3577 | 11 |
| CAE CORP. | $83,563,697 | 389 | CAE | 3690 | 11 |
| IRIDIUM SATELLITE LLC | $80,141,588 | 408 | IRDM | 4899 | 14 |
| TESORO PETROLEUM CORP. | $79,170,251 | 413 | TSO | 2911 | 11 |
| DEL MONTE FOODS CO. | $77,962,809 | 419 | DLM | 2000 | 11 |
| AMERICAN SCIENCE AND ENGRG | $76,545,302 | 429 | ASEI | 3844 | 14 |
| CCI GROUP LIMITED LIABILITY CO. | $75,872,038 | 432 | GIB | 7373 | 11 |
| MICHAEL BAKER CORP. | $74,263,592 | 437 | BKR | 8711 | 12 |
| KIMBERLY-CLARK CORP. | $69,832,351 | 454 | KMB | 2621 | 11 |

| | | | | | |
|---|---|---|---|---|---|
| ESTERLINE TECHNOLOGIES CORP. | $68,716,933 | 462 | ESL | 3823 | 11 |
| DYNAMICS RESEARCH CORP. | $67,638,183 | 470 | DRCO | 7373 | 14 |
| INTEGRAL SYSTEMS, INC. | $67,261,245 | 473 | ISYS | 7373 | 14 |
| MINE SAFETY APPLIANCES CO. | $67,166,647 | 474 | MSA | 3842 | 11 |
| WORLD FUEL SERVICE CORP. | $66,258,375 | 478 | INT | 5172 | 11 |
| SARA LEE CORP. | $65,361,053 | 482 | SLE | 2000 | 11 |
| WILLIAMS COMPANIES INC. | $65,024,852 | 483 | WMB | 4922 | 11 |
| HORIZON LINES LLC | $65,008,856 | 484 | HRZ | 4400 | 11 |
| CASE CORP. | $64,498,750 | 488 | CNH | 3523 | 11 |

Table 1 shows that the vast majority of firms in our sample are either traded on the NYSE or NASDAQ, consistent with the perception that top defense prime contractors tend to be big and established companies. Moreover, DoD contracts with a wide spectrum of industries as evidenced by various SIC codes. Table 2 illustrates the distribution of industry membership. In particular, our 112 sample firms cover 24 unique industry sectors, as defined by 2-digit SIC codes.

**Table 2. The Distribution of 112 Sample Firms Across 2-Digit SIC Industry Sectors**

| Industry Name | 2-Digit SIC Code | Frequency |
|---|---|---|
| Transportation Equipment | 37 | 15 |
| Business Services | 73 | 13 |
| Petroleum Refining | 29 | 11 |
| Food & Kindred Products | 20 | 10 |
| Electronic Equipment & Components, except Computer Equipment | 36 | 8 |
| Measuring, Analyzing, & Controlling Instruments; Photographic, Medical & Optical Goods | 38 | 8 |
| Industrial & Commercial Machinery & Computer Equipment | 35 | 7 |
| Engineering, Accounting, Research, Management & Related Services | 87 | 7 |
| Heavy Construction other than Building Construction Contractors | 16 | 5 |
| Wholesale Trade-Non-Durable Goods | 51 | 5 |
| Communications | 48 | 3 |
| Wholesale Trade-Durable Goods | 50 | 3 |
| Non-Classifiable Establishments | 99 | 3 |
| Chemicals & Allied Products | 28 | 2 |
| Fabricated Metal Products, except Machinery & Transportation Equipment | 34 | 2 |
| Insurance Carriers | 63 | 2 |
| Building Construction General Contractors | 15 | 1 |

| | | |
|---|---|---|
| Apparel & Other Products made from Fabrics & Similar Materials | 23 | 1 |
| Furniture & Fixtures | 25 | 1 |
| Paper & Allied Products | 26 | 1 |
| Stone, Clay, Glass, & Concrete Products | 32 | 1 |
| Water Transportation | 44 | 1 |
| Electric, Gas, & Sanitary Services | 49 | 1 |
| Insurance Agents, Brokers, & Service | 64 | 1 |
| | | Total |
| | | 112 |

Table 3 presents basic statistics of various accounting measures for the 112 sample firms in fiscal year 2008. In particular, we report ROA, ROCE, Total Assets, Revenue, Profit Margin Ratio (PMR), Operating Margin Ratio (OMR), Long-term Debt Ratio, and Dollar Awarded as Percentage of Revenue. The mean values of Total Assets and Total Revenue were $42 billion and $39 billion, respectively. The mean ROA (ROCE) was 5.76% (15.86%). Profit Margin and Operating Margin averaged at about 5.19% and 9.76%, respectively. About 18% of assets were financed by long-term debt and the government contracts contributed about 18% of the firms' 2008 revenue.

## Table 3. The Basic Statistics of 112 Sample Firms in Year 2008

| | Mean | Median | Min | Max | Std Dev |
|---|---|---|---|---|---|
| ROA(%) | 5.76 | 6.21 | -33.89 | 19.83 | 6.99 |
| ROCE(%) | 15.86 | 16.54 | -206.49 | 112.29 | 34.45 |
| Total Assets (millions) | 38,737 | 7,433 | 147 | 797,769 | 92,650 |
| Total Sales (millions) | 42,034 | 14,246 | 160 | 458,361 | 79,559 |
| PMR(%) | 5.19 | 4.86 | -20.71 | 24.05 | 6.05 |
| OMR(%) | 9.76 | 8.80 | -8.04 | 36.79 | 6.67 |
| Long-Term Debt Ratio | 17.84 | 16.23 | 0 | 63.57 | 13.12 |
| Dollars Awarded as Percent of Sales (%) | 16.26 | 4.83 | 0.07 | 102.57 | 22.27 |

*Note*. ROA = Net Income/Total Assets; ROCE = Net Income/Common Equity; PMR = Net Income/Sales Revenue; OMR = EBIT/Sales Revenue; Long-Term Debt Ratio = LTD/Total Assets

# III. Empirical Analyses and Results

## A. Measuring Excessive Profits

A challenging issue that contributes to the controversy over defense contractors' excessive profits is the definition of excessive profits. We argue that some approaches are fundamentally flawed. For instance, a very common and seemingly sensible method is to compare the profitability measures of defense contractors with similar measures of the member firms of an index. In a recent report (Arnold et al., 2009), the AIA uses Figure 1 to make the point that "defense industry profitability lags significantly behind its industrial peers."

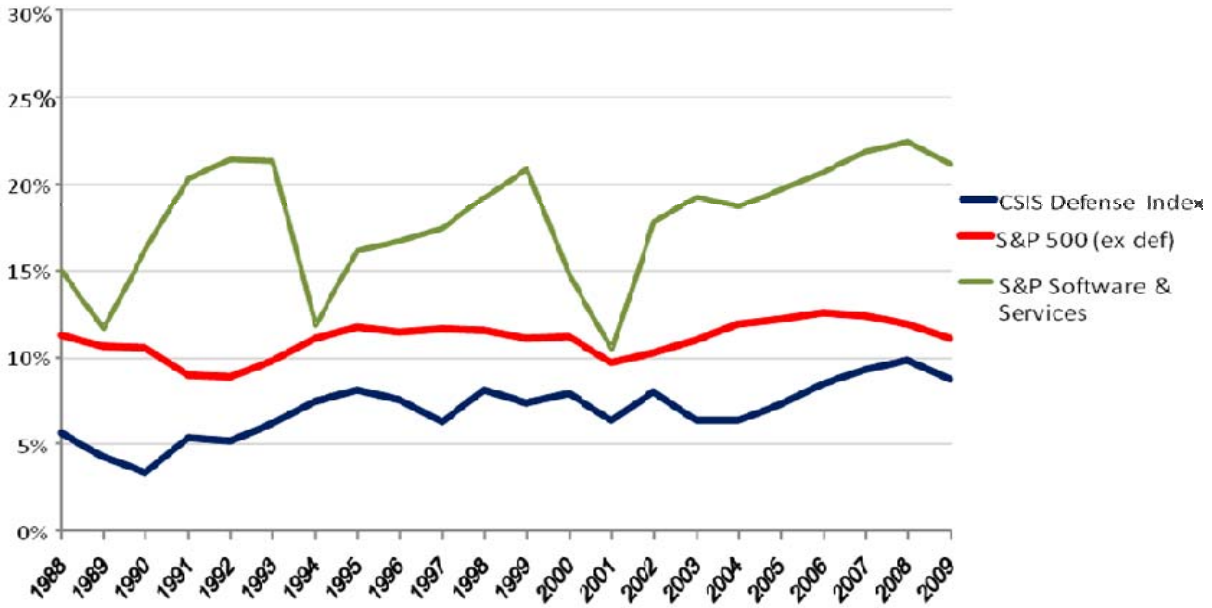


**Figure 1. Defense Industry Operating Margin—The Lowest Returns Amongst its Peers**
(Arnold et al., 2009)

*Note*. This analysis was performed by the CSIS Defense Industrial Initiatives Group, using data from Bloomberg. (1) The CSIS Defense Index comprises 34 publically traded companies with the majority of revenues derived from defense business. (2) For the S&P 500, the CSIS obtained historical data for the period 1988–2009 for the constituents as of July 2010.

This approach is also used by some defense-related research centers. A Center for Strategic & International Studies (CSIS) working paper by Berteau, Levy,

Ben-Ari, and Moore (2011) compared operating profit margins for the CSIS Defense, S&P 500, and S&P 1500 industrial indices between 1990 and 2010. Berteau et al. (2011) claimed that, while the CSIS Defense Index's operating margin is higher today than at any point in the past 20 years, it has been consistently lower than those of the commercial indices.

Worrying about the explicit and implicit inferences drawn from the above "defense versus S&P index" comparisons, we asked the following question: what implications concerning defense contractors' excessive profits, if any, can be drawn from these figures? Our answer is none. Just because we observe that defense contractors' operating margins (or any other profitability measure) are lower than that of the S&P 500 index does not necessarily rule out the possibility of defense contractors' excessive profits. The major reasoning is that it's meaningless to use a very broadly defined index as the benchmark for inferring the defense contractors' normal profitability. Defense contractors, as a whole or as individual firms, and the broad market are two different animals. Even a narrowly defined index, such as a manufacturing index, is also problematic. The bottom line is this: defense contractors span a wide range of industries. For instance, our 112 public U.S. firms on the 2008 top 500 list cover 24 unique 2-digit SIC codes. If measured by 4-digit SIC codes, the number goes up to 56 industries! As pointed out by McGahan and Porter (2002), profitability is very industry specific. Different industries have different risk exposures, competitions, and entry barriers, among many other differences. Therefore, given the wide number of industries represented by defense contractors, the correct benchmark for inferring defense contractors' normal profitability (and hence excessive profitability) must focus on the individual-firm level. There is no one-size-fits-all benchmark, not the S&P, not a manufacturing index, not any readily available index.

Based on the theoretical literature, we propose an innovative measure to assess the excessive profitability of defense contractors. McGahan and Porter (2002) documented the importance of year and industry on accounting profitability.

Moreover, numerous papers demonstrate that firm size should be considered in constructing a benchmark for comparison (Albuquerque, 2009; Dechow, Hutton, & Sloan, 1996). Hence, we devised an industry-year-size matched excessive profit measure *for each individual firm-year* and, in turn, used it as the basis for analyzing our research questions.

Our excessive profit measure was defined as follows. First, we assumed that a significant contracting relationship continuity exists between the government and defense contractors. Hence, we extended the use of our 2008 list of top defense contractors to all the other sample years, as well. This likely introduced some noise into the data. However, since any noise would only work against finding any results, we were willing to sacrifice the power of the test in order to avoid extremely time-consuming data collection work. Second, for each of the 112 firms, we used their stock ticker to map into the Compustat database and extract various accounting variables across a wide range of years, 1950–2010. So a single firm on our list would likely have multiple hits (each hit was a firm-year) depending on how long the firm had existed. Note that the maximum possible number of hits was 61 for any particular firm. We report that mapping our 112 firms to the Compustat database yielded a total of 4,099 firm-years, representing 110 firms (two tickers had no hits). On average, the number of hits per firm was 37.26, with a minimum of four and a maximum of 61. Finally, for each of the 4,099 firm-years, we tried to find a benchmark firm-year, whose profit became the proxy for "normal profit" of the firm-year investigated. The benchmark firm-year was selected based on a three-dimension match on industry, year, and size. Specifically, we went to *the same industry-year,* where industry membership was defined by 4-digit SIC codes, and identified the *non-defense* (i.e., not on our 112-firm list) firm that had the best size match with our defense firm-year. The difference between the profit of the firm-year investigated and the profit of the benchmark firm-year was the measure of "excessive profit."

## B. Empirical Results and Findings

Table 4 is similar to Table 3, except that we included all 4,099 firm-years as opposed to only year, 2008. Note that due to missing values, the sample sizes for calculating the various measures were less than 4,099 and varied across different metrics.

**Table 4. The Basic Statistics of 4,099 Sample Firm-Years From 1950–2010**

| | N | Mean | Median | Min | Max | Std Dev |
|---|---|---|---|---|---|---|
| ROA(%) | 4,050 | 5.59 | 5.78 | -87.55 | 76.91 | 6.16 |
| ROCE(%) | 3,567 | 14.28 | 13.79 | -953.98 | 1274.14 | 56.67 |
| Total Assets (millions) | 4,058 | 16,048 | 1,763 | 0.40 | 797,769 | 51,793 |
| Total Sales (millions) | 4,058 | 14,716 | 2,430 | 1.35 | 458,361 | 35,979 |
| PMR(%) | 4,037 | 4.36 | 4.11 | -99.74 | 100.22 | 5.92 |
| OMR(%) | 4,050 | 8.61 | 7.86 | -98.62 | 40.31 | 6.64 |
| Long-Term Debt Ratio | 4,057 | 16.09 | 14.63 | 0 | 83.40 | 12.21 |

A comparison between Table 4 and Table 3 shows that multiple-year statistics, especially the mean and the median, are fairly close to the one-year (2008) statistics. The notable difference is that the firms' assets and sales were higher in 2008, which was expected.

Next, we analyzed our key measure: excessive profit. Table 5 reports the various measures of excessive profitability. Again, the sample size varied across different measures.

## Table 5. The Excessive Profitability of 4,099 Firm-Years From 1950–2010

### Panel A: Size Matched by Total Assets

| | N | Mean | Min | Max | Std Dev | t | P-value |
|---|---|---|---|---|---|---|---|
| Excessive ROA(%) | 3,809 | 1.12 | -23.49 | 44.17 | 7.08 | **9.77****** | <0.0001 |
| Excessive ROCE(%) | 3,314 | 3.65 | -143.64 | 175.57 | 25.73 | **8.08****** | <0.0001 |
| Excessive PMR(%) | 3,809 | 0.28 | -31.82 | 74.56 | 7.87 | **2.22**** | 0.03 |
| Excessive OMR(%) | 3,777 | -0.09 | -59.59 | 257.33 | 10.32 | -0.52 | 0.60 |

*Note*. ** indicates a 5% significance level; *** indicates a 1% significance level; and **** indicates a significance level of less than 0.01%. Excessive profitability measures were derived based on an industry-year-size matching. Industry was defined as 4-digit SIC code, while the size was defined as total assets.

### Panel B: Size Matched by Revenue

| | N | Mean | Min | Max | Std Dev | t | P-value |
|---|---|---|---|---|---|---|---|
| Excessive ROA(%) | 3,825 | 1.04 | -21.89 | 44.37 | 7.29 | **8.80****** | <0.0001 |
| Excessive ROCE(%) | 3,246 | 3.71 | -142.09 | 178.70 | 26.08 | **8.10****** | <0.0001 |
| Excessive PMR(%) | 3,825 | 0.45 | -31.82 | 74.91 | 7.23 | **3.85***** | 0.0001 |
| Excessive OMR(%) | 3,793 | 0.35 | -48.23 | 69.29 | 7.80 | **2.77***** | 0.006 |

*Note*. ** indicates a 5% significance level; *** indicates a 1% significance level; and **** indicates a significance level of less than 0.01%. Excessive profitability measures were derived based on an industry-year-size matching. Industry was defined by 4-digit SIC code, while size was defined as total revenue.

Panel A of Table 5 (size matched by total assets) demonstrates that the average excessive ROA (ROCE) was 1.12% (3.65%), both statistically significant at a level of less than 0.01%. The excessive Profit Margin Ratio (PMR) was positive and had a mean of 0.28%, which was statistically significant at a 5% level. The Operating Margin Ratio (OMR), which is most often used by the defense industry to show the inferior profitability of defense contractors, did appear to have a negative

average excessive value. However, the magnitude (-0.09%) was too small to be statistically significant.

Panel B of Table 5 (size matched by Revenue) provides similar evidence as Panel A, except on Operating Margin Ratio (OMR). The average excessive ROA (ROCE) was 1.04% (3.71%), both statistically significant at a level of  less than 0.01%. The excessive Profit Margin Ratio (PMR) was positive and had a mean of 0.45%, which was statistically significant at a 0.1% level. In contrast to Panel A, however, the Operating Margin Ratio (OMR) was positive and statistically significant as well, consistent with the other measures of profitability.

The overall evidence suggests that, measured by ROA, ROCE, and PMR, defense contractors consistently demonstrate superior profitability than their industry-year-size matched non-defense peers. Another important finding is that, in contrast to what the AIA claims, the Operating Margin Ratios of defense contractors are, at least, *not* significantly lower than that of their industry-year-size matched non-defense peers.

# IV. Determinants of Excessive Profits

## A. Time Series Variation Determinant: Industry Consolidation

We first investigated whether the defense industry consolidation in the past two decades has increased defense contractors' excessive profit. In 1993, then-Deputy Secretary of Defense Bill Perry hosted a dinner that is now called "The Last Supper" with the CEOs of the major defense companies. During the dinner, Perry urged his guests to consolidate their industry because the DoD would no longer support the high infrastructure costs of a fragmented set of industries due to lower demand induced by the "peace dividend" from the end of the Cold War. As a result, a series of high profile mergers and acquisitions (M&As) happened in subsequent years, including but not limited to the following cases: Boeing acquiring McDonnell Douglas, Lockheed acquiring Martin Marietta, and Northrop acquiring Grumman.

It is reasonable to assume that as the industry structure shifted toward a less competitive nature, the bargaining power in (re)negotiation, as well as the political influence over the Pentagon, of the largest defense contractors, would increase. Consequently, excessive profitability became more attainable. Hence, we have our first hypothesis, H1:

**H1: Defense contractors' excessive profitability relative to their industry peers became more pronounced after 1992.**

To test H1, we regressed various measures of excessive profit onto a dummy variable that took the value of one if the year was post 1992 and zero otherwise. Table 6 reports the regression results.

Table 6 shows that excessive profitability, measured by ROA and PMR, increased after 1992. For example, when size is matched by revenue, post-1992 ROA was almost 1% higher than pre-1992 era. Given the average public firms' ROA was around 5%, this magnitude not only is statistically significant, but also

economically significant. This result held regardless of whether the size was matched by total assets or revenue. However, the magnitude of the increase, as well as the statistical significance of the change, was more pronounced if size was matched by revenue. We did not find any statistically significant difference in ROCE and OMR between pre- and post-1992 periods.

**Table 6. Excessive Profitability Increased After 1992**

| | Dependent Variable: Industry-Year-Size Matched Excessive Profit | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Size Matched by Total Assets | | | | Size Matched by Revenue | | | |
| Independent Variables | ROA (N=3,307) | ROCE (N=3,307) | PMR (N=3,307) | OMR (N=3,307) | ROA (N=3,352) | ROCE (N=3,352) | PMR (N=3,352) | OMR (N=3,352) |
| Intercept | 0.0072 | 0.0505 | -0.0003 | -0.0034 | 0.0048 | 0.0589 | -0.0009 | 0.0012 |
| Post-1992 Dummy (*t*-value) | **0.0076*** (2.99)** | 0.0053 (0.57) | **0.0048* (1.69)** | 0.0006 (0.16) | **0.0097*** (3.68)** | -0.0074 (-0.63) | **0.0077*** (2.96)** | -0.0020 (-0.72) |

*Note*. * indicates a 10% significance level; ** indicates a 5% significance level; and *** indicates a 1% significance level.

Since the most dramatic defense industry consolidation happened after 1992, we believe that the above evidence reasonably supports the conjecture that the industry consolidation made the excessive profits of defense contractors more attainable.

## B. Cross-Sectional Variation Determinant: Corporate Governance

Another possible determinant of excessive profit is the quality of corporate governance. Laffont and Tirole (1993) pointed out that the information asymmetry between the government and contractors could give rise to the "extraction of information rents" that is associated with potential excessive profits. Based on this observation, we conjecture that a better governed corporation would be less likely to engage in such opportunistic and unethical "rent-seeking" behavior. Hence, we have formulated our second hypothesis, H2:

**H2: The defense contractors' excessive profitability relative to their industry peers increased with poorer corporate governance.**

To test H2, we referred to the finance literature for empirical measures of corporate governance. Several key governance mechanisms are documented to impact governance quality. First, Jensen (1993) argued that the separation of the CEO and Chairman of the Board is an important feature of good corporate governance because otherwise the CEO is given too much power and too little oversight. A number of other studies (Goyal & Park, 2002,;Lipton & Lorsch, 1992) also support the importance of the separation of CEO and Chairman. Second, most researchers believe that the quality of oversight deteriorates when the board gets bigger due to the "free-rider" problem (Boone, Field, Karpoff, & Raheja, 2007; Yermack, 1996). Finally, board independence, as measured by the percentage of independent directors, plays a role in limiting the opportunistic behavior of management arising from conflicts of interest (Brickley & James, 1987; Weisbach, 1988; Rosenstein & Wyatt, 1990). We, therefore, regressed our various measures of excessive profit onto the corporate governance variables mentioned by the above studies. Table 7 reports the regression results. Note that we constructed our corporate governance variables based upon the firms' proxy statements and other relevant SEC filings.

## Table 7. Excessive Profitability and Corporate Governance

| | Dependent Variable: Industry-Year-Size Matched Excessive Profit | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Size Matched by Total Assets | | | | Size Matched by Revenue | | | |
| Independent Variables | ROA (N=3,307) | ROCE (N=3,307) | PMR (N=3,307) | OMR (N=3,307) | ROA (N=3,352) | ROCE (N=3,352) | PMR (N=3,352) | OMR (N=3,352) |
| Intercept | 0.0097 | 0.0528 | 0.0003 | -0.0041 | 0.0087 | 0.0491 | 0.0015 | -0.0005 |
| CEO-Chairman Duality Dummy (*t*-value) | **0.0084**<br>**(2.48)** | 0.0062<br>(0.60) | **0.0116*****<br>**(3.06)** | 0.0055<br>(1.12) | **0.0076****<br>**(2.18)** | 0.0048<br>(0.46) | **0.0098*****<br>**(2.84)** | 0.0035<br>(0.97) |
| Board Size (*t*-value) | -0.0004<br>(-0.38) | 0.0192<br>(0.76) | -0.0007<br>(-0.50) | 0.0011<br>(0.88) | -0.0004<br>(-0.41) | 0.0005<br>(0.42) | 0.0005<br>(0.41) | **0.0023****<br>**(2.01)** |
| Board Independence (*t*-value) | -0.0132<br>(-0.76) | -0.0237<br>(-0.56) | -0.0140<br>(-0.62) | -0.0151<br>(-0.69) | 0.0014<br>(0.08) | -0.0263<br>(-0.46) | -0.0143<br>(-0.72) | -0.0172<br>(-0.90) |

*Note*. * indicates a 10% significance level; ** indicates a 5% significance level; *** indicates a 1% significance level. The CEO-Chairman dummy took a value of one if the CEO was also the chairman. Board size was defined as the number of directors. Board independence was defined as the percentage of independent directors on the board.

Table 7 shows that excessive profitability, measured by ROA and PMR, was higher for those firms with CEOs also holding the title of Chairman of the Board. This result held regardless if the size was matched by total assets or revenue. Board size and board independence did not appear to have any impact on any measure of excessive profitability except that board size marginally affected the excessive profitability measured by OMR. Similar to Table 6, we found few noteworthy results in the ROCE and OMR columns.

## C. The Robustness Test

In Section IV.A, we suggested that industry consolidation played a role in determining the excessive profits of defense contractors. Moreover, in Section IV.B, we reported that the poorer quality of corporate governance, measured by the non-separation of CEO and Chairman of the Board, was positively associated with the excessive profits. Although it is unlikely, we cannot completely refute the possibility that these two factors, industry consolidation and corporate governance, have confounding effects. To make sure one factor did not subsume the other, we ran a multiple regression by including both the post-1992 dummy and the CEO-Chairman dummy as independent variables. Table 8 reports the results.

The basic result, shown in Table 8, was that the two determinants we identified in Sections IV.A and IV.B did not subsume each other. The magnitudes, as well as statistical significances, appeared to be lower than seen in Tables 6 and 7. However, the coefficients remained both statistically and economically significant.

**Table 8. Two Determinants of Excessive Profitability: Industry Consolidation and Corporate Governance**

| | Dependent Variable: Industry-Year-Size Matched Excessive Profit | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Size Matched by Total Assets | | | | Size Matched by Revenue | | | |
| Independent Variables | ROA (N=3,307) | ROCE (N=3,307) | PMR (N=3,307) | OMR (N=3,307) | ROA (N=3,352) | ROCE (N=3,352) | PMR (N=3,352) | OMR (N=3,352) |
| Intercept | 0.0072 | 0.0505 | -0.0003 | -0.0034 | 0.0048 | 0.0589 | -0.0009 | 0.0012 |
| Post-1992 Dummy | **0.0060**** | 0.0050 | **0.0042*** | -0.0015 | **0.0088***** | -0.0028 | **0.0056**** | -0.0038 |
| (*t*-value) | **(2.13)** | (0.48) | **(1.58)** | (-0.36) | **(3.04)** | (-0.36) | **(1.96)** | (-1.26) |
| CEO-Chairman Duality Dummy | **0.0064**** | 0.0032 | **0.0108***** | 0.0063 | **0.0058**** | 0.0077 | **0.0067*** | 0.0057 |
| (*t*-value) | **(2.25)** | (0.33) | **(2.58)** | (1.16) | **(1.96)** | (0.58) | **(1.74)** | (1.42) |

*Note*. * indicates a 10% significance level; ** indicates a 5% significance level; and *** indicates a 1% significance level. Note that, as another alternative, we included board size and board independence in addition to these two dummy variables. The results were little changed.

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# V. Conclusion

In this study, we used an innovative industry-year-size matched measure of excessive profit and investigated the long-controversial issue of defense contractors' alleged superior profitability. Using alternative profit measures, our results indicated that defense contractors earn excessive profits relative to their industry peers. This result was strongest when profit was measured by ROA, ROCE, or PMR. The evidence of excessive profit was less consistent if profit was measured by OMR. Another important result from this research was that the defense contractors' excessive profit was more pronounced after 1992, consistent with the conjecture that the significant defense industry consolidation after 1992 enabled superior profitability due primarily to both the strong bargaining power and increased political influence of the remaining firms. A final research result was that poor corporate governance, as measured by the non-separation of the CEO and the Chairman of the Board, led to defense contractors' higher excessive profitability.

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