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Arms, Tanks, and Munitions: The Relationship between Profits and Monopoly Conditions Heidi Peltier

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Abstract

Production and sales of arms, tanks, and munitions are dominated globally by a few large firms. These firms often have monopolies on certain goods, such as the Abrams Tank produced by General Dynamics. In addition, de-facto monopolies are created through the contracting process, as the U.S. Department of Defense offers "sole supplier" contracts to certain firms which enable them to avoid competition. In recent years, nearly one-half of DoD contracts were non-competitive. This paper explores the question of whether a lack of competition in the arms-tanks-munitions (ATM) industries results in higher profits for the monopolistic firms. We focus here on a case study of General Dynamics, which is one of the "Big 5" firms in the defense sector and earns about 70 percent of its revenue through sales to government. Using data from USASpending.gov, we find that over half of the contracts that General Dynamics held with the DoD were non-competitive, and that within the ATM industries about three-quarters of this firm's contracts were non-competitive. Financial reports from GD's business segment with ATM contracts, called "Combat Systems," earned higher profits than its other business segments in 2020, lending support to the notion that monopoly conditions (through niche markets and contract type) yield higher profits.

Tags

Market Structure; Contracting; Defense Industries

Citation

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Arms, Tanks, and Munitions: The Relationship between Profits and Monopoly Conditions

Heidi Peltier¹

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Background

The purpose of this paper is to identify a relationship between profits and monopoly conditions in the commercial enterprises that produce and sell arms, tanks, and munitions. In the U.S., these industries have a high level of market concentration, with the top four or five firms in each accounting for about 60-70% of sales. These sales are mainly through contracts with the U.S. government, and thus the profitability of these industries has consequences for taxpayers.

The thesis of the paper is that large firms in the "ATM" (arms-tanks-munitions) industries are able to secure monopoly or monopoly-like conditions, which then foster higher profits. In some cases, this is achieved through mergers and acquisitions, resulting in greater market share and dominance of the market. In other cases, firms are able to secure monopoly-like conditions through the nature of contracting with the U.S. government. There are various types of contracts which are not competed, including "sole supplier," "unique source," and contracts for matters of "urgency," which essentially grant a monopoly to a supplier of a good or service for the duration of the contract. The relationship between non-competitive contracts and profits is an understudied topic; this paper contributes to the literature by providing background and data on contracts and profitability in the ATM industries and by conducting a case study of one of the major firms in these industries, General Dynamics.

Military Contracting in Context

Spending on contracts now accounts for more than one half of all Department of Defense spending.² In Fiscal Year 2020, DoD contract obligations totaled \$431 billion, according to data from USASpending.gov, while total DoD budget authority was about \$739 billion and outlays were about \$690 billion, according to OMB data.³ Thus DoD contract obligations in FY2020

¹ Heidi Peltier is a Senior Researcher at Brown University's Watson Institute for International and Public Affairs and is the Director of Programs for the Costs of War Project. Email: heidi-peltier@brown.edu. The author would like to thank members of the financialization and militarism working group for valuable comments and suggestions. The Security in Context Working Paper Series was made possible (in part) by a grant from Carnegie Corporation of New York. The statements made and views expressed are solely the responsibility of the author.

² McCormick, Rhys. 2020. Defense Acquisition Trends 2020: Topline DoD Trends. Center for Strategic and International Studies. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/201007 McCormick Defense Acquisition Trends 2020.pdf;
Peltier, Heidi. 2020. The Growth of the "Camo Economy" and the Commercialization of the Post-9/11 Wars. Providence: Brown University, Watson Institute. https://watson.brown.edu/costsofwar/papers/2020/growth-camo-economy-and-commercialization-post-911-wars-0
³ DoD contract obligations for FY2020 were retrieved from USASpending.gov using Advanced Search and selecting Department of Defense. Total Department of Defense Budget Authority and Outlays are from OMB Historical Tables 5.2 and 4.1, respectively, from https://www.whitehouse.gov/omb/historical-tables/



account for 58% of budget authority and 62% of outlays, though the latter figure may be a less useful comparison since it compares obligations to outlays.

In 1966, the Whitehouse Office of Management and Budget first issued Circular A-76, which "established Federal policy regarding the performance of commercial activities…" Activities which are not deemed "inherently governmental" are supposed to be evaluated in order to determine whether it is more cost-effective to provide the good or service in-house or to contract to commercial providers.

All Federal agencies are subject to the rules and procedures laid out in the Fair Acquisition Regulation (FAR), and the Department of Defense has a supplemental set of rules and procedures contained in the Defense Federal Acquisition Regulation Supplement (DFARS). These documents set the policies and procedures for acquisition personnel to issue and assess commercial contracts. Acquisition teams (contracting officers and other related personnel) conduct pre-contracting assessments and other planning and develop a request for proposals in the case of competitive contracts. Proposals are reviewed based on cost, past performance, risk, and other factors, and then a contract is created with the winning bidder.

In some cases, "sole source procurement" is conducted, in which procurement is non-competitive and is solicited from only one source. Subpart 6.3 of the FAR outlines the policies for "Other Than Full and Open Competition." The circumstances that justify other than full and open competition include:

- Only one responsible source and no other suppliers or services will satisfy agency requirements
- Unusual and compelling urgency
- Industrial mobilization; engineering, developmental, or research capability; or expert services
- International agreement
- Authorized or required by statute
- National security
- Public interest

A 2020 report examining competition in military procurement found that just over half of military contracts were competed, as shown in table below.⁶ Of the \$382 billion in contracts in FY2019, only \$205 billion or 53.7 percent were subject to competition.

 $^{^{4} \ \}underline{\text{https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A76/a076.pdf}}$

⁵ https://www.acquisition.gov/far/part-6#FAR_Subpart_6_3

⁶Duddy, Lt Col Brian, Lt Col Timothy Landucci, and Lt Col Julie A. Knechtel. "Delivering Capability Through Competition in Defense Contracting. Defense ARJ, October 2020, Vol. 27 No. 4: 436-474



TABLE 1. DOD CONTRACTING AND COMPETITION SUMMARY							
FY	Category	Army	Navy / Marines	Air Force	DLA	All Others	Total
	Total (\$B)	\$75	\$84	\$56	\$32	\$37	\$284
2014	Competed (\$B)	\$49	\$37	\$24	\$27	\$29	\$166
	% Competed \$	65.4%	44.4%	43.5%	84.1%	77.6%	58.5%
	Total (\$B)	\$73	\$85	\$53	\$31	\$33	\$275
2015	Competed (\$B)	\$43	\$37	\$21	\$26	\$26	\$153
	% Competed \$	59.4%	43.7%	39.0%	83.3%	77.7%	55.6%
	Total (\$B)	\$74	\$93	\$65	\$30	\$36	\$298
2016	Competed (\$B)	\$43	\$38	\$26	\$24	\$27	\$158
	% Competed \$	58.3%	40.9%	39.3%	79.3%	74.7%	53.0%
	Total (\$B)	\$78	\$110	\$61	\$36	\$37	\$322
2017	Competed (\$B)	\$45	\$40	\$26	\$28	\$29	\$168
	% Competed \$	57.6%	36.2%	43.1%	78.0%	77.4%	52.2%
	Total (\$B)	\$92	\$108	\$71	\$45	\$43	\$359
2018	Competed (\$B)	\$54	\$44	\$30	\$35	\$32	\$195
	% Competed \$	58.9%	40.3%	41.8%	75.9%	74.4%	54.3%
	Total (\$B)	\$95	\$120	\$76	\$44	\$47	\$382
2019	Competed (\$B)	\$58	\$48	\$34	\$31	\$34	\$205
	% Competed \$	60.8%	40.1%	44.6%	71.1%	73.5%	53.7%

Source: Duddy et al 2020

The report also found that by far the biggest single justification for non-competition was "only one responsible source." The authors note that "Many of the examined J&As describe extensive investments made by their incumbent source and the high cost and schedule requirements of starting a new source, which would outweigh any perceived benefit gained from competition. For complicated hardware purchases, the additional costs and time investments necessary to establish a new source may not justify potential savings from a competition."

Defense procurement, with its specialized goods and needs that are urgent or important to national security, thus has high levels of non-competitive contracts. These sole suppliers, particularly major defense contractors such as Lockheed Martin, Northrop Grumman, Raytheon, Boeing, and General Dynamics ("The Big 5") are able to secure monopoly-like conditions through contracts.

The complexity of the weapons systems, which require high levels of R&D and specialized manufacturing, results in high barriers to entry and limits competition in the market, which often benefits a single supplier who is capable of fulfilling a procurement contract.

Furthermore, large contractors spend significant sums on lobbying and political influence, further enhancing their ability to secure sole supplier contracts. According to OpenSecrets.org,

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⁷ Duddy et al 2020, p. 456



the Big 5 spent about \$11 million to \$13 million each, or a combined \$60 million, on lobbying expenditures in 2020, placing these 5 among the top 30 firms of all industries and lobbyists nationally.

We now turn to the question of whether these monopoly-like conditions enable firms to earn higher-than-average returns in their markets. Do military contracting monopolies earn high profits at taxpayer expense?

Data and Methodology

Using the USASpending.gov database, we can access contract data for producers of arms, tanks, and munitions for the years 2008-2021. We focus on five different NAICS codes, listed below. The USASpending data allow us to identify contracts by whether they were competed or not, and what the justification for non-competition is. We can then use data from various business databases, including MergentOnline and Hoover Company Records, to identify profits for these businesses in each of these years.

- 332992 SMALL ARMS AMMUNITION MANUFACTURING
- 332993 AMMUNITION (EXCEPT SMALL ARMS) MANUFACTURING
- 332994 SMALL ARMS, ORDNANCE, AND ORDNANCE ACCESSORIES MANUFACTURING
- 332995 OTHER ORDNANCE AND ACCESSORIES MANUFACTURING
- 336992 MILITARY ARMORED VEHICLE, TANK, AND TANK COMPONENT MANUFACTURING

Future research could analyze industry-wide trends in profits and contract types or monopoly conditions. With enough data, we could test the hypothesis that firms with monopolies or quasi-monopolies through contracts have profit levels above the industry average. We could also test the secondary hypothesis that businesses with multiple segments would have higher profitability in the segments that have a greater percentage of non-competitive contracts.

For this paper, we have narrowed the research focus, since even with a fairly extensive search of the data, we have thus far been unable to compile a sufficiently extensive dataset for each of these variables to identify any trends across each of these industries. Using Compustat, the Economic Census, and other data sources, we produced partial datasets that were insufficient to identify correlations among our variables. Given these difficulties, we instead focus here on a case study in order to test the secondary hypothesis.

Using the data we compiled on all five industries listed above from USASpending, we found that in 2001 the companies with the highest level of contract dollars with the Department of Defense were General Dynamics, BAE, Lockheed, and Textron. In 2011, industry leaders in terms of contract dollars were Alliant, BAE, General Dynamics, GM, Oshkosh, Raytheon, and Textron. In 2020, the industry leader was General Dynamics, followed by Oshkosh, BAE, and Alliant.



For the case study, we chose the firm General Dynamics, which has held more than 200,000 contracts with the U.S. Department of Defense from 2008 through 2020, according to our analysis of USASpending data.

General Dynamics: Contracts and Profits

General Dynamics is a company with over 100,000 employees (as of October 2021), based in Virginia. It is a prime contractor with the U.S. government, with 70% of its revenues from sales to the U.S. government, according to its 2020 10-K annual report. The civilian side (about one quarter of its sales) is mainly the production and servicing of aircraft. Its revenues were about \$38 billion in 2020, with \$6.3 billion in gross profit and about \$3.2 billion in net income in 2020.8

According to Hoover Company Reports, about 85% of General Dynamics' total sales are in North America, though it also sells to businesses and governments in about 45 countries. It should also be noted here that some sales that are categorized as domestic or as sales to the U.S. government are in fact destined for foreign governments and international organizations which can purchase arms through the U.S. government through a program known as the Foreign Military Sales (FMS) program. Thus, when we look at the financial information of contractors such as General Dynamics, a portion of what shows up as domestic sales or sales to the U.S. government are in fact destined for overseas markets.

General Dynamics is one of the largest U.S. government contractors, routinely ranking in the top five in terms of the dollar value of contracts, along with Lockheed Martin, Boeing, Raytheon, and Northrop Grumman. In 2020 it received about \$26 billion in contracts from the U.S. government, as shown in the table below.

Using the USASpending database, for each year from 2008 through 2020, we identified the percentage of contracts that were competitive. Our analysis of federal contracts shows that the majority of contracts held by General Dynamics are not competitive, as shown in Table 1. Focusing on the segment of the business that produces arms, munitions, and tanks, the percentage of non-competed contracts is even higher, as shown in Table 2.

⁸ Dun & Bradstreet, accessed 10/20/2021. https://www.dnb.com/business-directory/company-profiles.general_dynamics_corporation.2ddae221afced9c4176753670758284c.html



TABLE 1: All General Dynamics Prime Contracts with U.S. Federal Government (in current \$)

	Cor	mpeted	Not	Competed	% Not Competed
2009	\$	7,596,662,685	\$	9,151,493,246	55%
2010	\$	7,412,879,795	\$	8,163,855,905	52%
2011	\$	7,982,765,080	\$	11,874,287,483	60%
2012	\$	6,782,497,284	\$	8,516,074,896	56%
2013	\$	6,102,217,855	\$	7,825,562,265	56%
2014	\$	5,836,376,731	\$	9,571,801,059	62%
2015	\$	5,854,810,639	\$	7,656,689,321	57%
2016	\$	6,273,937,421	\$	8,236,291,693	57%
2017	\$	6,690,918,648	\$	8,689,599,667	56%
2018	\$	7,679,748,902	\$	9,931,113,996	56%
2019	\$	11,256,226,618	\$	9,694,737,936	46%
2020	\$	10,024,329,753	\$	15,493,810,817	61%

Source: Compiled by author from USASpending.gov

TABLE 2: General Dynamics Prime Contracts for Arms, Tanks, Munitions⁹ (in current \$)

Arms-Tanks-Munitions					
	Competed		Not Competed		% Not Competed
2009	\$	899,642,110	\$	3,589,479,212	80%
2010	\$	938,277,875	\$	2,579,908,860	73%
2011	\$	1,583,270,981	\$	2,305,246,872	59%
2012	\$	827,691,948	\$	2,419,346,253	75%
2013	\$	559,648,272	\$	1,512,496,632	73%
2014	\$	445,203,729	\$	1,351,924,404	75%
2015	\$	400,773,293	\$	1,176,670,935	75%
2016	\$	533,719,469	\$	1,243,146,057	70%
2017	\$	576,721,445	\$	1,795,932,801	76%
2018	\$	755,698,823	\$	2,404,343,192	76%
2019	\$	587,843,622	\$	2,219,411,805	79%
2020	\$	703,678,675	\$	1,970,680,517	74%

Source: Compiled by author from USASpending.gov

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⁹ NAICS codes 332992, 332993, 332994, 332995, 336992



As seen in Table 1, when including all contracts that General Dynamics held with the federal government from 2009 through 2020, between 46% and 61% were not competed, depending on the year. When we focus on only the contracts in the NAICS codes 332993-332995 and 336992, what we will call "ATM" (Arms-Tanks-Munitions) industries, the percentage of non-competed contracts is much higher. The ATM contracts range from 59% to 80% non-competed.

The types of products produced by General Dynamics in the ATM industries include the Abrams tank (the main battle tank of the U.S. Army), Strykers (8-wheeled armored vehicles), and warheads such as the Hydra 70 rocket. The ATM industries do not include aircraft or watercraft, nor do they include communications equipment, though General Dynamics does produce these as well.

General Dynamics has a near-monopoly on tank production, as the producer of the Abrams tank. When including tanks along with all other armored vehicles, IbisWorld reported that GD accounted for nearly 29% of the market as of July 2020. Other major producers of armored vehicles include BAE Systems and Oshkosh Corporation.

Business Segments

General Dynamics organizes its business into four segments: (1) Information Systems and Technology, which includes production of information and communication technologies used in military, intelligence, and space operations; (2) Combat Systems, which produces tracked and armored combat vehicles, armor, ammunition, and other combat-related technologies; (3) Marine Systems, which produces ships and submarines for the U.S. Navy; and (4) Aerospace, which produces commercial aircraft as well as aircraft for the U.S. military and foreign military sales.

According to CSI Market, General Dynamics accounts for 20.96% of the Information Systems and Technology market, 9.58% of the Combat Systems market, 21.08% of Marine Systems, and 11.58% of the Aerospace market. When focusing on the percentage of total income earned in each market, General Dynamics accounts for 29.65% of the total market in IST, 29.53% in Combat Systems, 13.91% in Marine Systems, and 26.91% in Aerospace.

General Dynamics reports its revenues according to these four different business segments, which fall roughly but not perfectly in line with our analysis based on NAICS codes. The segment referred to as "Combat Systems," which produces munitions, weapons systems, and combat vehicles, yielded just over \$7 billion in revenue in 2019 and accounted for 17.8% of the company's revenue, according to MarketLine.

The 2020 10-K annual report for General Dynamics states that:

Operating earnings and margin in the defense segments are driven by changes in volume, performance or contract mix. Performance refers to changes in profitability based on

¹⁰ https://www.ibisworld.com/united-states/market-research-reports/tank-armored-vehicle-manufacturing-industry/

¹¹ https://csimarket.com/stocks/competitionSEG2.php?code=GD, accessed Oct 20, 2021.



adjustments to estimates at completion on individual contracts. These adjustments result from increases or decreases to the estimated value of the contract, the estimated costs to complete the contract or both. Therefore, changes in costs incurred in the period compared with prior periods do not necessarily impact profitability. It is only when total estimated costs at completion on a given contract change without a corresponding change in the contract value (or vice versa) that the profitability of that contract may be impacted. Contract mix refers to changes in the volume of higher-versus lower-margin work. Higher or lower margins can result from a number of factors, including contract type (e.g., fixed-price/cost-reimbursable) and type of work (e.g., development/production). Contract mix can also refer to the stage of program maturity for our long-term production contracts. New long-term production contracts typically have lower margins initially, and then margins generally increase as we achieve learning curve improvements or realize other cost reductions.

The bolded sections of the above passage highlight the assertions that (1) contract type can affect profitability and (2) longer-term contracts become more profitable over time. This second point is attributed to the effect of cost reductions that come through learning but may also be attributable to an increase in specialization and experience that enables companies such as GD to secure sole source supplier contracts, which, as we saw above, are most often justified because there is "only one reliable source." A company that can create a niche by producing a specialized product can then turn that niche into a monopoly through its ability to secure a sole source contract with the U.S. government. This may then enable the company to achieve higher profits on those products, not only through cost reductions but also through monopoly conditions.

One way to assess whether these monopoly-like conditions lead to higher profitability is to examine the profit rates in each of the company's business segments. The question we want to address is whether profits are higher in business segments in which competition is lower. Table 3, below, shows the operating margins by business segment, according to General Dynamics' 2020 annual report.

Table 3: Operating Margins by Segment, according to 2020 10-K Annual Report

	2020	2019
Aerospace	13.4%	15.6%
Marine Systems	8.6%	8.5%
Combat Systems	14.4%	14.2%
Technologies	9.6%	9.8%

Note: "Operating Margin" is a measure of the profitability of operating activities. It is calculated as (Sales – Operating Expenses)/Sales. It does not net out interest or taxes.

The table above shows that "Combat Systems," the business segment that produces the Abrams Tank, the Stryker wheeled combat vehicle, and other weapons systems and combat vehicles,



earned higher margins than General Dynamics' other business segments in 2020 and was close behind the Aerospace segment the previous year.

The table and figure below show the comparison of profit margins in the "Combat Systems" segment and the percentage of non-competed contracts held by General Dynamics in the ATM industries that closely correspond to the Combat Systems division.

Table 4: General Dynamics "Combat Systems" Segment: Competition and Profit Margins

	% Not Competed ¹²	Profit Margins for "Combat Systems" 13
2009	80%	13.1
2010	73%	14.4
2011	59%	8.3
2012	75%	14.5
2013	73%	15.6
2014	75%	15.0
2015	75%	15.6
2016	70%	16.3
2017	76%	15.8
2018	76%	15.4
2019	79%	14.2
2020	74%	14.4

Note: Profit margin = (Sales – total expenses)/Sales. In comparison to 'operating margin,' profit margin includes the deduction of interest and taxes.

As we see, for the most part both the size of the profit margin in "Combat Systems" and the percentage of contracts that are not competed in that segment are fairly stable from 2009 through 2020, with the exception that they both dip in 2011.

The correlation coefficient, which is an indicator that measures the strength of the relationship between two variables, is 64% here. This indicates a strong relationship between the profit margin and the percentage of contracts that are non-competitive.

Conclusion

Defense acquisition policy should be a major concern of taxpayers, as about half of all federal discretionary spending goes to the Department of Defense, and recently more than half of the Defense budget has been spent on military contractors. When these contracts are non-competitive, contractors may be able to earn higher profits, which ultimately come at the taxpayer's expense.

¹² From USASpending, for the 5 ATM NAICS codes

¹³ From Annual 10-K reports for General Dynamics (fiscal years ending 2010, 2012, 2014, 2016, 2018, 2020)



This paper examines this question by focusing on the case study of General Dynamics, which is one of the "Big 5" military contractors in the U.S. General Dynamics earns the majority of its revenue from government sales. It earns particularly high returns in its "Combat Systems" business segment, in which about three-quarters of its contracts are non-competitive. We find that the correlation coefficient between non-competitiveness and profit is 64%.

The overarching theory that this paper explores is that the concentration of capital, as measured by market share in a given industry, leads to above-average profit rates for that company (or those companies) that are major players in the market. In some cases, as with General Dynamics and the production of the Abrams Tank, only one producer exists, and can set prices above the level they would be in a competitive market; however, even without a true monopoly, quasi-monopoly conditions can result from contract types. Companies with large market share are able to negotiate sole supplier contracts or other forms of non-competitive contracts. This, combined with high spending on lobbying and political contributions, then yields quasi-monopolies and higher-than-average profit levels, which is what appears to be shown in the data on General Dynamics and its "combat systems" business segment, where non-competitive contracts account for roughly ¾ of the contracts, and where profit margins are higher than in its other business segments that have lower proportions of non-competitive contracts.



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