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Contractual Diversification Advantage: A Relational View of the Link Between Supplier Diversification and Performance

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Problem Definition

The purpose of this research is to examine the effect of diversification on interfirm relationships. Given how extensively firms develop key relationships with customers, suppliers, and other stakeholders, understanding the role that interfirm (relational) strategies are affected by diversification likely will be quite informative. This is particularly true of small businesses, which are not as frequently studied by strategy scholars. A relational perspective suggests that investments in relationship-specific assets, substantial knowledge exchange, combinations of complementary resources and capabilities, and effective governance structures between supply/buyer firms in a partnership dyad can generate relational rents.

Methodology/Results

A foundational predication within our research is that firm diversification will lead to more advantageous relationships with business partners, a hypothesis that we test through contract performance. In our study, we review 240 Research & Development and New Product Development contracts with supplier firms and the US Department of Defense that incorporated some form of risk-sharing between the buyer and supplier. We find that diversified firms engage in contracting with suppliers in a way that provides an advantage over their single-segment competitors in terms of total contract cost, the number of change proposals by engineers in contract work, and longer durations of government contracts. We also find that diversified small firms receive more of a benefit than their larger counterparts in terms of contracting advantage.

Managerial Implications

Based on our findings, it is evident that managers of diversified firms provide advantage to their firms by being more accustomed to complex contractual arrangements than their single-segment firm counterparts. Our findings also suggest that enhanced opportunities for organizational learning are available to diversified firms who engage in contractual relationships. Relational contracts that feature risk-sharing between buyers and suppliers provide space for joint-learning, and it is likely that managers of diversified firms have more experience navigating these risk-sharing relationships. This is particularly influential in a dynamic marketplace as firms prioritize innovation and adaptability in order to thrive.

INTRODUCTION

Research on the diversification-performance (D-P) relationship has been a favorite amongst management, economics, finance, and legal scholars within the field of strategy (Ahuja & Novelli, 2017; Kovach et al., 2015; Lim & Audia, 2020; Mansfield et al., 1978; Rumelt et al., 1994). The logic of the D-P relationship is that diversified firms have market power advantages versus firms in single industries, which ultimately leads to superior firm performance. In particular, related diversification market power is for-

midable since the knowledge expropriated from one industry can be leveraged in another (Palepu, 1985). Firms engaged in related diversification achieve positive spillover effects by capitalizing on knowledge reuse between two or more industries (Anjos & Fracassi, 2015). Yet, for all we know about diversification, there has been little investigation into the impact of how diversification impacts interfirm relationships. Given how extensively firms develop key relationships with customers, suppliers, and other stakeholders, understanding the role that interfirm (relational) strategies are affected by diversification is important to un-

derstand. Notably, our research explores whether this relational advantage of diversification has differential effects in small versus large firms.

The relational view of strategy (Dyer & Singh, 1998) also makes predictions to explain differential firm performance by considering how interfirm resources and capabilities can be sources of competitive advantage. Specifically, the relational view suggests that investments in relationship-specific assets, substantial knowledge exchange, combinations of complementary resources and capabilities, and effective governance structures between partner firms can generate relational rents (Dyer & Singh, 1998; Lavie, 2006; Penrose, 1959). Relational rents are defined as profits that are jointly generated in an exchange relationship that could otherwise not be generated in isolation (Dyer & Singh, 1998). Our goal in this study is to determine whether relational advantage can be affected by diversification or, specifically, whether investments in non-relationship-specific assets can generate additional value in firm partnerships. The perspective introduced in this research shifts earlier assumptions of firm capabilities affecting patterns of diversification (Chiesa & Manzini, 1997; Coad & Guenther, 2013; Lynn & Reinsch, 1990) by suggesting that diversification strategy drives relational capabilities.

A foundational predication within our research is that firm diversification will lead to more advantageous relationships with business partners, particularly for small businesses, which we test through a series of hypotheses using contract performance as a proxy for interfirm relationships. As such, our research makes several contributions to the literature on firm diversification and relational advantage. First, we extend the customary view of diversification advantages as risk mitigation, increased scope, and the redeployment of underutilized resources (Baptista et al., 2020; S. Chang, 1996; Haug et al., 2017; Miller, 2004) by joining recent research that demonstrates the relational advantages of diversification (Goldschmidt et al., 2021; Gray et al., 2009). Second, in contrast to the traditional understanding of relational diversification advantage that is gained *after* investments are made in relational capital, we advance a conceptualization of relational advantage that occurs *because of* diversification. Thus, our findings indicate that diversification can itself be a source of relational rents, which are able to be exploited in contracts with external firms. Third, in contrast to the primacy of unique and non-contractible resources as the foundation of diversification advantage (Chatterjee & Wernerfelt, 1991; Levinthal & Wu, 2010; Teece, 1982), we demonstrate how performance advantages can also be achieved through resources and capabilities that are contractible. Finally, we explore the relational advantage of diversification in both small and large firms to test whether its benefits are affected by firm size.

Our investigation of these ideas occurs in the commercial and defense aerospace industries which are unique domains with assets specific to each (Adler et al., 1998; Williamson, 1985). The relationships between defense and aerospace firms offer a unique opportunity to investigate contractual diversification advantages specifically due to the presence of risk-sharing that is commonly built into

supplier/buyer contracts. In the United States, the defense industry is akin to a monopsony with only one buyer, wherein suppliers are at a disadvantage due to less market flexibility (Muehlemann et al., 2013). We argue, however, that diversification within the supplier firm may change that dynamic and provide more power to the supplier firm than previously theorized. Thus, diversification alters the relationship and provides opportunities for relational advantage. This finding has the potential to be generalized into other monopsonistic markets that are dominated by a single buyer, such as Google's hold over online search advertising, Walmart's retail power, or the supermarket industry's ability to dictate prices to farmers among others. It also has strong implications for small businesses, which previous research suggests have different strategic priorities than large firms (Lumpkin et al., 2010; Robson et al., 1995) and which have been compared to larger business in studies of firm performance and diversification (Situm, 2019).

THEORY AND HYPOTHESES

Relational Advantage

In contrast to traditional views of synergies that are generated by internal resources, the relational view of strategy is founded on the premise that value can be created when partners make investments in external relationship-specific resources and capabilities (Dyer & Singh, 1998; Kale et al., 2000; Zajac & Olsen, 1993). The theory suggests that investments in relational capital can enhance the productivity of exchange relationships (Elfenbein & Zenger, 2014). The relational view has developed deep insights into vertical interfirm relationships but the question of how relationships affect and are affected by horizontal interfirm relationships through related diversification remains largely unexplored (Mawdsley & Somaya, 2018). Given the pervasiveness (and success) of related diversification, extending the relational view by understanding its impact on such activities can be very instructive. Our research takes on this question and the findings indicate that investment in the set of products and services offered – otherwise known as the horizontal scope – through diversification strategies can also enhance the productivity of interfirm relationships.

Recent scholarship has explored the effect of relationships on the demand-side of strategy in industry contexts such as the US defense industry (Wang et al., 2020), the automotive industry (Smeritschnig et al., 2021), and the professional services industry (Eckardt & Skaggs, 2018; Mawdsley & Somaya, 2018; Pittz & White, 2016). The latter study found positive effects of diversification by demonstrating how buyer diversification can drive enhanced value through added relational assets. There has been a wide variety of contemporary research on the supply-side of strategy that has found general diversification advantages, such as in retail firms (Aversa et al., 2021; Giarratana et al., 2021) in medical facilities (Parker-Lue & Lieberman, 2020), and in technology (L. Chen et al., 2020; Corradini et al., 2016), but a knowledge gap remains in our understanding of whether horizontal scope affects relational advantage. As a result,

our study builds on the supply-side approach to examine whether supplier performance in contractual arrangements is affected by firm diversification.

There is a long history of research that considers the economic transaction as the fundamental unit of analysis and whether risk-sharing or market deals are superior ways of governing transactions (e.g., Coase, 1937; Williamson, 1975). In this study, we review a sample of risk-sharing contracts to determine whether supply-side diversification affects contract performance. Thus, we contribute to the literature on supply-side strategy by systematically examining the implications of an important source of supplier-specific synergies – relational capital – within diversification strategies. As we note above, the effects of supplier diversification may be especially important in rapidly growing sectors, such as technology, that are trending toward monopsony (Fleishman, 2019) and should be of value for future research and practice.

Market Power and Diversification

Scholars have long held that diversified firms should experience superior economic performance compared to their single-segment counterparts due to enhanced market power. Market power is defined as the “ability of a market participant or group of participants (persons, firms, partnerships, or others) to influence price, quality, and the nature of the product in the marketplace” (Shepherd, 1970, p. 3). Previous research has demonstrated that firms with market power achieve faster growth (Weston & Mansinghka, 1971); better profitability (Palepu, 1985); more cost efficiencies (S. J. Chang & Choi, 1988; Montgomery, 1985); and greater risk reduction (Hill & Hansen, 1991). More recently, attention has been devoted to less tangible outcomes, such as how market power can increase organizational slack (Gary, 2005); improve innovation and development of technology (Bodlaj et al., 2020; Kim et al., 2013; Miller et al., 2007); and enhance productivity (Y.-H. Chen & Kao, 2014). Firms with market power also benefit from asymmetrical competitive advantages (Kaplow, 2017) and lower levels of contract enforcement (Basu et al., 2014) (see Table 1).

We agree with Kaplow (2017, p. 1308) that market power provides some “procompetitive benefits, including innovation” and more overall benefits than costs, particularly in the development of new technology. Extant research, however, has not yet provided adequate insight into how market power affects firm transactions; namely, how diversification affects relational advantage which can, in turn, enforce or negate that power. Ahuja and Novelli (2017) call for such an investigation after their meta-review of the scholarship revealed a paucity of studies linking transactional-level synergies to firm-level performance. Further, they identified a central issue in this literature regarding whether performance differs between ownership structures. For the purposes of this study, we follow prior research (e.g., Denis et al., 1997; Klein, 2001; Lang & Stulz, 1994; Rajan et al., 2000) that characterizes a firm’s ownership structure as single-segment (focused firms, non-diversifiers), multiple-segment-unrelated (conglomerate, unrelated diversifiers),

and multiple-segment-related (concentric, related diversifiers).

In this research, we propose to answer the question of how diversification affects relational advantage through the study of organizational contracts. Previous scholarship has recognized organizations as a “nexus of contracts” and, as such, investigating organizational contracts represents a useful mechanism for determining how and why relational advantage and market power can be gained through diversification (Alchian & Demsetz, 1972; Fama, 1980; Jensen & Meckling, 1976). Given that diversification often includes the act of engaging in partnership relationships with other firms, it is reasonable to assume that organizational contracts from diversified suppliers play a fundamental role in the success of the effort (Lam et al., 2013; Williamson, 1991).

Contractual Diversification Advantage

The nature of research and development (R&D) and new product development (NPD) contracts within the defense industry prioritizes risk-sharing between buyer and supplier (Adler et al., 2016). More frequent and substantive changes to defense contracts result in greater financial performance for the supplier as the lion’s share of the contract changes (greater contract cost, more expensive labor, and schedule stretch-outs) are paid for by the government. We anticipate that diversifier market power in this context allows firms simultaneously to build coalitions in and around their own supply chain (Birge et al., 2022; Tang & Kouvelis, 2011) and negotiate around the terms and conditions of the Department of Defense (DOD) contract (Foss et al., 2018) better than single-segment competitors.

Furthermore, as DOD project managers routinely are handcuffed by their requirements of hard contracting (e.g., fixed-price frameworks), the experience and relational advantages achieved by diversified firms represents an advantage over DOD project managers in work done relationally (Williamson, 1991). This aligns with recent work regarding the effectiveness of project managers under differing levels of project complexity (Salvador et al., 2021). To illustrate this advantage, according to the Blue-Ribbon Report on military acquisition (1986, p. 46):

“...most production and many development contracts are negotiated on a firm, fixed-price basis. For the government, the advantages of a fixed-price arrangement, particularly the incentives it creates for realistic bidding, are obvious. The disadvantages to the government, while more subtle, are nevertheless of real concern. Fixed-price contracts effectively can enshrine overstated requirements and understated costs in a legal arrangement that allows little or no flexibility for needed trade-offs between cost and performance. This contractual arrangement, intended to protect the government, may cause both sides to lose.”

Conversely, diversified firms are often able to use their market power to chip away incrementally at contract terms and conditions in ways to benefit themselves economically (Prasad & Salmon, 2013). They can leverage market power

Table 1. Market Power Research and Organizational Contract Implications

Author(s)	Year	Findings/Conclusions	Implications on Organizational Contracts
Basu, Chau & Kanbur	2014	Theoretical model posturing that the lack of contract enforcement leads to the development of market power in equilibrium	Provides support for possible seller market power when the buyer cannot enforce the terms and conditions of the contract due to lack of adequate information or training
Chang & Choi	1988	An investigation into whether firm structure affects the D-P link	Efficiencies gained through market power will lower a firm's transaction costs
Chen & Kao	2014	Bank data indicates that diversification leads to market power through technical efficiency	Related diversified firms should see between contract efficiencies with the lack of resource duplication in the long run
Elsas, Hackethal, & Holzhäuser	2010	Diversification provides a financial supermarket with cost advantages over specialized competitors	Contracts with single-segment providers will reflect less products and services valued by customers
Foss, Foss & Klein	2018	Market power is reframed in how transaction costs affect the position of an exchange partner	The continual negotiation of firm contracts introduces costs that affect the market power and strategic performance of a firm
Gary	2005	Addresses whether managerial policies affect firm slack	Market power will increase organizational slack in maintaining the D-P link
Hasan, Liu, Wang & Zhen	2017	A look at seller market power and its effect on favorable loan terms	Seller market power should extend to favorable contractual terms and conditions
Hill & Hansen	1991	Research into risk avoidance for doing diversification	Market power will reduce risk in the economic exchange thereby improving firm performance
Kaplow	2017	Market power is not necessarily anticompetitive and may be good as in innovation	Market power of related diversifiers while possibly more expensive may be good for buyers given the complexity of innovation
Kim, Arthurs, Sahaym & Cullen	2013	An investigation into whether benefits in improved innovation exists in related diversification	Innovation will improve due to the efficiencies of market power
Miller, Fern & Cardinal	2007	Opportunities exist for resource sharing in diversification	Seller will experience greater technology development with market power
Montgomery	1985	The low market power of diversified firms challenges traditional theoretical views	Market power is possibly from technical relatedness of the assets which could support the uniqueness of contractual management as a skill
Muehmann, Ryan & Wolter	2013	Monopsony influences labor market outcomes such that lower wages by skilled labor and trainees is compared to higher wages for unskilled labor	Buyers should be able to craft and haggle contract terms and conditions that favor lower labor costs by the seller. With more market power, however, one would expect unrelated diversifiers to charge more than other structures
Prasad & Salmon	2011	Risk preference from market power affects whether partners enter into contracts	Self-selection into an organizational contract reveals the risk preferences and scarcity of trading partners and resources
Scherer	1980	Unrelated diversification brings a generalized subsidized power to new markets when firms can square off in different industries	Generalized skill sets exist in framing contracts regardless of industry so that terms and conditions become less important in framing the contractual relationship
Shepard	1970	Seller market power influences quality, price and nature of product	Contractual terms and conditions will reflect the market power of the seller not the buyer
Weston & Mansinghka	1971	Study that accounted for sales, net income and total assets growth	Seller's will experience faster growth through the terms and conditions of the contract

to request contract changes, which increase contract costs (Hasan et al., 2017), pricing of labor (Pindyck, 1988) and extend schedule projections. As R&D and NPD projects develop, engineering requirements often change in unexpected ways (Adler et al., 2016) which, if approved by the DOD, drive up the total cost and labor hours required to complete the contract, thereby resulting in better financial performance for the supplier. Therefore, following our sup-

position of market power advantages discussed previously, we suggest that diversified firms will be able to appropriate more relational rent than non-diversified firms. Stated formally:

Hypothesis 1. Compared to single-segment firms, *re-related* multiple-segment firms will exhibit superior contract performance.

Furthermore, contractual advantage is due in large part to information asymmetry and unrelated multiple-segment firms can also use market power to charge a labor price premium due to their information advantages (Muehlemann et al., 2013). Thus, we also hypothesize that:

Hypothesis 2. Compared to single-segment firms, *unrelated* multiple-segment firms will exhibit superior contract performance.

Proportional Relational Rents

Several factors have been shown to affect the proportion of relational rents that can be appropriated in an interfirm relationship. Particularly, the relative scale of partner resources in a contractual relationship can influence the potential for rent appropriation (Murphy & Tocher, 2017). Lavie (2006) discusses firm size effects in his identification of factors that can determine the availability of relational rents, also including the relative amounts of absorptive capacity, scale and scope of resources, opportunistic behaviors, bargaining power and contractual agreements within a relational network. Supporting the relative relational rents argument, Stuart (2000) demonstrated that small firms often benefit more than larger partners in contractual arrangements. Previous research has found that small firms, by association with large contract partners, benefit from enhanced reputations in the eyes of risk-averse potential customers, employees, and suppliers and achieve a higher rate of growth than larger firms with the same association (Iacobucci & Rosa, 2005; Stuart, 2000). Building upon this idea, we suggest that for multiple-segment firms, the benefits of diversification are attenuated by size, such that contract financial performance decreases as the firm's sales revenue increases. Stated formally:

Hypothesis 3. The benefits of diversification for multiple-segment firms (both related and unrelated) will be attenuated by size, such that contract performance will decrease as sales revenue increases.

Ownership Structure and Equity Capital

The advantage possessed by publicly traded firms to acquire information and equity capital should also not be underestimated. Research indicates that publicly traded firms acquire privately held firms more frequently because they have the resources to do so (Anjos & Fracassi, 2015; Capron & Shen, 2007). When this happens, publicly traded firms add to their core skills to increase specialized knowledge in an industry or set of industries (Capron & Shen, 2007). Thus, diversification allows publicly traded firms to acquire information to convert to specialized knowledge to improve decision-making quality (Bailey & Peck, 2013) and ultimately improve firm performance (Reuer & Shen, 2004). The spillover effects of acquiring and using new information are also valuable, especially in lowering transaction costs and lowering the probability of making a mistake (Cohen & Levinthal, 1990; Fayard et al., 2012). This capability has been referred to as a firm's absorptive capacity by Lane and Lubatkin (1998).

Privately held firms typically are characterized as single-segment type ownership structures (Box, 2011; Mascarenhas, 1989). Given this simple structure, they often do not have the market power to compete as adaptability suffers due to a relative lack of financial liquidity (Hall, 2016; Pindyck, 1988). As a result, privately held organizations face a double-edge sword in managing DOD contracts: they provide a singular expertise on specific technical issues early in the development process (Pittz & Liguori, 2020) but lack the larger resources required to build new products in the complex military DOD infrastructure (e.g., they lack market power). Enhanced market power is useful to thrive while facing the effects of a large DOD bureaucracy, and publicly traded diversified firms are better at navigating this bureaucracy while building and testing new systems. Publicly traded firms are more likely to maintain multiple business segments, resulting in the ability to reduce information asymmetry (Wen & Tikoo, 2020) and mitigate government bureaucracy. Thus, we suggest that this ability leads to contractual advantages in the following way:

Hypothesis 4. Compared to privately held firms, publicly traded diversified firms (both related and unrelated) will exhibit superior contract performance.

METHODOLOGY

Data & Sample

To investigate the contractual diversification advantages proposed in this research, we captured data from the United States DOD database of contractors. The U.S. defense industry is an excellent source to investigate diversification because there are many military contracts included that represent all three types of firm ownership structures: single-segment, related multiple-segment, and unrelated multiple-segment. To study the D-P relationship, we randomly sampled 240 DOD contracts that contained work related to both R&D and NPD projects involving risk-sharing contracts. These contracts spanned the timeframe from 1970 to 1995 and represented 54 single-segment and 45 multiple-segment firms, for a total of 99 firms in the database. We used a stratified sample approach suggested by Kerlinger (1986) where we selected contracts based on the three types of firm ownership structure we investigate in this study. We collected data initially on 300 contracts but had to eliminate 60 due to missing information. The remaining 240 contracts allowed us to have at least 50 contracts for reliability considerations (Stevens, 1992) in each firm ownership type: 81 for single-segment, 107 for related multiple-segment and 52 for unrelated multiple-segment firms.

The 240 contracts we used for the investigation of our hypotheses came from the Air Force Material Command (AFMC) located at Wright-Patterson Air Force Base in Dayton, Ohio. The AFMC functions as the responsible center for the acquisition of weapon systems by the Air Force and the contracts surveyed represent mega-projects related to research and development (R&D) and new product development (NPD). The data are robust and include a wide range of contractual terms and conditions. Data in this

study are defense contracts in the period of 1970-1995, reflecting a time of military acquisition reform by the U.S. government (Ferrara, 1996; Fox, 2011). While this data is older, we selected this period because of its uniqueness reflecting DOD's dual challenge of managing *ex ante* weapon system competition while concurrently trying to minimize *ex post* undesirable winning contractor performance outcomes (Melese, 2021). This period consequently provides an excellent context to study the inherent tension between the DOD and their commercial partners because of the uncertainty inherent in the DOD budget and complexity of managing the DOD bureaucracy (Vedantam & Iyer, 2021).

We coded firms as a single-segment firm if their sole business operations were with the DOD. We coded firms as unrelated multiple-segment providers if they had at least one unrelated DOD business unit in combination with the DOD line of business. For example, we coded the Hughes Summa Corporation as an unrelated diversifier since its ownership structure included military helicopters, television, and mining, and other unrelated business units. We classified firms as related multiple-segment providers if they operated simultaneously in both DOD and commercial markets in the same industries. For example, we coded Boeing as a related diversifier because of their DOD business and their business of manufacturing commercial aircraft. Sampled firms varied on many factors including annual sales that ranged from \$222k to \$123b, providing a unique view of firm market power via organizational contracts.

Dependent Variables

To test the D-P relationship, we were interested in how differences between single-segment, unrelated multiple-segment or related multiple-segment firms were reflected in contract performance. To operationalize contract performance, we examined the *Total Contract Cost*, in dollars (millions). Higher total contract costs reflect larger revenue capture by the firm and represent a direct, tangible example of appropriated relational rents.

We pretested the selected variables with ten DOD contract specialists who were familiar with the Federal Acquisition Regulation and had managed at least five military acquisition contracts during their careers. As we indicate in Table 3, each of the dependent variables is significantly correlated with one another, yet not so correlated as to be redundant. To satisfy normality assumptions and provide consistent coefficient reporting, all dependent variables were log transformed in the econometric models.

Independent Variables

Single-segment firms reflect work limited to the DOD market, while multiple-segment firms were participating in commercial aerospace or other non-commercial work as well. Following prior research (Lang & Stulz, 1994; Rajan et al., 2000), we classified firms based on how many markets the firm was providing goods and/or services to at the time of contract performance. Using binary predictors, we coded each firm-level observation as either single-segment, multiple-segment-unrelated, or multiple-segment-related.

Control Variables

We also included several relevant control variables in our analyses. To begin, we created dummy variables for each major US Defense policy era within which our data were gathered. These policy eras are defined in Table 2. The breakdown of these periods is important since each represent a distinct transition in defense contracting policy (Anjos & Fracassi, 2015; Fox, 2011; Miller et al., 2007; Morris, 1994; Rappa, 2015). In the first policy period (1970 – 1977), which was omitted as a reference group, contracts were highly detailed and routinely micro-managed by the defense department. Contracts formed in the period of 1978-1983 are labeled *Policy Period 1*, a period of lavish spending and more flexible contract terms. Contracts formed in the period of 1984-1989 are labeled as *Policy Period 2*, when failures from the previous period caused industry consolidation and heightened contract management. Finally, contracts formed in the period of 1990-1995 are labeled as *Policy Period 3*, which were executed during a time of heavy specialization of suppliers. In addition, we also controlled for *Firm Type*, with privately held (coded with a “0”) or publicly traded (coded with a “1”) firms.

Further, a firm's *Sales* were included as a proxy for the size of the firm. Following Shin, Hasse and Schotter (2017) and Roy and Sarker (2016), we calculated the natural logarithm of corporate sales (in \$MM USD) to represent firm size. Larger firms have access to more resources and information are thus able to innovate better, reduce contract loopholes and change contract terms and conditions. As a firm's market power allows, capital and information access can be a strategic advantage (Christensen & Overdorf, 2000). Corporate sales at the time of the contract varied from \$222,156 to \$123,056 million. Prior research suggests that firms require specialized knowledge - or market power - to win DOD contracts (Adler et al., 2016). A primary effect of this learning is the lowering of transaction costs in managing compliancy with governmental standards, regulations, and laws and then using this capability to tailor contract terms and conditions as needed. The natural logarithm of corporate sales accounts for this market power.

Finally, we controlled for *Work Type* by conceptualizing Research and Development (R&D) and New Product Development (NPD) contracts separately, as each has unique functions in the development process (Hanks, 1990). As discussed previously, related diversifiers might be better at NPD than other types due to equity capital and information benefits. We coded R&D (represented with a “0”) and NPD (represented with a “1”) based on the type of project work the contract represents.

Analysis

We estimate our three contract performance outcomes using ordinary least squares log-linear regression modeling. The data contained multiple observations representing different contracts for the same firm, creating potential violations of independence (White, 1984; Wooldridge, 2010). To address this concern, the estimation procedure employed clustered standard errors, where each cluster was

Table 2. Major Eras in DOD Acquisition Reform

Period	Source	Intent	Effect on DOD Acquisition Industry
1970 to 1977	Passage of OMB Circular A-109, DODD 5000.1. and DODD 5000.2	Provide a framework to buy weapon systems with distinct phases of R&D and NPD. Test and evaluation was to begin as soon as possible in the research process. To increase our science and technology base by using bureaucracy and increasing oversight of acquisition process.	Huge government oversight of acquisition process. Because of complex federal acquisition policy and laws, many DOD systems were commercials. Cost overruns, schedule inflation and quality issues evident. Conglomerates popular due to inherent "information" advantages.
1978 to 1983	Publication of Carlucci Initiatives, and new versions of DODD 5000.1 and DODD 5000.2	Growth in DOD budgets was immense. The primary focus was limiting the time for new R&D and NPD mega-projects in development and maximizing the introduction of new operational systems. Phases were allowed to be skipped and risk assessment was emphasized on critical components not just the whole project.	However, procurement horror stories continued with regard to uncontrolled schedule slippage, outrageous cost growth, and lack of adequate performance. Use of fixed-price contracts to limit cost growth expanded. Budget growth of early 1980s kept unrelated diversification a popular ownership structure. Basic research in DOD acquisition started due to pent-up demand from 1970s.
1984 to 1989	Passage of CICA, Blue Ribbon Report, and DODD 5000.3	Blue Ribbon Commission chaired by David Packard was charged to review the military acquisition process. Training and competencies of military project managers was identified as a problem as well as using "hard contracting" in the development of military weapon systems. Political support for new weapons began to wane.	Firms began to merge and acquire as the DOD budget began to shrink. New product development programs following on to early 1980s basic research failed to meet expectations DOD budgets began to shrink due to shrinking public confidence. Related diversification became more popular amongst DOD contractors to focus efforts in resource-constrained environment
1990 to 1995	DODD 5000 documents were again revised to centralize policy control and allow military contractors more leeway in the acquisition process	Challenged all military project managers to use of "off-the-shelf" items in weapon systems development since their perceived ability to adequately manage a DOD contract was low relative to their industry counterparts. Continued to push development and operational test early in project life-cycle to identify and reduce risks.	Firms continued to merge like Lockheed-Martin and Northrup-Grumman culminating in the big five DOD contractors. Larger sources of capital were required to finish new product development and production of systems started in the early 1980s. Firms tended to be related diversifiers and publicly-traded due to access focused information and equity capital respectfully.

defined by a firm identifier. This procedure corrects for error terms that are correlated within clusters while maintaining that they are uncorrelated across clusters (Cameron & Miller, 2015; Rogers, 1993). As we discussed previously, each dependent variable was log transformed to satisfy the normality assumption and provide consistent reporting of coefficient estimates.

RESULTS

We present descriptive statistics and pairwise correlations in Table 3 and the results of our OLS analysis are summarized in Table 4. Multicollinearity diagnostics were assessed for each main-effect only model (Models 2, 5, and 8). The average variance inflation factor across each of these models was 6.30, well below the recommended cutoff of 10 (Freund & Littell, 1991; Neter et al., 1989), suggesting no substantial issues with multicollinearity. In addition, with the use of a $p < .001$ criterion for Mahalanobis distance, no problematic outliers were detected.

Furthermore, we examined the condition index eigenvalues for each of the independent variables. The highest reported condition index for any independent variable was 11.63, suggesting that while some collinearity is present, it is not strong enough to be particularly problematic. The slight collinearity was isolated to the *Firmtype* and *Worktype* variables and the exclusion of one or the other had no effect

on the relationships of interest. Therefore, both *Firmtype* and *Worktype* were retained in the final model due to theoretical relevance. No other significant sources of multicollinearity were detected.

The results of our analyses provide broad support for our hypotheses. As compared to the single-segment firms, the main effect model (M2) shows that related multiple-segment firms consistently perform better in terms of *Total Contract Cost* ($\beta = 1.51, p < 0.001$). The results also show that the benefits of diversification are not limited solely to the related-segment firms. Within the main effect models, unrelated multiple-segment firms were consistently associated with superior performance as compared to the single-segment firms in terms of *Total Contract Cost* ($\beta = 1.25, p < 0.01$). Taken together, these results provide robust support for Hypotheses #1 and #2. In general, the analyses reveal ownership structure to be associated with the best contract performance for the related multiple-segment firms. The estimated effect sizes are particularly striking when the coefficients are exponentiated for interpretation. For example, as compared to single-segment firms, related multiple-segment firms realize an average benefit of 353% in terms of total contract costs.

Hypothesis 3 predicts that the benefits of ownership structure on contract performance accrue disproportionately to smaller firms. To test this hypothesis, we included an interaction term of ownership structure with the logged

Table 3. Descriptive Statistics & Pairwise Correlations

	Mean	SD	1	2	4	5	6	7	8	9	10	11	12
1. Total Contract Cost (mil USD)	58.70	234.26	1.00										
2. ECPs	53.26	150.64	0.72*	1.00									
3. Single-segment	0.34	0.47	-0.18*	-0.24*	1.00								
4. Multiple-unrelated-segment	0.22	0.41	-0.05	-0.06	-0.38*	1.00							
5. Multiple-related-segment	0.45	0.50	0.21*	0.27*	-0.64*	-0.47*	1.00						
6. Sales (mil USD)	6225	11902	-0.04	-0.05	-0.32*	0.09	0.24*	1.00					
7. Work Type	0.44	0.50	0.05	0.15*	-0.21*	0.12	0.10	-0.09	1.00				
8. Firm Type	0.57	0.50	0.21*	0.26*	-0.73*	0.25*	0.49*	0.41*	0.23*	1.00			
9. Policy Period 1	0.19	0.39	0.32*	0.42*	-0.32*	0.16*	0.17*	-0.11	0.33*	0.29*	1.00		
10. Policy Period 2	0.23	0.42	0.01	0.03	-0.33*	0.16*	0.18*	0.18*	0.20*	0.28*	-0.27*	1.00	
11. Policy Period 3	0.37	0.48	-0.16*	-0.22*	0.15*	-0.11	-0.06	0.02	-0.35*	-0.09	-0.37*	-0.42*	1.00
12. Policy Period 4	0.21	0.41	-0.13*	-0.17*	0.47*	-0.20*	-0.28*	-0.09	-0.11	-0.46*	-0.25*	-0.29*	-0.40*

* $p < 0.05$, $N = 240$

Table 4. Regression Results - Effect of Ownership Structure on Contract Performance

	Total Contract Cost (log)		
	M1	M2	M3
Multiple-unrelated-segment	-	1.25** (0.43)	2.17* (1.03)
Multiple-related-segment	-	1.51*** (0.33)	2.58*** (0.64)
Sales (log)	0.09 (0.07)	0.02 (0.07)	0.11† (0.06)
Multiple-unrelated x Sales (log)	-	-	-0.19 (0.12)
Multiple-related x Sales (log)	-	-	-0.21* (0.09)
Work Type	0.14 (0.27)	0.17 (0.27)	0.13 (0.28)
Firm Type	1.53*** (0.46)	1.11* (0.47)	1.37** (0.47)
Policy Period 1	3.96*** (0.38)	3.46*** (0.37)	3.31*** (0.38)
Policy Period 2	2.53*** (0.37)	2.15*** (0.36)	2.13*** (0.36)
Policy Period 3	0.63* (0.27)	0.50* (0.22)	0.48* (0.22)
$R^2_{(adj)}$	0.59	0.62	0.62

† $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

$N = 240$ for models 1-3 and 7-9, $N = 215$ for models 4-6

Robust (clustered) standard errors reported in parentheses, clustered by firm identifier (109 total clusters)

value of the prior year's total sales revenue, in millions (USD). These results are summarized for the dependent variable in Model 3. For related multiple-segment firms, we find that the benefits of diversification are attenuated by sales, such that contract performance decreases as sales revenue increases in terms of *Total Contract Cost* ($\beta = -0.21$, $p < 0.05$). As Figure 1 indicates, the highest predicted performance on the dependent variable corresponds to the lowest sales values. Contrary to expectations, our analysis reveals that the attenuation of performance by ownership structure holds only for the related multiple-segment firms. For unrelated multiple-segment firms, we did not find a significant interaction with sales. We also find partial support for hypothesis 4, which suggests that publicly traded firms perform better than private firms (omitted variable) in government contracts in terms of total cost, likely due to their ability to reduce information asymmetry in contracting.

Robustness Check

To further validate our findings, we reviewed an alternative outcome that has been shown to reflect contract performance: The number of *Engineering Change Proposals* (ECPs) added to each contract during its lifetime. Previous literature has found that ECPs are reflective of improved outcomes from contractual relationships, particularly evidenced through organizational learning (e.g., Adler et al., 2016; Lumineau et al., 2011) and innovation (e.g., Davies et al., 2009; Rose-Anderssen et al., 2008). Therefore, ECPs

represent additional opportunities for value capture, and higher values of ECPs represent superior contract performance.

To examine the robustness of our results, we regressed the number of *Engineering Change Proposals* onto the same vector of independent variables as in the previous analysis. Because *Engineering Change Proposals* is a count variable and our data contained 25 zeros (not all contracts included engineering change proposals), we first modeled this as a zero-inflated negative binomial regression. Upon further examination, the results of a Vuong test ($z = 0.15$, $p = 0.44$) suggest that the zero-inflated model is not preferable to a standard negative binomial regression model (Vuong, 1989; Wilson, 2015). We have reported the results of a standard negative binomial regression instead, which are presented in Table 5.

Collectively, these results reflect a very similar pattern of results as was uncovered in the analyses of total contract cost. When compared to single-segment firms, the main effect model (M4) shows that related multiple-segment firms were consistently associated with superior performance in terms of the number of ECPs ($\beta = 1.33$, $p < 0.001$). In addition, we find a marginally significant association between unrelated multiple-segment firms and ECPs ($\beta = 0.49$, $p < 0.10$). For related multiple-segment firms, we find that these benefits of diversification are attenuated by sales, such that contract performance decreases as sales revenue increases ($\beta = -0.24$, $p < 0.05$). For unrelated multiple-segment firms, the results demonstrate a marginally significant interaction effect ($\beta = -0.17$, $p < 0.1$).

DISCUSSION AND IMPLICATIONS

Whereas the link between diversification and performance is typically measured by synergy, risk mitigation, and scope, our research has looked at how firm diversification affects performance within contracts between the firm and external partners. Using contracts as a proxy for interfirm relationships, we analyzed whether firm ownership characteristics that can influence performance, with primary focus on the impact of diversification on the contract. The results of our study indicate that diversified firms tend to perform better in interfirm relationships than their single-segment counterparts, a finding that we have termed "contractual diversification advantage".

This phenomenon of contractual diversification advantage builds upon the "reformulated version of the resource-based view" of strategy proposed by Lavie (2006, p. 638), which goes beyond internal firm resources to consider the effects of external relationships (Dyer & Singh, 1998) on strategic performance. Following Lavie (2006), the relational rents available for appropriation in interfirm relationships are due to the nature of the relationship, which we demonstrate can be affected by supplier-side diversification. Whereas relational advantage has typically been demonstrated as the result of investments in relationship-specific assets (Dyer & Singh, 1998), our findings demonstrate that relational advantage can be gained by investments (pre-investments, if you like) in non-relational diversified assets.

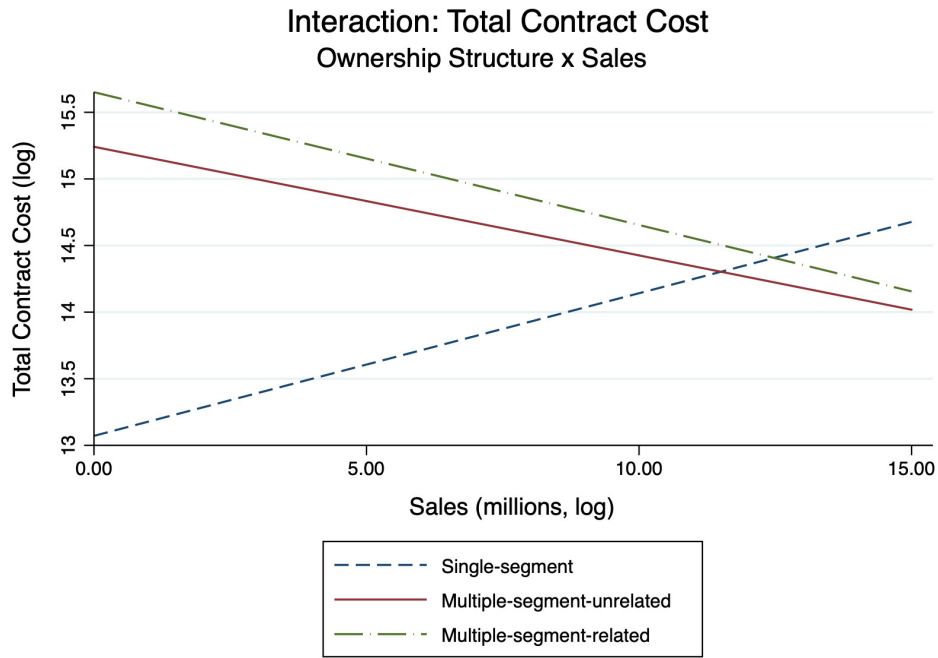


Figure 1. Interaction Effect of Sales on Total Contract Cost

Table 5. Effect of Ownership Structure on Engineering Change Proposals

	Engineering Change Proposals		
	M4	M5	M6
Multiple-unrelated-segment	-	0.48 [†] (0.29)	1.29 [†] (0.77)
Multiple-related-segment	-	1.33*** (0.23)	2.68*** (0.84)
Sales (log)	-0.01 (0.06)	-0.04 (0.07)	0.07 (0.07)
Multiple-unrelated x Sales (log)	-	-	-0.17 [†] (0.10)
Multiple-related x Sales (log)	-	-	-0.24* (0.11)
Work Type	-0.29 (0.21)	-0.11 (0.20)	-0.14 (0.20)
Firm Type	1.28*** (0.35)	0.20 (0.31)	1.00 (0.35)
Policy Period 1	3.26*** (0.34)	2.80*** (0.34)	2.61*** (0.37)
Policy Period 2	2.30*** (0.37)	1.80*** (0.35)	1.71*** (0.31)
Policy Period 3	0.57* (0.28)	0.35 (0.27)	0.27 (0.28)
Pseudo R ² _(adj)	0.52	0.12	0.57
	$\chi^2_{(7)} = 302.41^{***}$	$\chi^2_{(8)} = 344.63^{***}$	$\chi^2_{(10)} = 409.76^{***}$

[†] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

$N = 240$ for models 1-3 and 7-9, $N = 215$ for models 4-6

Robust (clustered) standard errors reported in parentheses, clustered by firm identifier (109 total clusters)

The results of our investigation support the notion that related diversifiers hold both macro-level and micro-advantages when it comes to managing inter-firm contracts. From a macro-lens, a related segment diversified firm may

have more opportunity to take advantage of information asymmetry in a contractual relationship and/or be afforded more trust (Yang et al., 2012). This follows previous work by Chang and Choi (1988), Prasad & Salmon (2013), and

Miller et al. (2007) which suggests that additional risk-sharing in contracts within diversified firms can lead to superior economic performance. Thus, our findings give additional credence to contract-performance theory by adding context to how risk-sharing potential is observed in practice. This finding is particularly important when considering the over-sized effect we observed in smaller firms, suggesting that diversification strategies can be even more important for smaller firms to create contractual advantage.

We also found compelling advantages shared by multiple-segment firms at the micro-level. Multiple-segment firms accrue larger contract costs, more contract changes, and longer durations of government contracts than single-segment firms. These results suggest that a diversified firm's market power extends to their ability to facilitate contract renegotiation on a continuing basis, thereby supporting Prasad and Salmon's (2013) study of how market power evolves in risk-sharing contracts. The ability to successfully barter for contract changes appears to be greater for multiple-segment firms than single-segment firms, with relatedly diversified firms demonstrating the highest levels of performance. As shown in our study, relatedly diversified firms worked contracts for 58.1 months longer than single-segment providers, gainfully employing their assets for almost 5 years longer as a result.

Finally, we found that small firms accrue more benefits from contractual diversification advantage than their large firm counterparts. The interaction effect in our research demonstrates that, in terms of total cost, contract performance advantages decrease as sales increase. In our data, the smallest firms in terms of sales predict the highest contract performance.

Implications for future research

Factors that govern success in US defense department contracting have been discussed in this research, thus answering a call for additional research to better understand the circumstances where relational rents "become more pronounced relative to the internal rents that have received the majority of attention in traditional RBV studies" (Lavie, 2006, p. 652). This also answers a call from Okamura (2007) for more insight into the contract characteristics of specific industries and more insight into possible synergies that affect the D-P link. Further research in alternative organizational contexts will help to demonstrate reliability for these results regarding contractual diversification advantage. Studies that take on this challenge can enhance our understanding of specific contractual terms and conditions (i.e., structural mechanisms) that affect the D-P relationship. For example, do structural mechanisms differ across firm ownership structure and, if so, how are these *ex-ante* coordination and control features developed and ratified to facilitate *ex-post* contract performance (Kashyap & Murtha, 2017)? Other research could attempt to identify other "pre-investments" at the firm level that can impact contract performance and generate relational advantage. Such research could align with our findings as well as previous work that has considered how common investment influences market performance (Cheung et al., 2020).

The relational view of strategy says little about the impacts of firm size. The results of our study suggest that smaller diversified firms, particularly related diversifiers, may have additional advantages by being nimbler or more focused on contract performance than their larger counterparts. Additional research that considers the size and ownership structure of the firm in terms of relational advantage are warranted. Furthermore, additional studies to compare the contractual performance outcomes of public versus private firms is warranted as our data indicate an advantage to the public firm, perhaps because of superior capabilities at reducing information asymmetry.

Implications for practitioners

We have seen a considerable emphasis placed upon the adroit use of contracts in modern organizations and it behooves managers to understand the economic implications of using organizational contracts to accomplish strategic objectives. The findings from our study indicate that it is possible for managers of diversified firms to provide substantial advantage to their firms by becoming more accustomed to complex contractual arrangements. The evidence is also quite clear that smaller diversified firms accrue a greater advantage than their larger diversified counterparts, highlighting the importance of diversification in smaller firms. As the relational view of strategy has been well established in scholarship, our research contributes by suggesting that firm diversification is an important consideration in gaining relational advantage from the forming and managing of organizational contracts (i.e., a contractual diversification advantage).

In addition to contract performance, our findings regarding the increases in engineering change proposals suggest that enhanced opportunities for organizational learning are available to diversified firms who engage in contractual relationships. As firms prioritize innovation and adaptability in order to thrive in a dynamic marketplace (Døving & Gooderham, 2008; Pittz & Adler, 2023), relational contracts that involve some form of risk-sharing are becoming a priority over hard contracts with rigid terms. These relational contracts provide space for joint-learning (Schijven et al., 2021), and it is also likely that managers of diversified firms have more experience navigating these risk-sharing relationships.

CONCLUSION

Our research has shown, over a 25-year period of US department of defense contracts, that ownership structure provides advantages when contracts are established in research and new product development projects. These advantages are particularly pronounced when the firm is structured to be relatedly diversified with greater horizontal scope. Whether driven by information asymmetry, perceived trust, or some combination of factors, diversified firms appear to be able to better negotiate changes to contract terms during the life of the project to achieve better contract performance than their single-segment firm counterparts.

While relatedly diversified firms achieve the best contract performance of the firms we studied, our research also highlights an interaction effect between firm size (as measured by sales) and the ownership structure. We found that as relatedly diversified firms are larger, their contract performance benefits are attenuated. This finding extends previous research that suggests small firms benefit more from interfirm relationships than larger firms (Stuart, 2000) into the diversification-performance relationship. Overall, this

research advances a conceptualization of relational advantage that occurs as the result of firm diversification. The results of our study suggest an extension of the relational view of strategy that considers whether ownership structure makes a firm more adept at, or more open to, taking advantage of shared relational rents.

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