

Private military and security companies, contract structure, market competition, and violence in Iraq

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Abstract

Conflict environments exacerbate an incentive dilemma between employers and private military and security companies (PMSCs). PMSCs seek to maximize profits, but employers seek to minimize expenses and maximize services. We argue that PMSCs are influenced by two complementary economic factors: contract structure and intra-sector competition. Contract structures are set by employers and establish compensation constraints and intra-sector competition identifies potential replacements. Both impact service delivery. We find that PMSCs with contract structures that lack performance incentives, even in the presence of competition, increase the likelihood of violence in Iraq. PMSCs that lacked intra-sector competition had a similar but smaller effect.

Keywords

Contracts, insurgency, Iraq, private security and military companies

Introduction

International demand for private security services over the last 40 years has generated a diverse, globally competitive marketplace. Today, private military and security companies (PMSCs) provide a range of services. PMSCs are legal, profit-maximizing companies that provide military and security services.¹ Over the years, national governments that have ceded national security functions to private actors have generally done so based on the expectation that contracting would improve service efficiency. International actors, particularly the United States, are increasingly reliant on PMSCs in conflict environments to deliver military services (i.e. intelligence and physical security) and government and social services (i.e. water purification, construction, and electricity). Recently, scholars have shown that PMSC employment impacts violence intensity (Petersohn, 2014), conflict duration (Akcinaroglu and Radziszewski, 2012), and military operational capabilities (Singer, 2003). Despite

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contractor malfeasances and failure to provide contracted duties that reduce military effectiveness (Dunigan, 2011), PMSC employment continues as states, international organizations, and humanitarian organizations contract a range of risk management, security and governance services (Grant, 2013; Ostensen, 2011; Stoddard et al., 2008). Chaotic conflict environments and limited government oversight can result in few objective success measures, weak country infrastructure, and limited penalties for failure. This creates the following dilemma for employing governments: what conditions, if any, can employers use to shape PMSC behavior in conflict environments?

Contract structure and intra-sector competition are two complementary factors that influence PMSC behavior. Contract structures are set by employers after identification of needs; intra-sector competition is determined after contracts are announced or advertised. Thus, in the principal-agent dynamics between PMSCs and employers (Fahn and Hadjer, 2015), contract structures are known by employers, but intra-sector competition is unknown and determined by the market. In each instance where PMSCs are employed, contract structures establish performance incentives and how firms are compensated for services (Dickinson, 2007). Contract structures vary, even in the same service sector, because of incentive incompatibilities and general confusion in conflict environments (Hutton and Solis, 2009). PMSCs seek contract structures that maximize profits; employers seek structures that set limits on profitability. Contracts that set compensation constraints and service requirements force PMSCs to provide services efficiently in order to profit. However, when PMSCs are not constrained by performance incentives (e.g. when firms can charge unlimited fees), efficient service delivery declines, as firms have no incentive to provide services.

Intra-sector competition occurs after employers identify needs and specify contract structures. Employers are uncertain about intra-sector competition because firms that provide the desired service are identifiable; firms may or may not decide to bid on a contract. Decisions to bid on contracts are based on factors such as expected profitability, firm costs, and likelihood of winning. Intra-sector competition occurs when multiple firms compete for a contract, not simply when multiple firms are present in a conflict (Akcinaroglu and Radziszewski, 2012; Petersohn, 2015). Intra-sector competition benefits employers by reducing prices and identifying potential replacements in the same service sector. The degree of intra-sector competition influences PMSC performance but less than contract structures because of the increased level of uncertainty. Employers cannot identify the degree of competition until after a contract is announced; similarly, PMSCs are not certain of the degree of competition until contracts are awarded.

Contract structure and intra-sector competition are complementary mechanisms for employers to influence PMSC behavior. Employers determine contract structure, but they must balance compensation requirements with other considerations such as delivery time, profitability opportunities, and intra-sector competition to ensure contracts are filled. However, contracts with few restrictions on how firms are compensated or contracts that guarantee high profit margins are inefficient and costly because firms may take advantage of employers. Thus, in the absence of contract structures that incentivize completion, competition levels will likely have a negligible effect on contract completion. Alternatively, PMSCs are most likely to complete contracted services when both contract structure and intra-sector competition promote contract completion.

The following section develops a theory-based explanation of how contract structure and intra-sector competition influence PMSC performance. Broadly identified, this article argues

that when PMSCs have contractual performance incentives and face intra-sector competition, performance improves. Conceptualization of PMSC performance is restricted to the employer's military objectives in the conflict. In this analysis, US employment of PMSCs in Iraq is used as a heuristic for analyzing the complex and diverse global private security market. PMSCs' impact on the conflict is measured using the number of insurgent attacks against US and coalition forces per governate (province)-month from January 2004 to December 2008. Firms facing no intra-sector competition have no effect on violence. PMSCs that operate under contracts without competition constraints increase the likelihood of violence, whereas firms with constraints decrease the likelihood of violence. The results suggest that employers have mechanisms at their disposal to mitigate incentive disparities and improve performance when employing PMSCs.

From a policy perspective, our findings are important because they identify complementary factors that impact PMSCs. Variation in contract structure offers employers opportunities to incentivize efficient performance while balancing the need to procure services in a competitive market. Paradoxically, the results suggest that an increase in the number of global PMSCs competing for contracts may regulate firms. However, PMSCs are not necessarily an effective or desirable alternative to national military forces because they do not directly substitute for military forces (Avant, 2005) and may generate resentment in the state's armed forces (Heinecken, 2009) and civilian populations (Zedeck, 2007). These findings suggest that if employers opt to hire PMSCs, there are policy alternatives that influence firm performance.

The following sections contain a review of contracting in counterinsurgency operations in Iraq, development of the theoretical argument, and two testable hypotheses. The empirical analysis is followed by a brief discussion of theoretical and policy implications.

Related literature

The effect of PMSCs on military capability is debated in the literature. PMSC services can negatively influence military effectiveness. Dunigan (2011) argues that, overall, PMSCs reduce military effectiveness because of communication limitations, coordination problems, and disparate organizational accountability. Heinecken (2009) argues that PMSCs' disproportionately high pay rates generate negative morale in the military and reduce military effectiveness. Haphazard contracting practices, extensive demand for services, and lack of experience enhance oversight liabilities (Berrios, 2006). When PMSCs fail to provide contractually obligated services, military effectiveness and the likelihood of achieving military objectives decrease. For the United States, PMSCs are viewed as an extension of the supported agencies (Flavin, 2012: 92; Kelty & Schnack, 2012: 48). For example, the majority of US Department of Defense (DoD)-hired PMSCs support US military objectives (Cancian, 2008), even if particular contracts are for seemingly non-military services (Kinsey, 2006).

However, PMSCs may improve military effectiveness through the provision of specialized services and by enabling armed forces to concentrate on core functions. US military commanders recognize the importance of PMSCs for operational success; delivery of services as varied as electricity to intelligence is critical for US military effectiveness (Grasso, 2010). Moreover, using friendly fire incidents data drawn from Wikileaks documents, Petersohn (2013) finds that the performance of PMSCs under sound oversight "supersedes that of

poorly trained military personnel, such as the Iraqi military and, in some cases, even that of highly capable US military” (Petersohn, 2013: 486). In sum, PMSCs’ impact on military effectiveness is mediated by other factors.

PMSCs also deliver government services beyond security such as electricity generation, water purification, information services, and general logistics that affect the population. Governments, international organizations, and humanitarian organizations contract PMSCs for risk management, governance, and reconstruction services as well as traditional security tasks (Grant, 2013; Stoddard et al., 2008). Multiple peacekeeping operations use private firms to provide logistics and transportation as well as the delivery of aid (Ostensen, 2011: 38). The provision of government services may decrease incentives for violence and bolster support for the government. Consequently, government service programs are targeted by insurgent groups that fear program success will undermine their support in the population (Crost et al., 2014). Provision of government services is fundamental to the counterinsurgency (COIN) doctrine introduced by the United States in Iraq (Pirnie and O’Connell, 2008: 87–88). Berman et al. (2013) demonstrates that government service delivery can reduce incentives for violence. Their theoretical model has three actors: violent rebels, government, and civilians. Rebel groups seek to change government policy through violence, and the government seeks to reduce violence through counterinsurgency efforts and service provision. Civilians either provide information to the government about the insurgents or do not. The authors test their expectations that provision of public services—measured by 62,628 small reconstruction projects funded by the Commander’s Emergency Response Program (CERP)—decreases the likelihood of insurgent attacks in Iraq from 2003 to 2007. CERP funding is designed for small projects to enhance social order.

However, there are numerous limitations of PMSC involvement in government and social service delivery. Management of PMSCs is generally poor, particularly by states that generally shift responsibility for post-conflict operations to PMSCs (e.g. United States and UK; Tzifakis and Huliaras, 2015). PMSCs often fulfill contracts with third-party nationals that may or may not have the necessary skills and experience. Finally, PMSC contracts rarely identify human rights as a priority, and alleged abuses by PMSCs decrease population support (Zedek, 2007).

Contract structure, intra-sector competition, and levels of violence In Iraq

PMSCs augment military capabilities and government services by providing contracted services but do so unevenly based on PMSC performance. Performance variations arise because PMSCs and their employers face principal–agent dilemmas throughout the contracted relationship. Conflict environments foster conditions that promote information asymmetries between firms and employers that favor PMSCs: the combination of chaotic and violent environments, lack of legal regulation mechanisms, and poor transportation infrastructure can limit the employer’s monitoring ability. Consequently, PMSCs have incentives to deliver services in a less than optimal manner, and poor performance will likely go unpunished. Under these principal–agent dilemma conditions and monitoring difficulties, constraints placed on firms by contract structure and intra-sector competition are options for employers to influence PMSCs.

Contract structure

Contracts are the governing authority between employers and PMSCs. Contracts are negotiated legal agreements that establish compensation parameters, evaluation metrics, and oversight mechanisms. All of these factors influence risk in a business relationship, particularly when discerning risk is difficult (Romzek and Johnston, 2005). Contract structure favors either PMSCs or employers by determining incentives that influence service provision. Because employers utilize different contract structures to reduce uncertainty about securing critical resources (Malatesta and Smith, 2011), employers implement different contract structures for the same services depending on risk and requirements. In the US context, when not explicitly stated in law, contract officers have substantial discretion in the selection of contract structure. Decisions are made based on factors such as degree of price competition, time sensitivity, and performance period (Manuel, 2010).

Employers must balance various contract structures to ensure that sufficient incentives exist for firms to compete for contracts while employers pursue cost-effective service acquisition. If contracts are structured such that firms cannot profit, firms may not compete or, worse, contracts go unfulfilled. Yet if contracts have no performance incentives, employers may not receive efficient services. Because contract structures are one of the few aspects of the contracting process employers can control—uncontrollable aspects include chaotic conflict environments and intra-sector competition levels—how they utilize contract structures shapes the effectiveness of PMSC support.

The “fog of war”—the uncertainty about service requirements, delivery costs, and oversight capacity—confounds contracting. Time-sensitive services required for military operations improve PMSC leverage. General confusion results in inconsistent contracting procedures, implementation, and evaluation. This is particularly the case in complex environments; US military operations in Iraq were plagued by inconsistent application of contract structures and service procurement (Hutton and Solis, 2009). In addition, various departments in DoD independently signed and administered contracts, limiting DoD-wide standardization of contracting practices (SIGIR, 2004: i).² Consequently, contract structures were applied haphazardly across various services and governorates in Iraq, reducing the likelihood that contract structure was endogenous to service and governorate location. Variation in contract structure within a service sector is not unique to US operations in Iraq. Decisions on PMSCs are often made independent of headquarters, as field personnel identify service needs and initiate the contracting process. Surveying humanitarian organizations, Stoddard et al. (2008: 13) found that only half of headquarter personnel were told of PMSC hiring; field personnel believed that headquarters was informed only about 40% of the time.

Contract structures are ordered on a continuum of risk in conflict environments where monitoring is difficult. First, contracts can provide fixed prices (i.e. lump sum or unit price), which minimize employers’ financial risks since firms are liable for cost overruns. These contracts advantage the employer since profitability is dependent on efficient service provision. Second, contracts can provide a specific reimbursement for service delivery (e.g. cost reimbursement). These structures maximize employers’ risk while protecting firms because profits are determined by the quantity, not the quality or timeliness, of a particular service. When cost-reimbursement contracts are used, the likelihood of PMSCs providing efficient services is lower than in contracts where total contract compensation is set and firms must independently develop strategies to remain profitable. Consistently, in contracts that have more efficiency incentives, PMSCs are less likely to shirk.

Overall, contract structures influence PMSC service delivery requirements. PMSCs that shirk contract obligations negatively influence military effectiveness and public support for the government through reduced service provision. PMSC service delivery contributes to the achievement of an employer's military objectives, which, in the case of the United States in Iraq, was a reduction in the level of insurgent attacks (Jones et al., 2005). The uncertainty of service demands during conflicts heightens the importance of contract structures and the use of performance incentives. Therefore:

H1: In Iraq, PMSCs under contracts that decrease (increase) efficiency incentives are associated with increases (decrease) in the likelihood of insurgent attacks.

Intra-sector competition

PMSC contract competition is an observable indication of the specific service offered by a given firm. PMSCs self-select into a conflict based on observed and unobserved factors. Observable factors occur when PMSCs bid on a contract. Consistent with economic theories that firms possess specialized knowledge that advantages them in the market, PMSCs pursue contracts that align with their specialized services. PMSCs are discouraged from bidding on contracts in service areas outside their specialty because failure to fulfill a contract hurts their reputation. PMSCs that establish and maintain positive reputations with employers are more likely to be hired in the future (Fahn and Hadjer, 2015); the potential for future contracts and the potential to be replaced with competitors influence firm performance. Ubiquitous bidding diminishes a PMSC's advantage in specific service markets, as few, if any, firms provide the entire range of services purchased in conflict environments.

Employers are uncertain about intra-sector competition because individual PMSCs' business calculus includes both observable and unobservable factors. Observable factors (e.g. service history, geographic footprint, and public announcements) provide employer and competitors alike with a reasonable estimate on which firms will bid. Yet unobservable selection criteria (private information) include contract evaluation, conflict situation, completion likelihood, and firm resources. In many cases, PMSCs have incentives to keep this information private from competitors and employers because the information might enhance a competitor's edge. For example, a firm that is able to identify a competitor's unobservable factors has a strategic advantage when bidding on a contract. Possession of a competitor's private information enables firms to either price match or underbid competitors, even though both firms submit proposals simultaneously. Consequently, employers face uncertainty in determining competition levels because a firm may not compete for a contract.

PMSCs are discouraged from ubiquitous contract solicitations because the bidding process is costly. Costs vary based on contract requirement complexity, firm size, geographic location, and time horizon. PMSCs limit bids based on the likelihood of winning and profitability of the contract. Indeed, a limited number of bids is the norm for most contracts and results from the following causal paths. First, a small number of bids might result from limited competition, as few firms are qualified to provide the service. Second, a small number of bids might reflect an underdeveloped or poorly structured contract from an employer, reducing incentives to bid. On both paths, the effects of competition are similar since the number of bids received for a contract reflects the number of firms that provide that particular service and are willing to accept the contract.

Intra-sector competition shapes the business environment in which firms operate. Such competition generates pressure to provide contracted services and reduces the likelihood that PMSCs will shirk contractually obligated service deliveries. PMSCs that perform optimally increase the capacity of the employer to provide services to the population in the conflict environment. Therefore, intra-sector competition is expected to reduce shirking behavior by improving service delivery, which directly and indirectly contributes to the reduction of violence in Iraq. This hypothesis is formalized below:

H2: In Iraq, as intra-sector competition amongst PMSCs increases (decreases), the likelihood of insurgent attacks decreases (increases).

Contract structures are often the only facet employers can manage in volatile conflict environments; yet employment of PMSCs does not guarantee that services are delivered efficiently, effectively, or at all. Contract structures reduce uncertainty for employers because they explicitly identify PMSC compensation structures. However, two factors limit the capacity of contracts to improve service delivery. First, unlike peacetime contracting that prioritizes fair prices, the larger strategic goal in contingency operations is to reduce violence and support for insurgents (Commission on Wartime Contracting, 2011). Second, without intra-sector competition, employers are less able to correctly estimate the true cost of service delivery. When incentive contract structures are used and high competition is present, employers benefit from increased market information because it improves future contracting rounds. In many contexts including Iraq, employers simultaneously field multiple contracts for the same service, which enables employers to learn about the market and better prepare for the next contract round. In the absence of competition, employers cannot identify how best to modify contract features (e.g. prices, location, required services and other factors) to improve service delivery in future contract rounds. Consequently, the inverse—that in the absence of intra-sector competition contract structure will have a diminished effect on firm performance—is also likely. Thus, while employers do benefit from incentive contracts, this benefit is maximized only when intra-sector competition is present. Therefore, we propose the following conditional hypothesis,

H3: In Iraq, as contract structures that incentivize efficiency increase, the likelihood of insurgent attacks decreases in the presence of intra-sector competition.

Research design

Dependent variable

To examine the complex and diverse global private security market, US employment of PMSCs in Iraq is used. The dependent variable, *INSURGENT ATTACKS*, is the governorate-month total of insurgent attacks reported, as drawn from the Multi-National Forces Iraq SIGACTS III Database. The data are gathered from de-classified Coalition reports that detail insurgent attacks “targeted against coalition, Iraqi Security Forces (ISF), civilians, Iraqi infrastructure and government organizations” (Department of Defense, 2008). The reports contain information on the location, date, and type of attack.³ Insurgent attacks may include small arms attacks, roadside bombs, ambushes, mortar attacks, and other types of Coalition-directed violence (Hoffman, 2006). The measure captures 166,983

incidents from February 2004 until December 2008. Insurgent attacks vary over time and governorate. For example, Anbar and Baghdad governorates experienced the highest sustained levels of insurgent attacks with Baghdad accounting for nearly 40% of the total incidents (63,394 of 166,983 incidents). Despite the high levels of violence, several governorates experienced months without insurgent attacks. Governorate-level analysis captures the conflict's heterogeneity: over one-quarter of the observations had two or fewer attacks, and 50% of the observations had fewer than 15 attacks.

Explanatory variables

DoD contract data are from the US Census Bureau and include PMSCs operating in Iraq from February of 2004 until December 2008. Contracts totaled 1901 and included 17 service sectors for PMSCs operating in 14 of Iraq's 18 governorates.⁴ The major base, city, or forward operating location identifies PMSCs' operational governorate. Data are governorate-month-year. Generating the unit of analysis required expansion of the original dataset to generate time-series data for each contract. PMSCs are counted as operating in a governorate if they spent more than 15 days in a particular month in said governorate. PMSCs did not choose regions of the country in which to operate. In many instances, PMSCs signed contracts to provide services in Iraq and only later, based on military necessity, were locations specified. Security service requirements dictated the number of PMSCs in a given governorate, not competition levels. PMSCs might select which conflicts to compete in geographically but not necessarily select a particular location within the conflict. Securing a contract in Iraq did not allow firms to select a particular governorate in which to operate. Instead, identification of service locations within Iraq typically occurred after a firm won a bid. This procedure diminishes the likelihood that contract bids were endogenous based on violence in an Iraqi governorate.

US-Iraqi data provided the opportunity to identify initial bidding competition and contract structures. PMSCs that bid on a given contract provided similar services and were in competition with the other bidding firms. Contracts issued by the US Federal Government were required, with restrictions, to be available publicly. We used two sources to compile competition data. First, the Federal Procurement Data Systems (FDPS) provided summary information for each federally issued contract, including many Iraqi contracts. Second, the DoD was required to announce and provide daily information on all contracts over \$5 million. If a contract was not in either database, an Internet search was conducted. The resulting coding procedure captured nearly 60% (1133 of 1901) of the DoD's contracts for the period. Contracts for publicly traded and individually owned firms are included in the analysis as are contracts in every service area. The FDPS provided the majority of data regarding the number of bidders for each contract. The DoD and Internet searches augmented the FDPS's contract bid data.

To examine hypothesis 1, variables capturing three contract structures were created.⁵ Table 1 shows the three primary contract categories issued by the DoD and information on the number of contracts, brief descriptions, key characteristics, and efficiency incentives.⁶ The three contract types were times and materials, cost-plus, and firm fixed price. Times and material compensated PMSCs based on hourly rates and reimbursement structures. These contracts typically advantaged the firm, since they required employers to closely oversee operations to ensure firms were not overcharging. Cost-plus contracts were those in which a PMSC was provided with a reimbursement of costs and was guaranteed a pre-set fee or

Table 1. Contracted service total by contract structure

Contract structure	Number of contracts	Description	Key characteristics	Performance incentives
<i>TIMES & MATERIALS</i>	128	Direct fixed labor hours and materials costs	Accurate labor estimates	Low
<i>COST-PLUS</i>	219	Negotiated fee over cost	Limited change in fee	Medium
<i>FIRM FIXED</i>	429	Set fixed price for services	Set price	High
Two or more	334	More than one	Unknown	Unknown
Unknown	23	contract type		

profitability margin. In these cases, profits were guaranteed. Finally, firm fixed contracts set a fixed price for services, which placed more risk on the firm. Performance incentives were maximized under this condition since profit was ascertained through efficient service provision. Each of the three variables *TIMES & MATERIALS*, *COST-PLUS*, and *FIRM FIXED* aggregates the total number of employees operating under the specified contract mechanisms in each governorate month. Because services were not tied to contract structure, each variable contains PMSCs that provided a range of services—ensuring the results are not driven by specific services.

In Iraq, PMSCs, services, or locations determined contract structure. For example, when considering Iraqi-wide contracts for armed services, firm fixed contracts were more numerous (16) than times and materials (10) and cost-plus (7). Considering governorates that experienced the greatest levels of violence—Anbar, Baghdad, and Salah al-Din—services did not determine contract structure. The DoD was largely unprepared for the massive increase in wartime contractors owing to a small professional contractor corps and lack of contingency contracting experience.

Since US contracting policies in Iraq were not uniform, two sets of variables were used to capture intra-competition. *COMPETITION EMPLOYEE RATIO* is a measure of competitive employees versus non-competitive employees. In Iraq, some PMSCs were selected by the US Government to receive contracts without competitive bidding. There were 211 no-bid contracts in the sample. A ratio of employees is utilized to account for the initial decision of the employer to use PMSCs. Once that decision is made, an employer must decide to competitively award the contract. Employee ratio provided a baseline measure that captured the degree to which employees in a governorate represented firms that faced competition. The ratio creates a relative scale of the level of competition in each governorate, enabling comparisons among employee levels. The variable was constructed by totaling the number of employees from competitive and non-competitive firms per governorate-month. Employees from competitive firms were the dividend, and employees from non-competitive firms were the divisor. Large values represented instances in which employees from competitive firms outnumbered employees from non-competing firms. Since employee ratio was skewed, it was logged. When interpreting the variable, negative coefficients represented improvements in PMSC efficiency and positive coefficients represented decreases in PMSC efficiency. Based on hypothesis 2, the coefficient for employee ratio is expected to be negative.

A second set of variables separates employee totals based on levels of intra-sector competition. Competition is based on specific contracts that capture similar services. Delineating competition in this manner allows for within-service sector comparisons. These variables were required to identify how competition shaped PMSC operations. For example, a PMSC that provided multiple services and maintained multiple contracts faced different competition for each service. Some services—such as translation and interrogation services—were less competitive than others—such as convoy management. L3 provided both services. In addition, since PMSCs self-select into competition, this procedure ensures that competition, not services, was tabulated across PMSCs operating in Iraq. This reduced the likelihood that idiosyncratic attributes of a service competition would affect results unduly. Three variables were constructed. *NO COMPETITION* captures the number of employees from firms that did not experience competitive bidding. No competition contracts occurred when the US Government hired a firm without open competition. *LOW COMPETITION* captured the number of employees working for firms that faced three or fewer competitors, excluding sole-source contracts. *HIGH COMPETITION* captured employees from PMSCs who experienced four or more bidders. The bid mean was 3.47, ranging from 1 to 30. Bids of four or fewer comprised approximately 65% of the sample.

Control variables

PMSC operations are not the only influence on the likelihood of an insurgent attack. Drawing from counterinsurgency and terrorism literatures, several military, political, and economic control variables are included in the analysis. Governorate-month variation is used when possible, but some variables do not vary by governorate or month. PMSCs were not the primary military presence in Iraq. In Iraq, US and coalition forces assumed the bulk of security operations while supported by PMSCs. Two measures, *US MILITARY* and *COALITION FORCE*, are monthly counts of coalition forces in Iraq. Foreign forces may have competing effects on insurgent attacks. While the total number of military personnel does not capture changes in tactics and strategy, such as the adoption of counterinsurgency tactics, the measure does capture important aspects of the United States's overall strategy, notably the troop surge in 2007. The presence of foreign forces may simultaneously improve security through peacekeeping operations but may also motivate—and provide opportunities for—insurgent attacks (Pape, 2003). Two measures capturing Iraqi security personnel are used. *NATIONAL GUARD* captures the primary Iraqi security force. The three military variables are from the Brookings Institute Iraq Index, tabulated from US and Iraqi government sources. Variables vary by month, but governorate variation is unavailable owing to data limitations. *NATIONAL GUARD* is logged.

Three variables are used to control for Iraq's social and economic conditions. First, *OIL EXPORTED* is the logged monthly total pipeline oil volume per governorate weighted by price, based on data from Berman et al. (2011). Oil remains a major source of revenue for Iraq, and the literature suggests that oil exports have competing effects on violence. Oil revenue is often critical for recovery, yet oil dependence is also associated with weaker democratic institutional capabilities. Monthly data are provided from the Brookings Institute's Iraq Index, and the variable is logged. *ELECTRICITY* production is measured as the average megawatts generated per month in Iraq. Electricity is an important economic indicator of post-conflict recovery (Collier, 2003), particularly as PMSCs are contracted to produce and distribute electricity. The variable is obtained from the Brookings Institute's Iraq Index,

and is logged. Third, *POPULATION* (ln) is the logged annual population per governorate. The data are from the World Food Program.⁷

Democratic political development in Iraq is captured using *PRE-ELECTION*, which is coded 1 during an election month and the two preceding months and 0 otherwise. Iraqi parliamentary elections were held in January 2005. Similar to economic development, in some cases, elections showing political progress reduce violence; however, elections escalate violence when issues remain unresolved (Collier et al., 2008).

Temporal variation in the five-year sample was addressed using two variables. *CONFLICT START* is a count variable for each month of the conflict, and year fixed effects are used to model conflict progression. The sample covers variations in the conflict including the so-called “Anbar awakening”, which witnessed decreased levels of violence in Sunni areas between August 2006 and December 2007. The year dummy variables are not reported in the tables.

Estimation technique

The dependent variable, *INSURGENT ATTACK*, is a count variable that demonstrates over-dispersion.⁸ Negative binomial regression is used since Poisson-model assumptions are violated, particularly variance equaling the mean (Long, 1997). Iraq is a diverse country, with various ethnic and religious groups scattered across the 18 governorates. Significant divisions within the Sunni, Shia, and Kurdish populations contributed to violence, even while the population consolidated along social fissures (Weidmann and Salehyan, 2013). Time-invariant region-specific heterogeneity is controlled using governorate-fixed effects.⁹ The unit of analysis is governorate-month-year, and all explanatory variables were lagged one month to control for simultaneity bias.

Results

Table 2 contains the results for PMSCs' impact on insurgent attacks based on contract structures. Model 1 contains the baseline model with each of the variables. Model 2 includes the control variables and Model 3 excludes Baghdad. Baghdad experienced approximately 40% of the total insurgent incidents during the period. Baghdad also accounted for the highest percentage of PMSCs with nearly a quarter of all in-country PMSCs operating in that governorate. The results of the contract structure analysis generally support hypothesis 1: PMSCs operating under contracts that increased efficiency incentives are associated with decreases in the likelihood of insurgent attacks. The variables for *TIME & MATERIAL* and *COST-PLUS* are positive, but *FIRM FIXED* is negative. All three variables are statistically significant across model specifications. What is the substantive impact of the variables? When holding other variables at an appropriate measure of centrality (mean or mode), moving *TIME & MATERIAL* from its mean (approximately 93 employees) by one standard deviation (approximately 267 employees) increased the likelihood of an insurgent attack by about 20%.¹⁰ Under similar changes in variable value, PMSCs operating under cost reimbursement contracts have about half the substantive effect of PMSCs employed under time and material, or about a 10% increase in the likelihood of an attack. Consistent with hypothesis 1, PMSCs that have performance incentives in their contracts provide better services. The variable *FIRM FIXED* is negative and statistically significant across model specifications. PMSCs operating under firm fixed contracts were associated with an 18% decrease in the

Table 2. Contract structure type and insurgent attacks in Iraq: 2003–2008

	Model 1	Model 2 Controls	Model 3 No Baghdad
<i>TIMES & MATERIALS</i>	0.088** (0.014)	0.083** (0.014)	0.083** (0.015)
<i>COST PLUS</i>	0.061** (0.015)	0.039** (0.015)	0.029** (0.015)
<i>FIRM FIXED</i>	−0.084** (0.026)	−0.122** (0.024)	−0.137** (0.024)
<i>US MILITARY</i>		0.874* (0.462)	0.779 (0.047)
<i>COALITION FORCES</i>		0.139** (0.044)	0.136** (0.047)
<i>IRAQ NATIONAL GUARD</i>		0.349 (0.253)	0.341 (0.274)
<i>OIL EXPORTED</i>		0.047** (0.007)	0.047** (0.007)
<i>PRE-ELECTION</i>		0.137 (0.156)	0.129 (0.169)
<i>ELECTRICITY</i>		−0.806* (0.395)	−0.823* (0.433)
<i>CONFLICT START</i>		−0.012 (0.016)	−0.009 (0.018)
<i>POPULATION (ln)</i>		−0.002 (0.011)	−0.001 (0.007)
Constant	0.859** (0.152)	−6.384 (5.044)	−5.810 (5.540)
Log likelihood	−3228.2	−3195.5	−2802.4
Wald test (χ^2)	502.1**	604.4**	507.6**
Observations	662	662	607

Standard errors in parentheses, two-tailed test: * $p < 0.10$; ** $p < 0.05$.

likelihood of insurgent attacks when the variable is increased from the mean (approximately 737) by one standard deviation (approximately 1030), with other variables being held at their means. Substantively, when moving from the 25th percentile value of the variable to the 75th percentile, the likelihood of an insurgent attack decreases by about 19%. The results suggest that PMSCs with contracts that have performance incentives are more likely to perform optimally and, in this case, contribute to the employer's objective of reducing the number of insurgent attacks.

In terms of controls, the data indicate that security forces in Iraq had different effects on insurgent attacks. *US MILITARY* and *IRAQI NATIONAL GUARD* fail to reach conventional levels of statistical significance. One explanation for this result is that the US military often operated in the most violence-prone governorates, confounding benefits from increased military personnel. In these governorates, US forces may have simultaneously decreased violence through patrols and operations while at the same time increasing opportunities for attacks. Insurgents choosing to attack softer targets instead of well-fortified ones would be consistent with the phenomenon of transnational terrorist organizations alternating tactics (Brandt and Sandler, 2010). *COALITION FORCES* has a positive and statistically

significant effect on insurgent attacks in each model specification. The disparity in results is attributable to differences in activities, locations, and operations between US and coalition forces.

Social and economic conditions also impacted insurgent attacks. *ELECTRICITY* is negative and statistically significant, suggesting that general economic development reduces violence. When holding other variables at their means, a standard deviation increase in electricity, which is about 1140 mW/h, reduces the likelihood of an attack by approximately 40%. Consistent with the resource curse literature, *OIL EXPORTED* is positive and statistically significant. Distribution of oil revenue generated significant political turmoil, contributing to a reduction in political cooperation in parliament. *POPULATION* (ln) fails to reach levels of statistical significance at conventional levels across multiple model specifications. Finally, democratic developments had no apparent effect on insurgent violence, as *PRE-ELECTION* failed to reach conventional levels of significance across model specifications.

Table 3 contains the results of the intra-section competition analysis. Models 4–6 include *EMPLOYEE RATIO* and Models 7–9 include the set of variables for different levels of competition. The discussion proceeds with the key theoretical variables as political and economic control variables were largely consistent with previous results. Model 4 is a bivariate test of hypothesis 2 that intra-sector competition decreases violence. PMSC performance reduces the likelihood of violence when *EMPLOYEE RATIO* is negative and statistically significant across model specifications. To ensure Baghdad did not overwhelm the analysis, the governorate was removed in Models 6 and 9. With Baghdad removed, results for *EMPLOYEE RATIO* remained consistent, despite Baghdad's high per-month average for insurgent attacks.

To examine the substantive effect, changes in predicted probabilities were calculated. Calculated from Model 5, each scenario describes the predicted probability of an insurgent attack when the value of *EMPLOYEE RATIO* is changed to substantively meaningful values. For example, we might consider the situation where there are five times more employees from PMSCs that experience intra-sector competition compared with employees from non-competitive PMSCs. This scenario is consistent with shifting the *EMPLOYEE RATIO* from a value of 1:1 to 5:1. When holding other variables constant, shifting the variable value in this direction results in an approximately 3% decrease in the likelihood of an insurgent attack. The substantive effect increases as the ratio of intra-sector employees increases. Shifting the variable to meaningful values that represent an increase in the ratio from 1:1 to 10:1 results in a decrease of approximately 7% in the likelihood of an insurgent attack. Figure 1 shows the predicted probabilities of the *EMPLOYEE RATIO* when set at its minimum, mean, and maximum. Substantively, the ratio variable is at its minimum when there are no employees from PMSCs that faced intra-sector competition. The mean value for *EMPLOYEE RATIO*, the middle predicted probability, corresponds to instances when PMSC employees from competitive firms outnumber non-competitive employees by five to one. Finally, the maximum value corresponds to instances when there are no non-competitive PMSCs employees present and thousands of competitive PMSC employees. The figure demonstrates that when PMSCs face intra-sector competition, the likelihood of violence is reduced. When the ratio variable is at its maximum, the likelihood of an insurgent attack is decreased by nearly 50% when other variables are set at their means. This scenario occurs when PMSCs that face intra-sector competition have thousands of employees in a governorate while PMSCs that do not face competition have only a few.

Table 3. Competition levels and PMSCs' performance in Iraq: 2003–2008

	Model 4	Model 5	Model 6 No Baghdad	Model 7	Model 8	Model 9 No Baghdad	Model 10
EMPLOYEE RATIO	–0.062 ^{**} (0.018)	–0.047 ^{**} (0.017)	–0.042 ^{**} (0.018)				
NO COMPETITION				0.101 ^{**} (0.018)	0.085 ^{**} (0.017)	0.078 ^{**} (0.018)	0.032 [*] (0.019)
LOW COMPETITION				–0.005 (0.034)	–0.119 ^{**} (0.034)	–0.156 ^{**} (0.035)	
HIGH COMPETITION				–0.013 (0.014)	–0.027 ^{**} (0.013)	–0.030 ^{**} (0.015)	
US MILITARY		0.077 (0.460)	0.039 (0.498)		–0.224 (0.457)	–0.359 (0.492)	0.810 [*] (0.463)
COALITION FORCE		0.174 ^{**} (0.043)	0.159 ^{**} (0.047)		0.187 ^{**} (0.043)	0.193 ^{**} (0.047)	0.130 ^{**} (0.043)
IRAQ NATIONAL GUARD		0.187 (0.256)	0.187 (0.278)		0.168 (0.252)	0.129 (0.273)	0.270 (0.248)
OIL EXPORTED		0.042 ^{**} (0.006)	0.041 ^{**} (0.006)		0.049 ^{**} (0.007)	0.051 ^{**} (0.007)	0.039 ^{**} (0.006)
PRE-ELECTION		0.094 (0.160)	0.096 (0.173)		0.098 (0.156)	0.078 (0.169)	0.167 (0.157)
ELECTRICITY		–0.666 ^{**} (0.372)	–0.596 ^{**} (0.405)		–0.880 ^{**} (0.381)	–0.987 ^{**} (0.413)	–0.092 (0.371)
CONFLICT START		0.013 (0.016)	0.011 (0.017)		0.019 (0.016)	0.024 (0.018)	–0.011 (0.016)
POPULATION (ln)		–0.004 (0.011)	–0.007 (0.012)		–0.008 (0.010)	–0.011 (0.010)	–0.008 (0.010)
TIMES & MATERIALS							0.028 (0.022)
TIMES & MATERIALS × NO COMP.							0.009 [*] (0.004)
Constant	0.841 ^{**} (0.094)	2.128 (4.772)	1.816 (5.194)	0.444 ^{**} (0.201)	5.530 (4.892)	7.467 (5.313)	–6.059 (4.800)
Log likelihood	–3253.1	–3217.8	–2824.5	–3242.1	–3204.6	–2809.1	–3200.9
Wald test (χ^2)	395.4 ^{**}	525.6 ^{**}	435.6 ^{**}	439.8 ^{**}	584.7 ^{**}	504.3 ^{**}	620.7 ^{**}
Observations	662	662	607	662	662	607	662

Standard errors in parentheses, two-tailed test: * $p < 0.10$; ** $p < 0.05$.

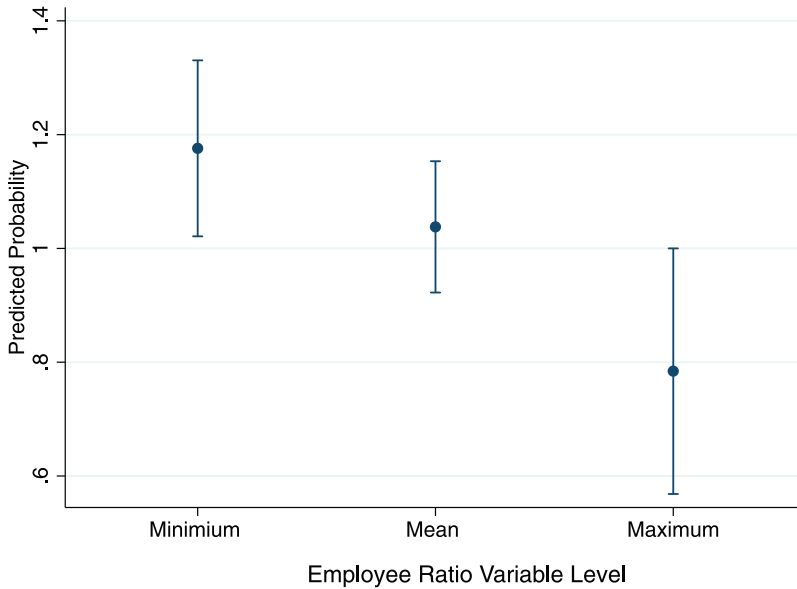


Figure 1. The effects of employee ratio on insurgent attack.

Results pertaining to the influence of various competition levels are shown in Models 7–9. *NO COMPETITION* is positive and statistically significant across model specifications.¹¹ This result is consistent with hypothesis 1 that competition influences PMSC performance—in this case, the lack of competition limits incentives for PMSCs to perform. The result is also substantively meaningful. When holding other variables at their means, a standard deviation increase in the number of non-competitive employees (approximately 326 individuals) increases the likelihood of an insurgent attack by almost 33%. The number of employees from PMSCs that did not face intra-sector competition peaked at 2879 in Baghdad in March 2010. Under this scenario, the increase from the mean to the maximum number of non-competitive employees increases the likelihood of an insurgent attack by nearly 47%. Model 6 drops Baghdad from the analysis, but this has little substantive effect on the results. The results suggest that the presence of PMSCs that do not face competition increases the likelihood of attacks. It is important to note that these results do not mean that PMSCs or their employees actively antagonized insurgents or took specific actions that directly led to attacks. Rather, it appears that PMSCs that do not face intra-sector competition have much less incentive to perform their contracted duties than firms that do face competition. Consequently, where non-competitive firms operate, there is an elevated likelihood of duties being shirked or not being performed at a high level, and this, in turn, may increase support for insurgents and lead to an increase in insurgent activity.

The variable for *LOW COMPETITION* is negative and statistically significant at conventional levels once control variables are included. One approach to interpreting the coefficients from a negative binomial regression is to use incident rate ratios (IRR).¹² IRR represent the increase or decrease in the likelihood of an insurgent attack given a one-unit increase in the explanatory variable and the standard error. Values over 1 represent increases in expected counts and values under 1 represent decreases in expected counts. Based on

Model 5, *LOW COMPETITION*'s IRR value indicates that a unit increase of employees from low competition firms corresponds to an increased likelihood of an insurgent attack by a factor of 0.88, when other variables are held constant. Alternatively, shifting *LOW COMPETITION* from its minimum value to its maximum value, an increase from 0 to approximately 16,000 employees decreases the likelihood of an insurgent attack by nearly 50%. This result provides evidence to support hypothesis 1.

Similarly, *HIGH COMPETITION* is positive and statistically significant when including control variables. Calculated from Model 5, the IRR value indicates that an insurgent attack is decreased by factor of 0.97 when the variable is increased by one unit. Shifting *HIGH COMPETITION* from its minimum to its maximum value decreases the likelihood of an insurgent attack by approximately 21%. In general, the results suggest that PMSCs that experienced higher levels of intra-sector competition reduce the likelihood of insurgent attacks, supporting hypothesis 1. Interestingly, after a certain level of competition is reached, any further increase in the level of competition firms face does not appear to substantively improve their performance.

A series of interaction models are used to examine hypothesis 3. Model 10 in Table 3 is one of the four models.¹³ Each model uses the same specifications, except for the interaction and constitutive terms. Figure 2 shows the marginal effect and enables comparisons of the conditional relationship between PMSCs with different contract structures and competition levels. The *x*-axes are the estimated total employees from PMSCs based on the competition levels. The *y*-axis is the predicted linear effect of PMSCs based on contract structure. Column 1 contains the effects of PMSCs with *TIMES & MATERIALS* contracts, and

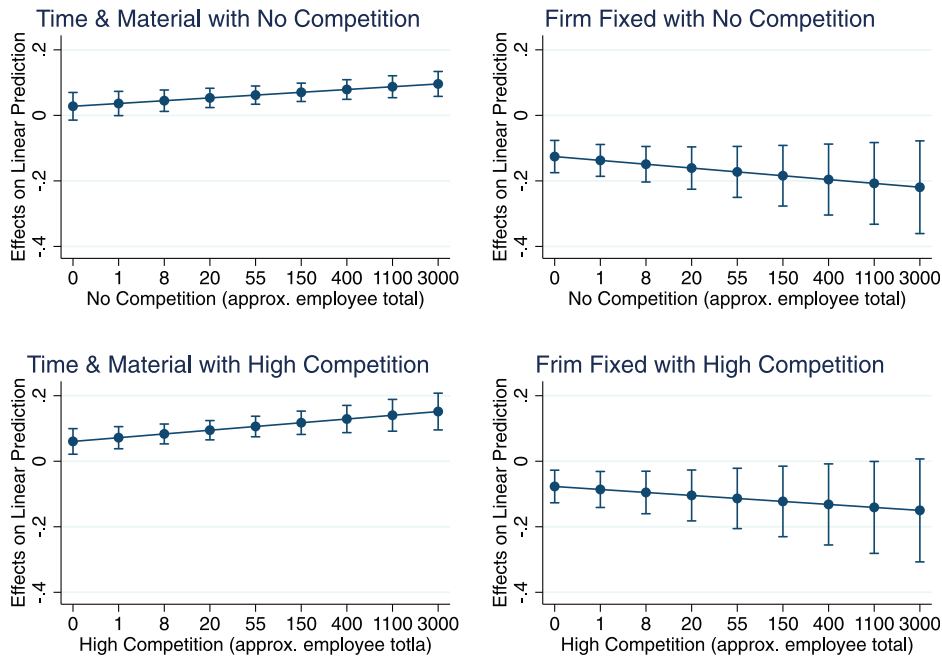


Figure 2. Marginal effects of contract structure by intra-sector competition levels on insurgent attacks in Iraq: 2003–2008.

column 2 contains the effects of PMSCs with *FIRM FIXED* contracts. Row 1 depicts firms that experienced no competition, and row 2 depicts firms that experience high competition levels. The vertical bars are 95% confidence intervals. The figure shows that PMSCs with contracts that set performance incentives start with a lower probability of insurgent attacks than PMSCs with other contract forms (differences between column 1 and 2). In instances of low competition (row 1), increases in the use of PMSCs with no contract incentives are associated with an increased likelihood of insurgent attacks. Yet, even in environments with low competition, firms with contract constraints reduce the likelihood of violence. In instances where firms face high competition levels, a similar pattern develops. Consistent with hypothesis 3, PMSCs are likely to be associated with a reduction in violence when operating under performance incentive contracts (column 2). Intra-sector competition, identified by comparing rows within each column, has limited effects on PMSCs as evidenced by the similarity in marginal values (e.g. panels 1 and 3 (time and material column), which are both positively sloped and have similar effects). The marginal effect of high competition and restrictive contract structures is not significant at higher variable levels (high levels of PMSC employees operating in a province). This suggests that there are limits to the degree to which economic factors can influence PMSCs. This finding casts doubt on the widespread employment of PMSCs in conflict environments because even in the most favorable conditions (high competition and performance incentive contracts), PMSCs have limited effects on violence.

Conclusion

This analysis contributes to a growing body of research indicating that contracting government services can be both a boon and a bane. Under certain conditions, contracting private security services can support achievement of employers' goals by freeing military forces to concentrate on core activities and increase public support through service delivery. However, contracting can also negatively impact employers when PMSCs shirk their contractual obligations. This study systematically examines how economic parameters of contracts and intra-sector competition influence PMSCs. Contracts are ubiquitous when hiring PMSCs, as they establish the legal framework, specific service delivery, and terms of compensation. Consistent with expectations, PMSCs that operate under contracts that utilize performance incentives are associated with a decrease in the likelihood of violence. PMSCs that operate without contractual constraints are associated with an increase in the likelihood of violence. Similarly, intra-sector competition, when present, improves PMSC operations. Intra-sector competition creates an environment where PMSC employers can reduce the likelihood of shirking without engaging in direct supervision, which is often difficult in conflict environments. The results suggest that employers should adopt competitive awarding procedures and utilization of incentive contract structures. Non-competitive hiring practices and vague contracts either have no effect on conflict outcomes or may contribute to an increase in violence.

Two policy implications emerge. First, analysis of contract structures suggests that employers can exert leverage over PMSCs in the absence of effective monitoring. While the straightforward recommendation is empirically supported, using only contract structures belies the complexity of conflict environments. Employers and PMSCs are likely to continue to use multiple contract forms to supply the myriad services PMSCs deliver in conflict environments.

Second, to increase intra-sector competition, employers can reduce the number of available contracts or increase the number of PMSCs competing for a contract. Continued

expansion of international markets for private security services suggests that limiting available contracts is not a policy priority. Paradoxically, increasing the number of PMSCs is one alternative to increase competition. However, the analysis does not establish that PMSCs are desirable or more beneficial than alternative forces. Rather, if employers continue to hire PMSCs, there are policy alternatives available to manipulate PMSC performance.

Global employment of PMSCs continues to expand as governments and non-state actors seek security services previously provided by governments. The UN notably increased spending on such firms from \$44 million in 2009 to \$76 million in 2010 (Ostensen, 2011). Moreover, states increasingly organize their militaries following the US model, including the use of operational contract support (Krishnan, 2008). Because PMSCs' influence on violence varies, the exact manner in which employers utilize and regulate PMSCs will continue to shape conflict. Incorporation of PMSCs into international areas presents a new, non-state actor that has considerable military and security capabilities. This study identifies market-based management techniques that employers can adopt to regulate firm behavior. The results also demonstrate that PMSCs have limited effects on violence in conflict environments. Finally, PMSC employment should be limited to conditions where intra-sector competition is robust and incentive contracts are used.

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Supplementary Material

The dataset and any other supporting materials employed for the analysis can be accessed via a supplementary data file hosted on SAGE's CMPS website.

Notes

1. Private contract support has evolved over time as have conceptualizations used by scholars. We utilize PMSCs because the term is consistent with services and organizational structure of analyzed firms as well as the developing literature (see Fahn and Hadjer (2015), Grant (2013), Petersohn (2014, 2015) and Tzifakis and Huliaras (2015)).
2. Referring to the chaotic Iraqi environment in 2004, the DoD Inspector General criticized the reconstructing effort, stating that "contracting rules were either circumvented or liberally interpreted" (quoted in Berrios, 2006: 121).
3. Berman et al. (2011) detail the cleaning and coding procedures used to aggregate the daily district reports. Consistent with Berman et al. (2009), the data excludes attacks not directed at Coalition and Iraqi government targets.
4. PMSCs likely operated in all Iraqi governorates. Numerous contracts (279) are not geo-located owing to insufficient data or are described as "Iraq-wide" (92). The dataset is incomplete because DoD did not maintain complete records. Additionally, other US government agencies (e.g. Department of State) did not keep systematic records and are not included in the analysis.
5. DoD used six contract structures in Iraq; contracts were collapsed into three categories owing to similar incentive structure.
6. Six original contract categories were collapsed into three categories owing to similarity of incentive structure.
7. Berman et al. (2011) provide the data at the governorate level for 2003, 2005, and 2007. For 2004 and 2006, the average value is used to estimate 2004 and 2006. The value for 2008 is calculated by adding the difference between 2007 and the 2006 estimate to the 2007 value.

8. The dependent variable is not analyzed as a selection model for three reasons: (a) recoding as a dichotomous outcome artificially limits variation (Sartori, 2003); (b) the over-dispersion term in sample-selected negative binomial models may combine ALPHA and E which overcorrects the data (Hible, 2011: 433–38); and (c) it is difficult to identify an exogenous predictor for the first stage of the selection model.
9. The Hausman test suggests that differences between fixed and random effects models are minimal.
10. Marginal effects are calculated from Model 2.
11. Altering the competition level threshold for PMSCs in *LOW*, *MEDIUM*, and *HIGH COMPETITION* has little substantive impact on the variables. Three competing firms are used to differentiate between *LOW* and *HIGH* based on recommendations from Iraqi war veterans obtained in individual interviews.
12. Incident rate ratios are from Model 5.
13. The four additional interaction models are found in the Online Appendix, available at the *CMPS* website.

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Appendix

Table A1. Interaction models used in Figure 2

	Model 1	Model 2	Model 3	Model 4
NO COMPETITION	0.032** (0.019)	0.165** (0.057)		
HIGH COMPETITION			−0.089** (0.021)	0.065 (0.024)
TIMES & MATERIALS	0.028 (0.022)		0.060** (0.020)	
FIRM FIXED		−0.126** (0.025)		−0.077** (0.025)
TIMES & MATERAIL × NO COMP.	0.009* (0.004)			
FIRM FIXED × NO COMP.		−0.012 (0.009)		
TIMES & MATERIALS × HIGH COMP.			0.011** (0.005)	
FIRM FIXED × HIGH COMP.				−0.009 (0.009)
US MILITARY	0.810* (0.463)	−0.032 (0.446)	0.754 (0.466)	0.005 (0.456)
COALITION FORCE	0.130** (0.043)	0.151** (0.042)	0.178** (0.043)	0.194** (0.043)
IRAQ NATIONAL GUARD	0.270 (0.248)	0.392 (0.250)	0.180 (0.250)	0.129 (0.256)
OIL EXPORTED	0.039** (0.006)	0.049** (0.007)	0.046** (0.006)	0.049** (0.007)
PRE-ELECTION	0.167 (0.157)	0.145 (0.155)	0.085 (0.157)	0.049 (0.160)
ELECTRICITY	−0.092 (0.371)	−0.564 (0.365)	−0.639** (0.376)	−0.933 (0.383)
CONFLICT START	−0.011 (0.016)	0.004 (0.436)	0.005 (0.016)	0.021 (0.016)
POPULATION (ln)	−0.008 (0.120)	−0.002 (0.011)	0.005 (0.011)	0.009 (0.010)
Constant	−6.059 (4.820)	−0.800 (4.672)	−1.183 (4.892)	4.83 (4.908)
Log likelihood	−3200.9	−3201.2	−3198.2	−3216.1
Wald test (χ^2)	620.7**	592.1**	619.2**	529.9**
Observations	662	662	662	662

Standard errors in parentheses, two-tailed test: * $p < 0.10$; ** $p < 0.05$.

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