

Employing Force: The Decision to Use Private Actors in Inter-State Wars

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Abstract

The contemporary rise to infamy of Blackwater Worldwide and the private corporation's misdeeds in the Iraq War has historical precedents. That is, it is not unheard of for a state to employ non-state actors to carry out traditional state activities such as the use of force - something the modern state is supposed to have a monopoly over. In this paper, we build a game theoretic model that determines the prospects for using non-state actors in combat on behalf of the state. From this model, we hypothesize that despite the risk of agency loss by these private combatants, certain conditions increases the likelihood of their use. Specifically, autocratic polities are predicted to have a positive influence on the employment of non-state combatants while their democratic peers will prefer to abstain from such activities. We test these hypotheses using a censored probit model for all wars from 1816-2002.

Introduction

Mercenary participation in conflict is not a new phenomenon. Employing extra-state forces against an enemy for pay has traceable roots back to Classical Greece as Athenian citizens preferred to place the burdens of war on non-citizen hoplites rather than engage in combat themselves (Sinclair 1988). Later on the British employed the infamously notorious Hessian army to fight in the American revolution (Ingrao 1987). Most recently, it has been observed that, since the end of the Cold War era, private militaries are growing while centralized state armies are decreasing in size. The actions and subsequent media attention to recent scandals involving Iraqi civilians killed by Blackwater Worldwide personnel has made the presence of non-state, hired forces poignantly clear. (Bjork & Jones 2005, Shearer 1998, Singer 2005).

The historical legacy of using non-state forces against an enemy has not gone unnoticed. The use of mercenary forces has attracted attention in intra-state conflict studies while inter-state scholars have tried to explain the decline of their use in the 19th and 20th centuries.

While the use of mercenaries is documented, the strategic rationale on whether or not to use them has not been covered in depth in either quantitative or formal literatures within political science. This paper proposes a basic game theoretic model illustrating the strategic mechanisms that influence the choice of whether or not to use a private military force (PMF). Subsequently, we test the predictions of this model using a censored probit model for all interstate wars from 1816-2003 in determining the preconditions that favor hiring mercenaries. We find that, despite the most well known cases of PMF employment are by democratic powers, the most likely candidate to employ non-state combatants are autocracies.

1 The Established Theory of State Warcrafting

According to the conventional understanding of the nature of the modern state and the use of force by the state, a state "is a human community that (successfully) claims the monopoly of the legitimate use of physical force within a given territory" and "the right to use physical force is ascribed to other institutions or to individuals only to the extent to which the state permits it" (Weber 1946). Our primary interest in this paper is to discern when a state would choose to delegate the use of force to a non-state military resource to achieve a state military goal instead of using a conventional military forces.

Before the 20th century, states often delegated the use of force to non-state actors to achieve military goals abroad. However, in the early 1800s, there was a steady decline in the use of private actors in war and an increase in relying on conventional military forces to fight wars. This change was so dramatic that we now differentiate between the nature of pre-modern states (pre-1900s) and the nature of modern states (20th century till today).

There are different explanations for the sudden change in the use of private actors fighting in wars in pre-modern states to using standing armies in modern states. The most common explanation is that modern states were simply finally able to consolidate control over the use of external force and no longer needed to employ non-state actors to fight wars (Fredland 2004, Thomson 1994, 207,5,43).

Avant offers a different causal theory for the decline of mercenary-based militaries. Avant (2000)'s explanation starts with an external shock to the domestic political sphere that shifts domestic actors away from the status quo of military use. This shock is followed by an influx of ideas and competition between groups and coalitions offering a way to alter the domestic scene to account for the shock to the system. This process creates a form of path dependency were better models of change are emulated by other states that undergo their own

exogenous shocks. Thus, a winning citizen army creates a strong model to shift away from losing mercenary armies.

In this paper, we take into account that states in the pre-modern era were more likely to choose non-state actors in wars than states in the modern era (see Figure 1 for the absolute distribution of PMF use versus war onset). As Figure 1 suggests, while there were more uses of mercenaries in the post-1900 period, there are also more states and, directly, more conflicts (150% more bilateral wars) in which the option to use mercenaries is available. Still, while we take into account this change, we do not attribute it to states finally being able to consolidate the use of external power in the 20th century. Nor do we contribute this change to an external shock that, partially by chance, caused states to establish standing armies. We offer an alternative explanation. We argue there has been a change in the use of external force abroad between the 19th and 20th century because there has been a change in the dominant type of regime in states between both time periods, from autocracies to democracies (Gurr, Jagers & Moore 1990, Huntington 1991). Since, as we argue below, autocracies are more likely to use non-state actors in wars, as the number of autocracies declined in the world, so did the relative use of non-state actors in wars. And, while we point out the popular cases of democratic uses of mercenaries in the introduction, these cases are popular because they seem to serve as exceptions to the rule.

[Figure 1 Here]

In order to explain why autocracies and democracies make different choices when deciding to hire non-state actors to fight in wars, we develop a simple principal-agent model to explain why states in general hire non-state actors to fight in wars. Then, we impute assumptions into the model, based on the literature, on the nature of war in democracies and autocracies. Once again,

based on the model and theoretical assumption, the results indicate that, given similar conditions, autocracies are more likely to hire non-state actors in war.

In the next section we clarify some language to be more precise in the types of non-state actors we evaluate. After this, we describe the formal model that underlies our research.

Terminology

Employment of non-state military personnel has gone by many names and is most commonly referred to as mercenaries, mercenary armies, or mercenarism (Thomson 1994). The problem with these terms is that they have had multiple different contextual meanings and to use it without definition would pose interpretability problems. After all, for Thomson (1994) a privateer is different from a mercenary —and both entities are substantively different than chartered mercenary corporations that exercise violence on behalf of the state (such as the East Indian Company). With such a definition, only foreign employed soldiers are considered to be mercenaries. However, other scholars (and we would fall into this latter category) would suggest that the causal forces that encourage states to delegate (and in some instances, abdicate) power to non-state entities are similar and could be explained within a single framework. Indeed, the modern period is filled with groups “unrelated to the nation-state, from terrorists, mercenaries, guerrillas and warlords to non-state militias and private military corporations, [that] conduct war worldwide” (Brayton 2002, 303).

As such, we will primarily use the term “Private Military Force” (henceforth: PMF) to incorporate traditional conceptions of mercenaries with more modern conceptions of private military arrangements that would include both Blackwater Incorporated as well as foreign contingents of soldiers hired by the state for war-making purposes. Thus, in context of this study, a PMF is any contingent

of personnel that is either a) composed of foreign nationalities and is in service of the state or works on behalf of the state or b) a domestic, private entity employed by the state that has some decision-making autonomy in its employment. In either case, the PMF must see combat or have made a contract to be deployed in combat as ancillary functions are of less interest to us. Additionally, we exclude cases in which a state intervenes in a third party conflict on behalf of a rebel group as the causal mechanisms for these interventions (Regan 2002) look different than those for employing mercenaries. Practically, this means cases such as the US intervention into Cuba (triggering the Spanish-American War) and India's intervention into East Pakistan (on behalf of the Bengalis) are not considered as employing a PMF. However, if a state is using a non-state actor to fight a proxy war that the state later becomes involved in, then this is included in the study. The primary example of this is Somalia's invasion of Ethiopia after an extensive campaign of funding and arming the West Somali Liberation Front.

Counter to this, we consider a "Domestic Military Force" (DMF) to represent the traditional military force of state (conscripted or voluntary) who's ultimate decision making comes from the state. Thus, while the literature we briefly review here speak to specific kinds of mercenary behaviors and contracts, we seek to understand a more general phenomenon of outsourcing violence to non-state actors.

2 The Model

2.1 Background

Governments are faced with a conflict when delegating any state function to a private actor. On the one hand, the government can perform the task itself and

have confidence that the job will be done correctly as it is in government's best interest to perform it correctly. However, such action may involve specific high costs or the opportunity costs of direct action are too high. On the other hand, the government can delegate the task to a private agent, often at a cheaper cost, but it may be concerned that the agent's interest and the government's interests do not coincide and may even oppose one another. This is a principal agent problem.

As the extensive literature on principal agent problems suggests, there are several ways for principals to overcome principal agent problems and ensure that agents act in the interest of the principal. Before agents are hired, principals can screen candidates to prevent them from hiring imperfect agents. Further, after agents are hired, principals can also monitor agents to ensure that they are performing the job correctly, and punish them if they are not (Akerlof 1970, Fama 1996, Kiewiet & McCubbins 1991)

Overcoming principal agent problems when employing a PMF to fight a war appears to be a difficult task, especially after the agent is hired. Given that progress in a war is difficult to measure and actions of a PMF may be hard to monitor, especially in a short period of time, we do not think governments would be able to adequately monitor a PMF after hiring them. The best strategy for a government is then to carefully screen its agents before hiring them to ensure they pick a good agent, or PMF. Therefore, in the model in this paper, we allow the principal, or the government, to overcome the principal-agent problem by being able to screen its agents, the PMF, before they are hired. We do not go into great detail in the model about how governments do this, we simply assume that the government has some belief about the type of agent an agent is and will not hire an agent it believes cannot or will not act in the government's best interest.

Consequently, this model is focused on the principal's decision to delegate authority to an agent with little attention paid to the agent's decision-making beyond accepting or declining a contract. This focus on the principal side of the game is most realistic under conditions where there is a competitive market of agents that desire the contract and the principal is able to select the most promising candidate as his or her agent. In conditions where potential agents are limited, a monitoring and reward/punishment system would likely become more prominent.

2.2 Model

In this model, the government has two choices. It can choose to solely rely on Domestic Military Forces (DMFs) to fight in a war, or they can choose to rely on their DMF and a Private Military Force (PMF) to fight in a war. If they decide to supplement their own domestic forces with a PMF, then they offer a contract to a PMF with wage B and cost E . The PMF can accept a government's contract or not accept the contract. In this model, the government never offers a contract if they do expect E to be met and the PMF never accepts a contract unless the benefit is equal to or greater than the minimal effort required to fulfil the contract.

2.3 The Government

The expected utility for the government to solely use their DMF in a conflict is:

$$E(U)_{DMF} = K = [(p_{DMF} * u_{DMFW}) + [(1 - p_{DMF}) * u_{DMFL}] - C_{DMF}]$$

Where:

- a. p_{DMF} = Probability of winning the War
- b. $(1 - p_{DMF})$ = Probability of losing the war
- c. u_{DMFW} = Utility for winning the war

- d. u_{DMFL} = Utility for losing the war
- e. C_{DMF} = Cost of the war

The expected utility for the government to hire a PMF to supplement its DMFs in a conflict is:

$$E(U)_{PMF} = [(p_{PMF} * u_{PMFW}) + [(1 - p_{PMF}) * u_{PMFL}] - C_{PMF}]$$

Where:

- a. P_{PMF} = Probability of winning the War
- b. $(1 - P_{PMF})$ = Probability of losing the war
- c. u_{PMFW} = Utility for winning the war
- d. u_{PMFL} = Utility for losing the war
- e. C_{PMF} = Cost of the war

We assume that the probability of winning the war, P_{PMF} , is $P_{PMF} = E\theta$. E is the expected effort put forth by the PMF to fulfill their contract and win the conflict. It is uniformly distributed between $[0, 1]$. θ is also a uniformly distributed variable with range $[0, 1]$. It affects the ability of a state to win a war when using PMFs. The value of theta is common knowledge.

In this game, the government chooses to hire a PMF if the expected utility for hiring a PMF is greater than or equal to solely relying on a DMF to fight in the war:

$$E(U)_{PMF} \geq E(U)_{DMF} \tag{1}$$

2.4 The Private Military Force

As for the PMF, the expected utility for a PMF to accept a contract from the state is $E(U)_L = B - E$ where B is the payment from the state to the PMF and E is the effort put forth by the PMF to fulfill the contract. Or, in other words, E is the cost for the PMF to fulfil the contract. The expect utility for

the PMF to decline the contract is simply $E(U)_{\sim L} = 0$. A PMF chooses to accept a government contract if the expected utility of doing so is greater than or equal to not accept the contract at all:

$$E(U)_L \geq E(U)_{\sim L} \tag{2}$$

$$B - E \geq 0$$

2.5 Solving the Game

In order to determine when a PMF would actually fight in a war, we had to ensure that the conditions for the government to offer a contract (Equation 1) and the PMF to accept the contract (Equation 2) were simultaneously met. The details are outlined in Appendix A in how we approached this problem. Based on the results, we have derived two proofs dealing with when a government will use a PMF in a war (and a PMF will accept the contract):

Proposition 1.

$$K \leq u_{PMFL} - C_{PMF}$$

This proof suggests the minimum condition in which the government will use a PMF in a war is if the expected utility for winning the war solely using DMFs is lower than the worse possible scenario when hiring a PMF, losing the war and having to pay the cost for losing the war. On the surface, it seems unlikely that this equality would ever be met. However, once we take into account the nature of war in democracies and autocracies, it is clear that this equality is met more often than expected.

While Proof 1 is theoretically interesting, a more in-depth analysis of K must be used to determine when the proof will be met. After further simplification

of the model, we derive the following proof:

Proposition 2.

$$\frac{u_{PMFL} - u_{DMFL} + C_{DMF} - C_{PMF}}{u_{DMFW} - u_{DMFL}} \geq p_{DMF}$$

This proof suggests that when the probability of winning a war solely using DMFs is less than the equality on the left hand side of the equation, the state will use PMFs. Since we assume the utility for losing a war is always negative, we can re-write the equation and derive the best response strategy profiles for the two actors:

Proposition 3.

$$State = \begin{cases} Offer B & \text{if } \frac{-u_{PMFL} + u_{DMFL} + C_{DMF} - C_{PMF}}{u_{DMFW} + u_{DMFL}} \geq p_{DMF} \\ Offer 0 & \text{if } \frac{-u_{PMFL} + u_{DMFL} + C_{DMF} - C_{PMF}}{u_{DMFW} + u_{DMFL}} < p_{DMF} \end{cases}$$

$$PMF = \begin{cases} Accept & \text{if } B \geq E \\ Decline & \text{if } B < E \end{cases}$$

Since the solution to the game demands that $B \geq E$, the second strategy does not get realized in any state of the game, but is included for completeness. Theory can tell us when the remaining states and strategies should occur.

2.6 Theoretical Assumptions about the Nature of War in Democracies and autocracies

2.6.1 Utilities for Winning Wars

We assume that winning a war solely using DMFs always yields the highest utility for any regime type. However, democracies should receive a higher utility than autocracy for winning a war solely using DMFs. Officials in democracies

will receive immediate electoral benefits for winning the war, especially winning a war with DMFs. Further, they need that electoral benefit to stay in power. Officials in autocracies, on the other hand, will not necessarily reap immediate rewards from their constituents for winning a war and there is not necessarily an immediate threat of losing power because they lost a war.

While winning a war with DMFs yields great returns, winning a war using PMFs is still better than losing, but it has a cost. Claiming credit for winning the war is reduced. Democrats should still receive a higher utility for winning a war using PMFs than autocrats do, due to electoral benefits, but the rewards are still lower than they would be had they used DMFs.

2.6.2 Utilities for Losing Wars

We assume losing a war solely using DMFs will always yield the lowest utility for both regime types. Losing a war solely using DMFs makes the state look weak and the officials who head the state incompetent. Further, democracies should suffer more in these cases because they have to face voters in an election.

Next, losing a war while using PMFs yields the second lowest utility for both regime types. However, while losing a war using PMFs also makes leaders look incompetent, officials can in the very least shift partial responsibility for the failure onto the shoulders of PMFs, blaming them for why the war was lost (Renou 2005, 110). Democracies should get a lower payoff than an autocrat in this case, however, for losing a war this way due to electoral punishment.

2.6.3 Costs of the War

While both regime types bear a cost of going to war with a DMF, democracies will always pay a higher cost to fight a war using a DMF than a PMF. In autocracies, dictators may pay a cost of a power struggle after winning a war. Having the military or certain members of the military gain popularity due to a

successful war attempt may lead to an internal conflict. However, while there is a potential for conflict, it is not for certain. In contrast, officials in democracies definitely have to face voters after the war. Even if they won the war, they still have to take responsibility for all the citizen soldiers who died in the war. The cost of battle deaths may actually hurt them in an election if citizens feel as though they benefit of winning did not exceed the cost of battle deaths, or even worse. An even worse scenario will be when they lost the war. Voters may feel the soldiers died for nothing because they lost the war (*Blood and Treasure* 2006, Fredland 2004, 213).

Second, there are two types of costs saved when employing PMFs: monetary and electoral costs.

2.6.4 Monetary Costs and Agency Loss

In terms of monetary resources, we assume it is always cheaper to go to war supplementing DMFs with PMFs, as it is cheaper to employ a temporary PMF than to bare the cost of replacing lost resources to a standing army (Fredland 2004, 213). However, this reduction in cost is asymmetric between autocrats and democrats. Democrats will have to pay more for a PMF than an autocrat would. We understand that citizen-democratic troops tend to more successful than their autocratic peers (Avant 2000, Reiter & Stam 2002). Consequently, to accurately supplement their own force, a democracy is going to have employ PMFs at a higher level per soldier it wants to prevent parts of its DMF from seeing combat. This means that, assuming an equal DMF force composition for both a democratic regime and an autocratic regime, the required level of B provided for a PMF to make up for a portion of a DMF will be higher for an democrat than it will be for an autocrat.

Conversely for autocracies, the regimes are saving in a few ways when employing a PMF. The initial saving mechanism is a monetary cost from employing

a temporary PMF force instead of raising more professional soldiers. Additionally, mercenary troops will fight as well as, if not better than, as the troops of a dictator given the incentive schemes provided by the autocracy.

2.6.5 Electoral Costs and Agency Loss

Overall, the electoral cost for going to war using a PMF is lower than using a DMF. The number of battle deaths is reduced when going to war when using a PMF, thereby reducing the electoral costs for democrats to go to war. However, this is counteracted by introducing the cost of agency loss when employing a PMF. Democracies have to pay costs in ensuring that the PMF behaves as expected. In a democracy, blame for a PMF that acts against the interests of the state is more transferable to electoral mechanisms and can punish a leader while a deviant PMF for a autocracy poses less political reverberations. To compound the problem, democracies are more likely to pay higher costs for agency loss than a autocracy during a successful conflict. While the agency loss (the magnitude of which can be derived from our model as $\frac{B}{E}$) for an autocracy may be undesirable, the long term effects are less likely to affect the survival of the autocrat.

Beyond this, an autocrat has generally more mechanisms to control agency loss than a democrat does. Autocrats, while facing the dictators dilemma (Wintrobe 1998) may not have the best information for for scheduling a perfect information contract, can alleviate this problem by offering a larger stick to punish deviant agents than democrats could. That is, while a third party may fear being fired by a disgruntled democrat, an autocrat can offer the ultimate disincentive for failure to fulfill a contract and doling out such an extreme penalty is generally less costly than an extensive monitoring (or, in this case, a comprehensive screening mechanism) and scheduled payments scheme. Naturally, an autocrat is constrained from threatening death to all agents that fail

to fulfill the terms of a contract; however, given that the employment of forces tends to be extra-legal in the first place, the autocrat will have more freedom in punishing unfaithful agents.

In sum, for both regime types, the costs are reduced when using a PMF over a DMF. However, the costs for a democracy to go to war are always higher than that of an autocrat regardless of whether they employ a PMF or a DMF.

When we insert the above conditions into the left side of the equation in proof 2, we derive the following hypothesis:

Hypothesis 1. *The P_{DMF} needed for a autocracy to employ a PMF is lower than it is for a democracy.*

What hypothesis 1 suggests is that autocracies will employ PMFs in more circumstances than a democracy will. In a democracy, a P_{DMF} that is sufficient for the government to only use DMFs is not necessarily sufficient for a autocracy to solely use DMFs. This result seemed counterintuitive as we have argued that democracies pay a high cost of battle deaths when solely using DMFs in a war. However, officials in democracies also reap electoral benefits from winning a war solely using DMFs so this offsets the cost. It seems as though electoral institutions actually discourage heads of states in democracies from hiring PMFs to fight wars.

3 Research Design

In applying the game theoretic model to the observed world, we treat the model as a partial-data generating process. That is, while we could have numerical values derived in the actual model, we are more interested in the directions and expectations of the associated variables rather than the precise numerical predictions of the model - especially given that it is a simplification of reality and

precise estimates would demand too much of the above model. Additionally, we also understand that there are contextual variables that frame the game and act as controls to the results presented here. Consequently, the hypothesis derived above guide our research and the framing of the data analysis presented.

With that proviso, our ideal sample would be all possible uses of force by a state in the international arena. However, this sample is invariably limited due to the ill-reporting of small-scale violence and actions taken by states. Given the extant preference for reporting on major events, focusing on inter-state wars provide us with a set of cases that are well reported and have a consistent threshold in magnitude. Using the Correlates of Wars (CoW) definition of war and the data generated from the CoW project, we used a sample of 79 wars from 1816-1999 that involve 282 participants to begin coding the deployment of mercenaries (Singer, Bremer & Stuckey 1972, Sarkees, Wayman & Singer 2003).

Using this as a base of cases to investigate, we used case histories of particular wars and looked for positive affirmation of any system member participants in the conflict using a PMF while non-reports were assumed to indicate that a state has chosen to solely use DMFs. Given that the norm of mercenarism was abandoned in the early 1800s (Thomson 1994), this is a defensible assumption to make. Table 1 in Appendix B lists the wars and countries that were found to use PMFs during some point in a conflict. Our primary sources for the histories of the conflict were Clodfelter (2008) and Thomson (1994).

While it would be convenient if states were able to divorce their decision to use PMFs in wartime from their decision to go to war and, thus, make this isolated sample appropriate for testing our hypotheses, this would be an unreasonable assumption to make. As such, to try and control for this estimation contagion that could happen, we employ a censored probit (or Heckman selection probit) that accounts for two stages in our model 1) the onset of war and

2) the decision to employ PMFs. By using a censored probit, we are able to control for some of the variational effects from being over-represented (or represented at all). For example, since we know democracies are less likely to go to war with other democracies (Oneal & Russett 1997), there could be an under-representation of democracies in the second sample. By estimating some of these selection biases, the choices of democracies can be properly contextualized in the war onset estimations.

To isolate the contagion from the decision to go to war with the decision to use PMFs, we setup the data in a dyadic manner such that the unit of observation is the directed dyad-year. This framework allows us to select out the dyads that go to war from the dyads that choose not to while allowing that decision to be incorporated into the second stage of the analysis. However, with this setup, we simplify the interactions between states into a bilateral framework. Thus, to meet the demands of the unit of analysis, we only include bilateral conflicts in the second stage of estimation.

For the first stage of the model, we turn to Bremer's (1992) classic investigation of the conditions that facilitate war. Specifically, we include several variables as controlling conditions for the first stage of the model. This includes a binary variable for alliances¹ from the Alliance Treaty Obligations and Provisions (ATOP) project (Leeds, Ritter, Mitchell & Long 2002). We would generally expect allied countries to have a war onset while we do not have an expectation of its effect on the use of mercenaries. To get at the effects of democracy, we use the Polity-IVe data (Jagers & Gurr 1995, Marshall & Jagers 2002) and using the 21 point scale of Polity, we consider democracies to be those that have a score of six or higher. This high threshold for democratic governance follows the work of Bueno de Mesquita, Cherif, Downs & Smith (2005) in suggesting that most of our theories do not offer a linear interpreta-

¹We exclude non-aggression pacts from inclusion in this variable.

tion of marginal increases in democratic behavior, but instead posits that the effect of democratic institutions occur once specific institutions have been established. Despite the theoretical reasons to only include consolidated democracy as a measure for regime type, we also introduce the full scale of polity, as well as polity-squared, into estimation to allow for any linear or non-linear trending. The inclusion of these variables has become common in the literature as democracy has seen linear effects in the prospects for conflicts and paper suggesting that state capacity leads to more "murder in the middle" — that is, anocratic states in middle categories are more prone to conflict. Figure 2 shows the distribution of PMF use by polity type.

[Figure 2 here]

For the selection model, we follow Bremer's model and include whether or not there is at least one democratic state in the dyad. The consolidated democracy variable is the primary test of our theoretic model. We expect it to have a negative relationship with the use of PMFs during wartime.

Since most international theories suggest that power matters, we include a ratio of the power within the dyad. This is a straightforward calculation of the weaker power divided by the stronger power and establishes the relative parity of power in the bilateral relationship. The power ratio is drawn from the capabilities data of the COW data and we would expect a preponderance of power to have a positive association with the likelihood of conflict (Lemke 2002, Organski & Kugler 1980) and a negative association with the use of PMFs (as asymmetrically strong states will have little need for a PMF during war). Contiguous states have shown to be prone to conflict in multiple studies and we control for this by using including a binary variable for all states that share a border or are within 600 miles of each other (Beck & Tucker 1997); we expect contiguous states to be less reliant on PMFs. Additionally, we control whether or

not there is a major power in the dyad and the number of peaceful years the dyad has experienced (Bremer 1992) ² The Correlates of War data and associated variables were compiled using the EUgene program(Bennett & Stam 2000).

[Table 2 here]

Studies of temporal, historical processes are prone to temporal correlation in estimating their dependent variables of interest (Beck, Katz & Tucker 1998). To help eliminate unexplained heterogeneity caused by autocorrelation, we include a temporal cubic polynomial in both stages of the estimation (Carter & Signorino 2007). Table 2 presents the summary statistics for the relevant variables for the study.

4 Results and Discussion

[Table 3 here.]

Table 3 provides the estimations for both stages of the censored probit estimation. Generally, the control variables for estimating the likelihood of conflict maintain their expected direction. It should be no surprise that we find on-going MIDs, major powers in a dyad, and contiguous states increase the likelihood of a inter-state war. Additionally, the power ratio variable measuring the preponderance of power held by one state in a dyad makes the dyad more war-prone. The alliance variable also suggests that allied countries are more likely to be rivals in a war, but this result is the opposite of most studies on the subject. On

²It is worth noting that we exclude Bremer's development variable for practical reasons. Most data on GDP and economic activity are spotty prior to 1950 and become increasingly more difficult to acquire as years get closer to 1816. While forgoing his binary variable may introduce additional complication into the model, we believe that there are other proxies that get at this indication. Both the temporal measures and the Capabilities data match development trends over time. Additionally, other studies have shown that the capabilities score is highly correlated with measures of GDP (Organski & Kugler 1980).

the other hand, the selection stage suggests that increasingly long, peaceful relationships and systemic concentration of power encourage peace. The robustness check from ρ does not provide significance that the two equations are independent and suggests that there may be further unexplained correlation between the selection and estimation stages of the models.

The second stage of the model shows some tentative support for our primary hypothesis from the game theoretic model. Democratic states are substantially less likely to use a Private Military Force than their autocratic counterparts despite the general linear or parabolic trending of the 21-point polity measure. In essence, the probability of using mercenaries significantly decreases once a state becomes a consolidated democracy. However, prior to consolidation, there is an increasing probability of mercenary use as a state becomes more democratic.

The lack of significance for most of the remaining controls is potentially disturbing given that many of the estimators are standard international relations estimators. However, the causal literature on mercenary use in specific kinds of wars is limited and the expectations for variable particular performance beyond our model is not well documented. As such, it suggests that regime type can serve as a base for further estimations of the use of mercenaries in inter-state wars.

Conclusions and Further Research

The Heckman probit model provides initial support for our formal model that suggests that autocracies are more prone to outsourcing force employment to non-state actors — though this relationship does not appear to be linear or static. The linear trending within the polity variable suggests that there are some differences within consolidated democracies in deciding how to employ force. Additionally, the above analysis is currently limited as it only looks at

a subset of wars and excludes nearly half of all possible conflicts by failing to include multilateral wars. This provides an additional avenue for expansion.

The game theoretic model provides some initial insight into the decision making that would favor autocrats giving out contracts to PMFs over democrats. While the assumptions we make seem to pertain to some reality in the given the estimation, there is some further complication that would increase the explanatory power of the model. For example, we plan on further subdividing autocratic behavior into non-military and military autocracies as we foresee military autocracies being more prone to DMFs (given the justification for their existence) while non-military autocracies will prefer to avoid the military if given the option.

Additionally, the model is state-centric in the decision making process and this is reflected in our estimation of the models. The room for a third player to complicate the model (an opposing state) or for the non-state actor to have more options is limited. Given improved information about strategic interaction in the employment of PMF (force balancing or norm setting behaviors) and information about the types of PMFs available could create an avenue for a more complicated model.

Finally, one factor that may alter the costs of hiring a PMF is the type of recruitment the state has for its DMF. A conscripted DMF may be cheaper to recruit and maintain soldiers (as service is involuntary) while a fully volunteer and professional army will likely have a higher cost per soldier (a state has to attract volunteers to serve in the army). This disparity would cut across polity types (as both democracies and autocracies have varying levels of conscription or volunteer armies) and may be an exogenous factor in determining the attractiveness of PMFs.

Despite these additional avenues for complicating the formal model and

quantitative estimation, the results here provide the foundation for further research into non-state armies and mercenaries in inter-state wars. Additionally, it continues the line of work on democratic and autocratic behaviors in international relations that is becoming increasingly relevant given the renewed prominence of PMFs in the news.

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A Game Theoretic Proofs

A.1 The Government

The expected utility for the government to solely use their DMF in a conflict is:

$$E(U)_{DMF} = K = [(p_{DMF} * u_{DMFW}) + [(1 - p_{DMF}) * u_{DMFL}] - C_{DMF}]$$

The expected utility for the government to hire a PMF to supplement its DMFs in a conflict is:

$$E(U)_{PMF} = [(p_{PMF} * u_{PMFW}) + [(1 - p_{PMF}) * u_{PMFL}] - C_{PMF}]$$

We assume that the probability of winning the war, p_{PMF} , is:

$$p_{PMF} = E\theta$$

A.2 The Private Military Force

The expected utility for a PMF to accept a contract from a state is:

$$E(U)_L = B - E$$

The expected utility for a PMF to not accept a contract from a state is:

$$E(U)_{\sim L} = 0$$

A.2.1 Solving the Model:

In this game, the government chooses to hire a PMF if the expected utility for hiring a PMF is greater than or equal to solely relying on a DMF to fight in the

war.

$$E(U)_{PMF} \geq E(U)_{DMF}$$

$$[(p_{PMF} * u_{PMFW}) + [(1 - p_{PMF}) * u_{PMFL}] - C_{PMF}] \geq K$$

Since $P_{PMF} = E\theta$, we replace it:

$$[(E\theta * u_{PMFW}) + [(1 - E\theta) * u_{PMFL}] - C_{PMF}] \geq K$$

First we determined what the minimum effort level would have to be for the government to hire a PMF:

$$[(E\theta * u_{PMFW}) + [(1 - E\theta) * u_{PMFL}] - C_{PMF}] \geq K$$

$$(E\theta * u_{PMFW}) + u_{PMFL} - E\theta * u_{PMFL} - C_{PMF} \geq K$$

$$E(\theta * u_{PMFW} - \theta * u_{PMFL}) + u_{PMFL} - C_{PMF} \geq K$$

$$E(\theta * u_{PMFW} - \theta * u_{PMFL}) \geq K - u_{PMFL} + C_{PMF}$$

$$E \geq \frac{K - u_{PMFL} + C_{PMF}}{(\theta * u_{PMFW} - \theta * u_{PMFL})}$$

$$E \geq \frac{K - u_{PMFL} + C_{PMF}}{\theta(u_{PMFW} - u_{PMFL})} \quad (3)$$

Once again, this is the minimum effort needed for a government to hire a PMF.

A PMF chooses to accept a government contract if the expected utility for doing so is greater than or equal to not accepting at all.

$$E(U)_L = B - E$$

$$B - E \geq 0$$

Since a government will only offer a PMF a contract if the minimum E is met (stated earlier in equation 3), we can substitute E with:

$$B - \frac{K - u_{PMFL} + C_{PMF}}{(\theta * u_{PMFW} - \theta * u_{PMFL})} \quad (4)$$

If this equality is met, the government will offer a contract and the PMF will accept.

The next step is to determine when the equality in equation 2 is met. First we solve for theta.

$$B - \frac{K - u_{PMFL} + C_{PMF}}{(\theta * u_{PMFW} - \theta * u_{PMFL})} \geq 0$$

$$\frac{K - u_{PMFL} + C_{PMF}}{(\theta * u_{PMFW} - \theta * u_{PMFL})} \leq B$$

$$K - u_{PMFL} + C_{PMF} \leq B * (\theta * u_{PMFW} - \theta * u_{PMFL})$$

$$\frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})} \leq \theta$$

Since theta is uniformly distributed on [0,1], the likelihood that the PMF will be willing to exert the required effort that the government is looking for is:

$$1 - \frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})}$$

The government's expected utility for hiring the PMF would then be:

$$E(U)_{state} = \begin{cases} 1 - \frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})} & \text{if } E(U)_{PMF} \geq K \\ K * (1 - \frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})}) & \text{if } E(U)_{PMF} = K \\ K & \text{if } E(U)_{PMF} \leq K \end{cases}$$

The second equation in the conditional definition above establishes the point of indifference for a state between a pure DMF or using a PMF. As stated earlier,

as long as the expected utility for choosing a PMF is greater than or equal to the expected utility for choosing a DMF, the government will choose a PMF.

Hence:

$$K * \left(1 - \frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})}\right) \geq K$$

What is useful about this equality is that it ensures θ is met with 100 percent probability, otherwise $K \neq K$. More importantly, this means that the left side of the equation forces the minimum conditions for a government to offer a contract and the minimum conditions for a PMF to accept are met. Simplifying the model further:

$$K - K * \frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})} \geq K$$

$$K * \frac{K - u_{PMFL} + C_{PMF}}{B * (u_{PMFW} - u_{PMFL})} \leq 0$$

$$K^2 - K * u_{PMFL} + K * C_{PMF} \leq 0$$

$$K^2 \leq K * u_{PMFL} - K * C_{PMF}$$

$$K^2 \leq K * (u_{PMFL} - C_{PMF})$$

$$K \leq u_{PMFL} - C_{PMF}$$

The final step is to determine when a government will hire a PMF based on the probability they can win a war solely using a DMF:

$$u_{PMFL} - C_{PMF} \geq K$$

$$u_{PMFL} - C_{PMF} \geq [(p_{DMF} * u_{DMFW}) + [(1 - p_{DMF}) * u_{DMFL}] - C_{DMF}]$$

$$u_{PMFL} - C_{PMF} \geq (p_{DMF} * (u_{DMFW}) + u_{DMFL} - p_{DMF}) * u_{DMFL} - C_{DMF}$$

$$u_{PMFL} - C_{PMF} \geq (p_{DMF} * (u_{DMFW} - u_{DMFL}) + u_{DMFL} - C_{DMF}$$

$$u_{PMFL} - C_{PMF} - u_{DMFL} + C_{DMF} \geq (p_{DMF} * (u_{DMFW} - u_{DMFL}))$$

$$\frac{u_{PMFL} - C_{PMF} - u_{DMFL} + C_{DMF}}{(u_{DMFW} - u_{DMFL})} \geq p_{DMF}$$

When this equality is met, the government will be willing to hire a PMF and the PMF will accept.

B List of Countries and Wars that Use PMFs

Table 1: PMF use in bilateral inter-state wars.

COW #	War Name	Country
7	Mexican–American	USA
7	Mexican–American	Mexico
19	La Plata	Brazil
25	Anglo–Persian	United Kingdom
37	Italo–Sicilian	Sicily
40	Franco–Mexican	France
49	Lopez	Paraguay
65	Anglo–Egyptian	Egypt
67	Sino–French	China
94	Spanish–Moroccan	Morocco
97	Italo–Turkish	Turkey
127	Italo–Ethiopian	Italy
142	Russo–Finnish	Finland
147	First Kashmir	Pakistan
166	Second Kashmir	Pakistan
175	Football	Honduras
175	Football	El Salvador
184	Turco–Cypriot	Cyprus
199	Iran–Iraq	Iraq
205	Israel–Syria(Lebanon)	Syria

Table 2: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
PMF	0	0.004	0	1	1158632
War Onset	0	0.009	0	1	1158632
Consolidated Democracy	0.289	0.453	0	1	1158632
System Conc.	0.276	0.044	0.221	0.419	1158632
Polity	-0.55	7.343	-10	10	1158632
Polity ²	54.218	33.136	0	100	1158632
Capabilities(A)	0.011	0.031	0	0.384	1158632
Border	0.052	0.221	0	1	1158632
Alliance	0.088	0.283	0	1	1158632
Democrat in Dyad	0.533	0.499	0	1	1158632
Ongoing MID	0.003	0.052	0	1	1158632
Power Ratio	0.26	0.269	0	1	1158632
Major Power	0.114	0.318	0	1	1158632
Log(Peace Years)	2.636	1.158	0	5.209	1158632
Time	149.407	36.77	1	184	1158632
Time ²	23674.442	8704.147	1	33856	1158632
Time ³	3850599.833	1757487.241	1	6229504	1158632

Table 3: Estimation Results from the Heckman Probit Model

Variable	Coefficient	
	(Std. Err.)	(Std. Err.)
	Equation 1 : War Onset	Equation 2 : Private Military Force
Consolidated Democracy	0.128 (0.250)	-2.846** (1.269)
Polity	-0.001 (0.002)	0.125* (0.071)
Polity ²	-0.001 (0.002)	0.014* (0.008)
Border	0.810*** (0.077)	-0.492 (0.523)
Ally	0.077* (0.095)	0.600 (0.439)
Power Ratio	0.165* (0.124)	0.530 (0.586)
Time	0.005 (0.008)	0.039 (0.038)
Time ²	0.000 (0.000)	-0.001 (0.000)
Time ³	0.000 (0.000)	-0.001 (0.000)
System Conc.	-6.740** (2.273)	14.154 (8.797)
Capabilities(A)	0.497 (0.710)	
Dem. in Dyad	-0.011 (0.092)	
Ongoing MID	0.894*** (0.102)	
Major Power	0.268*** (0.100)	
Log(Peace Years)	-0.210*** (0.033)	
Intercept	-1.420 (0.891)	-6.419** (3.095)
Observations	1158632	93
ρ	0.1117	S.E. (0.298)
$\chi^2_{(1)}$.14	Probability $\geq \chi^2_{(1)}$.7098

Robust standard errors in parentheses; significance tests are one-tailed for all variables except the temporal controls, system concentration, and the log of peace years., *** p \leq .01, **p \leq .05 *p \leq .1

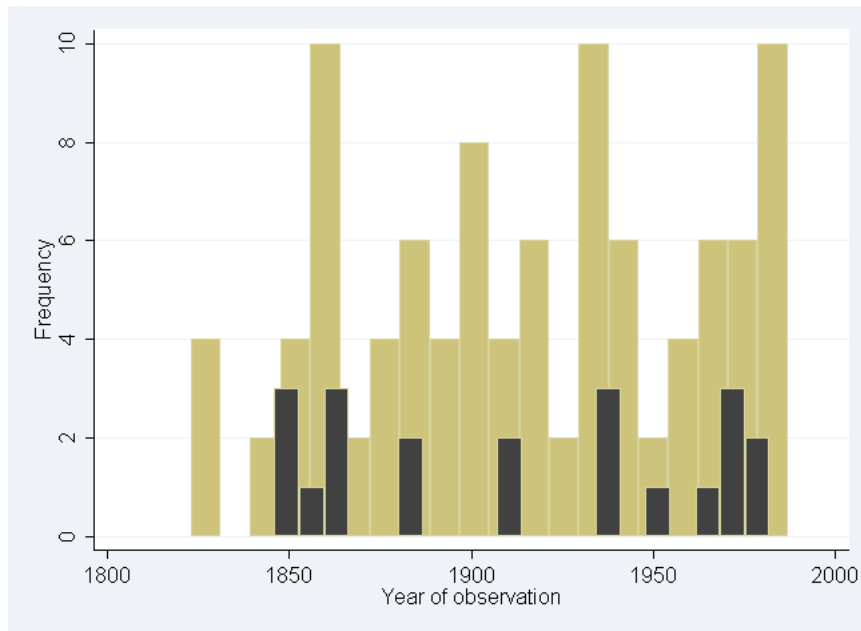


Figure 1: Dark bars represent a count for the use of mercenaries while lightly shaded bars represent all bilateral onsets. The graph shows that, while the number of PMF use stays relatively constant in the pre- and post-1900 eras, the number of war onsets are much higher.

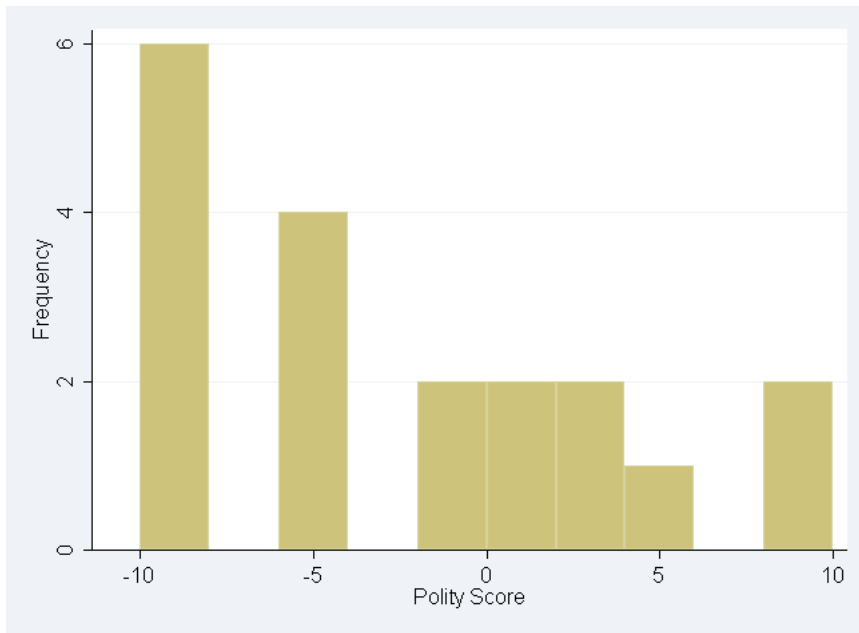


Figure 2: The distribution of PMF use by Polity type on a 21 point scale