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Domestic Institutions and Wartime Casualties[1]

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Military leaders, policymakers, and academics have long debated the relative merits of volunteer versus conscript armies. They also have studied the possible effects of eroding resolve among mass publics in democratic states during wartime. In this paper, we use battlefield casualty data from the population of interstate wars to compare theories of property takings and domestic institutions. We find conscription, like other non-market-based property takings, to be a wasteful means of mobilizing military manpower. Volunteer armies suffer far fewer casualties than their conscripted counterparts. We also find that this effect compounds when interacted with regime type. Volunteer democratic armies suffer especially few casualties. Finally, we find that democratic societies are willing to bear the costs of large-scale commitments to maintaining state sovereignty and survival when targeted by authoritarian states, at times in the face of certain defeat.

Since the age of Napoleon, military strategists and planners have marveled at the latent power of national conscript armies. Conscription makes possible the mass mobilization of a state's population for military purposes, an alluring prospect for many political leaders. At the same time, however, conscript armies also have more than their share of detractors. Potentially unwieldy due to their typical size and poor training, conscript armies may lack the war-fighting capacity of their professional volunteer counterparts.[2] Disagreement over the political and wartime costs associated with the two mobilization strategies has become increasingly relevant due to questions about whether the US military has stretched itself too thin in Afghanistan and Iraq (Crabtree 2009).

[1] The authors thank the participants in Government 3005b at Harvard University and the anonymous referees for their advice and suggestions. A previous version of this paper was presented at the 2006 International Studies Association Annual Meeting. All errors are the authors alone. Replication data are available at http://www.michaelchorowitz.com/data/.

[2] This could also theoretically be true of mercenaries.

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In this paper, we investigate the links between mobilization schemes, domestic political institutions, and casualty rates with tests ranging from simple correlations to more complicated regression models. We derive hypotheses from property takings theories and theories of democratic institutional constraints. From the takings perspective, the closer a state's compensation for a taking is to the free market value for property, the less likely the state is to wastefully use the property. Applied to military forces, because conscription is a non-market method of recruiting military forces, conscript forces will be used with less regard for the lives of soldiers than volunteer armies, resulting in conscript armies suffering greater casualties. *Ceteris paribus,* volunteer armies will take fewer casualties.[3]

In contrast to the economic perspective, which focuses on a state's willingness to waste an uncompensated asset, a more explicitly political perspective looks at the domestic political consequences of high casualties. Within the literature on the impact of regime type on military performance, there is an ongoing debate about democratic states' ability to sustain high casualties (Bennett and Stam 1996, 1998; Gartner 1997; Berinsky 2004, 2005; Feaver and Gelpi 2004). Siverson found that democracies appear to have lower casualty rates as well as suffering lower aggregate casualties than their more authoritarian counterparts (Siverson 1995). Others state that the importance of regime type is often overstated (Desch 2002). We engage both those who claim that regime type is irrelevant in determining outcomes in international relations and those who believe that democracies make for inferior war fighters, implying relatively higher casualty rates (Brooks 2003).

To assess these claims about the effects of manpower policies and political institutions, we evaluate the effects of military recruitment strategies and regime type associated with battlefield casualties among the population of interstate wars from 1815 to 2001. In contrast to some prior literature on military labor policy and casualties, we find that volunteer armies, in general, sustain significantly fewer casualties than conscript armies. Moreover, the interaction between volunteer recruitment and democratic institutions is also associated with a decline in casualty rates much larger than what we would expect given a simple additive model. Finally, confirming prior research on the importance of the stakes in influencing the propensity of democracies to fight, we find that democracies are able to sustain high levels of casualties when targeted in existential wars (Mueller 2005).

The Puzzle

The link between military labor policy and casualties, theoretically, should be easy to discern. We know from Great Britain's experience in World War I and the United States' experience in World War I and World War II that fighting in extremely large wars can cause countries to shift from volunteer to conscription recruitment. There is an endogeneity effect: the need for more soldiers due to the size of the war drives a shift in military recruitment away from a volunteer military and toward conscription. In smaller wars, states employ volunteer militaries because there is a lower need for labor.

Focusing on a Correlates of War derived data set of wars from 1815 to 2001, with one observation per country, per war, reveals a potentially different relationship between military labor policy and casualties. While the recent American and

[3] More broadly, debates about military effectiveness in the United States have often taken the form of evaluating the capabilities of the all-volunteer force (Altman and Fechter 1967; Hansen and Weisbrod 1967; Miller and Johnson 1968; Cooper 1982; Binkin 1984; Lee and McKenzie 1992; Warner and Asch 1995; Bicksler, Gilroy, John, and Rumsfeld 2004).

TABLE 1. Summary Statistics for Key Dependent and Independent Variables

Variables	*Observations*	*Minimum*	*Maximum*	*Median*	*Mean*	*Standard deviation*
Casualties	309	0	1.33E+07	1800	119,312.50	800,687.70
Conscription	286	0	1	1	0.82	0.39
Polity IV	279	0	20	6	8.87	7.41
Initiation	292	0	1	0	0.47	0.50
Terrain	297	0.30	1.05	0.60	0.70	0.21
Strategy	297	1	5	3	2.97	0.80
Prewar army size	300	1	5100	167	524.21	884.46
Military spending	268	103	3.22E+08	161,466	7,384,484	3.19e+07
Duration	302	5	3735	128	502.42	718.79

European experience has made volunteer armies appear to be the norm, the reality is just the opposite. Whether wars are big or small, war-participants typically have employed conscription armies. Of the 286 armies for which we have military recruiting data, only 52 of them, or about 18%, utilize volunteer armies.[4]

The typical war is also short and of low intensity compared with oft-cited wars, such as the World Wars or the Vietnam War. The median interstate war (see Table 1) lasts about 4 months with about 1,800 casualties. This suggests that states select conscription armies even when expectations of casualties are very low. Figure 1, a histogram of casualties for conscript armies, shows that countries employ conscription armies independent of expectations about casualties and war size.

What are the military consequences of the choice to use conscription militaries more broadly? Moreover, how does it relate to a critical question in the literature on international conflict—the role of domestic political regimes? In what follows, we explore the relative efficiency of volunteer and conscription militaries, along with the interaction between military labor policy and domestic politics.

Literature Review

Existing Literature on Recruitment and Casualties

Early work on military recruitment strategies typically approached the issue from a labor economics perspective (Altman and Fechter 1967; Hansen and Weisbrod 1967; Oi 1967; Miller and Johnson 1968; Fisher 1969), focusing on "efficiency" as an economic measure, that is, whether a draft is the most economically efficient means of recruiting the appropriate numbers of military forces with the least economic cost (Lee and McKenzie 1992; Warner and Asch 1995). Rotte and Schmidt (2003) looked at battlefield outcomes, but they did not evaluate conscription as a potential factor influencing casualties. Rohlfs (2005) models the persistence of soldiers' lives as a function of the utility they provide to the government. Using World War II battle data, he finds that American relative investments in tanks and troops in World War II were roughly "efficient" in the context of the United States' relative capital and labor endowments.

Choi and James (2003:811) examine the relationship between conscription forces and militarized disputes. They argue that the maintenance of large peacetime conscript armies makes military aggression more likely by providing national leaders with relatively easy *means*, in the form of readily deployable military forces, to initiate militarized disputes. Choi and James (2003:802) conclude that the choice to adopt a volunteer recruiting strategy likely results from political pressure rather than military need. As a result, volunteer armies risk

[4] Coding is described below in the research design section.

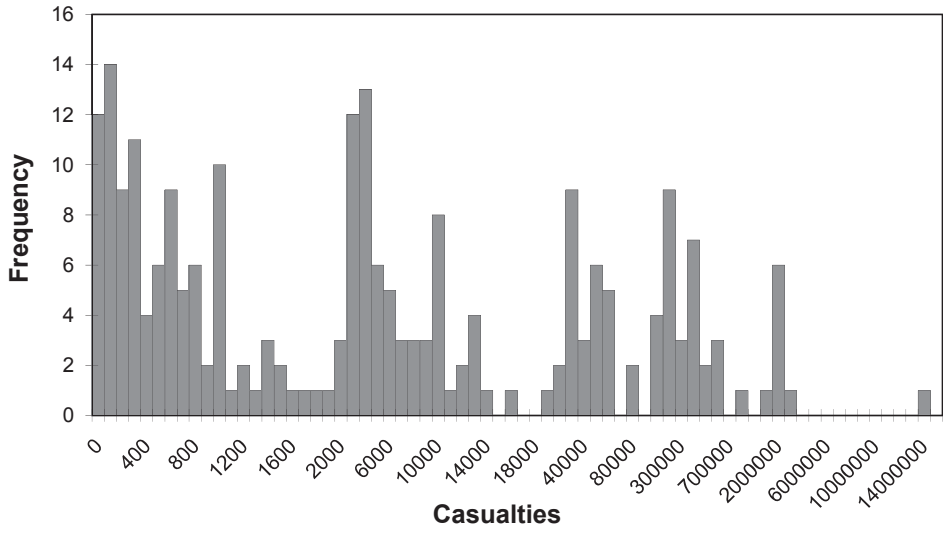

FIG 1. Distribution of Casualties Taken by Conscript Armies
(*Notes*. The scale is unevenly distributed to better demonstrate the range of casualties. Scale: 0–2,000 casualties in bins of 100; 2,000–20,000 casualties in bins of 1,000; 20,000–100,000 casualties in bins of 10,000; 100,000–1,000,000 casualties in bins of 100,000; 1,000,000–14,000,000 casualties in bins of 1,000,000.)

being poorly trained, inherently less capable, and hence more likely to sustain high casualty rates.

In contrast to Choi and James' results, Vasquez finds that democratic conscription armies, in militarized disputes, suffer fewer casualties on average than democratic volunteer armies. He argues that conscript armies constrain democratic institutions in two ways that make casualties less likely. First, conscription guarantees that more soldiers from politically powerful sectors of American society will join the military, increasing the lobbying power of groups seeking to constrain the military by making sure more powerful actors take notice. Second, a broad distribution of war costs in society causes politicians to fear a political backlash if high casualties occur, meaning democratic leaders will avoid strategies that make casualties more likely (Vasquez 2005:853). Vasquez makes an implicit "audience cost" argument, arguing that because democratic conscript armies tend to be both larger and somewhat more representative than volunteer armies, governments relying on conscription will face more pressure to minimize casualties than they would if volunteers were involved. Vasquez' argument also raises a question about selection into wars. If it is harder to get consent for conscription militaries, they should only be employed in wars where clear national interests are at stake and the nation strongly supports military action.

Are the low casualty rates associated with the modern American volunteer military anomalous? We present two theories below which shed light on the question, one about regime type and one about recruitment systems, recognizing that they may interact.

Property Rights Perspective

In a September 2003 speech on the all-volunteer force in America, Former Deputy Secretary of Defense Paul Wolfowitz explicitly linked compensation and incentives in the all-volunteer force to its use:

> Because admittedly, volunteers cost more than conscripts. And we had to change the way we thought about how we procure and manage our people. Manpower can no longer be regarded as abundant and cheap, but rather had to be treated as it should be, as scarce and expensive. And we had to learn how to compete in the civilian labor market for young people. That meant paying a lot of attention to the compensation and quality of life package that we offer prospective recruits. But a quality force is a productive force, and it has to be compensated accordingly. It costs money to maintain standards. (Wolfowitz 2003)

Wolfowitz linked volunteer forces and market mechanisms that dictate compensation rates and result in scarcity. The converse is also true: competitive markets are not needed for the recruitment of conscripts, nor are conscripts scarce. In particular, Fischel argues that states are relatively less likely to waste a particular resource only when the owner is not exploiting the property for maximal gain or when the efficiency gains made for compensating for the land overcome the costs of non-compensation (Michelman 1967; Fischel 1995). Said differently, if the state does not pay fair market value for the property, it is likely to waste the potential productive use of that property. One source of this waste is in the ''demoralization costs'' of those whose property is seized. After witnessing property seizures, individuals develop shorter investment time horizons, meaning they do not devote significant resources to developing the full productive capacity of their property (Fischel 1995).

This labor market view of conscription points to North's (1981) work on property rights and their effects on investment and consumption. North argues that the development and enforcement of private property rights was a key factor allowing for economic growth in early modern Europe. Property rights and the institutions that enforce them create incentives for investment by preventing arbitrary seizures of property by the state. Drawing on North, others have noted the empirical relationship between state property takings and subsequent wasteful use of property (Arneson 1987; Williams 1998).

Military conscription is one type of a general class of property takings. Land, personal possessions, natural resources, and even education and training generally constitute the definition of ''property.'' When compensation for military service is at ''market value,'' including the cost of hedging against the risk of death, conscription is not necessary because the needed quantity of soldiers enlist voluntarily. As the risk associated with military service rises, states with volunteer armies often raise their compensation packages or reduce the barriers to entry into the military labor market to meet recruitment goals (Miles 2006). When paying market compensation rates, states face incentives to employ soldiers with greater care, given the substantial investment in each soldier. This translates into better training for volunteer soldiers as well as their more cautious use on the battlefield. Well-trained volunteers are valuable and scarce. As a result, states are less likely to expend them in suicide missions or to adopt Verdun-like attrition strategies. Market mechanisms make volunteer replacement costs too high, which in turn results in lower overall casualties for volunteer armies. Absent the incentives to extract the most output from each of its soldiers, states with conscript armies will generally place the soldiers at greater risk than they would otherwise, thereby increasing casualty rates.[5] A state that fails to invest in its soldiers at rates that would be necessary under a volunteer system of recruitment will therefore put them at greater risk than they would be otherwise[6], which explains the reduced casualties of volunteer armies.

[5] It is important to note the way that the quality of reserve armies could influence casualties as well. The gap between reservists in a volunteer army and those in a conscription army, especially if the conscript term is long, may be reasonably small. Thus, wars that require mobilizing reserves (or the National Guard in the United States) may lead to smaller differences in performance. Unfortunately, we lack the data to test this point, but it is an important issue for future research. Thanks to an anonymous reviewer for pointing out this issue.

[6] One could respond that those who select themselves into the military are simply better suited to war fighting.

We argue that the differences in casualties for volunteer and conscript armies result in large part from the recruiting strategy itself, not an antecedent selection process.

Hypothesis 1a: *Conscription armies should suffer heavier casualties than volunteer armies.*

Regime Type Perspective

A growing body of literature in international relations has expanded on the initial insight that democracies rarely fight each other to develop competing theories of the relationship between domestic politics, political institutions, and the character of international conflict (Levy 1989; Lake 1992; Russett 1993). Key assumptions that underscore this line of thinking, which leads to hypotheses about democratic states generally and democratic war initiators specifically, include the desire by all leaders to stay in office and the unique challenges to leaders and decision making posed by electoral accountability (Russett and Oneal 2001; Reiter and Stam 2002; Bueno de Mesquita 2003).

Because democracies are typically more accountable to the general public than other types of regimes, civilian commanders of democratic militaries are more subject to fluctuations in popular will (Bennett and Stam 1998). Chiozza and Goemans (2004), as well as Bueno de Mesquita, Siverson, and Woller (1992), argue that the outcomes of foreign policy decisions influence the fate of the regime.[7] Due to this linkage between public consent and military strategy, democratic states may adopt more cautious battlefield strategies. Koch and Gartner (2005:889–890) argue that issues surrounding the use of military force, especially casualties, affect the possibility of re-election for legislators. They also find no relationship between whether a state used conscription and the probability that it takes casualties.[8]

Mueller (2005) links rising American casualties in the Korean War, Vietnam War, and Iraq War to declining public approval for the war in question. For example, rising public dissent during the Vietnam War, according to Mueller, led President Lyndon Johnson to end his re-election campaign.[9] In contrast, Feaver and Gelpi (2004) and Gelpi, Feaver, and Reifler (2005) argue that public support for war in the United States depends less on casualties per se than clear progress toward victory. In their view, if a war is going poorly, casualty tolerance (relative to other similarly situated states) should drop dramatically. More recently, Gartner (2008) finds that upward trending casualties over a period of months exert a stronger drag on approval for wars than casualties in isolation.[10] Reiter and Stam (2002) attribute the apparently greater relative capability of democratic targets not to heightened morale or material capabilities, but to superior leadership and initiative on the battlefield. According to Reiter and Stam, democratic political culture and social value systems, stressing individualism and the de-centralization of decision-making authority, are associated with more effective battlefield practices and hence lower casualties.[11]

[7] Chiozza and Goemans (2004) do make a somewhat distinct argument about how regime type influences the way leaders treat warfare, since war affects the probability a leader is removed from office differently in different types of regimes.

[8] Interestingly, they do find that states with conscription militaries are more likely to engage in disputes. However, Koch and Gartner (2005:887–888) tested whether casualties occur at all, not the relative level of casualties. See also Klarevas (2002).

[9] Larson and others at RAND have also done important work in this area (Larson 1996; Larson and Savych 2005).

[10] This builds on Gartner and Segura (1998).

[11] This view of democratic war performance is not without critics (Desch 2002; Downes 2009).

Autocracies may believe that heightened audience costs in democracies, due to the public consent constraint, will be a potential source of weakness. Filson and Werner (2004) find that despite democracies' relatively higher likelihood of victory in war, they are subject to challenges from nondemocracies who believe that democracies will back down. This leads to a number of conflicts where autocracies apparently incorrectly evaluate the costs of war by underestimating democratic resolve, resulting in autocratic defeat.

Hypothesis 2a: *Democratic armies should have lower casualties than autocratic militaries.*

Some argue that democracies' peculiar advantages are only evident when they are war initiators. Siverson (1995) links Mueller's casualty aversion thesis to democracies' superior ability to choose which wars to fight. But unlike Mueller, his argument is an *ex-ante* evaluation of whether to go to war, not an *ex-post* decision to keep fighting. If the democratic constraint argument is true, democracies should only initiate those wars they are likely to win at costs acceptable to domestic constituencies. Siverson finds that battle deaths for democratic initiators, as a proportion of their total population (not total army size), are substantially lower than that of democratic targets or nondemocratic initiators or targets. This implies that democracies must find ways to sustain lower casualty levels during sustained engagements, as the constraints imposed by public participation necessitate lower casualty numbers than might be acceptable in other types of regimes.

Hypothesis 2b: *Democratic initiators should have lower casualties than democratic targets and autocratic militaries.*

A related question is whether democratic states will employ conscripts or volunteers more cautiously, especially in relation to autocracies. While both the battlefield superiority and the audience costs approaches suggest that democracies will take lower casualties on the battlefield than autocracies, the audience costs perspective leads to specific predictions about the way democratic conscript armies are likely to perform. Bueno de Mesquita et al. argue that countries with broad selectorates (the size of the group selecting the next political executive) face different resource mobilization challenges than those with more narrow selectorates. More representative states "seek gains primarily in the form of public goods," such as foreign policy success, which has benefits that are not diluted by the large size of the selectorate (Bueno de Mesquita, Morrow, Siverson, and Smith 2004:364). Military recruitment is a logical extension of Bueno de Mesquita et al.'s discussion of differential tax burdens, since military recruitment strategies are part of how the state distributes the costs of war. This suggests that states with broad selectorates who employ conscript armies will try to minimize the "costs" to the selectorate, in the form of casualties, just as these states try to minimize the tax burdens on the selectorate.[12]

Hypothesis 2c: *Democratic conscript armies will have the lowest casualties.*

It is also likely that the stakes of a war affect states' casualty sensitivity. The more a war threatens the territorial integrity or autonomy of a state, the more willing it should be to take casualties. When the regime itself is threatened, essentially, political limits to casualty sensitivity should wane. When state survival is at risk, the domestic political costs for taking casualties should be at their lowest.

[12] This hypothesis is similar to Vasquez's findings.

In cases where the stakes in the war involve national survival, such as Belgium in World War I, democratic states should be willing to take high casualties even in a losing effort. It is in wars of choice that a combination of high casualties and perceived failure appears to drive down democratic states' ability to sustain support for the war. For example, as referenced earlier, Feaver and Gelpi argue that the American public is relatively tolerant of high casualties when it feels that the state's war aims are being accomplished or when victory is at hand. They "find that beliefs about the likelihood of success matter most in determining the public's willingness to tolerate US military deaths in combat" (Gelpi et al. 2005:8). In their view, it is when military operations appear to be failing that sustained casualties reduce public support for war, though their results are limited to the United States and they do think stakes matter.[13]

Since they govern based on the consent of the people, democracies may also try harder in wars—they are more willing to invest the resources necessary to prevail (Lake 1992; Gartzke 2001; Bueno de Mesquita 2003). This general tendency should be pronounced in the biggest wars. Democratic targets, when fighting for state survival or autonomy, should be generally willing to absorb exceptionally high casualty rates regardless of manpower policy. Since conscript armies may become more likely as the size of the war increases (though they are likely to exist even in smaller wars), democratic conscript armies may be especially casualty prone and willing to continue fighting. Especially if Vasquez is correct, it may also be harder to build support for wars fought by democratic conscript armies. Thus, the wars they do fight should be those that a huge segment of the population supports: the larger wars where national interests appear clearly at stake and large numbers of casualties are more likely.

Hypothesis 2d: *Conscript armies, including democratic ones, will have high casualties when participating in existential wars.*

Data and Research Design

Research Design

We test our hypotheses with a new data set. We extended the Correlates of War data set to include wars from 1816 to 2001 by adding wars in Armenia/Azerbaijan, the Congo, Kosovo, and Afghanistan.[14] We construct the data set with one observation per country per war. In cases where wars have multiple fronts, the wars are broken up by front (or in some cases, campaign), so that we can measure the independent interaction of national militaries.[15] The resulting data set contains 98 wars/campaigns and 309 total war-participant observations. The dependent variable is the number of fatal casualties a given war-participant suffered in the war. For wars prior to 1900, we draw on the COW interstate war data set for casualty figures; for the twentieth century, when possible, we use the newly developed Uppsala/PRIO data set and data gathered by the authors (primarily Clodfelter 2002; Lacina and Gleditsch 2005). We use campaign-specific data whenever possible.[16]

[13] In the context of Feaver and Gelpi's claims about the facts that influenced American public support for the US war in Iraq, support may depend on both the stakes and the probability of victory.

[14] We derived these additional wars from the MIDs data set or elsewhere as containing a use of force and having more than 1,000 casualties.

[15] For example, World War I is broken up by participant and front as follows: WWIa, Belgium and Germany; WWIb, Germany, Austria, Russia, and Turkey; WWIc, Britain, France, Germany, Austria, Italy, Greece, Bulgaria, Rumania, Turkey, and USA (Reiter and Stam 2003).

[16] If unavailable, the data are coded as missing and dropped from the analysis.

The two key independent variables of interest are the military recruitment strategy of the war-participant and its regime type. We coded the military recruitment variable a 0 if the military is fully volunteer for the duration of the war; otherwise, it is coded a 1. Original research on national militaries was supplemented with data gathered from other sources (Devi and Smythe 1968; Keegan 1983; Horeman et al. 1998; Choi and James 2003; Toronto 2005). There are 23 missing observations. Prior to 1900, most of the missing data are concentrated among Central American countries and small German-speaking states. In the twentieth century, most of the missing values are found among emerging Middle Eastern and East Asian states.[17]

As described elsewhere, the decision by states to employ conscription militaries so frequently is a bit of a puzzle. We would expect that countries facing large wars would select conscription militaries, while others would have volunteer militaries, but that is typically not the case. While volunteer armies have become more frequent in recent years, of the "volunteer" observations in the data, 30% are from the pre-World War II era, showing that the phenomenon is not just a recent development. Since the modal army, regardless of war severity, is a conscript army, it means countries most commonly select conscription regardless of expectations of casualties.

The regime type variable ranges from 0 to 20, based on a transposed version of the Polity IV data set. Zero represents the most autocratic regimes, and 20, the most democratic. The bargaining and war literature suggests that there should be observable selection effects in the distribution of casualties for war-participants. Democratic regimes should select into particularly low-cost wars of relatively short duration (Slantchev 2004), meaning the casualties they suffer may appear relatively low, even though they are *not* less willing to take casualties than autocracies under other conditions (see also Powell 2002; Reiter 2004). Slantchev's argument implies that it is essential to control for whether a state initiates the war or is attacked. We therefore code "*Initiation*" "0" when a war-participant is a target and "1" when it is an initiator. We rely on the COW and MID codings for initiation.[18]

Control Variables

We are primarily interested in testing the relative importance of military recruitment strategies and regime type in predicting casualties in war. It is necessary, however, to control for other factors that may influence wartime casualties and that are likely correlated with the variables of interest and errors therein.[19] We include controls for the terrain (*Terrain*) on which most of the battles in a war took place and the strategy (*Strategy: mobile, attrition, punishment*) each side employed during the war. We updated Stam's (1996) codings to incorporate the post-1991 wars.[20]

[17] There are differences between impressments, national service, and a draft. Our theory predicts the differences between all types of conscription militaries and volunteer militaries, so the grouping should not influence the results. This is an area for future research, however. In mixed armies, the size of the conscript force generally swamps that of the volunteer component, meaning that decisions about the use of force will be more like a conscription army. While it might be interesting to look at particular service differences, it is important to establish first that military recruitment matters at all.

[18] We code members of the initiating coalition as initiators rather than creating a separate "joiner" category (Bennett and Stam 2000). This is most relevant in the Korean, Vietnam, Kosovo, and Afghanistan Wars.

[19] Our results are also consistent without control variables (Achen 2005).

[20] See Appendix S1 for more on these variables. The strategy variable is ordinal to ensure consistency with prior research by Stam (1996), Reiter and Stam (2002), and others. Breaking it down into dummies also severely reduces the available degrees of freedom given the universe of the data. Therefore, we kept the strategy variable in a form consistent with previous research.

We also control for the size of and spending on the participating armies (*Prewar Army Size and Military Spending*) with data from the COW Material Capabilities data set (Ghosn and Palmer 2003).[21] To control for the possibility that our results are an artifact of the high-intensity engagements of the World Wars, we added a *World Wars* control for war-participants in fronts of either World War.[22] This is important to show that our findings are robust for the vast majority of wars and not driven by exceptional conflicts like World War I and World War II. Finally, we control for the wars' durations in days to control for the ongoing risk of becoming a casualty (*Duration*). We present basic descriptive statistics for each variable in Table 1.[23]

In our test of the property takings hypothesis, we are interested in questions of force employment—the ways that a country/military commits its forces in battle (Biddle 2004). This presumes that the decision to fight has already occurred since we are dealing with the population of states at war.[24] Conscription and volunteer armies, because of the market payment differential, should experience different levels of casualty sensitivity, leading volunteer armies to be less prone to taking casualties than conscription armies. The drawback of our approach is that it does not account for armies that use massive force to achieve their objectives; it also ignores improvements in battlefield medicine that create higher wounded-in-action and lower killed-in-action rates over time.[25] We assume that more capable militaries are better able to achieve those same objectives with lower casualties.[26] A simple correlation analysis of the variables suggests that the relationship between casualties and conscription is positive but small. The effects of democracy are similarly low, but in the opposite direction. The relationship between casualties and duration confirms what we intuitively expect: casualty levels increase with war duration.[27]

Statistical Model

The data-generating process for the dependent variable (battlefield casualties) is fundamentally a discrete count process. We therefore want to use a count model to evaluate the factors systematically associated with the differences in

[21] Adding a control for relative capabilities, whether measured by total material capabilities or just army size and military spending, does not affect the results. For data availability reasons, the army size and military spending data are not broken down by campaign. That is most relevant in the small number of cases where a country is fighting a two-front war. Optimally, while we would like to have troop counts for numbers engaged in a specific campaign, that data are not available. Using the COW prewar army size variable also makes our results consistent with other quantitative conflict research, which also often uses this variable. However, that is an important limitation to our results. The military spending variables include appropriate monetary adjustments as described in the COW National Material Capabilities documentation, available at http://www.correlatesofwar.org.

[22] For robustness purposes, we also ran separate versions of all models excluding those observations. We then tried different specifications, including adding dummies for the Korean and Vietnam Wars and substituting controls for war-participants with more than 500,000 casualties or more than 100,000 casualties. None changed the results.

[23] We add a series of economic controls when conducting additional robustness tests. We describe these tests below.

[24] See Vasquez (2005) for a detailed discussion of the effects of conscription on the nature of lower level disputes.

[25] To ensure comparability with existing research, we do not include a battlefield medicine control. For this variable to bias our results, it would have to both have differential effects on the two sides in a particular war and be uncorrelated with our variables of interest. A potential proxy would be each side's prewar life expectancy, but data issues limited our ability to compensate for this factor. Moreover, any correlation between improving medical care and the variables of interest is likely offset by similar trends during the same periods in increasing weapons' lethality.

[26] As described below, to control for the impact of technology over time, we ran a model with a year and year squared variable. It did not change the results.

[27] While we would like to control for forces actually *engaged* in combat and look at tooth-to-tail ratios, gathering that data on a large scale is nearly impossible. As described earlier in note 25, our data and model are comparable with previous research.

casualties across wars, leading us to consider fitting our data to both Poisson and negative binomial distributions.[28] We reject the Poisson model because its restrictive assumption of means–variance equality is inappropriate for the data. Furthermore, there is little reason to assume that a constant arrival rate (as measured in the Poisson parameter lambda) underlies the data-generating process here. As Cameron and Trivedi note, "(f)ailure of the Poisson assumption of equidispersion has similar qualitative consequences to failure of the assumption of homoskedasticity in the linear regression model. But the magnitude of the effect on reported standard errors and t statistics can be much larger" (Cameron and Trivedi 1998:77).

We use the generalized negative binomial model for our regression analysis because there is overdispersion, meaning there is a large amount of variance in our data. This makes sense given the large differences in casualties from war to war. It is identical in functional form as the standard negative binomial, but allows one to further parameterize the dispersion term to account for the variation in casualties. The standard setup for the negative binomial is:

$$\begin{aligned} yi &\sim \text{Poisson}\,(\lambda i) \\ \lambda i &= \exp(xi\beta + ui) \\ \exp(ui) &\sim \text{Gamma}(1/\alpha, \alpha) \end{aligned}$$

The generalized form of the model allows us to vary alpha systematically:

$$\alpha = \exp(zi\,\gamma)$$

One can think of this parameterization as estimating the variance as a function of a particular set of parameters. This allows us to estimate unbiased parameters for conscription and democracy, even though we expect the underlying casualty rate to vary within groups created by states' strategy choices (Winkelmann 2008). Explicitly modeling the variance via the dispersion term allows us to control for those factors that we expect would increase the mean and variance, the factors besides the main variables of interest that may influence the variance of the data's distribution as well as the mean level of casualties (Hilbe 2007). For example, wars fought in an open plain might be very quick with a blitzkrieg strategy or very long with an attrition strategy (think France in WWI and WWII). On the other hand, mountainous wars are less likely to have such variation.

These factors may vary by war or by participant within a given war. By modeling these factors as part of the dispersion term, we are better able to make comparisons of the effect on the mean level of casualties based solely on regime type

[28] We use a count model rather than logging our variables and running an OLS regression for three reasons. First, since we actually have a good account of the dependent variable, using a count variable is best because it does not throw away any of the data (King 1989b; Cameron and Trivedi 1998). Second, our data are zero truncated, meaning there are 0s present in the data. Log transforming count data when there are 0s present in the data forces us to skew the dependent variable (by adding a value like 1 or something else). The ad hoc nature of that decision, according to King, "introduces arbitrarily large biases into the analysis" when analyzing international relations data (King 1989a:126). Even adding only a 1 or other small number when transforming the data can significantly alter the substantive conclusions of a model (King 1988:846–849). Third, empirical research in other fields suggests that, because log transforming count data fundamentally changes the nature of the data from a discrete to a continuous distribution, it often leads to inappropriate conclusions, especially in cases where the dispersion is large, which it is in this case (O'Hara and Kotze 2010:9). As O'Hara and Kotze conclude, "For count data, our results suggest that transformations perform poorly and instead statistical procedures designed to deal with counts should be used, that is, methods for fitting Poisson or negative binomial models to data" (O'Hara and Kotze 2010:9). However, re-estimating our results with a logged casualties variable and logging the other appropriate variables produces the same substantive results. For replication information, please contact the authors.

Table 2. Rank Order Relationship between Regime Type, Conscription, and Initiation

	Rank (based on mean)	*Observations*	*Minimum*	*Mean*
Volunteer democratic targets (VDT)	1	4	218	475.5
Volunteer autocratic targets (VAT)	3	5	28	1258.8
Volunteer democratic initiators (VDI)	2	19	0	1289.895
Volunteer autocratic initiators (VAI)	4	9	0	2820.556
Conscript democratic initiators (CDI)	5	23	0	15,013.61
Conscript autocratic initiators (CAI)	6	43	0	99,544.98
Conscript democratic targets (CDT)	7	26	10	114,043
Conscript autocratic targets (CAT)	8	38	100	378,815.3

(*Notes*. Autocracy set at Polity20 $\leq$ 3. Democracy set at Polity20 $\geq$ 17.)

and recruitment strategy. Here, γ is a vector of coefficients for the *zi* variables, which we consider control variables.[29]

Results

First, we present the results of the simple rank order relationship between regime type, conscription, and initiation. These results provide the most stripped down picture of the relationship we are trying to test.

These simple correlations provide initial support for our theoretical arguments, especially by demonstrating that volunteer armies systematically outperform conscription armies. However, it is also important to test this simple data with regression analysis to confirm that these simple results hold up. Model 1 in Table 3 displays our first cut, with controls, at the relationship between conscription and casualties estimated with our multivariate generalized negative binomial model.[30] Model 1 provides support for our conscription hypothesis. The positive sign on the conscription variable indicates that conscription armies suffer higher casualties.

Neither the initiation variable nor the regime type variables achieve statistical significance at conventional levels. This suggests that, at an initial glance, they might not actually have a large influence on casualties after all. The simplest test, a cross-tab, and the simplest statistical model support our core hypothesis and contribution—the importance of military recruitment systems—but do not support the other hypotheses. Next, we look in more detail at the interactive relationship between regime type, war initiation, and conscription policies. One implication of the democratic selection and war-fighting arguments is that the true effect of democratic institutions may lie in the interaction of the primary variables of interest. In Model 2 of Table 3, we include the interactive terms needed to address the joint effects of democracy, conscription, and initiation.

The results of Model 2 are difficult to interpret directly. Braumoeller (2004) shows the necessity of including more than just the interactions of interest. The inclusion of the necessary higher- and lower-order terms renders the coefficients themselves uninformative.[31] We therefore turn toward more substantive tests designed to show how the interacted relationship works.

[29] We also considered using matching, but found it inappropriate for two reasons. First, since we already face limitations on the number of observations, matching would restrict our sample to such a degree that it would undermine confidence in the results. Second, we use the simple statistical evidence presented in Table 2 to show how the results vary based on different categories.

[30] As described earlier, the results are the same excluding controls. The results are also consistent excluding the initiation variable as well and with alternative specifications of the initiation variable.

[31] Omitting lower-order interaction terms is equivalent to assuming the coefficients are equal to zero; unless this assumption is true, bias will be induced.

Table 3. The Effects of Conscription and Regime Type on Battlefield Casualties, 1815–2001

	Model 1—initial run	*Model 2—add interactions*	*Model 3—interactions plus existential variable*	*Model 4—simple GDP and technology model*	*Model 5—extended GDP and technology model*	*Model 6 stage 1: mixed-process regression—conscription equation*	*Model 6 stage 2: mixed-process regression—casualties equation (using the log of casualties)*	*Model 7: instrumented probit test*
	B/*SE*	B/*SE*	B/*SE*	B/*SE*	B/*SE*	B/*SE*	B/*SE*	B/*SE*
Conscription	0.835	0.481	1.038	0.883	1.113		2.982	2.341
	(0.395)**	(0.544)	(0.584)*	(0.519)*	(0.673)*		(1.034)***	(0.842)***
Polity	−0.0348	−0.0876	−0.0615	−0.00688	−0.0228	−0.000814	−0.0854	0.00141
	(0.0262)	(0.0615)	(0.0688)	(0.0450)	(0.0485)	(0.0196)	(0.0438)*	(0.0210)
Initiation	−0.413	−1.374	−1.235	−0.135	−1.628	−0.333	−1.032	0.138
	(0.326)	(1.077)	(0.944)	(0.606)	(1.192)	(0.218)	(0.620)*	(0.195)
Existential			0.449	0.964	1.004			
			(0.481)	(0.580)*	(0.597)*			
Existential * Polity			0.0876					
			(0.0481)*					
Polity * Initiation		0.111	0.105		0.136			
		(0.0819)	(0.0775)		(0.0719)*			
Conscription * Polity		0.0641	−0.0272		0.0106			
		(0.0551)	(0.0418)		(0.0628)			
Conscription * Initiation		1.400	1.293		1.905			
		(1.019)	(0.858)		(1.023)*			
Conscription * Polity * Initiation		−0.181	−0.139		−0.205			
		(0.0798)**	(0.0661)**		(0.0754)***			
World War	2.741	2.826	2.193	1.862	2.021		2.736	0.419
	(0.518)***	(0.506)***	(0.429)***	(0.605)***	(0.679)***		(0.532)***	(0.787)
Duration	Exposure	Exposure	Exposure	Exposure	Exposure	0.000626	0.00134	0.000186
						(0.000274)**	(0.000303)***	(0.000298)
Constant	3.819	4.096	3.562	3.267	3.099	1.587	5.967	−2.224
	(0.446)***	(0.639)***	(0.808)***	(0.825)***	(0.826)***	(0.874)*	(1.666)***	(1.193)*

TABLE 3. (Continued)

	Model 1—initial run	*Model 2—add interactions*	*Model 3—interactions plus existential variable*	*Model 4—simple GDP and technology model*	*Model 5—extended GDP and technology model*	*Model 6 stage 1: mixed-process regression—conscription equation*	*Model 6 stage 2: mixed-process regression—casualties equation (using the log of casualties)*	*Model 7: instrumented probit test*
Lnalpha								
Terrain	−0.902	−0.906	−1.094	−1.081	−1.021	−1.241	0.273	0.0162
	(0.883)	(0.864)	(0.920)	(0.512)**	(0.461)**	(0.534)**	(1.497)	(0.729)
Strategy	0.0854	0.147	0.102	0.114	0.159	−0.0699	−0.364	−0.124
	(0.122)	(0.129)	(0.116)	(0.105)	(0.110)	(0.219)	(0.253)	(0.157)
Prewar army size	−0.000133	−0.000138	−0.000128	3.78e-05	3.43e-05	0.00455		
	(0.000132)	(0.000130)	(0.000120)	(0.000126)	(0.000111)	(0.00145)***		
Military spending	1.34e-08	1.21e-08	1.23e-08	−9.88e-09	−9.59e-09	−1.47e-08		
	(1.29e-08)	(1.12e-08)	(1.12e-08)	(4.46e-09)**	(4.40e-09)**	(9.00e-09)		
Spending per soldier				1.42e-08	8.73e-08	1.84e-07		
				(2.72e-07)	(2.69e-07)	(6.17e-07)		
Year				−0.322	−0.240			
				(0.578)	(0.581)			
Year squared				8.61e-05	6.47e-05			
				(0.000149)	(0.000150)			
GDP per capita				5.50e-05	5.32e-05			
				(7.28e-05)	(8.30e-05)			
GDP per capita squared				2.68e-09	2.96e-09			
				(4.07e-09)	(4.25e-09)			

Table 3. (Continued)

	Model 1—initial run	*Model 2—add interactions*	*Model 3—interactions plus existential variable*	*Model 4—simple GDP and technology model*	*Model 5—extended GDP and technology model*	*Model 6 stage 1: mixed-process regression—conscription equation*	*Model 6 stage 2: mixed-process regression—casualties equation (using the log of casualties)*	*Model 7: instrumented probit test*
Total population						−1.68e-06		
						(4.13e-06)		
Urban population						−7.49e-05		
						(1.83e-05)***		
Constant	1.682	1.491	1.699	301.9	223.2			
	(−0.706)**	(0.653)***	(0.753)**	(561.1)	(564.0)			
Observations	220	220	220	151	151	251	251	219

(*Notes*. Two-tailed tests. ***$p < 0.01$,**$p < 0.05$, *$p < 0.10$. Model 1: Wald χ^2 (4) = 40.27, Prob > χ^2 = 0, Log pseudo likelihood = −2081, Standard Errors adjusted for 77 clusters in war number. Model 2: Wald χ^2 (8) = 60.42, Prob > χ^2 = 0, Log pseudo likelihood = −2078, Standard Errors adjusted for 77 clusters in war number. Model 3: Wald χ^2 (10) = 88.50, Prob > χ^2 = 0, Log pseudo likelihood = −2069, Standard Errors adjusted for 77 clusters in war number. Model 4: Wald χ^2 (5) = 26.97, Prob > χ^2 = 0.0001, Log pseudo likelihood = −1311, Standard Errors adjusted for 53 clusters in war number. Model 5: Wald χ^2 (9) = 64.21., Prob > χ^2 = 0, Log pseudo likelihood = −1308, Standard Errors adjusted for 53 clusters in war number. Model 6: Wald χ^2 (7): 119.43, Prob > χ^2: 0, Log pseudo likelihood = −667. Standard errors adjusted for 84 clusters in war number. /lnsig_1 1.004 (0.067)***, /atanhrho_12−0.634 (0.321)**, /sig_1 2.730 (0.183), rho_12 −0.561 (0.220). Instrumented: Conscription. Independent Instruments: Military Spending, Pre War Army Size, Spending Per Soldier, Total Population, Urban Population. Model 7: Wald χ^2 (7): 183.71, Prob > χ^2: 0, Log pseudo likelihood = −173.6772, Standard Error adjusted for 77 clusters in wartime. Wald test of exogeneity (/athrho = 0): χ^2 (1) = 1.40, Prob > χ^2 = 0.2360. /lnsigma −1.031 (0.063)***, /athrho −1.180 (0.995), sigma 0.357 (0.022), rho −0.827 (0.314). Instrumented: Conscription. Independent Instruments: Military Spending, Pre War Army Size, Spending Per Soldier, Total Population, Urban Population.)

TABLE 4. Predicted Values of Interactive Model Controlling for Duration, Army Size, Strategy, and Military Spending

	Excluding Outliers		*Full Dataset*	
	Mean	*Standard Deviation*	*Mean*	*Standard Deviation*
Volunteer Autocratic Initiators (VAI)	5542	8110	38,647	99,237
Volunteer Democratic Targets (VDT)	6480	9484	44,806	115,054
Volunteer Democratic Initiators (VDI)	11,080	16,217	74,501	191,304
Conscript Democratic Initiators (CDI)	16,596	24,290	67,466	173,241
Volunteer Autocratic Targets (VAT)	19,638	28,743	152,683	392,060
Conscript Autocratic Initiators (CAI)	32,129	47,023	178,749	458,993
Conscript Autocratic Targets (CAT)	36,505	53,428	299,422	768,859
Conscript Democratic Targets (CDT)	156,166	228,561	215,477	553,3304

(*Notes*. Autocracy set at Polity 20 ≤ 3. Democracy set at Polity 20 ≥ 17. Full distribution of values graphically displayed in Figures 2 and 3.)

We look first at Model 2's predicted values (Table 4). We generate predicted values based on permutations of the variables of interest (with other variables held at their means).[32] This table presents the simulated casualties we would expect the states in question to suffer while controlling for other military factors also associated with casualty levels.

Controlling for a variety of other factors known to affect casualty rates, Table 4 shows that volunteer armies systematically suffer fewer casualties than conscription armies. For example, conscript autocratic initiators suffer over five times as many casualties as their volunteer counterparts, while conscript democratic targets take over thirteen times as many casualties as volunteer democratic targets. This provides strong support for the property takings argument, demonstrating that states appear to utilize their military "resources" less wastefully when market mechanisms are used to select soldiers into the military. These results hold whether we include outliers or with different specifications of the model. We graphically display the data from Table 4 as well in two box plots available in Appendix S2.

From the perspective of the literature, the strong evidence in favor of our property takings argument is important. Our results contradict James and Choi's findings as well as Vasquez's. We believe that three factors account for the differences in our empirical results and Vasquez's: we provide a more explicit theoretical perspective, we execute an improved research design, and we focus our analysis on wars rather than including hundreds of low-level disputes with few, if any, casualties. Regarding the first point, Vasquez's argument about the representative nature of conscription armies largely relies on an implicit audience cost perspective that is ambiguous with regard to the specific relationship between casualties and conscription. Our property takings argument draws a much more explicit link between a state's recruitment strategy and battlefield casualty levels than Vasquez's more implicit argument. Second, our data structure and research design are better able to capture the effects of regime type and conscription on casualties. Vasquez relies on a modified MID data set, which both artificially decreases his standard errors and swamps the effect of the larger interstate wars (on which we focus our analysis). This obscures the true effect of conscription during times of war. Vasquez's

[32] We calculated the predicted values in Table 4 and for Figures 2 and 3 by specifying the particular variable values at each point and then using the predicted standard deviation drawn from the "predict" command in Stata. This is similar to the procedures described by Brambor et al., among others (Brambor, Clark, and Golder 2006; Kam and Franzese 2007). As such, the predicted values are not generated using N random draws but they are, however, an accurate representation of the variance surrounding each point prediction. Given the difficulty of interpretation due to our use of interaction terms, it is important not to overemphasize these simulated substantive results.

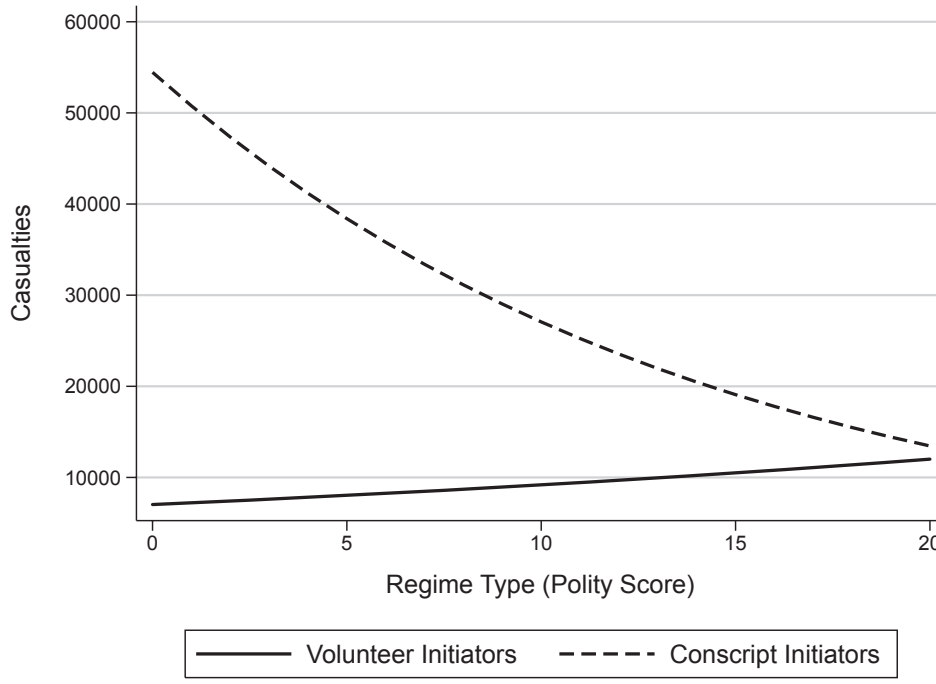

FIG 2. Marginal Effect of Conscription on Casualties for Initiating States as Regime Type Varies

data set only contains cases through 1985, omitting several wars with participation by volunteer armies. The functional form of our model, the generalized negative binomial, better reflects the data-generating process. Finally, the inclusion of the Uppsala/Prio data has vastly improved the completeness and accuracy of the battlefield casualties measure.[33]

Figures 2 and 3 illustrate our finding that volunteer armies do especially well regardless of regime type.[34] For example, volunteer autocratic initiators do especially well, taking fewer casualties than any other combination of regime type, initiation, and military recruitment method. While our general findings on conscription versus volunteer armies are stable, as are our regime type findings, the small numbers of observations in some of the categories—especially the autocratic volunteer categories—suggest that these results are somewhat tentative. For more on this issue, dealing with specific states, see Appendix S2.

The paucity of volunteer autocratic initiators points to a broader issue: the difficulty autocratic states have raising volunteer armies. Many citizens do not consider autocratic governments to be legitimate. As a result, it is potentially more difficult for them to inspire the type of loyalty and devotion that is necessary to recruit large numbers of volunteers. It also may be more difficult for autocratic states to pay soldiers market-clearing wages—since they do not regard their subjects as equal, they are less likely to think they should have to compensate them appropriately for their military service. This is one reason why many autocratic states with volunteer armies before the nineteenth century relied heavily on mercenaries. Autocratic states with volunteer units, such as the late eighteenth-century armies of Frederick the Great, are historical exceptions.

[33] Appendix S2 addresses the relationship between our findings and Choi and James (2003).

[34] As described in note 32, we generated the figures using predicted values from a modified version of Model 2, Table 3. The figures are modified to exclude outlier cases, cases with more than 1,000,000 casualties, in an attempt to show what the graphical relationship looks like for more typical wars.

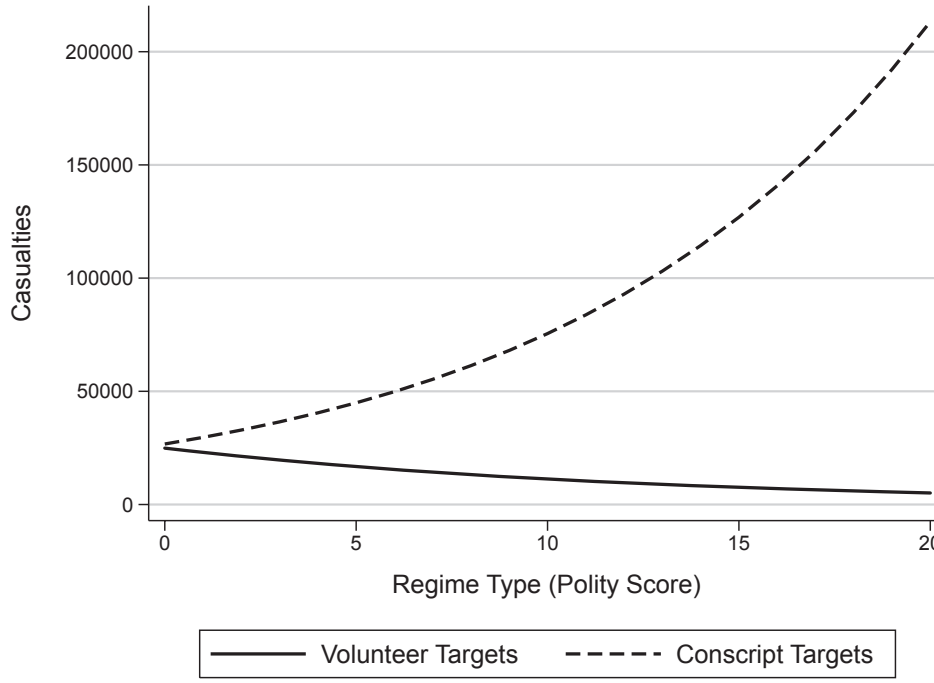

FIG 3. Marginal Effect of Conscription on Casualties for Target States as Regime Type Varies

Several of our categories are statistically indistinguishable, as indicated by the convergence shown at several points in Figures 2 and 3. We can, however, distinguish among four groups of states and retain our confidence in the lower casualty levels associated with volunteer armies. While volunteer democratic initiators (VDI), volunteer autocratic initiators (VAI), and volunteer democratic targets (VDT) are statistically indistinguishable from one another, they all suffer substantially fewer casualties than the states with other institutional arrangements. The next two types of states with the lowest casualties are volunteer autocratic targets (VAT) and conscript democratic initiators (CDI). Two of the three most costly (in terms of human costs to their own armies) producers of military force are conscripting autocracies, both targets and initiators (CDT and CDI). Conscript democratic targets (CDT) suffer substantially higher casualties than all other groups.[35]

The results do not afford such easy comparisons of democracies and autocracies. As noted earlier, the first of these pairs—volunteer initiators (VDI and VAI)—is statistically indistinguishable. We do note, however, that the subsequent two pairs—volunteer targets (VDT and VAT) and conscript initiators (CDI and CAI)—provide support for the regime type hypothesis that democracies should suffer lower casualties than authoritarian states. Both pairs have statistically significant differences between the estimated means. However, it is clear that the last pair—conscript targets (CDT and CAT)—offers no support for the initial regime type hypothesis that democracies should systematically suffer fewer casualties. In fact, it strongly suggests that under these conditions, autocracies take substantially fewer casualties.

As a target state's regime type becomes increasingly democratic, the associated costs of conscription rise dramatically. For democratic war initiators, there appears to be little difference in aggregate casualties between conscript armies and

[35] Significant t-tests scores verify these differences.

volunteer ones. The finding that democracies suffer fewer casualties holds even when we include controls for state size, winning, and other factors.[36] These results are generally consistent with the broader literature on democracies at war.

We now return to Hypothesis 2d and the circumstances under which democracies have been willing and/or able to sustain high levels of casualties relative to historical means. We theorize that these situations are most likely to occur during wars of state survival and that democracies will be disproportionately likely to take casualties in these situations and to employ conscription.[37] The results support Hypothesis 2d. Democratic targets utilizing conscription to generate their military forces are the only instance in which the results for similarly situated democratic and autocratic states (both conscripting targets) show a significant "advantage" for the autocratic state. One could argue that the performance of Holland (56,344 casualties) and Belgium (27,460 casualties) in World War II in the face of the German onslaught probably explains this result.[38] Both countries were woefully overmatched by German panzer divisions and as a result, both took heavy casualties. The category also includes the successful Israeli military operations in 1948 and 1973, when Israel survived attacks by a set of Arab nations and even gained territory in some cases. Israel lost approximately 6,000 troops in the 1948 war and about 3,000 in the 1973 war. However, the median casualties for conscripting democratic targets are 35,000, the highest of any of the eight categories. All American casualties in World War II, for example, fall into the category of a democratic target with conscription.

We systematically test this proposition in Model 3 of Table 3. We added a binary *Existential* variable that measures whether a given conflict represented an existential war for the target state and included it to estimate how participation in these wars influences the results. We also interacted the *Existential* variable with our regime type variable, *polity20*.[39] The variable is 1 if the autonomy and sovereignty of a state are threatened and a 0 otherwise. Figure 4, based on Model 3, highlights the unique way that wars of survival loosen the constraints on casualty taking in democracies. Democracies start behaving more like autocracies, in terms of casualty taking, in wars of survival.[40]

Our results point to the stakes involved in the conflict as a critical factor in determining democratic states' willingness to sustain high casualty levels. To test whether it is the war outcome driving the results, we also estimated a model that included a "war outcomes" control that is a 2 if the participant won the war, a 1 if the war was a draw and a 0 otherwise (based on Stam 1996). Including a war outcomes control does not alter the substantive results of the model.

The highest absolute casualty levels for conscript democratic targets are France and Britain in World War I and the United States in World War II, wars of the highest stakes, showing that democratic states are willing to sustain their efforts

[36] Adding the population of a state, its urban population, or war outcomes into the model or the exposure term did not change the results.

[37] Since we cannot directly measure casualty aversion, the tests of Hypothesis 2d comprise our best attempt to deal with this important issue. Future research should attempt to account more directly for national variations in casualty sensitivity.

[38] It is possible that the especially strong performance, according to some analysts, of Germany in wars between 1816 and 1945 could skew the results in that countries facing Germany might have especially high casualty rates. Controlling for German targets with a dummy did not alter the results.

[39] We coded the variable using available secondary sources, especially Holsti (1991). We attempted to add the existential war variable to our main interaction term and include all of the relevant subinteractions but collinearity and degrees of freedom problems forced us to turn to a more simple interaction with our regime type variable.

[40] We used predicted values from Model 3 in Table 2 to generate Figure 4, as described in note 32. Including an interactive term of polity*victory does not improve the overall fit of the model to the data, nor is the interactive term statistically significant. Bennett and Stam (1998) show that in smaller wars, taking large numbers of casualties over time decreases the probability of success for democracies.

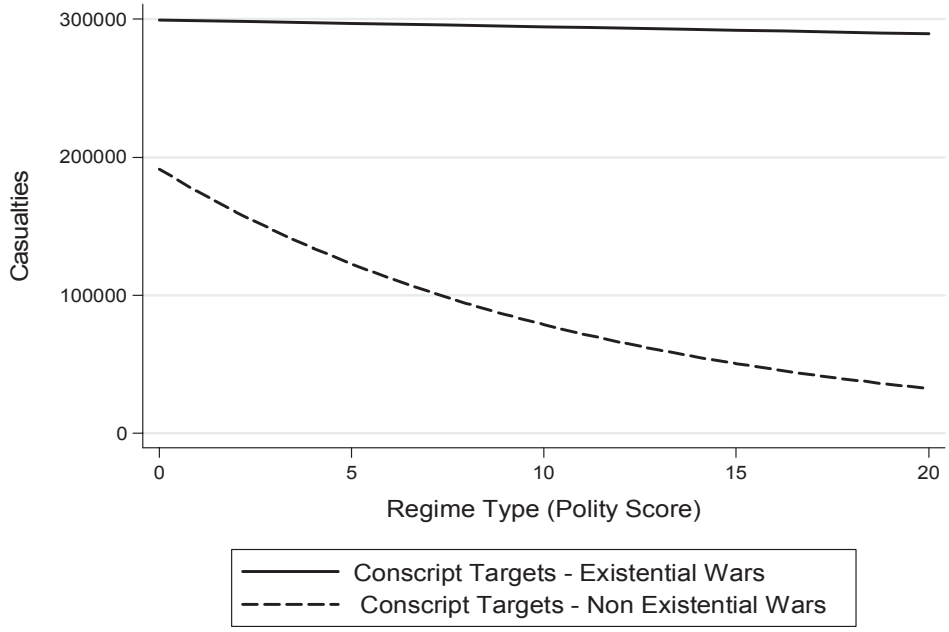

FIG 4. The Relationship Between War Type, Democracy, and Casualties

and take high levels of casualties in important wars. Almost all of the highest-casualty democratic target states are either targets of Germany in the World Wars or other democratic targets that risked substantial loss of territory or autonomy. This suggests that national interest or the issues at stake in the war are the primary factors affecting democratic states' willingness to take high levels of casualties. The significance of our existential variable despite the *World Wars* control described earlier also suggests that our finding has broader robustness and is not just an artifact of the World Wars.

The high casualty levels sustained by CDT also provide additional evidence against Vasquez's argument that because democratic conscript armies are more likely to include the children of elites, audience costs will serve to prevent those armies from taking high levels of casualties.[41] Instead, our results provide indirect empirical support to Bueno de Mesquita et al.'s (2004) selectorate theory of domestic institutions. The finding that democratic conscript targets, especially in wars of survival, are willing to take large numbers of casualties may show the way states and their populations update expectations and strategy during wars. In shorter wars, the desire to reduce the impact of the war on the broader population should cause states with large selectorates to focus on reducing casualties. However, in longer wars, especially wars for the existence of the state, updating by leaders means they will spend more lives because they are still focused on achieving the public good of victory.[42]

The empirical evidence presented earlier also shows that when the stakes are high and wars are lengthy, democratic states are willing to commit high amounts of labor in addition to capital—though they still might be comparatively more capital intensive than autocratic armies (Lake 1992; Gartzke 2001). Additionally, we

[41] There is also the potential for inequality after selection into the military in conscript armies, with the children of elites being assigned to military occupational specialties that decrease the risk of actual combat, like staffing or logistics. We observe this in the European theaters of both World Wars. It is also a potential issue with volunteer armies. Thanks to an anonymous reviewer for making this point.

[42] Personnel communication with Bruce Bueno de Mesquita.

control for the argument that large selectorate states (or democratic) will heavily capitalize wars only through investing in proportionately greater financial or materiel resources. The military spending and personnel variables in the dispersion term are the best available proxies for resource investment in warfare and do not alter our results. Moreover, military spending is the operational measure used by Bueno de Mesquita et al. (2004).

However, it is possible that these results ignore the way that wealthier states might have advantages on the battlefield through their adoption of new technologies and because of the way wealth might influence casualty sensitivity. In addition, during the time period in question, from the early nineteenth century through the early twenty-first century, there were large advances in the technology of warfare that made labor much more productive in general. Technological change could also influence casualty rates by affecting casualty sensitivity. For example, volunteer armies might not be more casualty sensitive due to market mechanisms, but because leaders seek to protect the advanced technology, they deploy with those smaller numbers of soldiers. This impact could increase with wealth. To account for the way that technology, time, and wealth influence the results, we added additional control variables and re-ran model 2 from Table 3. The results are presented in models 4 and 5 of Table 3. First, we include a variable measuring GDP per capita based primarily on Maddison's data, which includes accurate cross-national deflators, and a GDP per capita squared variable designed to test whether the impact of GDP is linear, since GDP may only matter up to a certain point (Singh and Way 2004; Eichengreen and LeBlang 2008:320). Second, to test for whether wealthier nations that spend more on their soldiers have different casualty rates, we added a measure of spending per soldier by interacting the prewar army size variable and the military spending variable. While far from perfect, this is one way to try to get at the role of technology and wealth. Finally, to try to account for the increasing effectiveness of technology over time, we added a variable for the year and year squared, since there is a possibility that increasing technology has only cut down on casualties up to a specific point.

The results show that while these factors may matter, as scholars like Gartzke (2001) argue, decisions about military recruitment still play an important role in influencing relative casualty levels. The conscription variable and relevant interaction terms are significant and in the predicted direction in models 4 and 5 just as they are in the other models.[43]

A final potential issue is that the theory does not separate willingness to take casualties from battlefield effectiveness. Volunteer armies might take fewer casualties only because they are better at war fighting, not because of whether they initiated the war, whether it is a war for national survival, or issues related to regime type. The *War Outcomes* control model described earlier takes into account this possibility and including it does not alter the results.

Choosing a Military Labor Policy

Given the evidence presented previously about their inefficiency, why are there so many conscript armies? The simple reason can be found in the takings argument. Conscript armies are cheap, relying on the coercive power of the state to induce participation rather than providing market-clearing inducements to raise the necessary manpower. Another reason is that switching between military recruitment systems is a relatively rare event regardless of the strategic situation. Analyzing Toronto's (2005) data on recruitment systems in all states from 1816 to 2004 shows

[43] Results from more models testing these factors are available in Appendix S3. Logging the GDP variables also does not change the results.

that countries keep their military recruitment system constant in 87% of country-years. Moreover, since it is true that the largest of wars, World Wars I and II, tended to feature the use of conscription by participants, we checked for the possibility that states, in general, create conscription systems when they expect to fight especially large wars. We created lag variables from 1 to 10 years to see whether states switched to a conscription system from a year before a war up through 10 years prior to a war. While some states might, in rare cases, face the constant threat of imminent war over a 10-year period, generally the threat of war increases just prior to the actual outbreak of war. If recruitment systems are endogenous to casualties, we should see at least some evidence of "switching" as war becomes more imminent. However, militaries kept the same recruitment system as the year before the war 98% of the time, they kept the same recruitment system as 5 years before the war 92% of the time, and they kept the same recruitment system as 10 years before the war 90% of the time. This suggests that, as Hadass (2004) finds, most states try to optimize prior to a war using the recruitment system they already have rather than switching systems. The stickiness of recruitment systems, once adopted, also suggests that whether a military enters a conflict with a conscription or volunteer military is not just a function of rational expectations about a specific upcoming conflict, but instead an indication of culturally and organizationally driven prior beliefs about what a military system is supposed to look like.[44]

To test this possibility, we gathered data on the date of implementation and the reason for implementation for a country's military recruitment, which could vary from expectations about war in general to beliefs about the specific war the country was fighting to domestic politics, norms about recruitment systems, or other factors.[45] The results show that something other than specific beliefs about the war a country was fighting drove the decision to implement a recruitment system in 205 of 223 cases, or 92%. Furthermore, of the 18 cases in which switching may have occurred for reasons related to expectations of casualties, 10 of them involve World War I or World War II, such as Great Britain in World War I or the United States in World War II. Even in World War II, the canonical example of a large war, not all participating militaries utilized conscription. The Polish Army had a volunteer force throughout the buildup prior to the German invasion, a situation in which the risk of war was widely and well understood.

In many cases, the selection of military recruitment systems is a function of domestic political culture and economics, as Kier's (1997) study of French decision making in the pre-World War II period shows. Organizationally driven beliefs about warfare in general and the "best" system for building a strong army also influence these decisions (Posen 1993). Domestic politics, learning from prior wars, and bureaucratic norms regarding the optimal military recruitment system play a larger role in determining the type of military recruitment system a country uses than do expectations of future casualties in the mean case. In most cases, casualty expectations are important for variations in army size within a system, not the system itself. Therefore, though the instances of casualty expectations influencing whether a state uses conscription or not are well known, like the British in World War I, states facing war tend to optimize within the framework of their pre-existing military recruitment system, rather than changing systems.

As a final statistical test, we ran instrumented models designed to test for the link between military recruitment and casualties (Models 6 and 7 in Table 3).

[44] This sort of learning could also influence the propensity of states to engage in large wars and take casualties, though it probably influences whether states get involved in wars, rather than casualties once war begins. It is an interesting point for future research.

[45] We examined a significant subset of the data—223 of the 309 observations in the data set. The complete data and coding is available upon request from the authors.

While the evidence described earlier shows that, as an empirical question, military recruitment systems are relatively independent of casualties, these models reinforce the robustness of our findings. Model 6 is a two-stage model where the dependent variable in the outcome equation is the natural log of casualties, a continuous variable. We instrument conscription, a binary variable, making it the dependent variable in the selection equation. The specific mixed process, with a continuous outcome variable and a binary (potentially) endogenous regressor, renders most traditional instrumented tests very unstable. Therefore, we turn to a mixed-process regression, which allows us to specify a regression process for the outcome equation (casualties) and independently specify the selection equation (conscription) (Roodman 2007). We have to drop the interaction terms due to the complexity of the model. Given that our hypotheses are specifically based on the interactions between conscription, regime type, and initiation, this move also biases the results against our theory.

We include several instruments, including total population, urban population, and spending per soldier. None is statistically linked to higher or lower casualties in our main model. Since spending per soldier is a valid instrument for conscription, we have to shift its component parts, prewar army size, and military spending, out of the outcome equation and into the conscription equation. This also increases the bar to significance for the conscription variable since variables that might only be partially independent are included as independent instruments in the conscription equation. This output is conceptually identical to instrumented probit or regression but more appropriate given the distribution of the dependent and instrumented variables. Conscription is still significantly related to casualties and in the predicted direction. Even if conscription is somewhat endogenous to expectations of casualties, the outcome equation shows that it exercises a significant independent and positive effect.

In Model 7, we estimated an Instrumented Probit model. We transform the dependent variable again to fit the model. Since the endogeneity concern is primarily a concern about extreme values, we created a binary variable coded as a 1 if casualties were above the 75th percentile for the casualties variable and a 0 otherwise. The results show a positive and significant relationship between conscription and casualties. Moreover, the Wald test of exogeneity is not significant, with a value of 0.23, suggesting that the use of an instrumented model is not necessary and the relationship is not endogenous. However, it is important to keep in mind the limitations of this instrumented test given how much the dependent variable is transformed from what we use elsewhere in Table 3.

Additionally, our data show that both democracies and autocracies have employed conscription at various points, as have militaries in countries of varying economic sizes and with different levels of military spending. While examples like Britain in World War I demonstrate that some countries do alter recruitment systems as their expectations about wars change, prewar estimates of war duration and intensity are often incorrect. For example, the United States vastly underestimated the costs associated with its invasion of Iraq. Since countries frequently mis-estimate war costs, expectations of war duration/intensity should not map onto the recruitment system.

Based on theory, close analysis of the data, and the examples we provide, the evidence implies an important interaction between recruitment systems, regime type, and casualties in warfare. The next puzzle to solve is what drives the adoption of different military recruitment systems. Our results are suggestive and a first step, rather than the final word.[46]

[46] One objection to these results is that the data disproportionately favor volunteer militaries because all militaries use conscription when involved in large wars, so our findings are epiphenomenal. To some extent, we deal with this objection above –military recruitment systems are reasonably exogenous to casualties.

Finally, a critic could argue that states select themselves into wars and are selected as targets in wars in part based on *ex-ante* observable characteristics. States with conscription armies may select or be selected into especially risky wars in which they are likely to suffer high levels of casualties since other states know that volunteer armies are more capable. While it is true that states choose to initiate wars in part on the basis of information about the quality of militaries, we were unable to find evidence that perceptions of a recruitment system as voluntary versus conscript influenced perceptions of military quality in a way that was significantly biased against conscription armies. If anything, the relationship worked the opposite way from the early nineteenth century, following the Napoleonic innovation of the levee en masse, through the mid-twentieth century. In that period, having a conscription system was a precondition to mass mobilization, considered the optimal form of military mobilization and a strong signal of army quality (Posen 1993; Herrera and Mahnken 2003).

Additionally, conscripting initiators, both autocratic and especially democratic states, actually suffer much lower relative levels of casualties than conscripting targets. The highest casualty levels for conscription armies actually tend to occur in cases of conscripting *targets*, meaning the conscripting army did not select into a particularly "risky" war; rather, they entered the war because another conscripting army attacked them, most commonly.[47]

Conclusion

While military labor policy re-entered American politics in the last decade due to the American-led wars in Afghanistan and Iraq, issues regarding the way the state recruits soldiers into its armed forces have always been controversial. Any time citizens die in the service of the state, questions will be raised about why they were there in the first place. This fact provides, in part, the justification for relying on citizen soldiers in democratic states that desire to retain strong civilian control of the military. But beyond the politics lies a substantive question with important academic implications for predicting military power and developing a more nuanced understanding of the factors influencing the character of war.

This phenomenon shows up in other aspects of states' defense policies as well. As Kier's work on the French military in the interwar period shows, France's conscription policy helped produce a defensive military strategy that both contradicted the offensive nature of their alliance commitments and was ill-suited to the type of warfare for which Germany was apparently preparing (Kier 1997).[48] In contrast to Choi and James' arguments, our results also show that there are several reasons to think that volunteer militaries should suffer fewer casualties than conscript armies. In brief, our evidence suggests that volunteer armies are more highly motivated since they are made up of people who choose to serve. They also have lower turnover ratios. All of these things increase military readiness and effectiveness (Orvis and Asch 2001; Wolfowitz 2003; Office of the Undersecretary of Defense, Personnel, and Readiness 2006).[49]

In general, governments employing conscription armies tend to expose their soldiers to greater risk even when controlling for the relative size of the war under observation. This is strong evidence in favor of our property takings argument. Specifically, volunteer armies appear to more carefully allocate and expend their resources, and because military leaders adapt their wartime strategies to the

[47] Finally, even if conscription armies select into risky wars, it is consistent with the claim that recruitment strategies play a major role in influencing military strategy and international politics, supporting our core argument.

[48] France's high casualty rates in World War I, an example of a democratic country being willing to accept high casualties from a conscription army, helped drive French military doctrine of the 1930s. Thanks to an anonymous reviewer for pointing this out.

[49] For more on this point, please see Appendix S2.

character of the army at hand, in part determined by recruitment policies, volunteer armies are less likely to find themselves engaged in particularly risky and costly wars.

Both democracies and autocracies seem more cautious with expensive, well-trained volunteer troops than they are with conscript armies. This finding applies to both initiators and targets. The former is not particularly surprising: one would expect governments to be choosy about which wars into which they send their volunteers. But even volunteer targets (who have not selected themselves into a war) suffer proportionally fewer casualties than their conscripting counterparts. We present strong correlations as evidence that the non-market mechanism by which conscripts enter into service tends to result in their relatively wasteful use by national governments.

However, there remains something a bit different about liberal democracies. These states do not use their conscripts as cannon fodder, throwing men against fire in desperate efforts to win, but when targeted by authoritarian states, contra the hopes of autocratic aggressors, democratic societies are willing to bear the costs of large-scale commitments to maintaining states' sovereignty and autonomy, sometimes even in the face of certain defeat. We see here, then, a revealing intersection between the property takings and the democratic peace literatures.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Appendix S1. Additional Variable Information.

Appendix S2. Additional Results and the Superiority of Volunteer Armies.

Appendix S3. Controlling for Other Economic and Technological Factors.

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