A Simple Political Economy of Relations among Democracies and Autocracies*

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Abstract

I consider a simple political economy model of international conflict in which the value of conquest depends on the tax policy that would be implemented in conquered territory by the median voter in a democracy, or by the dictator in a non-democracy. Endogenizing the value of war in this way yields a straightforward possible explanation for the democratic peace. If the citizens of democracies have normative commitments such that they will extend the same rights to people in conquered territory, then two democracies can have little economic reason to want to take over the other by force. By contrast, autocracies can gain rents from conquest and so must arm against each other for deterrence, which may be more expensive than fighting. A democracy needs to arm against an autocracy for protection, which can give it a reason for fighting in order to reduce its future defense burden by incorporating or changing the autocracy to a democracy. In the model there is no war between democracies, but sometimes war between dyads involving at least one autocracy (when fighting is cheaper than deterrence). I also consider the case of "colonialist" democracies that will exploit subjects in conquered territory, but divide the rents among the citizens.

1 Introduction

Suppose that the citizens of democracies have normative commitments such that they will extend the same rights and privileges to the inhabitants of any territory that their state gains control of

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militarily.[1] Then it is almost immediate that two democracies at a similar economic level can have little economic reason to want to take over the other by force. Doing so will not lower a citizen's taxes or raise her supply of public goods unless there are substantial efficiency gains from economies of scale in government. But even in that case the two states and their citizens would prefer to unite or federate without a violent conflict.[2]

Consider, by contrast, the rulers of two non-democracies – two kings, for example – who attempt to maximize the tax revenue they can collect from any subjects who come under their rule. Such regimes can have a good reason to want to take territory from others, since this adds to the number of producers to be taxed. Correctly fearing that the other might try to invade, two neighboring kings will have to arm to try to deter invasion. War may result from preventive concerns or bargaining failures of various sorts. Moreover, the cost of arming to deter will make the kings more willing to risk war in a crisis, since an upside of winning a war is that the victor no longer has to arm (or arm as much) against the defeated rival.

Finally, consider two countries where one is a democracy and the other an autocracy. If the citizens of the democracy would not exploit the inhabitants of the dictatorship if they took it over, then they have no reason to invade on grounds of "greed." But the dictator can have an economic reason to want to take territory from the democracy, and this implies that the democracy will have to spend tax dollars on an army in order to deter invasion. This in turn can give the democracy a positive reason to want to attack and take over the non-democracy, since by doing so it can eliminate the threat and so reduce the need to spend money on defense. And as with two autocracies, the burden of spending on arms makes both sides more willing to risk war in crisis bargaining, since success in war means a permanent or long-term reduction in defense burden.

[1]Since a democracy that conquered new territory and proceeded to treat the inhabitants as subjects without political rights would cease to be a democracy, this is similar to saying, Suppose that for some reason citizens in a democracy want to maintain their form of government.

[2]Cf. Bolton and Roland (1997), who study incentives for regions within a democratic state to stay united or to break up (nonviolently), where the trade off is between efficiencies from larger size versus ability to set a tax policy preferred by regional citizens. However, break up would never occur in their model if they allowed tax policy to vary across regions within the same country.

In this paper I analyze a simple political economy model that develops these arguments. It shows how, from the initial assumption that democracies are normatively committed not to exploit people in territories they conquer, several theoretical implications follow. First, democracies will not fight with each other and will not arm much against each other. Second, autocracies will sometimes fight each other and will arm against each other. Third, democracies and autocracies will sometimes fight, and will arm against each other, although the democracy tends to arm more than the autocracy in a mixed dyad of roughly equal sized states.

I also briefly consider relaxing the assumption that democracies extend equal citizenship rights to conquered territories, replacing it with the assumption that they act as dictators would in these areas. It is shown that such "colonialist democracies" are more conflict-prone with each other than with full democracies, and may be more or less war-prone with each other than with autocracies. Because the gains of conquest must be distributed over more people than in a pure autocracy, the "upside" of war is smaller for citizens in a colonialist democracy than for an autocrat. But the downside of losing is also smaller – citizens have less to lose from higher taxes than an autocrat does from losing office completely. Which effect dominates depends on risk aversion and the costs of war. But in general the results imply that colonialist democracies will be more conflict prone than full democracies.

The international relations literature distinguishes between "normative" and "institutional" explanations for the democratic peace (Russett and Oneal 2001). The former proposes that leaders and followers in democracies are just normatively committed to reciprocate non-coercive bargaining strategies in conflicts. The latter argues that the electoral connection in one way or another makes democracies less likely to fight. Kant is interpreted to have said that democracies have higher costs for going to war because those who do the fighting make the decision. As many have noted, the proposal that democracies have higher costs for war would predict – apparently incorrectly – that they will be less prone to war with all other types of state, not just with other democracies. Schultz (2001) shows how the fact of public opposition in democracies can improve their ability to resolve disputes short of war. Again this argument predicts that democracies would see less war in general, and not just with other democracies.[3]

The arguments developed below rely on both normative and institutional elements, but in ways quite different from the standard arguments in the literature. Here, the key normative commitment that leads ultimately to a democratic peace is *a commitment to political equality of the people within the state's borders*. This value removes or at least lessens any economic incentive for a democracy to take territory from another democracy. At the same time it leaves a reason to take over a non-democracy in order to extend democracy and so reduce one's defense burden. In effect, the argument suggests a political economy rationale for Wilson's idea of "making the world safe for democracy" (known by some as democratic or liberal imperialism).

The argument is institutional as well. In the model, political accountability or the lack thereof drives tax policy, which in turn shapes whether a ruler can gain from territorial conquest. Moreover, in the "colonialist democracies" version of the model where the democracy does not extend the same rights to people in conquered territory, the argument for differences in conflict propensities is completely institutional. In that case, democracies' are not normatively committed to political equality for people outside their initial borders, but the fact that they will divide up the benefits of conquest can them less keen on conquest than an unaccountable dictator would be.

Finally, anarchy and strategic interaction figure centrally in the argument, acting as a bridge from the institutional and normative assumptions to results about arms levels and propensity for conflict. If an autocracy could credibly commit not to raise arms or not to attack, then there would be no conflict in the core model among any combination of regime types.

Regarding related literature, the core model analyzed below is a direct extension of a model developed by Robert Powell (1993, 2000) in which two states alternate in choosing how much to arm and whether to attack the other side. Powell considered "unitary actor" states that value taking resources from each other. The model here builds a simple political economy behind each

[3]To be more careful, the Kantian and Schultzian arguments predict the least amount of war in democratic dyads, more in mixed dyads, and the most in autocratic dyads. Benoit (1996) finds some evidence for this ordering for the period 1960-1980, but most studies find mixed dyads to be at least as or more conflict-prone than autocratic dyads (Maoz and Abdolali 1989; Oneal and Russett 1997).

state (or leadership): each country has a continuum of citizens or subjects who produce taxable income, and tax revenue can be spent on arms, or on arms and rents for an autocrat. I also simplify the analysis by letting the discount rate (or time between decisions) go to zero, a move made by Nalebuff (1988) in an informal treatment of essentially the game formalized by Powell. Jackson and Morelli (2008) consider a version of the problem in which the states choose their arms levels simultaneously rather than in sequence each period; the only equilibria are then in mixed strategies where there is always a positive probability of war. McBride and Skaperdas (2007) examine a related model in which one side can make a bargaining offer in each period; war may again occur because it is the only way to guarantee low future arms levels. The model discussed in section 3.3 below, which considers bargaining, is similar to a two-period version of their game but with private information.

Jackson and Morelli (2007) consider a model in which a state's leadership may gain more of the spoils of war than the population as a whole. War can then become, in effect, a positive-sum enterprise for the rulers, as it is assumed that non-elites cannot pay the leaders not to fight (or otherwise get rid of them), and that the rulers cannot engage in mutual, peaceful exchanges of territory or resources.[4] There is some parallel with the model examined here, in which autocrats keep the gains of successful war and their incentives for conflict differ from their subjects. However, war is never positive-sum in the analysis below, even from the perspective of the autocrats.

In Bueno de Mesquita, Morrow, Siverson and Smith (2003), leaders in democracies spend more resources on war fighting because their continued tenure depends on satisfying a larger number of people, and victory in war is assumed to be a public good of exogenously given value. Autocratic leaders prefer to use more of their resources on patronage of the relevant political elite and themselves. In contrast to the argument developed here, in their model the issue is not the effect of regime type on the nature and distribution of the gains from war (which they take as fixed

[4]That is, fighting with the other state is for some reason necessary for the rulers to gain their disproportionate take. Jackson and Morelli consider the case of one side making a transfer to the other to avoid war, but not a mutual exchange, which given their assumptions both sides should always prefer to fighting.

and the same for all regime types) but rather how regime type influences war effort.[5] Similarly, in Baliga, Lucca and Sjöström (2007) the values for international outcomes are fixed across regime types and predictions about different behavior by regime type are derived from assumptions about how international outcomes affect a leader's odds of keeping power under different regimes.

The next section defines and analyzes the model, comparing outcomes for the cases of autocratic, democratic, and mixed autocratic-democratic state dyads. Section 3 considers three variations – colonialist democracies, unequal-sized states, and how the pressure from military spending affects war risk in bargaining over a disputed issue.

2 The model

2.1 Game form and payoffs

Two states 1 and 2 interact in successive periods $t = 0, 1, 2, \ldots$. Each state controls an amount of territory. The territories are normalized to each have size 1. People (producers) are uniformly distributed over each territory, and each individual or household produces pre-tax income each period normalized to be 1. Individuals can hide their income at cost $\lambda \in (0, 1)$, so that the maximum tax rate that can yield revenue is $\lambda < 1$.

The government in state 1 chooses actions in the even periods, and the government of state 2 in the odd periods. When a state has the move, it chooses how high to set the tax rate, what share of tax revenue to spend on the military, and then whether to attack the other state. Military spending does not accumulate; one can think of it as wages to pay soldiers. So, for example, if state i sets its arms level at A_i in a given period, this is the size of its military until its next move. Rulers and citizens/subjects discount future payoffs at a rate of $\delta \in (0, 1)$ per period.

If the government in state i is an autocracy, then it chooses a tax rate each period and a share $a_i \in [0, 1]$ of the tax revenue to spend on arms. In this simple model, an autocratic leader never

[5] Bueno de Mesquita et al's results depend heavily on the assumption that the benefits of war cannot be disproportionately taken by the members of the "winning coalition." They also depend on their assumption that selectorates do not get the value for the international issue resolution if the incumbent leader is replaced by a challenger, even though the international outcome is determined before the "reselection" decision takes place.

has a reason to set the tax rate less than λ (since increasing taxes could bring in more rents) and of course never wants to set taxes greater than λ since this yields no revenue at all. So we only need to look at the decision a_i^t which is the share spent on arms in period t. This choice divides the autocrat's total tax revenues λ between $a_i^t\lambda$ spent on the army and $(1-a_i^t)\lambda$ in rents for the ruler.

In this simple political economy, there is only one reason for citizens in a democracy to want to raise tax revenues: to spend them on the military for purposes of attack or defense. In other words, the military is the only public good for which government might be needed. Thus for a democracy we need only consider the amount of revenue to be raised for defense in each period. This is usefully scaled as $a_i^t\lambda$, where a_i^t is thus the proportion of the maximum feasible tax revenue (λ) being spent on arms. Note that I assume here that democrats are just as constrained as autocrats by individuals' ability to hide income if the tax rate is too high.[6] If we were to assume that democracies are better able to solve this collective action problem, then we would get results consistent with the empirical observation that democracies are more likely to win the wars that they fight (Lake 1992; Reiter and Stam 2002).[7]

Let A_i be the total amount of arms raised by state i in a given period, and A_j the total arms that the other state has when state i chooses whether to attack. If i attacks, then state 1 wins with probability $p(A_i, A_j)$ and state 2 wins with the complementary probability. We assume $p(A_i, A_j)$ is increasing in A_i and decreasing in A_j; symmetry, so that $p(A_i, A_j) = 1 - p(A_j, A_i)$; and that a state can certainly take over the other if it has arms and the other does not ($p(A_i, 0) = 1$ if $A_i > 0$). For simplicity the contest is modeled as "all or nothing," so that the winner gains political control of the loser's territory. War is costly, however. Again for simplicity, the costs are modeled as a permanent reduction in the income produced by the citizens in both territories, by the factor $\beta \in (0, 1)$. $\beta < 1$ is thus the size of the whole economy after a war.

[6] Of course, "hiding income" is just a simple way to model a constraint on tax revenues; a labor-leisure trade off is another way to do it.

[7] Another natural extension of the model is to let incomes vary within the democracy, and introduce the possibility of redistribution of some of the tax revenues. This would introduce a political conflict between the poor, who will prefer more redistribution and less defense spending, and the rich, who would like to see less redistribution and more tax dollars spent on defense.

Rulers and citizens/subjects have the same concave utility function for income, $u(\cdot)$ with $u(0) = 0$. Thus if state i spends share of tax income a_i on arms in a period, a ruler's consumption is worth $u(\lambda(1 - a_i))$ and a citizen's in a democracy is $u(1 - \lambda a_i)$.[8]

If an autocracy wins a war, its ruler takes over both territories and taxes the whole population as much as he or she can get away with. This yields $2\beta\lambda$ in all subsequent periods for a discounted sum of $u(2\beta\lambda)/(1 - \delta)$ for the autocrat and $u(\beta(1 - \lambda))/(1 - \delta)$ for all his subjects.

If a democracy wins a war, it no longer faces any adversary in this two-state world, so its citizens no longer have any reason to tax themselves. If the democracy is extended to the inhabitants of the conquered territory, then each individual receives $u(\beta)/(1 - \delta)$ thereafter.

If we assume instead that a democracy will act as an autocrat for people in conquered territory (call this "colonialism") then each citizen in the victorious democracy receives $u(\beta(1+\lambda))/(1-\delta)$.

To complete the definition of the game, we need to specify an initial arms level A_2^0 for state 2, in period $t = 0$. Consistent with the idea that we are "cutting in" to an ongoing process, I will restrict attention to Markov-perfect equilibria where A_2^0 is the same as state 2's equilibrium choice in subsequent periods.

Table 1 summarizes the per period payoffs under different outcomes and for different types of player. Note that for a citizen in a full democracy, the payoff from winning a war against another full democracy is the same as the payoff to losing, since one will face the same ex post tax rate (zero) either way. Moreover, there are costs to fighting, so one can anticipate that it will not be hard to construct an equilibrium of the game between two full democracies in which neither spends on the military and peace prevails.

[8]This may seem odd at first because it implies that a citizen's income is greater than a dictator's for a given share spent on arms. This is a consequence of normalizing the size of the population to 1. We could instead write a ruler's income as $n\lambda(1 - a_i)$ where n is the size of the population. If we assume preferences over income have constant relative risk aversion, such as $u(x) = x^\rho$, $\rho \in (0, 1)$, then scaling income by n in this way makes no difference in any of the analysis that follows. By contrast if we assume increasing relative risk aversion, then rulers will be more cautious about conflict than citizens (other things equal) because they care more about a given percent loss than a given percent gain than would a citizen; there may then be implications for arms levels and the likelihood of war between different regime types. This issue is noted when relevant in the analysis below. See Fearon (2008) for a parallel discussion in the context of a model of civil war.

Note further that the downside of losing a war is greater for an autocrat. The interpretation of getting $u(0) = 0$ in this case can be either that the autocrat is deposed and loses his or her life, or that he or she loses the large revenue stream associated with rule. By contrast, a citizen in a democracy that loses to an autocrat sees higher taxes and costs of war, but not a complete loss of income relative to the pre-war status quo. Of course, the upside of winning a war is also greater for an autocrat versus a citizen in either kind of democracy. Still, with diminishing returns (risk aversion), the fact that an autocrat effectively has more at stake from war can make *democracies* relatively more aggressive in mixed dyads, as shown below.

Table 1. Per period payoffs by outcome and player type

Outcome	Player type		
	Autocrat	Citizen in full democracy	Citizen in colonialist democracy
Win war against any type	$u(2\beta\lambda)$	$u(\beta)$	$u(\beta(1+\lambda))$
Peace period	$u((1-a_i)\lambda)$	$u(1-a_i\lambda)$	$u(1-a_i\lambda)$
Lose war to good democracy	0	$u(\beta)$	$u(\beta)$
Lose war to autocracy or colonialist democracy	0	$u(\beta(1-\lambda))$	$u(\beta(1-\lambda))$

The game so described has the same structure of moves as that analyzed by Powell (1993). Two states go back and forth choosing how much to arm and whether to attack. The main difference is that the model here introduces a simple political economy of production and taxation for stylized democracies and autocracies, which make the payoffs from winning or losing a war endogenous to the political economy rather than being exogenously fixed.

2.2 Autocracy versus autocracy

We begin by analyzing the game with two autocracies. This case is almost equivalent to the problem studied by Powell (1993), who assumed (naturally enough) that the states in his model had a positive value for controlling resources held by the other side. In a Markov Perfect Equilibrium

(MPE) of the game, a state's choice of arms spending in a period depends only on what the other state chose in the prior period. In a peaceful MPE, neither state ever attacks on the equilibrium path.

Powell showed that if parameter conditions are such that the game has a peaceful MPE, then any MPE has the following form: Each state chooses in each period the smallest level of arms such that the other state will be just deterred from "breaking out" in the next period. "Breaking out" means attacking after choosing a higher level of arms spending that maximizes the expected payoff from going to war.

For the model given above, the condition for state i to prefer peace to attacking state j in a peaceful MPE is:

$$u((1-a_i)\lambda) \geq \max_a (1-\delta)u((1-a)\lambda) + \delta p(\lambda a, \lambda a_j) u(2\beta\lambda)$$

Payoffs have been expressed in per period (time averaged) form. The left-hand side is the autocrat's payoff for a period of peace when spending a_i on the military. The right-hand side is the maximum expected value obtainable from going to war, given the size of the other autocrat's military. The decision of how much to spend when going to war presents a trade off between current consumption ($(1-\delta)u((1-a)\lambda)$) and a higher probability of winning the war.

Without any real substantive cost, we can *greatly* simplify the analysis that follows by letting the discount factor δ go to one, which guarantees that states want to "go all out" if they are going to go to war.[9] When enough weight is put on future payoffs – or if mobilization for war can proceed quickly – a state intent on war always wants to set $a_i = 1$, "buying" as high a probability of winning as possible.

[9]Nalebuff (1988) makes this move in his verbal rendition of essentially this model. We lose only the ability to perform comparative statics on the discount factor, the logic of which is straightforward (at least, conditional on having read Powell 1993).

Taking δ to unity, the conditions then become, for $i = 1, 2$ and $j \neq i$:

$$u(\lambda(1 - a_i)) \geq p(\lambda, \lambda a_j)u(2\beta\lambda) \tag{1}$$

The only efficient outcome in the model would have both states spending nothing on arms in every period. Substituting $a_1 = a_2 = 0$ into (1) and using $p(\lambda, 0) = 1$ we have that the efficient outcome requires $u(\lambda) \geq u(2\beta\lambda)$ and thus $\beta \leq 1/2$. When $\beta < 1/2$, there is no point in war even if a state is certain to win, since more than half the total output will be destroyed by the conquest, leaving one with less than what one gets in an unarmed peace. By contrast, if $\beta > 1/2$ then war is profitable if one will win for sure, so peace with no arms for deterrence is not feasible. Henceforth, we consider the case where war can be profitable, that is, $\beta > 1/2$.

Inspection of equation 1 makes plain the nature of the problem of maintaining peace in this class of models. Peace requires that the rulers not spend so much on arms that "breaking out" and trying to win all is more attractive than living at peace – that is, a_i cannot be too large. But the smaller are both states' force levels, the bigger the military advantage of break out, since $p(\lambda, \lambda a_j)$ is larger the smaller is a_j. It can happen that there is no pair of force levels such that peace at this level would be preferable to breaking out and attacking. If so, then war is the only subgame perfect equilibrium outcome. Both states will set $a_i = 1$ and expected payoffs will be $u(2\beta\lambda)/2$.

Proposition 1 in the Appendix establishes that in a peaceful MPE, expression (1) must be satisfied with equality for both states, and both states choose the same force level in every period. Thus, if a peaceful MPE exists, the arms level chosen by each state in every period on the equilibrium path satisfies

$$u(\lambda(1 - a^*)) = p(\lambda, \lambda a^*)u(2\beta\lambda). \tag{2}$$

Figure 1a illustrates a case in which a peaceful MPE can be sustained between two autocracies. In fact, it shows that there can be two (and in principle more than two, for complicated p functions) possible peaceful MPEs, although these will always be pareto ranked. The most efficient equilibrium is at the first intersection of the two curves, labelled a^* on the x axis in Figure 1a.

But these two curves need not intersect, as in Figure 1b, in which case the only subgame perfect Nash equilibrium involves immediate warfare on the path of play.[10] What parameter values favor the intersection of the two curves? First, greater risk aversion (concavity) in ruler preferences over income makes for more upward curvature of $u(\lambda(1-a))$, which makes existence of a peaceful MPE more likely.[11] Second, the more quickly the probability of winning falls as the adversary's arms level increases from zero, the more likely a peaceful equilibrium will exist. In other words, greater *defense dominance* in military technology favors peace in this class of models. With defense dominance, small armies are better able to hold off larger armies, which makes "break out" less likely to succeed. Third, and most obviously, the greater the costs of war (smaller β), the more likely peace will be possible and the lower are efficient arms levels in peace.[12]

2.3 Two democracies

We now consider the interaction between two democracies. For a peaceful MPE the analog of condition (1) above is, for $i = 1, 2, j \neq i$,

$$u(1 - \lambda a_i) \geq p(\lambda, \lambda a_j)u(\beta) + p(\lambda, \lambda a_j)u(\beta) = u(\beta). \tag{3}$$

It is immediate that between two democracies so modelled there will always be a peaceful

[10]For there to be non Markov strategies that support a peaceful equilibrium when this is not possible with Markov strategies, it would have to be that there is a worse "threat point" than war, but this is not the case. The functional forms and parameters for Figure 1 are $u(x) = x^\rho$ and $p(x, y) = x/(x + y)$, with $\lambda = .25$, and $\beta = .8$. In Figure 1a $\rho = .3$ and in 1b $\rho = .5$.

[11]An alternative approach would assume that ruler's preferences are linear in income, but that the costs of tax collection are increasing in tax rates due to incentive effects. This would also generate concavity of the left-hand side of (1).

[12]With constant relative risk aversion, varying the amount the kings can expropriate from society (λ) has no effect – increasing λ makes successful war more profitable, but peace is also worth more. However, with increasing relative risk aversion, greater productivity or tax capacity would imply a lower risk of war and lower shares of income spent on arms during peace.

equilibrium in which neither state spends anything on arms. Substituting $a_1 = a_2 = 0$ into (3) implies $u(1) \geq u(\beta)$, which is always true since war is costly.

The logic is as follows. If citizens in a democracy have no reason to fear invasion by another country, then they have nothing gain by taking it over if they are normatively committed to apply the same laws to others as they do to themselves. If they will not rule conquered people as subjects from whom they can extract income, then there is no offensive or "greed" based reason to go to war, especially given that war is costly. Nor can there be any defensive reason to go to war – that is, to attack to eliminate a dangerous adversary who is making you spend money on arms – if the other side also has no offensive reason to attack you.

Besides the Kantian-style assumption about extending the same laws to others as one has for oneself, there are assumptions about tax policy and income equality that are important to this conclusion that should be noted. In the model above, both states are the same size and have equally productive economies. Suppose instead that one democracy is poorer than the other, and that redistribution of income among citizens is possible through a linear tax rate set by the median voter. Then the poorer democracy could have an incentive to attack the richer one, since by winning it could form a new state with a larger tax base that could used to improve the situation of the poor state's citizens (cf. Bolton and Roland 1997). It would better for both states to bargain to a federation with multiple tax rates, or a transfer scheme (foreign aid) from the rich state to the poor state, although of course these arrangements could face the same commitment-problem obstacles that peacefully federating two kingdoms would. So this line of argument suggests that wars of territorial conquest between rich and poor democracies would be more likely than wars between democracies at similar levels of income.

2.4 An autocracy and a democracy

Suppose state 1 is an autocracy and state 2 is a democracy. Then the relevant conditions for a peaceful MPE are

$$
\begin{aligned}
u(\lambda(1-a_1)) &\geq p(\lambda, \lambda a_2)u(2\beta\lambda) \qquad (4)\\
u(1-\lambda a_2) &\geq p(\lambda, \lambda a_1)u(\beta) + (1-p(\lambda, \lambda a_1))u(\beta(1-\lambda)) \qquad (5)
\end{aligned}
$$

As before, a completely unarmed peace is possible if and only if $\beta \leq 1/2$; otherwise the autocracy would want to arm and attack if the democracy was defenseless. Now, however, it can happen that there is a peaceful equilibrium in which the democracy arms to deter attack by the autocracy, while the autocracy spends nothing on arms – the democracy won't attack because the costs of war outweigh the gains of reducing its future defense burden. This configuration of a peaceful MPE with $a_1^* = 0$ and $a_2^* > 0$ obtains when the a_2 large enough that the autocracy does not want to attack, namely a_2 such that

$$u(\lambda) = p(\lambda, \lambda a_2)u(2\beta\lambda)$$

also implies that $u(1-\lambda a_2) \geq u(\beta)$, and thus $\lambda a_2 \leq 1-\beta$, which is to say that the defense burden from peace is less than the costs of war for the democracy. Defense dominance, higher costs of war, and a lower state revenue capacity clearly favor this outcome.

As with the case of two autocracies, there can also be parameter values such that war is the only subgame perfect outcome, and values such that peace with mutual deterrence is possible. The interesting question for our purposes is whether the parameter conditions that support peace are more or less permissive between two autocracies than in a mixed dyad. Given that democracies in this model have no "greed" motive for war, one might have thought that if parameters are such that peace is possible between two autocracies, then changing one of them to a democracy (but changing nothing else) would not make peace impossible. Proposition 2, which states in general terms the counterexamples to be illustrated in Figure 2, asserts that this is not so.

Proposition 2. There exist (generic) sets of military technologies $p(\cdot,\cdot)$, costs of war $1-\beta$, maximum tax rates λ, and preferences over income $u(\cdot)$ such that peace can be possible in equilibrium between autocracies but not between a democracy and autocracy, and vice versa.

Proposition 2 is proved by examples. Figure 2 graphs the functions $a_i(a_j)$ such that if state j has force level a_j, then the best state i can do by "breaking out" gives the same payoff as if i lives at peace choosing $a_i(a_j)$ in each period. The higher a_j, the lower the value of break out and war, and thus the higher the annual cost of arms i would be willing to tolerate rather than fight.

For the case of two autocracies, these curves come from solving, respectively,

$$\begin{aligned} u(\lambda(1-a_1)) &= p(\lambda, \lambda a_2)u(2\beta\lambda) \\ u(\lambda(1-a_2)) &= p(\lambda, \lambda a_1)u(2\beta\lambda) \end{aligned}$$

for $a_1(a_2)$ and $a_2(a_1)$. For an autocracy and a democracy, they come from solving (4) and (5) above (as equalities).

The curves are illustrated for the case of two autocracies by the red and black lines in Figure 2a. State 1 would be willing to live with combinations of forces levels above the black line rather than attack, as would state 2 for combinations below the red line. Thus, as discussed by Powell (1993), points in the "lens" between the black and red lines are force levels such that if each side is expected to choose this level on the equilibrium path, neither state can do better by breaking out and going to war. Powell (and Proposition 1 in the appendix) show that the unique efficient MPE is at the lower tip of the lens, if a lens exists. If no lens exists, then there is no peaceful MPE and war is the unique equilibrium outcome.

Figure 2a graphs the case of $u(x) = x^\rho$, $\rho = .27$, $\lambda = .3$, $\beta = .99$, and $p(x, y) = x/(x + y)$. In this case there is a peaceful equilibrium when both states are autocracies, with the states each spending about 38% of tax income on defense. However, with the same parameter values peace between a democracy and an autocracy is impossible – there is no combination of force levels such that both states prefer peace at these levels to breaking out and trying war.

In Figure 2b, the parameter values are the same except that $\rho = .32$ (slightly less risk aversion) and $\beta = .95$ (greater costs of war). In this case, we see that peace can be sustained between a democracy and an autocracy (there is a "lens" between the black and green lines), but not between two autocracies. The democracy and autocracy can deter each other from war by spending about

28% and 12% of government revenues, respectively, on arms.

How is that that mixed democratic-nondemocratic dyads can be more war-prone than autocratic dyads in this model? This result comes from autocrats effectively having more at stake from a war for territorial control that might eliminate their rule. They have a lot of tax revenue to gain from winning, but a lot to lose from losing. Risk aversion thus lowers the value of the war lottery more for an autocrat than for a citizen in a democracy, who gets a somewhat lower long-run tax burden if war is won and a somewhat higher one if war is lost. When the expected costs of war are small enough, this risk aversion affect can make a democracy harder for an autocracy to deter than another autocracy, potentially making war the only feasible outcome.

To sum up the results on how regime type influences whether there exists a peaceful equilibrium: In the model, two democracies can always maintain peace at zero arms levels, because they have nothing to gain from territorial conquest if each state would treat the inhabitants of captured territory as citizens of the new, larger state. By contrast, peace may be impossible to sustain between two autocracies or between a democracy and an autocracy, because the amount of arms needed to deter attack by the other may make an armed peace less attractive than the lottery of war. Democracies can have an incentive to attack autocracies not to take territory but to reduce the cost of defense in the future. In general, in mixed or autocratic dyads, peace is harder to sustain (and equilibrium arms levels higher in the event of peace), the smaller the costs of fighting; the more sensitive the military technology is to small changes in arms levels away from parity ("offense dominance"); and the less risk-averse rulers or citizens are about gains and losses of income.

As is well known, jointly democratic interstate dyads have had lower rates of international conflict than other interstate dyads (the "democratic peace"). It is less clear if there is a significant difference between the rates of conflict in mixed dyads versus autocratic dyads. This is not inconsistent with the results just described, since as illustrated by Figure 2a there are sets of parameters such that war occurs in mixed dyads but not autocratic dyads. However, at least for specific functional forms like those used in these examples, my impression is that if one selected parameter values at random with all sets equally likely, one would have much more conflict outcomes in autocratic dyads than in mixed dyads. The reason is that for war to be the only equilibrium outcome in a mixed dyad, the ratio of the costs of war to the maximum tax rate ($(1-\beta)/\lambda$) must be quite small. If it is not, then war can't be worthwhile for the democracy since the future savings on arms can't justify the costs of war. So this is arguably inconsistent with the amount of aggression we observe empirically between democracies and autocracies.

3 Variations

3.1 Colonialist democracies

The "Great Debate" over U.S. foreign policy in the late 19th century pitted "imperialists" against "anti-imperialists," arguing over whether and how the U.S. should undertake to become a colonial power. One of the central anti-imperialist arguments held that making others subjects was simply inconsistent with U.S. principles of government enshrined in the Constitution and the Declaration of Independence. As Carl Shurz put it in 1893,

> According to the spirit of our constitutional system, foreign territory should be acquired only with a view to its admission, at no very distant day, into this Union as one or more States on an equal footing with the other States. The population inhabiting such territory ... would have to be endowed with certain rights and powers and the United States would have to undertake certain obligations with regard to them. ... This republic would admit them as equal members to its national household, ... [13]

Anti-imperialists argued further that becoming an empire (with subjects) abroad would undermine liberty and democracy at home.

Imperialists countered with claims of strategic necessity, commercial advantage, and "white man's burden." Nonetheless, imperialists generally accepted, at least for rhetorical purposes, that taking colonies had to be justified in terms of advancing the welfare of the "natives" and their eventual assumption of self-government, inside or outside the U.S. system. Some tried to draw

[13] From his "Manifest Destiny," *Harper's New Monthly Magazine*, 87 (October 1893), reprinted in Welch, Jr. (1972).

a distinction between "two opposing colonial systems: (1) the Continental European ... acquiring colonies for the exclusive benefit of the home governments," and "(2) the Anglo-American," "where colonies are encouraged to establish local self-government" and "thrown open to unrestricted trade."[14] Thus, even the imperialist arguments in the U.S. showed a discomfort with the idea of a democracy ruling over non-citizens, especially if for the express purpose of extracting rents. While the imperialist position won some victories (with the acquisition of the Philippines, Hawaii, and Puerto Rico), the U.S. never pursued a colonial empire in the manner of the British or continental European states, surely in part due to the opposition of the anti-imperialists.

Today it is even harder to imagine an established democracy proposing to acquire and formally incorporate new territory by force and to rule over the inhabitants as subjects without political rights, for the sake of extracting rents. However, some might argue that U.S. policy in Iraq has amounted to a paler, informal version of the same thing. And certainly in the colonial era there was a notion that the home country could benefit economically from colonies. So we should consider what happens in the model with "colonialist" democracies who would act as autocrats in territory acquired by war.

The relevant condition for a colonialist democracy to prefer peace at a_i to attacking an autocracy or another colonialist democracy armed at level a_j is

$$u(1-\lambda a_i) \geq p(\lambda, \lambda a_j)u(\beta(1+\lambda)) + (1-p(\lambda, \lambda a_j))u(\beta(1-\lambda)).$$

The same condition when the adversary is a full democracy is

$$u(1-\lambda a_i) \geq p(\lambda, \lambda a_j)u(\beta(1+\lambda)) + (1-p(\lambda, \lambda a_j))u(\beta).$$

Each of these is the same as the parallel condition for a full democracy, except that the first term on the right-hand side is larger, because the value for winning a war is now $u(\beta(1+\lambda))$ rather than $u(\beta)$. This implies that for any given a_j, the set of a_i such that a colonialist democracy would prefer to live at peace given a_j is at least as small or smaller than would be the case for a full

[14] John Procter, "Isolation or Imperialism," *Forum* 26 (September 1898), reprinted in Welch, Jr. (1972).

democracy. Moreover, it is apparent that if $\beta(1+\lambda) > 1$ we cannot support an efficient peaceful equilibrium between two colonialist democracies, since then each would want to take over the other if it could do so with certainty. In consequence we have

Proposition 3. Let the set of regime types be denoted $\{A, C, D\}$, where these refer to autocracy, colonialist democracy, and full democracy. The conditions for a peaceful MPE are more restrictive for CA dyads than for DA dyads. In addition, while the efficient peaceful MPE can be supported for any admissable parameter values for a DD dyad, this is not the case for a CC dyad when $\beta(1+\lambda) > 1$.

No ordering is possible (over all parameter values) for AA dyads versus CC dyads, or for CA versus CC or AA, however. Once again, there are competing effects. On the one hand, autocrats have more to gain from winning territory relative to a colonialist democracy, because the spoils of war are divided among many in the more democratic state. But on the other hand autocrats also have more at stake to lose, so that risk aversion makes war relatively less attractive for them than for citizens in a colonialist democracy. The net effect can go either way. Greater risk aversion (diminishing value for additional income) tends to make peace easier to sustain between two autocracies than between two colonialist democracies; greater costs of war tends to favor the reverse.

3.2 Different-sized states

To this point we have assumed equal-sized states, the better to focus on regime type. Dropping this assumption allows us to ask how equilibrium defense spending varies with the relative size of the two states in the dyad. The comparative statics again show competing effects, and unfortunately no clear tendency. It is still useful to understand the nature of the competing effects.

Consider the case of two autocracies (the same results obtain for two colonialist democracies). Let the total size of *both* states be normalized to 1, and let the size of state 1 be $s \in (0, 1)$. Finally, assume constant relative risk aversion over income, so that $u(x) = x^\rho$. Writing the usual conditions and simplifying we have that if a peaceful MPE exists, its force levels (a_1, a_2) must satisfy

$$
\begin{aligned}
s(1-a_1) &= \beta p(s\lambda,(1-s)\lambda a_2)^{\frac{1}{\rho}} \\
(1-s)(1-a_2) &= \beta p((1-s)\lambda, s\lambda a_1)^{\frac{1}{\rho}}.
\end{aligned}
$$

Dividing the first by the second and rearranging we have

$$
\frac{1-a_1}{1-a_2} = \frac{1-s}{s}\left[\frac{p(s\lambda,(1-s)\lambda a_2)}{p((1-s)\lambda, s\lambda a_1)}\right]^{\frac{1}{\rho}}.
$$

The equilibrium force levels a_1 and a_2 must adjust to preserve this equality as we vary s away from one half. But notice that increasing s, state 1's size, has two effects. For given (a_1, a_2), it makes the right-hand side smaller through the first term, but larger by increasing the ratio in brackets. If only the first effect existed, then equilibrium would be restored by increasing a_1 relative to a_2 – that is, making state 1 bigger would increase state 1's defense burden relative to the smaller 2's! By contrast, if only the second effect existed, then equilibrium would be restored by reducing state 1's defense ratio relative to state 2's. (Recall that a_i is share of tax revenue spent on arms.)

What is the intuition for these competing effects? They correspond to:

1. Increasing state 1's size relative to state 2 makes state 1 a more attractive target for state 2 because the benefits of conquest are greater, and it has less to lose. Thus, the more valuable target may need to spend more on defense to deter aggression by the smaller state.

2. But on the other hand, making state 1 larger relative to state 2 makes "break out" and war less attractive for state 2, since it cannot get as high a probability of victory by going all out against the larger state for any given a_1. This can limit state 1's need to spend on arms to deter attack, and so at the same time limit state 2's need to spend on arms.

These effects work against each other, and either one can dominate depending on the offense-defense balance, the costs of war, and the degree of risk aversion over income/territory. Figure 3 illustrates for the specific military function $p(x,y) = x^m/(x^m + y^m)$, where $m > 0$ parameterizes the offense-defense balance. Higher values of m make the probability of winning more sensitive to an increase in one side's arms from a position of equality.

In the first two examples (3a and b), as state 1's share of total resources increases, it spends a smaller share on arms, although the total size of its army grows and then declines.[15] In this case, then, the second effect dominates. In the third example, which has greater defense dominance, less risk aversion, and greater war costs, state 1's defense burden actually increases as it becomes larger than state 2. Here the first effect – needing to spend more to deter an adversary who has more to gain from war and less to lose – dominates. Note that in the third example, if the "balance of power" (in terms of resources) is sufficiently lop-sided, then there is no peaceful equilibrium. Instead, state 1 prefers just to eliminate the smaller state 2 rather than deter war (its probability of winning will be about .81 = $\sqrt{.95}/(\sqrt{.95}+\sqrt{.05})$.[16]

Another thing to observe about these examples is that the larger state always has a larger military in equilibrium, even though its defense ratio might be larger or smaller than the smaller state's.[17]

3.3 Incomplete information, arms levels, and the risk of war

In the models considered above, the rationale for a state to go to war is to eliminate an adversary who is forcing the state to spend money on deterrence and, in the case of autocracies or colonialist democracies, possibly to gain new territory and rents in the process.

The idea that war might occur between states because their defense burden is too high is not common in the vast literature on causes of war. Some arguments about how arms races can lead to war can be interpreted in this way, and some empirical examples can be adduced. For instance, an important rationale for the recent war against Saddam Hussein's Iraq was the idea that war would

[15] The figures use sa_1 and $(1-s)a_2$ as measures of total army size. Actual army sizes are these quantities times l, the share of national income appropriated by taxes.

[16] The parameters for Figure 3 are: (a) $m=1$, $\rho=.3$, $\beta=.8$; (b) $m=1$, $\rho=.3$, $\beta=.9$; and (c) $m=.5$, $\rho=.5$, $\beta=.7$.

[17] At this point I am not sure if this is a general feature.

be cheaper and more effective than the deterrence regime that appeared to be the only alternative due to the impending disintegration of the sanctions regime. Still, most accounts of how wars start stress conflicts over issues, often territorial, and a bargaining process in which one or both sides eventually choose to abandon diplomacy for force.

The main conclusions of the analysis above continue to hold when we allow for issue conflicts and the possibility of war from bargaining failure rather than, purely, the mechanism in the Powell model. The intuition is straightforward. Suppose two states are in conflict over some issue, and there is uncertainty about what each would be willing to accept in a deal rather than use force. Offers in negotiations can then imply a "risk-return tradeoff" (Powell 2000), wherein bigger demands get a state more if they are accepted but also run a higher risk of costly conflict. The level of war risk a state is willing to run depends on how it evaluates the costs and benefits of war versus the value of the status quo. Thus, if the requirements of peacetime deterrence are more demanding and expensive, then in issue conflicts states will be willing to make more aggressive offers and run higher risks of war.

Formalizing this intuition is not so straightforward, however, because we have to introduce a separate issue and some kind of private information affecting values for war or peace. The model that follows is intentionally rendered as minimally as possible in order to spell out the mechanism.

We consider two states, i and j, interacting in two periods. In the second period, the sequence of actions and preferences are as follows.

1. States i and j simultaneously choose arms levels $a_i \in [0, 1]$ and then consume what they do not spend on arms, $1 - a_i$.

2. One of the two states, say i, is randomly chosen to make a take-it-or-leave-it offer on an issue of mutual concern that has value $\gamma > 0$ to both states. State i's offer is $y_i \in [0, 1]$, which is the share of γ that i is demanding, leaving $\gamma(1 - y_i)$ for state j.

3. If state j says Yes, then i gets $1 - a_i + \gamma y_i$, and state j gets $1 - a_j + \gamma(1 - y_i)$. If state j says No, then they fight, with payoffs of $1 - a_i + \gamma\beta p(a_i, a_j)$ for state i and $1 - a_j + \gamma\beta p(a_j, a_i)$ for

state j. The function $p(a_i, a_j)$ is the probability of winning full control of the issue by force for state i when arms levels are a_i and a_j. $1 - \beta \in (0,1)$ again indexes the cost of conflict.

The first period of the game is nearly identical. The states begin by simultaneously choosing arms levels a_i^0 and a_j^0 and consuming what remains. Then one of the two states, say i, is randomly put in a position to make a take-it-or-leave-it offer x_i to state j on a first-period issue. Now, however, whereas the value of the first-period issue to state i is $\gamma > 0$, we assume that the value for state j, γ_j, is either low or high, $\underline{\gamma}$ or $\bar{\gamma}$, where $\underline{\gamma} < \bar{\gamma}$. State j knows γ_j while state i does not; it is commonly known that the prior probability that $\gamma_j = \underline{\gamma}$ is $\alpha \in (0,1)$.

If state j agrees to i's first period offer x_i, then the first-period payoffs are $1 - a_i^0 + \gamma x_i$ for state i and $1 - a_j^0 + \gamma_j(1 - x_i)$ for state j. If state j says No, a war occurs in which the loser is eliminated and winner takes control of all territory (resources) and control of the issues as well. Thus expected payoffs for conflict in the first period are $1 - a_i^0 + p(a_i^0, a_j^0)2\beta(1+\gamma)$ for state i and $1 - a_j^0 + p(a_j^0, a_i^0)\beta(\gamma_j + 2 + \gamma)$ for state j. Note that the payoffs for winning a first-period war include getting one's preferred issue resolution in both periods, and the value of both states' resources (2) in the second period, all discounted by the costs of conflict (β). Implicit here is that if one state defeats the other at war in the first period, it doesn't have to spend anything on arms in the second period.[18]

In the second period, the state receiving the offer prefers to remain at peace if the offer y_i is such that $\gamma(1 - y_i) \geq p(a_j, a_i)\gamma\beta$. Since war is inefficient, state i's best offer is then $y_i^* = 1 - p(a_j, a_i)\beta$. Thus, when the two states are choosing force levels, their expected payoffs for period two are given by

$$u(a_i, a_j) = 1 - a_i + \frac{1}{2}\gamma\left(y_i^* + 1 - y_j^*\right) = 1 - a_i + \frac{1}{2}\gamma\left[1 + \beta(p(a_i, a_j) - p(a_j, a_i))\right].$$

Spending more on arms reduces consumption but increases a state's expected gain in the

[18] I have also assumed that both states value the second period issue at a commonly known γ rather than γ_j for the state receiving the offer. This is purely for convenience.

bargaining on a disputed issue. State i's first-order condition for the optimal choice of a_i is $1 = \gamma\beta(p_1(a_i, a_j) - p_2(a_j, a_i))/2$. Symmetry implies that in equilibrium $a^* = a_i^* = a_j^*$, and so that the expected payoff for both states in the second period is $1 - a^* + \gamma/2$, where a^* solves the first-order condition.[19]

This two-period game exhibits a simple version of the same dilemma that can make for war in the infinite horizon game considered above. War in the first period can eliminate one's adversary, and so reduce the amount a state needs to spend in the future on arms for bargaining leverage. When the cost savings from arms are greater than the expected losses due to war, war is the outcome even though it is inefficient – if the states could commit to zero or lower arms level in the second period, there would be no need to fight in the first.

Formally, consider the complete information version of the game in which state j's value for the issue in period 1 is known to be $\gamma_j = \gamma$. Then there is no issue resolution in the first period such that both states prefer peace to war if the total surplus from peace is smaller than the surplus from war, namely, $2\gamma + 2(1 - a^*) < 2\beta(1 + \gamma)$, which simplifies to $(1 - \beta)(1 + \gamma) < a^*$. In words, both states prefer to fight in the first period if the cost of arming for bargaining leverage in the second period is greater than costs of fighting in the first period.

But our main concern here is to examine what happens if this is *not* the case, and there are, in principle, first-period deals that both sides prefer to conflict. So we will suppose that the relevant condition is satisfied for the "tougher" type of state j, so that if it were known that $\gamma_j = \underline{\gamma}$, there would be an offer x_i in the first period that both sides would prefer to war.

Proposition 4. In the incomplete information game, let $\hat{\alpha}$ be the smallest initial belief that state j is the "tough" type ($\gamma_j = \underline{\gamma}$) such that there exists a pooling equilibrium in which state i makes a first period offer that both types would accept. Then $\hat{\alpha}$ is increasing in (a) changes in the military technology $p(\cdot, \cdot)$ that increase the second-period arms burden (greater offense dominance); and (b) reductions in the cost of war, which also increase the second period arms burden. Increasing the value of the second period issue γ relative to consumption may increase or decrease $\hat{\alpha}$, although

[19] In the case of the simple ratio form $p(a_i, a_j) = a_i/(a_i + a_j)$, $a^* = \sqrt{\gamma\beta}/2$ if this is less than 1, and 1 otherwise.

this always increases second period arms a^*.

The proof for Proposition 4 is given in the Appendix. In words, the results are that for any given distribution of initial beliefs about state j's value for the issue at stake, a separating equilibrium and thus war is more likely when the costs of war are lower and when the military technology is more sensitive to changes in the balance of forces. These effects work in large part through their effect on the equilibrium level of armament in the second period. Other things equal, the higher the arms burden associated with peace, the greater is state i's temptation to risk war to get a better deal on the first-period issue.

The one partial exception concerns the value of the issues versus consumption – a higher valuation on the issues unambiguously increases the second period arms burden, but can nonetheless be associated with a lower risk of war from bargaining failure. This comparative static depends on my assumption that the costs of war are proportional to the size of the economy and the value for the issues at stake. If we instead assume fixed costs for war, raising the value placed on the stakes relative to consumption will unambiguously increase the risk of war while increasing the second-period arms burden. With proportional costs, increasing the stakes also increases expected war costs relative to arming costs, which can work against the effect through arms levels.

4 Conclusions

If the citizens and leadership of a democracy would view it as unacceptable to rule over the inhabitants of conquered territory as subjects to be taxed or otherwise exploited, then such a democracy would have little economic reason to undertake an offensive or "greed-driven" war. But if the democracy has to protect itself from exploitation by arming to deter autocratic neighbors, then it can have a reason for "liberal imperialism" – wars for democratic regime change – to reduce the international threat and so reduce the need for defense spending. These observations could help explain the empirical pattern of infrequent military conflict among democracies, and much more frequent conflict among autocratic and mixed democratic-autocratic dyads.

Why and when would democracies want to adopt a universalist commitment to treat the inhabitants of land taken in war as political equals? On one view, such a commitment is entailed by the idea of democracy, which means "rule by the people." If so, then a state that deprives a significant part of its population of the right to vote is by definition not a democracy. By this standard South Africa under apartheid would not be considered a democracy. But neither would the U.S. before 1865 and arguably not until women gained the suffrage. Nor would Britain or France while they held colonies, well into the 1960s.

Alternatively, one might define democracy more in terms of the institutions and procedures for selecting rulers, in which case the U.S. and Britain may be viewed as democratic in the 19th century, though perhaps also South Africa under apartheid.[20] In this view, a commitment to treat the inhabitants of conquered territory as political equals is not a necessary implication of the idea of political democracy. If this is how we understand the concept, then we can imagine, hypothetically, a world in which the reigning ideology is "Democracy for us, slavery for everyone else!" Even without the analysis above, it is difficult to imagine that there would be a robust "democratic peace" in such a world (although perhaps other proposed institutional or normative explanations for the democratic peace would have some impact).

Some states with democratic institutions practiced colonialism that denied political rights to colonial subjects. And at least at first, empire by these states was justified in part by the belief that great material benefits could be extracted. But formal empire always sat uncomfortably with the universalist, Enlightenment foundations of U.S. and French democracy, which became the models for many other countries. Perhaps the democratic peace, if it is a causal effect, is a contingent effect that depends on the broad normative commitments to political equality that have developed

[20]The Polity project seems ambivalent on this issue (Marshall and Jaggers 2007). The U.S. is coded as highly democratic throughout the 19th century and maximally democratic from 1871 on. But South Africa is coded as weakly democratic or nondemocratic (polity2 = 4) until 1990. The United Kingdom is coded as maximally democratic from 1922, which suggests Irish independence may have counted for something with the Polity coders, but not the rest of the Empire? Similarly, Doyle (1983) views the U.S. as a liberal democracy from its inception, but excludes South Africa; he says he required at least 30% adult male suffrage, and that female suffrage be granted within ten year of being demanded. Still, he codes the United Kingdom as democratic from 1832, despite its rule over India, etc.

over time in the existing great power democracies.[21]

Beyond the core prediction about conflict rates across different sorts of dyads, a number of empirical implications can be drawn from the analysis above. In particular, the propensity for conflict in a dyad should be positively related to the arms levels of its states. This is a causal relationship – higher arms burdens effectively lower the value of the status quo and make war more attractive if war might reduce future arms levels – although the arms burdens are in turn caused by more exogenous factors like the stakes in dispute, expected costs of war, and the offense-defense balance.

Probably as a result of the Realist tradition, formal theoretical arguments about international military conflict have tended to be agnostic about the nature of the issues or stakes in dispute between states. The standard approach is to say something like "Suppose there are two states competing over some issue that is worth v to both of them." The issue might be territorial, it might concern influence over a small state, support for rebel groups, access to trade concessions, or any such thing. This approach has the appeal of yielding potentially general insights. But if domestic political institutions determine the stakes of conflict, it may be misleading. A novel feature of the main model considered here is that states' political economies determine how the benefits of war would be realized, and thus in turn arms levels and probabilities of conflict.

5 Appendix

Proposition 1. In a peaceful MPE, expression (1) must be satisfied with equality for both states, and both states choose the same force level in every period.

Proof. Suppose expression 1 is not satisfied with equality for both states in a peaceful MPE. Then one state could reduce its spending in a period without making the other prefer to break out

[21] Although it is clear that there is an association in the historical data, it is not clear that the democratic peace is caused by democracy. If joint democracy caused dyadic peace, then we would surely expect to see dyads that transition to joint democracy becoming more peaceful than they had been before. But this pattern does not appear in the post-1945 data, and it is fragile in the data going back to the 19th century. See for example the discussion of fixed effects in Green, Kim and Yoon (2001) and Oneal and Russett (2001).

and attack in the next, since in an MPE the deviation can signal nothing about future play. Next, if (1) holds for both states, then it cannot be that $a_i > a_j$ because then $u(\lambda(1-a_i)) < u(\lambda(1-a_j))$ but

$$u(\lambda(1-a_i)) = p(\lambda, \lambda a_j)u(2\beta\lambda) > p(\lambda, \lambda a_i)u(2\beta\lambda) = u(\lambda(1-a_j)).$$

Proof of Proposition 4. State i's best pooling offer is the x_i such that the tough type is just willing to accept, defined as the x_i^p that satisfies

$$\underline{\gamma}(1-x_i^p) + 1 - a^* + \gamma/2 = p^j\beta(\underline{\gamma} + 2 + \gamma), \tag{6}$$

where $p^j = p(a_j^0, a_i^0)$. In this case state i's payoff from this point forward is $\gamma x_i^p + 1 - a^* + \gamma/2$.

State i's best separating offer is the x_i such that the weak type is just willing to accept, defined as x_i^s that satisfies equation (6) except substituting $\bar{\gamma}$ for $\underline{\gamma}$ and x_i^s for x_i^p. State i's payoff in this case is

$$\alpha p^i 2\beta(1+\gamma) + (1-\alpha)(\gamma x_i^s + 1 - a^* + \gamma/2), \tag{7}$$

where $p^i = p(a_i^0, a_j^0)$. Comparing i's payoffs for separating and pooling plus algebra gives us the following expression for the threshold value $\hat{\alpha}$ such that pooling is preferred for $\alpha \geq \hat{\alpha}$:

$$\hat{\alpha} = \frac{\gamma(x_i^s - x_i^p)}{\gamma x_i^s + 1 - a^* + \gamma/2 - p^i 2\beta(1+\gamma)}. \tag{8}$$

By subtracting the equation defining x_i^p from the equation defining x_i^s, we can obtain that

$$x_i^s - x_i^p = \left(\frac{1}{\underline{\gamma}} - \frac{1}{\bar{\gamma}}\right)(p^j\beta(2+\gamma) - \gamma/2 - (1-a^*)). \tag{9}$$

Now consider how $\hat{\alpha}$ changes as we change the military technology $p(\cdot,\cdot)$. Since there is ex ante symmetry in the payoff functions at the time of the first-period arms decisions, whatever the equilibrium levels of a_i^0 and a_j^0 we have $a_i^0 = a_j^0$ and thus $p^i = p^j = .5$. Thus variation in the offense-defense balance – the slope of $p(\cdot,\cdot)$ when states have roughly equal arms – affects $\hat{\alpha}$ only through the effect on the second-period arms burden a^*. Greater sensitivity to small changes in force levels makes for higher a^*, and thus a higher threshold value $\hat{\alpha}$.

Lowering the costs of war (higher β) increases $\hat{\alpha}$ both by making a first period conflict directly more attractive, and indirectly by raising the expected arms burden in the future.

Increasing γ, the value of the second-period issue, can decrease the difference between the separating and pooling offers if $da^*/d\gamma < 1/2 - p\beta$. It can also increase the separating offer x_i^s if the same condition holds. So it is possible for separating, and thus a risk of war, to become less attractive as γ increases, which also increases a^*.

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Figure 1a. Peaceful equilibrium at a^*

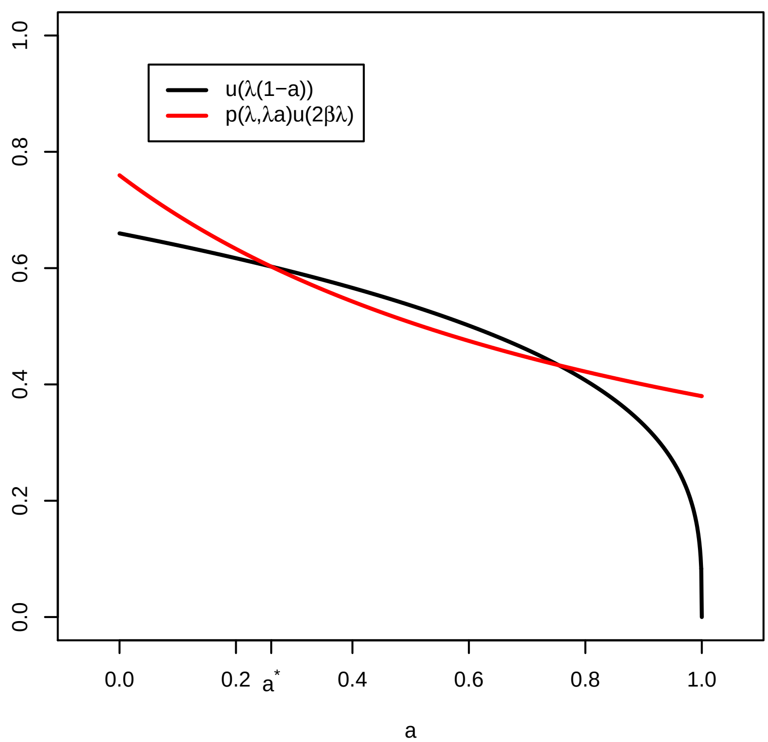

Figure 1b. No peaceful equilibrium

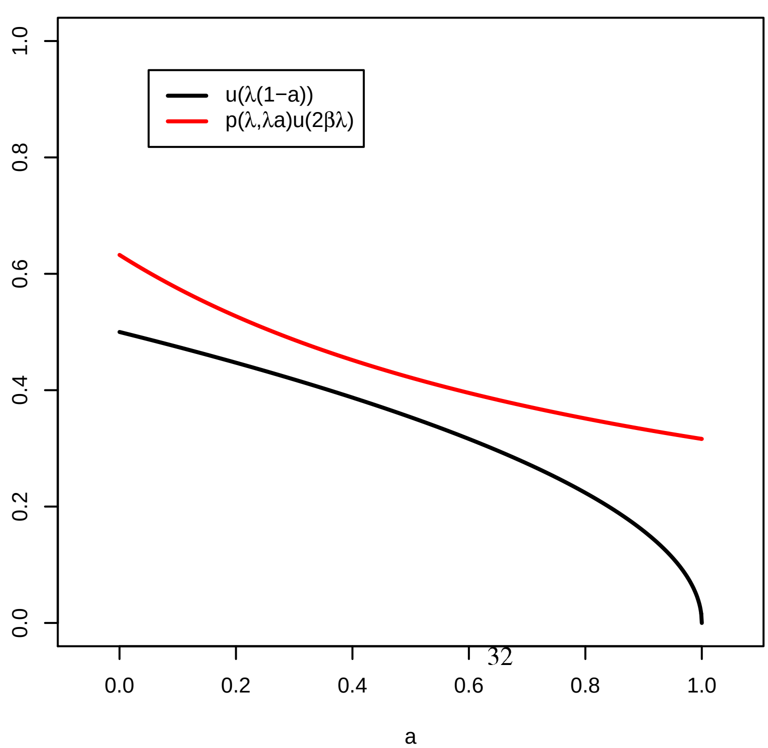

Figure 2a. Peace between autocracies, war in mixed dyad

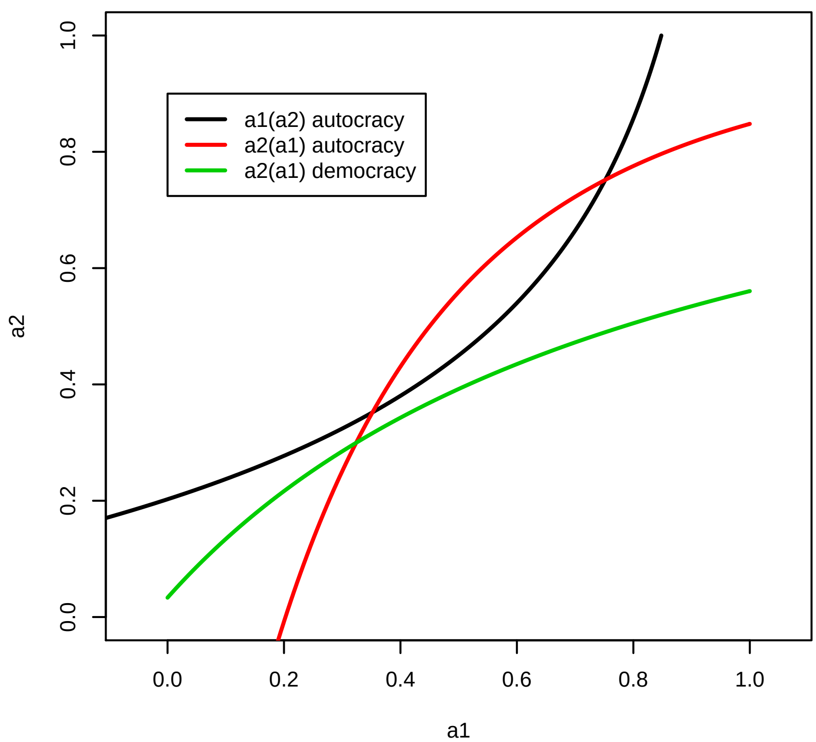

Figure 2b. Peace in mixed dyad, war between autocracies

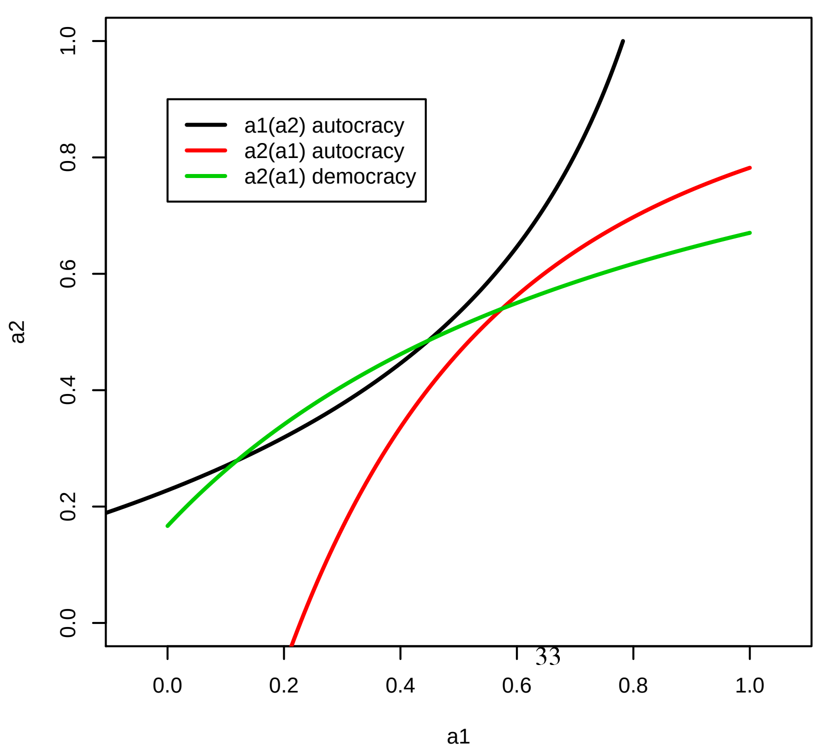

Figure 3a: Relative off. dominance, risk aversion, high war costs

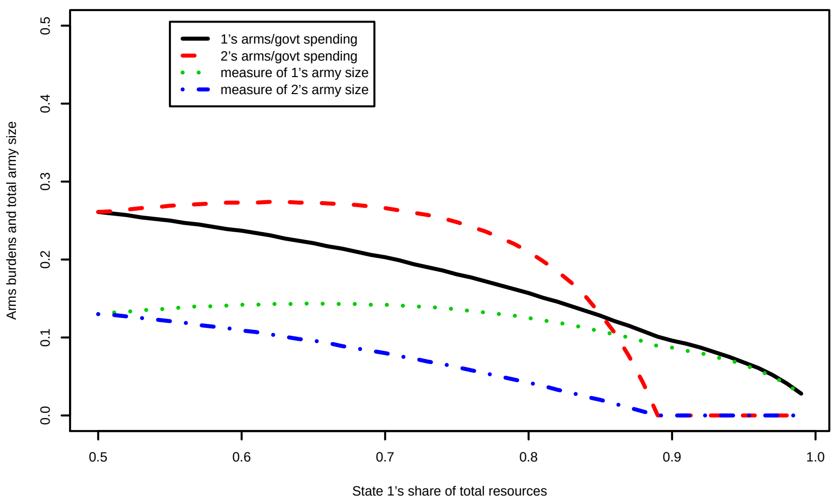

Figure 3b: Relative off. dominance, risk aversion, low war costs

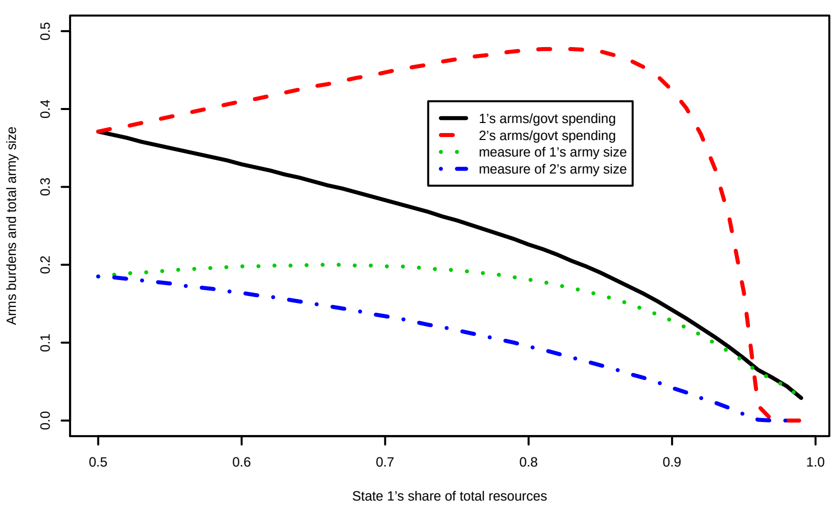

Figure 3c: Relative def. dominance, less risk aversion, high war costs