

Peaceful Territorial Transfers & Third Party Conflict*

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Abstract

This paper examines the relationship between peaceful territorial transfers and the risk of conflict with third party states. A model is analyzed that shows how peaceful land transfers can create a bargaining problem with a third party that is interested but uninvolved in the exchange of the land. This happens in many cases because the state receiving the land is also imparted with a significant increase in their bargaining leverage with the third party. Historical data on peaceful territorial exchanges is brought to bear on hypotheses developed from the theoretical model, and the empirical results are remarkably strong and illustrate third party conflict is an important and unintended consequence of peaceful territorial change.

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How does an exchange of land affect the prospect for peace? Scholars have long acknowledged that territorial disputes and the territorial nature of humans are at the root of many violent conflicts, both at the international and intra-state levels (Vasquez 1993, Vasquez & Henehan 2001, Buhaug & Gates 2002, Huth & Allee 2002, Huth 2009). From the perspective of the bargaining theory of war, a disagreement over territory is particularly difficult to resolve peacefully, because bargaining over land can often become bargaining over bargaining power itself and cause a bargaining problem (Fearon 1996, Powell 2006). That is, if one side makes a land transfer to one's opponent to appease her today, the opponent will be able to use the gained territory as a source of military power, which will then be translated into increased bargaining power and she will demand more in the future. The opponent might promise today not to take advantage of the land loser in the future, but such a bargaining is not credible. Moreover, the states may not be able to accurately judge how a exchange of land will affect the balance of power. Because of these bargaining problems, the argument goes, negotiations over territory easily breaks down in conflict (Reed & Chiba 2010).

However, Fearon (1996) demonstrates that the disputants should be able to arrange land transfers such that they can avoid bargaining problems even when the land can be a source of bargaining power in the future. In line with Fearon's (1996) theoretical conjecture, recent empirical work by Gibler and Tir (2010) provides convincing evidence for a relationship between the peaceful resolution of territorial claims through land transfers and a decrease in the likelihood of future militarized conflict.¹ Specifically, when two states with a claim to territory reach an agreement that involves a peaceful transfer of land, the likelihood of future conflict between the states agreeing to the transfer of territory is significantly lower than prior to the peaceful exchange. Gibler and Tir (2010) argue that peaceful land transfers limit the incentives for states to fight, because these exchanges lead to demilitarization and as a consequence less conflict. This path to a lasting peace through

¹ Huth & Prorok (2012) and Schultz (2014) report similar findings, but their studies suggest that the effect of a territorial exchange on subsequent peace is moderated by its legal standing.

the resolution of territorial claims has been extended to provide a compelling explanation for the observed peace between democratic states (Gibler 2012). The argument that resolving territorial claims through a peaceful exchange of territory leads to a consolidation of democracy and a lasting peace is quite compelling and commands substantial empirical support.

Building on these important lines of research, this paper argues that there are unintended consequences of peaceful land transfers. Although an agreement to peacefully exchange land is often a precursor to a lasting peace between the two states that agree to the peaceful transfer, there may be unexpected conflict enhancing effects of the territorial exchange because a peaceful transfer of territory may raise the risk of militarized conflict with a third party. Specifically, interested third parties may find a land exchange threatening inasmuch as the transfer of territory can be expected to change the distribution of power between the states making the transfer and interested third parties. This paper shows that it is important to consider the second-order effects of land transfers to completely understand how territorial transfers can shape the risk of conflict. The peaceful exchange of land likely does resolve a nagging territorial claim and contribute to a lasting peace between the two states with stakes in the disputed territory. However, it is important to consider the effect of the transfer of territory on potentially interested third parties. A peaceful land exchange may simultaneously pacify dyadic conflict and raise the risk of regional conflict through the spillover of dyadic bargaining into the geographic neighborhood (Siverson & Starr 1991, Gleditsch 2002).

To illustrate this logic a bargaining model is developed to describe the dynamic involved in a peaceful transfer of land between two states. In this model two states agree to exchange territory. The transfer of territory between the two states with a territorial claim is peaceful and self-enforcing because the territorial settlement reflects the dyadic balance of power (Powell 1996). The model shows that peaceful transfers of land that reflect the dyadic balance of power do consolidate a long term peace between the states that

have resolved their territorial claim. However, the presence of an interested third party complicates the peaceful exchange of territory because the new distribution of land can impact the security or perceived security of the third party. When the states involved in the peaceful transfer of territory are unsure about the interests of third parties, the transfer of territory can cause militarized conflict with a third party. Interestingly, even when the states involved in the peaceful exchange of land recognize the interests of third parties and attempt to incorporate the interests of third parties into the settlement deal, conflict can break out with a third party because of the peaceful land transfer.

The paper begins with a brief review of the literature on the resolution of territorial claims and the consolidation of peace. The robust empirical patterns from this literature are juxtaposed to the bargaining literature with a focus on bargaining problems as a source of militarized conflict. Next, a triadic bargaining model is developed to illustrate how interested third parties can affect the peaceful exchange of territory and raise the risk of regional conflict. Hypotheses derived from this model are evaluated using historical data on land transfers. The empirical results support the expectations of the bargaining model, showing that immediately following peaceful territorial transfers there is a significant increase in the risk of conflict with a third party. The paper concludes with a discussion of the implications of the results and explores possible mechanisms that might be employed to manage the risk of third party conflict when there are peaceful land exchanges.

Existing Research

The distribution of territory and the resolution of territorial issues is an important predictor of lasting peace and recurring conflict between states (Starr 2005, Gibler 2012, Vasquez 1993). Vasquez (1993) argues persuasively that the desire to control land is an inherent human characteristic that is passed on to statecraft. The considerable empirical evidence on recurring conflict between states over territory is consistent with this claim and suggests

that the terms of territorial settlements and the process by which states reach a territorial settlement are important clues about the causes of war and the hope for lasting peace. The scholarly literature focuses on two paths for the resolution of territorial issues. One path is through a peaceful exchange of land.

Gibler and Tir (2010) argue convincingly that peaceful transfers of strategic territory can result in a lasting peace and the consolidation of democracy. By reaching an agreement to exchange strategic territory, states are able to resolve their territorial issues through a peaceful process that should result in a self-enforcing redistribution of land. The alternative path to the resolution of a territorial issue is through forceful persuasion that may culminate in an absolute war. Although absolute war is one way for states to resolve their territorial issues, it is unlikely that such resolution will be long-lasting or self-enforcing. While a peaceful exchange of strategic territory is likely to be reflective of the interests and military capacity of the states, a transfer of strategic territory that takes place through violence will likely only reflect the short terms interests and capabilities of the states in expectation. That is, the stronger state will usually take more than their “fair” share of the land, leaving the weaker state with a claim that will resurface sooner rather than later. This is the *most* stable outcome from a absolute war over territory. It is also possible that the weaker state “gets lucky” and wins the war. Then it is only a matter of time before the more powerful loser reasserts itself in an effort to take back its just deserts (Werner & Yuen 2005, Beardsley 2008, Beardsley 2011).

The robust empirical evidence from Gibler and Tir (2010) is very much consistent with the expectations of bargaining theory (Fearon 1995, Powell 1996). Bargaining theory also expects that a peaceful transfer of disputed land is a strong predictor of peace. A lasting peace arises following a peaceful exchange of territory because any peaceful resolution of territorial issues must reflect the distribution of power and the states’ expected costs of fighting (Fearon 1996). That is, the lasting peace that follows a peaceful transfer of territory is an equilibrium outcome. When the states revert to militarized force to resolve their ter-

territorial issues, it is likely the result of uncertainty and/or some other bargaining problem. Moreover, when force is used to exchange strategic territory from one state to another the resulting distribution of land is likely to be lopsided. The state that wins the battle over the land will take most or all of the territory and the loser will be left with little or nothing. Although such an absolute victory for one side does resolve the territorial issue in the short run, it is not likely to result in a lasting peace. When the loser recovers, they will raise the unresolved issues with the winner because the outcome of the conflict will not reflect the balance of power and costs of fighting and is, therefore, not self-enforcing (Organski & Kugler 1977, Koubi 2005).

This paper looks more closely at the strategic consequences of the peaceful transfer of strategic territory (Smith 1996, Clark 2003, Clark & Regan 2003). Although there is convincing empirical evidence and strong theoretical reasons to believe that a peaceful exchange of land will result in a lasting peace between the two states involved in the transfer, there may be unintended consequences of peaceful transfers of strategic territory. Specifically, it is possible that a peaceful exchange of strategic territory may create a dynamic bargaining problem with a third party. If the peaceful transfer of land creates a sufficiently large shift in the balance of power between the state gaining the land and an interested third party, it is possible for peaceful land transfers to attract conflict from an interested third party.

Bargaining Problems and Third Parties

The canonical bargaining model of war focuses our attention on bilateral negotiation (Fearon 1995; Powell 1996). Interested third parties, however, often shape both the outcome of bilateral negotiations, the risk of conflict expansion, and the outcome of conflict (Balch-Lindsay, Enterline & Joyce 2008, Wolford 2012, Wolford 2014, Arena & Pechenkina forthcoming). To analyze this dynamic more explicitly, imagine two states X and Y bargaining

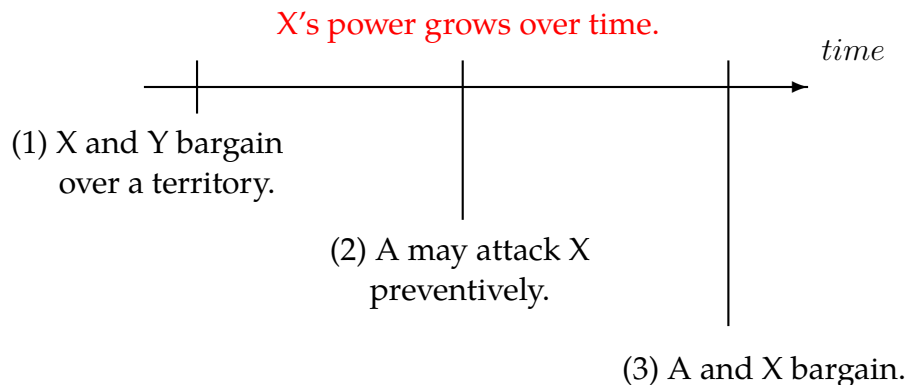


Figure 1: The timeline of the triadic interaction

over a section of strategic territory. The negotiated distribution of the land has the potential to cause a bargaining problem with a third party A . The bargaining between X and Y may cause a bargaining problem with A because a peaceful land transfer as a result of the negotiation between X and Y can cause a rapid and large shift in power between the territorial gainer (X) and A . The bargaining power will shift in the favor of X and against A due to the land exchange from Y to X through direct and indirect paths. Directly, X might be able to use the newly gained land to mobilize its troops and take advantage of A . Indirectly, a resolution of territorial disputes with Y means that X can now utilize its freed-up foreign policy resources and direct them against A . Foreseeing that X can soon consolidate its military power against A through these direct and indirect paths, state A has an incentive to preventively attack X today rather than wait and bargain with a stronger X in the future. State X might seek to promise A that X will not take advantage of A after the shift in power balance, but such a promise is not credible to A . When this expected shift in power is sufficiently large, a bargaining problem between X and A will result in a preventive war.

To formally describe this strategic setting, Figure 1 depicts the timing of moves by three strategic actors, States X , Y , and A . In stage 1 of this triadic bargaining game, States X and Y bargain over a division of land currently held by Y , worth 1 for the two states. As a result of this interaction, State X will gain a certain amount of territory $t \in [0, 1]$ from Y . At the same time that X is bargaining with Y , A and X are also interacting with one

another. Specifically, after observing the result of the X - Y interaction, A decides whether to attack X preventively or to make a demand from X on some foreign policy issues. We call A 's decision to attack X "preventive" because it is meant to cripple the expected growth of bargaining power of X vis-a-vis A due to X 's land gain from Y . In other words, we assume that the balance of power between X and A is shifting over time in favor of X and in proportion to the territorial gain, t . We will seek to identify conditions under which war breaks out in equilibrium between A and X because of the land exchange from Y to X .

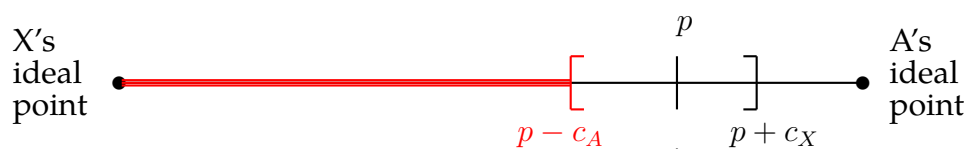
We analyze this triadic interaction in steps, solving the game for three strategic settings. The first strategic setting is a special case where there is no uncertainty and there is no relevant third party state that has an interest in how X and Y redistribute the strategic territory.² In other words, scenario one involves only the first part of Figure 1, essentially reducing this triadic interactions to a dyadic interaction between X and Y . In the second strategic setting, we still assume complete information but there is a relevant third party state, A , that cares about the redistribution of the strategic territory. The third strategic setting introduces asymmetric information by allowing A to have private information about their cost of attacking X .

Setting I: No Uncertainty & No Third Party

Scenario 1 of the game reduces to a bilateral interaction between X and Y . State X is demanding Y 's land normalized to be of size 1. State X can threaten to take the strategic territory forcibly by attacking state Y , or X can bargain with Y . If state X attacks state Y , state X takes all of the disputed land from state Y with probability q and pays costs of fighting c_X , and state Y retains all of the disputed territory via conflict with probability $1 - q$ and pays costs c_Y . Alternatively, state X can propose a distribution of the strategic territory to Y , $t \in [0, 1]$. If state Y accepts this distribution, the payoff to state X is t and

² Or, an interested third party state exists but it does not pose a credible threat of an attack against X , allowing X to ignore it.

(2) A may attack X preventively.



(3) A may wait and bargain with X.

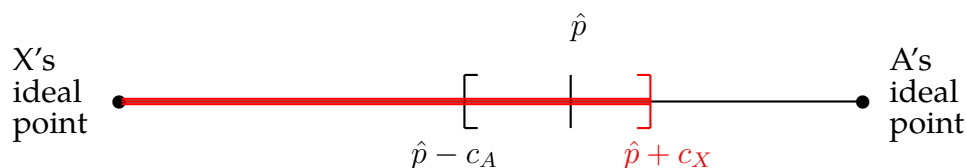


Figure 2: Bargaining range before and after a shift in power balance

The figure shows the bargaining range before (top) and after (bottom) a shift in power balance. If A attacks X before the shift in power, A will get a payoff of $p - c_A$ in expectation. If A bargains with X , the maximum A can demand from X will be $\hat{p} + c_X$.

the payoff to state Y is $1 - t$. If state Y rejects the distribution of the land, the states fight and the payoff to X and Y from fighting are the same as above (i.e., $q - c_X$ and $1 - q - c_Y$).

In equilibrium, state X offers $t^* = q + c_Y$ to make state Y indifferent between rejecting and accepting the offer, and state Y always accepts this offer. Since there is no uncertainty and no third party state A involved, X extracts as much territory as possible from Y short of a demand that would be rejected and result in conflict. This is the maximal amount of strategic territory that X can hope to obtain from Y . If X demands more, their demand will be rejected by Y resulting in costly conflict. The exchange of land, in this case, is self-enforcing and peace persevering because it reflects the actors expected values for conflict.

Setting II: No Uncertainty with a Third Party

Now consider how this dynamic changes when we introduce a relevant third party state A into the picture. At the same time that X is bargaining with Y , A and X negotiating over the division of some good worth 1 to both sides. For convenience assume that A 's and X 's ideal point on the disputed issue is 1 and 0, respectively, on a unit interval. After observing the outcome of a negotiation between X and Y (i.e., the amount of territorial transfer t),

A has an option to attack X “preventively” (i.e., before X consolidates its military power by converting the land from Y into military power) or A may bargain with X . The central dynamic is that if A forgoes the opportunity to attack X and decides to bargain, X ’s power grows in the meantime. If A preventively attacks X , the winner imposes a settlement according to their ideal point and both sides pay cost of war, c_A and c_X , respectively. Let p denote the probability that A wins in a preventive war, then A and X obtain the expected payoff of $p - c_A$ and $1 - p - c_X$, respectively. In other words, $p - c_A$ is the amount A can “lock-in” by initiating a preventive war.

On the other hand, if A bargains with X , A can demand $g \in [0, 1]$ from X . If X accepts this offer, the payoff to A is g and the payoff to X is $1 - g$. The game only reaches this stage if A forgoes the opportunity to launch a preventive attack against X . Yet, A and X are still bargaining in the shadow of war. That is, the maximum amount A can demand from X in bargaining will critically depend on the likelihood of A ’s victory in a military contest. However, the probability of A ’s victory has now declined because of the land exchange from p to \hat{p} .³ If X rejects the demand g , the states fight and the expected payoff from war at this stage is $\hat{p} - c_A$ for A and $1 - \hat{p} - c_X$ for X , where $\hat{p} < p$. Then the maximum amount A can expect to receive from bargaining is $\hat{p} + c_X$. If A makes a demand greater than this, X will fight, which reduces A ’s expected payoff to $\hat{p} - c_A$. Therefore, A will bargain if and only if

$$\hat{p} + c_X \geq p - c_A, \tag{1}$$

and launches a preventive attack otherwise.

When $\hat{p} + c_X$ is smaller than A ’s lock-in payoff, $p - c_A$, X has created a bargaining problem through the peaceful transfer of territory. If the peaceful exchange causes $\hat{p} + c_X < p - c_A$ then a preventive war occurs. Since a preventive war returns X a payoff $1 - p - c_X$

³ By foregoing the opportunity to attack X , A is essentially letting X employ some delaying tactics to gain time to grow stronger.

which is smaller than the payoff from bargaining $1 - \hat{p} - c_X$, X will consider the interests of the third party carefully such that the inequality in equation (1) holds and there is no bargaining problem. What is X to do?

Recall that there is a shift in power, $\hat{p} < p$, caused by the territorial transfer from Y to X during the initial stage of the game. If one assumes that the shift in the balance of power is proportional to the amount of land, t , that X obtains from Y , such that $p - \hat{p} \propto f(t)$ where $f(\cdot)$ is an increasing function. For the sake of simplicity assume that $p - \hat{p} = t$. Then, if t is so large that the inequality in equation (1) no longer holds, A prefers to attack X rather than bargaining because X cannot agree to not taking advantage of the shift in the balance of power caused by the exchange of strategic territory from Y . This makes it clear that the only way for X to avoid a bargaining problem is to place limits on the amount land it accepts, t .

Knowing this, X chooses the equilibrium demand t in the initial stage that will be accepted by Y and will not result in a preventive attack from A . Rearranging the terms in inequality (1), we obtain $p - \hat{p} \leq c_X + c_A$. Noting that $p - \hat{p} = t$, we find that X will demand $\min\{q + c_Y, c_X + c_A\}$ from Y . Demanding more than $q + c_Y$ will result in conflict with Y , and demanding more than $c_X + c_A$ will result in a preventive war with A . This outcome is peaceful, self-enforcing, and may promote a lasting peace as long as the third party remains interested. It is possible if the third party is no longer interested in the transfer of territory, there will be an incentive for X to renegotiate the terms of the exchange with Y .

Setting III: Uncertainty with a Third Party

Our analysis of settings I and II so far reveals that, when there is a risk of a preventive attack by a third party A , bargaining over strategic territory between X and Y is affected if $q + c_Y > c_X + c_A$. When this inequality holds, X demands less land from Y in order to avoid a preventive attack by A . Instead of demanding $q + c_Y$ from Y , X will lower their demand to $c_X + c_A$. When this inequality does not hold, X demands $q + c_Y$. The

analysis also reveals that war will never break out between X and Y or between X and A in equilibrium. This is because X knows A 's costs of attacking and can thus make a maximal demand of Y such that A will not have incentives to launch a preventive attack.

We will now examine the more descriptive case where X is uncertain about the costs of a preventive attack from the third party state, A . X knows that as they demand more from Y , the chance of being attacked by A increases. Therefore, X faces the risk-return trade-off where X prefers to take as much territory as possible from Y , but the more X demands from Y the greater the risk of a preventive attack by A . Although X is uncertain about c_A , they have prior beliefs that A has high costs of preventive attack, c_A^+ , with probability z and low costs of preventive attack, c_A^- , with probability $1 - z$, where $c_A^+ > c_A^-$.

In this setting there are three interesting cases to be analyzed. In the first case, A 's with high costs and low costs bargain with X rather than preventively attacking. In the second case, A 's with low costs preventively attack X , and A 's with high costs bargain with X . In this second case, X demands $q + c_Y$ if they believe that A has high costs and demands $c_X + c_A^-$ if they believe that A has low costs. In the third case, if X makes the maximal demand, $q + c_Y$, even weak A 's will preventively attack. Therefore, X must lower their demand to something less than the maximal demand to avoid a preventive attack by A . The analysis below will clarify some conditions under which the combination of private information and a land transfer can cause a conflict with a third party state.

Case 1: $q + c_Y \leq c_X + c_A^-$

The first case involves a relatively weak X and a strong Y (i.e., $q + c_Y$ is small) and/or a weak A relative to X , such that the most land X can peacefully obtain from Y will not be large enough to concern a third party A . In this case both types of A will bargain with X even when X demands as much as possible from Y . Therefore X makes the maximal demand from Y , $q + c_Y$. This demand shifts the balance of power between X and A from p to $\hat{p} = p - q - c_Y$. This shift in power is not large enough to cause a bargaining problem

between X and A because $\hat{p} - p \leq c_X + c_A$. Since there is no bargaining problem, A bargains with X offering them $1 - \hat{p} - c_X$. State X accepts this offer and there is no conflict. In this case the bargaining between X and Y over the strategic territory is unaffected by the presence of A and uncertainty about A 's costs of preventive conflict is not relevant.

Case 2: $c_X + c_A^- < q + c_Y \leq c_X + c_A^+$

In this case X faces a dilemma. Making the maximal demand to Y now entails a risk of a preventive attack from A 's with low costs but not from A 's with high costs. Alternatively, X can make a safe-bet demand from Y that is always accepted and never results in a preventive attack from A . The safe-bet demand is $t = c_X + c_A^-$. If X makes this safe-bet demand to Y , Y will accept it and both types of A 's will bargain with X . The expected utility for X to make this demand is:

$$\begin{aligned}
 EU(t = c_X + c_A^-) &= t + 1 - (p - t) - c_X \\
 &= 2t + 1 - p - c_X \\
 &= 1 - p + c_X + 2c_A^-.
 \end{aligned} \tag{2}$$

Although making the safe-bet demand involves zero risk of a preventive war with A , it is not always optimal for X . Even when X demands as much as possible from Y (i.e., $t = q + c_Y$),⁴ weak A 's will still bargain instead of preventively attacking, offering $1 - \hat{p} - c_X = 1 - (p - t) - c_X = 1 - (p - q - c_Y) - c_X$ to X . Following the maximal demand $q + c_Y$, strong A 's will preventively attack X , giving X a payoff of $1 - p - c_X$ which is smaller than what X would get from weak A 's through bargaining. Then, the expected utility for X to

⁴ X can demand more than $q + c_Y$ but such demands will result in a war between X and Y . As the focus of our paper is peaceful land exchanges, we will not consider such cases.

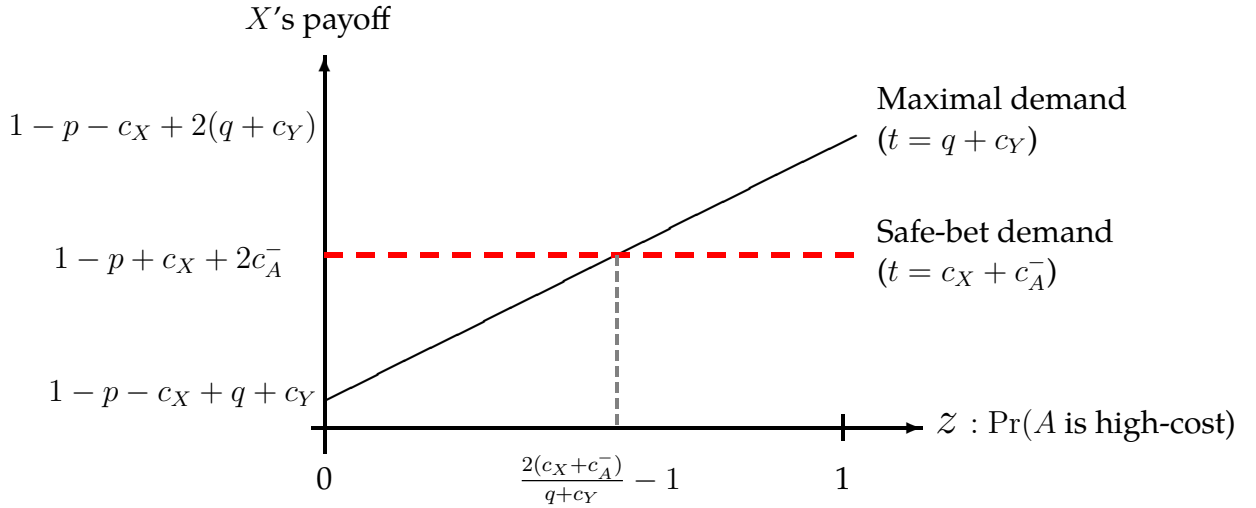


Figure 3: Payoffs from safe-bet demand and maximal demand (Case 2)

This figure shows the expected utility for X to make the maximal demand (black solid line) and the safe-bet demand (red dashed line) across different values of X 's prior belief about A 's type. The x-axis shows the values of z , prior probability that A is a high-cost type. The y-axis shows the expected payoff for X .

make the maximal demand is:

$$\begin{aligned}
 EU(t = q + c_Y) &= t + z(1 - p + q + c_Y - c_X) + (1 - z)(1 - p - c_X) \\
 &= 1 - p - c_X + (z + 1)(q + c_Y).
 \end{aligned} \tag{3}$$

We can now identify the condition under which X makes a risky demand that can cause third party conflict. Specifically, for X to make a risky demand, the payoff from the risky demand must be greater than the payoff from the safe-bet demand:

$$\begin{aligned}
 EU(t = q + c_Y) &> EU(t = c_X + c_A^-) \\
 1 - p - c_X + (z + 1)(q + c_Y) &> 1 - p + c_X + 2c_A^- \\
 q + c_Y &> \frac{2(c_X + c_A^-)}{z + 1}.
 \end{aligned} \tag{4}$$

We can see that when $z = 1$ (X is certain that A is a high-cost type), the inequality in equation (4) simplifies to $q + c_Y > c_X + c_A^-$, which always holds by assumption. In other words, when $z = 1$, X will always make the maximal demand and a preventive war will

occur when A is in fact a low-cost type. However, as z deviates from 1 (X believes that some A 's will be a low-cost type), condition (4) becomes less likely to hold, which will reduce the probability of preventive war. Rearranging the terms in (4), we find that a bargaining problem occurs when $z > \frac{2(c_X + c_A^-)}{q + c_Y} - 1$. Figure 3 shows this dynamic graphically. When z is sufficiently small ($z < \frac{2(c_X + c_A^-)}{q + c_Y} - 1$), the safe-bet demand gives X higher payoff than the maximal demand so that the probability of preventive war is zero. On the other hand, when $z > \frac{2(c_X + c_A^-)}{q + c_Y} - 1$, X prefers the maximal demand to the safe-bet demand, knowing that A will initiate a preventive war with probability $1 - z$.

Case 3: $c_X + c_A^+ < q + c_Y$

The third case involves a relatively strong X and relatively weak Y (i.e., $q + c_Y$ is large), and/or relatively strong A (i.e., c_A^+ is low). In this case X considers three types of demands. The safe-bet demand is $c_X + c_A^-$ as before, which makes both types of A 's bargain with X . The payoff to X from this demand is also the same as the one shown in (2). The maximal demand $q + c_Y$ is again the same but it now yields a different payoff to X . This is because in case 3 both types of A 's initiate a preventive war if X obtains $q + c_Y$ from Y . As the bargaining problem arises with certainty if X demands $q + c_Y$, the expected utility for X to make this maximal demand is:

$$\begin{aligned} EU(t = q + c_Y) &= t + 1 - p - c_X \\ &= q + c_Y + 1 - p - c_X. \end{aligned} \tag{5}$$

In addition to these two demands, X considers a third type of demand, $c_X + c_A^+$. We call this the medium demand because it is smaller than the maximal demand and greater than the safe-bet demand. This demand will result in a preventive war with low-cost A 's but

not with high-cost A 's. The payoff to X from the medium demand is:

$$\begin{aligned}
EU(t = c_X + c_A^+) &= c_X + c_A^+ + z(1 - \hat{p} - c_X) + (1 - z)(1 - p - c_X) \\
&= 1 + c_A^+ + z(p - \hat{p}) - p \\
&= 1 + c_A^+ + z(p - p + c_X + c_A^+) - p \\
&= (z + 1)c_A^+ + zc_X + 1 - p.
\end{aligned} \tag{6}$$

The latter two types of demands can cause a preventive war induced by a bargaining problem. Specifically, X assesses that the probability of preventive war is 1 if they make the maximal demand, and $1 - z$ if they make the medium demand. We will now identify the conditions under which a bargaining problem arises. We begin by comparing the payoffs from the safe-bet demand (2) and the maximum demand (5). X prefers the maximum demand to the safe-bet demand if

$$\begin{aligned}
EU(t = q + c_Y) &> EU(t = c_X + c_A^-) \\
q + c_Y + 1 - p - c_X &> 1 - p + c_X + 2c_A^- \\
q + c_Y &> 2(c_X + c_A^-).
\end{aligned} \tag{7}$$

This condition is likely to hold when Y is weak relative to X such that X can extract a large amount of land peacefully that is greater than $2(c_X + c_A^-)$. When the opposite holds, X prefers the safe-bet demand that completely eliminates the risk of preventive war. The top panel of Figure 4 describes the case where the condition (7) holds, and the bottom panel shows the case where it does not hold.

We will now analyze the case where the condition (7) holds and X never makes the safe-bet demand. The demand X makes under this scenario is either the maximal demand or the medium demand. Specifically, X prefers the maximal demand to the medium de-

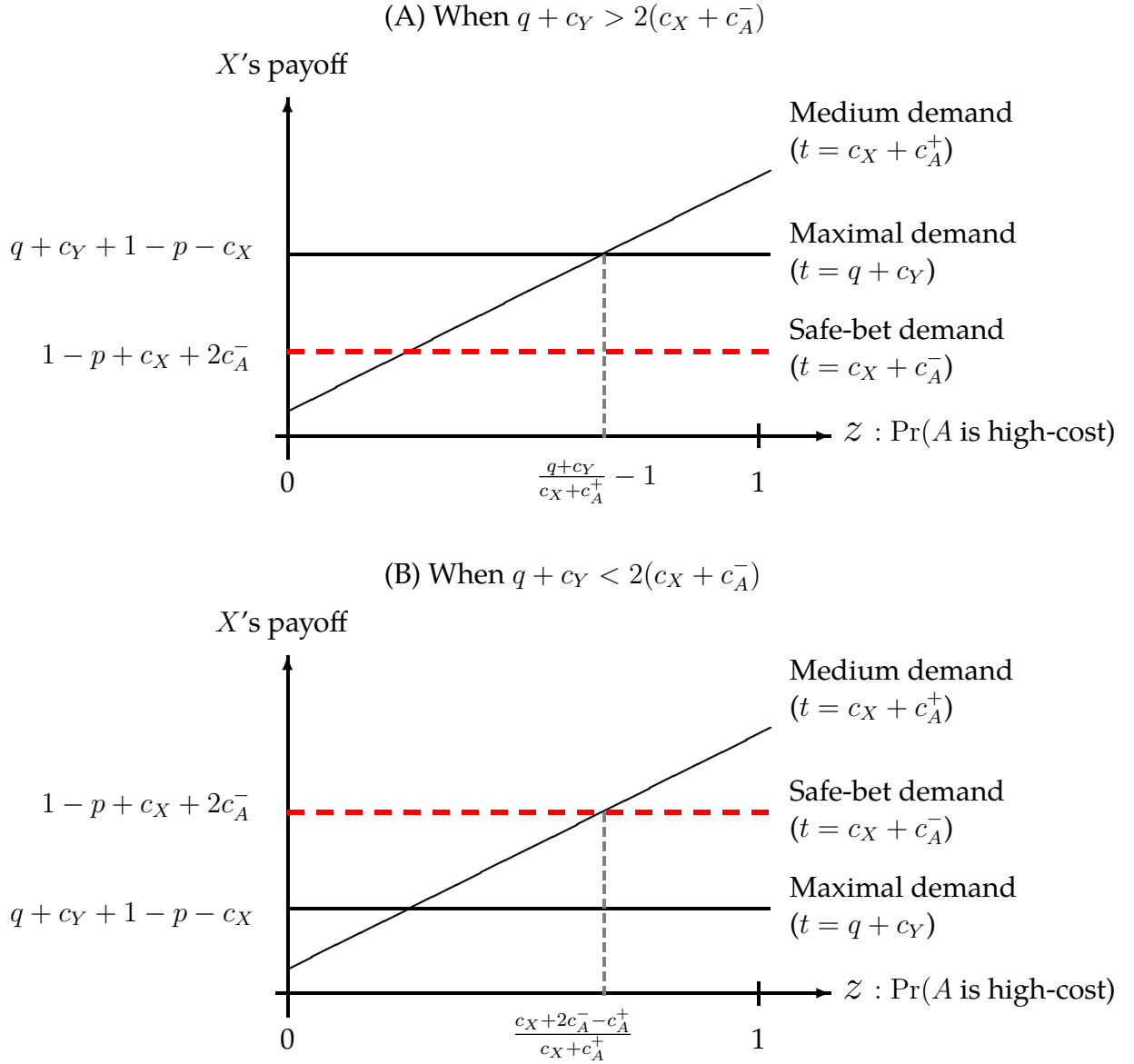


Figure 4: Payoffs from safe-bet, maximal, and medium demand (Case 3)

This figure shows the expected utility for X to make three types of demand, maximal, medium, and safe-bet, across different values of X 's prior belief about A 's type. The x-axis shows the values of z , prior probability that A is a high-cost type. The y-axis shows the expected payoff for X from each type of demand.

mand when the following condition hold:

$$\begin{aligned}
 EU(t = q + c_Y) &> EU(t = c_X + c_A^+) \\
 q + c_Y + 1 - p - c_X &> (z + 1)c_A^+ + zc_X + 1 - p \\
 q + c_Y &> (z + 1)(c_X + c_A^+) \\
 z &< \frac{q + c_Y}{c_X + c_A^+} - 1.
 \end{aligned} \tag{8}$$

Interestingly, when X perceives that a third party A poses an imminent threat of a preventive attack, so much so that even a high-cost A 's will launch a preventive attack following the maximal demand, then X will not even try to avoid the preventive war by refraining from taking "too much" from Y . As can be seen from the top panel of Figure 4, the maximal demand gives X the highest utility as long as $z < \frac{q+c_Y}{c_X+c_A^+} - 1$. X demands the maximal amount of territory, knowing that doing so will lead to a preventive war with certainty. X will only seek to lower the demand to the medium level when there is a decent chance that A is a weak type, or $z > \frac{q+c_Y}{c_X+c_A^+} - 1$. When this holds, X makes the medium demand and lowers the probability of a preventive war from 1 to $1 - z$.

Finally, we analyze the case where the opposite of condition (7) holds. As can be seen in the bottom panel of Figure 4, X will never make the maximal demand under this scenario. To identify the condition under which X makes the safe-bet demand rather than the medium demand and eliminates the probability of preventive war, we compare the payoffs from the two demands, as follows:

$$\begin{aligned}
EU(t = c_X + c_A^-) &> EU(t = c_X + c_A^+) \\
1 - p + c_X + 2c_A^- &> (z + 1)c_A^+ + zc_X + 1 - p \\
z &< \frac{c_X + 2c_A^- - c_A^+}{c_X + c_A^+}.
\end{aligned} \tag{9}$$

When this condition holds, X makes the safe-bet demand to Y , guaranteeing that A will not attack X . However, when z exceeds the threshold identified in (9), it becomes optimal for X to make the medium demand, which will cause a bargaining problem with probability $1 - z$.

Empirical Implications

The formal analysis of triadic interaction identifies various conditions under which a territorial exchange can induce a dynamic bargaining problem between the land gainer and

an interested third party state. The model suggest important empirical implications. For example, we find that uncertainty about the intentions of a third party is a prerequisite for a bargaining problem. We also find that the relationship between X 's threat assessment with respect to a third party state and the likelihood of preventive war may well be conditional and non-monotonic. That is, the fear of a preventive attack by A can make X prudent in their handling of territorial disputes with Y , but only to some extent. When A 's threat of preventive attack is obviously credible, X will no longer refrain from seizing as much land as possible from Y , knowing that becoming too strong can induce a bargaining problem with a third party state.

Thus, bargaining theory expects that states that gain territory (X) will face a greater chance of being attacked by a state that is outside the territorial rivalry between X and Y . Observing the exchange of land from Y to X , the third party state A may want to attack X immediately (in which case the probability of A 's victory is still p) rather than forgoing the opportunity and negotiate with X after X has converted the newly gained territory into its military strength (in which case the probability of A 's victory is $\hat{p} < p$). We thus have the following testable hypothesis:

Hypothesis 1 *A state that gains land from another state will have a higher probability of being attacked by a state other than the territorial loser, on average.*

We would also expect that a peaceful exchange of land that occurs as a result of bargaining between X and Y may have a greater effect on conflict than a violent transfer that involves militarized conflict between X and Y . This is because it will be more difficult for the territorial gainer (X) to convert the spoils of war into its military strength than to convert the territorial gain obtained peacefully into military strength.

Hypothesis 2 *A transfer of land has a greater conflict enhancing effect when the exchange is made peacefully than when the transfer occurs violently.*

Empirical Assessment

Our theoretical model suggests that land transfers, especially when made peacefully, can increase the risk of future conflict between the state gaining territory and a third party state. In order to evaluate our theoretical argument empirically, we utilize historical data on state-to-state territorial exchanges and their effect on the probability of militarized conflict thereafter.

The key explanatory variable of this study is land transfers between states. We rely on the information in the territorial change data version 4.01 from the Correlates of War (COW) project.⁵ This data set records all territorial changes in the COW state system between the years 1816 and 2008. We limit our sample to the period between 1816 and 2001, as we have information on our dependent variable and other explanatory variables only for this period. During this period, there have been 630 state-to-state territorial transfers, involving 454 territorial-gainer-year observations.⁶ If we limit our focus to “peaceful” land exchanges that occurred without militarized conflict, there have been 456 state-to-state peaceful transfers, involving 356 territorial-gainer-year observations during this period. Similarly, if we limit our focus to “violent” territorial transfers, there have been 174 state-to-state violent exchanges, involving 140 territorial-gainer-year observations during this period.

We treat these states gaining territory (state X in our formal model) as the potential targets of militarized conflict, and estimate the extent to which the probability that these land gainers are targeted in militarized conflict in the following year is greater than the probability that states without territorial gains are targeted. Thus, our unit of observation is directed-dyad-year, where we distinguish the potential challenger in militarized con-

⁵ Available online at <http://www.correlatesofwar.org/COW2%20Data/TerrChange/terrchange.html>. Last accessed on October 10, 2013.

⁶ Some territorial gainers gained a piece of land from two or more states in a given year: 377 out of 454 gainers gained territory from 1 state in a given year, 59 gainers gained land from 2 states, 9 gainers gained territory from 3 states, 5 gainers gained territory from 4 states, and 3 gainers gained land from 5 states, and 1 gainers gained territory from 13 states.

flict (state A in our formal model; side A in our empirical test) and the potential target in militarized conflict (side B in our empirical test). To ensure that the land exchange *precedes* militarized conflict (if any), we look at the transfer that takes place in the previous year. This is important because our formal model assumes that state A decides whether or not to attack X *after* observing the territorial transfer from Y to X . The key explanatory variable, Territorial Transfer, takes a value of 1 when the potential target state (side B) in a directed-dyad had gained a piece of land from any states other than the potential challenger (side A) in the previous year, and 0 otherwise.⁷ There are 1,307,782 directed-dyad-year observations in our sample, of which 28,193 observations experienced a land transfer.

Our outcome variable records the initiation of a militarized interstate dispute (MID). It is coded as 1 if the potential challenger state (side A) in a directed-dyad initiated a MID against the potential target (side B) in the directed-dyad in a given year, and 0 otherwise. 2,471 out of 1,307,782 directed-dyad-year observations in our sample receive the value of 1.⁸

The challenge in estimating the effect of a land transfer on conflict with observational (i.e., non experimental) data is that territorial transfers do not occur randomly. If there are some unmeasured or unmeasurable factors that makes it more likely that a state gains land *and* makes it more likely that the state is attacked by another state, we may mistakenly conclude that a territorial exchange causes third-party conflict even when land transfer itself has no effect on third-party conflict. To reduce this threat to inference, we adopt an instrumental variable approach where we jointly estimate the likelihood of the territorial exchange and the effect of such transfers on third-party conflict, controlling for the correlation between the unobservables governing the two processes.

Let $T_i \in \{0, 1\}$ denote the key explanatory variable, where $T_i = 1$ means that the poten-

⁷ We omit those directed-dyad-year observations where side B gained territory from A because our theoretical focus is to understand how a third party state would react to such exchanges.

⁸ Data on MID's are from Maoz's (2005) refined version of the data.

tial target state (side B) in directed-dyad i had gained a piece of territory from any states other than the potential challenger (side A) in the previous year, and $T_i = 0$ otherwise. Assume that the value of T_i is determined by a function or latent index that is linear in covariates, with a random component or error term, ν_i , such that

$$T_i = 1[Z_i'\gamma > \nu_i], \quad (10)$$

where Z_i' is a vector of covariates that influence the likelihood that side B gains territory from any states other than side A in the $A - B$ dyad and γ is a vector of coefficients. For example, states that have more resources and greater military power, such as major power states, are probably much more likely to gain land from other states than less powerful states (Chiba, Martinez Machain & Reed 2014).

Furthermore, let $Y_i \in \{0, 1\}$ denote the dependent variable (being targeted in MID), when $Y_i = 1$ the potential challenger state (side A) in directed-dyad i initiated an MID against the potential target (side B) in directed-dyad i in a given year, and $Y_i = 0$ indicates that state A did not initiate an MID against state B in that year. The value of Y_i is also determined by the latent index

$$Y_i = 1[X_i'\beta_0 + \beta_1 T_i > \epsilon_i], \quad (11)$$

where X_i' is a vector of covariates that influence the likelihood of MID initiation by side A against side B , β_0 is a vector of coefficients for the covariates, and β_1 is the effect of land transfers on third-party conflict, and ϵ_i is a second random component or error term.

The potential source of bias in this setup is the correlation between ν_i and ϵ_i . Unmeasured random determinants of territorial exchanges and militarized conflict are potentially correlated, as those states that are likely to gain territory from other states might also be likely to be targeted in MID for reasons other than the bargaining problem that the territorial gain creates. To adjust for this, we estimate a bivariate Probit model that controls

for the correlation between the two error terms. The model is identified by assuming Z'_i is independent of the random components and that ν_i and ϵ_i are jointly normal. The log likelihood function is given as

$$\sum Y_i \ln \Phi_2(X'_i \beta_0 + \beta_1 T_i, Z'_i \gamma; \rho) + (1 - Y_i) \ln [1 - \Phi_2(X'_i \beta_0 + \beta_1 T_i, Z'_i \gamma; \rho)], \quad (12)$$

where $\Phi_2(\cdot, \cdot; \rho)$ is the bivariate normal distribution function with correlation coefficient ρ . Once we estimate the model, the effect of territorial transfers on third-party conflict is obtained as

$$\begin{aligned} E\{1[X'_i \hat{\beta}_0 + \hat{\beta}_1 > \epsilon_i] - 1[X'_i \hat{\beta}_0 > \epsilon_i]\} &= E\{\Phi(X'_i \hat{\beta}_0 + \hat{\beta}_1) - \Phi(X'_i \hat{\beta}_0)\} \\ &= E\{\Phi(X'_i \hat{\beta}_0 + \hat{\beta}_1)\} - E\{\Phi(X'_i \hat{\beta}_0)\}, \end{aligned} \quad (13)$$

where $\Phi(\cdot)$ is the normal distribution function.

In estimating the log likelihood function (12), we use side B 's major power status (Major Power) and its military capability score (Capability), both measured in the previous year, as the components of Z'_i . We use Joint Democracy, the Probability of Victory, Contiguity, and Peace Years and its cubic splines as the components of X'_i . The measurement and description of these variables are provided in Table 1.

Table 1: Variable Concepts and Measurements

Variable Name	Measurement
<i>Outcome Variable</i>	
MID Initiation	Recorded as 1 if state <i>A</i> in the dyad initiated a militarized interstate dispute (MID) against state <i>B</i> in the year; 0 otherwise. Data are from Maoz's (2005) refined version of the data.
<i>Main Independent Variables</i>	
Territorial Transfer	Recorded as 1 if state <i>B</i> in the dyad (potential target) gained territory from any entities other than state <i>A</i> in the dyad (potential challenger) in the previous year; 0 otherwise. Data are from COW project. This variable takes the value of 1 for 28,919 directed-dyad-year observations.
Peaceful Territorial Transfer	Recorded as 1 if state <i>B</i> in the dyad gained territory from any entities other than state <i>A</i> in the dyad peacefully in the previous year; 0 otherwise. This variable takes the value of 1 for 23,868 directed-dyad-year observations.
Violent Territorial Transfer	Recorded as 1 if state <i>B</i> in the dyad gained territory from any entities other than state <i>A</i> in the dyad via conflict in the previous year; 0 otherwise. This variable takes the value of 1 for 6,862 directed-dyad-year observations.
<i>Variables Explaining Territorial Transfers: Z'_i</i>	
Major Power	Recorded as 1 if state <i>B</i> in the dyad is recognized as a major power in the previous year; 0 otherwise. Data are from COW project.
Capability	State <i>B</i> 's composite military capability score (<i>cinc</i> score) in the previous year. Data are from COW project.
<i>Control Variables: X'_i</i>	
Joint Democracy	Recorded as 1 if both states in the dyad receive a democracy score greater than or equal to 6; 0 otherwise. We use the <i>polity2</i> (Democracy minus Autocracy score) variable from the Polity IV dataset.
Probability of Victory	The military capability of state <i>A</i> (potential challenger) divided by the sum of military capabilities of states <i>A</i> and <i>B</i> . Capability is operationalized using the <i>cinc</i> score.
Contiguity	Recorded as 1 (contiguous) if states <i>A</i> and <i>B</i> are either sharing a land or river border, or separated by less than 400 miles of water; 0 (non-contiguous) if they are separated by more than 400 miles of water.
Peace Years	Years passed since the last occurrence of an MID in the dyad.

Results

Table 2 shows the maximum likelihood estimates of the model parameters, γ_1 , β_0 , β_1 , and ρ . Model 1 estimates the effect of any land transfers on conflict, whereas Model 2 focuses only on peaceful exchanges and Model 3 focuses only on violent transfers. The estimated coefficient for the central explanatory variable, β_1 , is positive in all three models, providing substantial support for Hypothesis 1.

In addition to the fact that any type of territorial exchange increases the likelihood of third party conflict, the model also shows that the probability of a land transfer is shaped by the distribution of military capabilities and the overall power of the actor. More pow-

erful states are more likely to obtain land through peaceful or conflictual means. This pattern is also consistent with the bargaining model. The model suggests that stronger states will demand more territory, *ceteris paribus*.

Control variables are included in the model to reflect the tendency for democratic states to experience less conflict, neighbors to experience more conflict, and for power parity to be correlated with militarized conflict. The risk of third party conflict increases when there is any type of territorial exchange, and this relationship holds when common controls variables are included in the model. The empirical analysis provides striking evidence for the first hypothesis.

To evaluate the second hypothesis the substantive effects of the different types of land transfers are plotted in Figure 5. In each of the three panels, the histogram to the left shows the predicted probability of an MID for directed-dyad-years where there was no territorial exchange in the previous year (the second component in equation (13), or $E\{\Phi(X'_i\hat{\beta}_0)\}$), whereas the histogram to the right shows the predicted probability of an MID for those where there was a land transfer in the previous year (the first component in equation (13), or $E\{\Phi(X'_i\hat{\beta}_0 + \hat{\beta}_1)\}$). The top of this figure shows the estimates from the first model. In this model all territorial transfers are shown to increase the risk of third party conflict. The middle of the figure shows the results from the second model, where the substantive effect of peaceful land exchanges is illustrated. Finally, the third model is used to generate the results on the bottom of this figure. This shows violent territorial transfers can increase the probability of third party conflict. The difference between violent and peaceful territorial transfers can be evaluated by comparing the middle and bottom of Figure 5. Consistent with the second hypothesis, peaceful land exchanges are the mostly likely to enhance the chances of third party conflict. This is strong evidence for the second hypothesis and illustrates how peaceful territorial transfers can sometimes have unintended consequences for the recipient of the land.

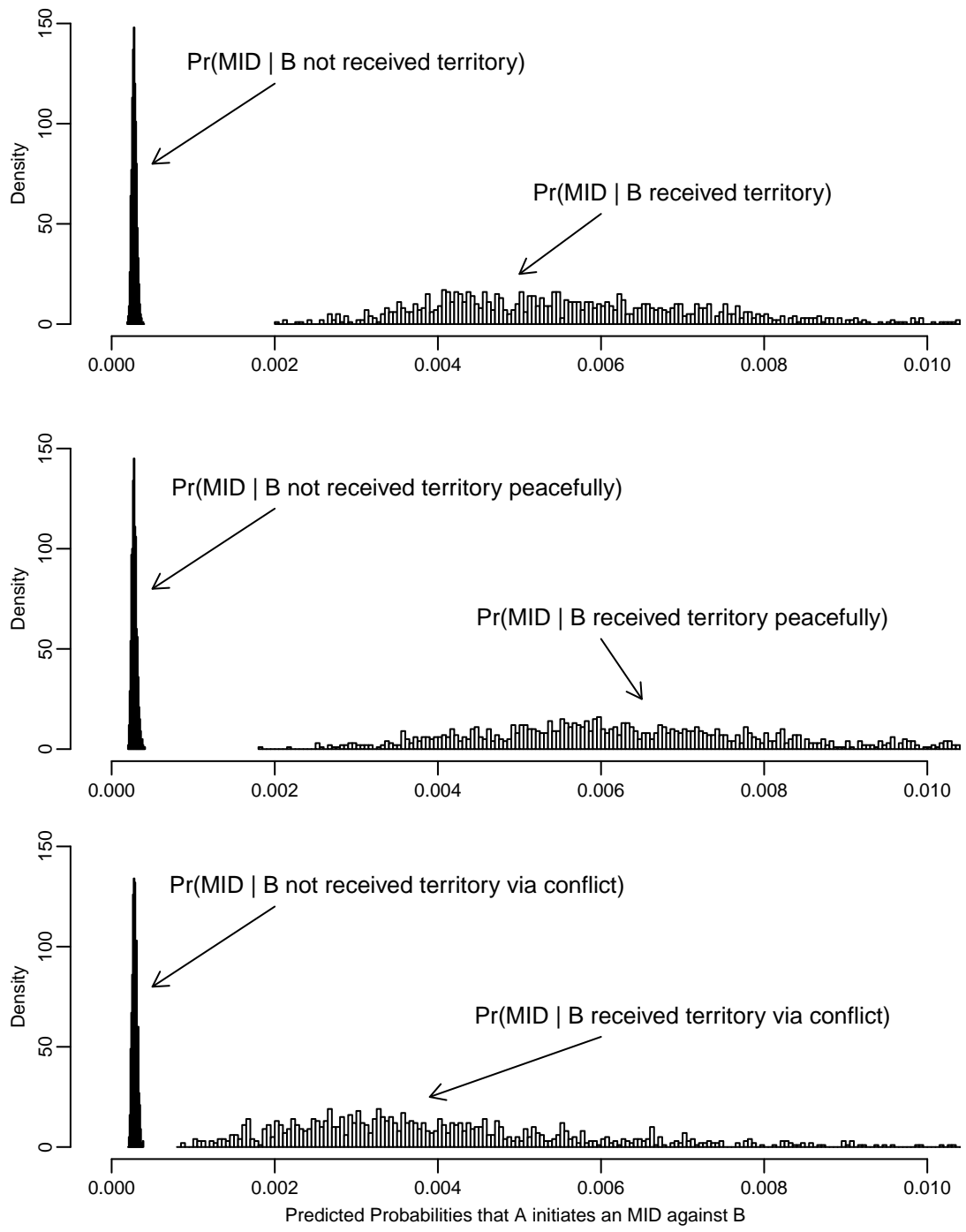


Figure 5: Estimated Effects of Territorial Transfer on Conflict

These figures show the estimated effects of territorial transfers on the probability that a third party initiates an MID against the country receiving the transfer. In each panel, the histogram to the left shows the predicted probability of an MID for observations without a land exchange, whereas the histogram to the right shows the predicted probability of an MID for those with a transfer. Uncertainty estimates are obtained by following the procedures described in King, Tomz & Wittenberg (2000).

Table 2: Bivariate Probit Coefficients: DV = MID Initiation, 1816–2001

	Model 1	Model 2	Model 3
β_1 : Territorial Transfer	0.913** (0.098)		
β_1 : Peaceful Territorial Transfer		0.958** (0.104)	
β_1 : Violent Territorial Transfer			0.763** (0.141)
γ : Capability	5.119** (0.193)	5.117** (0.191)	3.354** (0.177)
γ : Major Power	0.430** (0.026)	0.355** (0.023)	0.678** (0.030)
γ : Constant	-2.182** (0.004)	-2.251** (0.004)	-2.780** (0.008)
β_0 : Joint Democracy	-0.261** (0.047)	-0.261** (0.047)	-0.261** (0.047)
β_0 : Probability of Victory	0.240** (0.029)	0.235** (0.029)	0.220** (0.029)
β_0 : Contiguity	1.136** (0.033)	1.138** (0.033)	1.145** (0.033)
β_0 : Peace Years	-0.132** (0.007)	-0.133** (0.007)	-0.133** (0.007)
β_0 : Constant	-2.575** (0.372)	-2.569** (0.110)	-2.553** (0.105)
ρ	-0.314** (0.033)	-0.326** (0.033)	-0.236** (0.042)

Robust standard errors in parentheses

† significant at * $p < 0.05$; ** $p < 0.01$

Implication and Conclusions

A large and important literature has developed around the fact that peaceful territorial transfers are related to the consolidation of democratic institutions and a lasting peace between those states that have resolved their territorial issues. The analysis here shows an important unintended consequence of the peaceful exchange of territory. Namely, these peaceful transfers can significantly raise the risk of conflict with interested third parties. This is an important contribution to our cumulative understanding of how land transfers

shape international politics and places important bounds on the claim that peaceful territorial exchanges unconditionally lead to a lasting peace.

When third parties have a stake in the terms of a territorial exchange between two other states, the interests of the third party must be taken into account to insure that the land transfer fosters a lasting peace. If the states involved in the transfer of land fail to address the interests of third parties, even if the territorial exchange is peaceful and reflects the dyadic balance of power, it is possible for the transfer to draw conflict from a third party. Moreover, even if the interests of third party states are incorporated in the land transfer, the territorial exchange can raise the risk of conflict. Within the dyad that transferred the territory, conflict may break out if an interested third party state becomes disinterested. If the territorial transfer was shaped by the interests of a third party that is no longer relevant, the states involved in the land exchange may have incentives to renege on the original agreement. Finally, it is possible that the states involved in the territorial transfer may simply misunderstand the interests of the third party. Even if they attempt to incorporate the third party state's interests in the land exchange, they may misperceive the interests of the third party. Such uncertainty about the aims of third parties may result in conflict.

One important policy implication of this research is that when states are negotiating over territory, the negotiations should explicitly consider the interests and concerns of third party states. Perhaps it even makes sense to bring these third parties directly to the negotiation table and to develop strategies to reassure the third parties that the transfer will not shift the regional balance of power too dramatically or place them in a disadvantaged bargaining position. For land transfers to be peace preserving they must recognize the multilateral nature of international politics.

References

- Arena, Philip & Anna Pechenkina. forthcoming. "External Subsidies and Lasting Peace." *Journal of Conflict Resolution* .
- Balch-Lindsay, Dylan, Andrew J Enterline & Kyle A Joyce. 2008. "Third-party intervention and the civil war process." *Journal of Peace Research* 45(3):345–363.
- Beardsley, Kyle. 2008. "Agreement without peace? International mediation and time inconsistency problems." *American Journal of Political Science* 52(4):723–740.
- Beardsley, Kyle. 2011. *The mediation dilemma*. Cornell University Press.
- Buhaug, Halvard & Scott Gates. 2002. "The geography of civil war." *Journal of Peace Research* 39(4):417–433.
- Chiba, Daina, Carla Martinez Machain & William Reed. 2014. "Major Powers and Militarized Conflict." *Journal of Conflict Resolution* 58(6):976–1002.
- Clark, David H. 2003. "Can strategic interaction divert diversionary behavior? A model of US conflict propensity." *Journal of Politics* 65(4):1013–1039.
- Clark, David H & Patrick M Regan. 2003. "Opportunities to Fight A Statistical Technique For Modeling Unobservable Phenomena." *Journal of Conflict Resolution* 47(1):94–115.
- Fearon, James D. 1996. Bargaining over objects that influence future bargaining power. In *Annual Meeting of the American Political Science Association, Washington, DC, August*.
- Gibler, Douglas M. 2012. *The territorial peace: Borders, state development, and international conflict*. Cambridge University Press.
- Gleditsch, Kristian Skrede. 2002. *All international politics is local: The diffusion of conflict, integration, and democratization*. University of Michigan Press.
- Huth, Paul. 2009. *Standing your ground: Territorial disputes and international conflict*. University of Michigan Press.
- Huth, Paul K. & Alyssa K. Prorok. 2012. "International Law and the Consolidation of Peace Following Territorial Change." *Unpublished manuscript, University of Maryland* .
- Huth, Paul K & Todd L Allee. 2002. *The democratic peace and territorial conflict in the twentieth century*. Vol. 82 Cambridge University Press.
- King, Gary, Michael Tomz & Jason Wittenberg. 2000. "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *American Journal of Political Science* 44(2):347–361.
- Koubi, Vally. 2005. "War and economic performance." *Journal of Peace Research* 42(1):67–82.

- Maoz, Zeev. 2005. "Dyadic Militarized Interstate Disputes Dataset (version 2.0)." Available online.
 URL: <http://psfaculty.ucdavis.edu/zmaoz/dyadmid.html> (Last accessed on July 10, 2012)
- Organski, Abramo FK & Jacek Kugler. 1977. "The costs of major wars: the Phoenix factor." *American Political Science Review* pp. 1347–1366.
- Powell, Robert. 1996. "Stability and the Distribution of Power." *World Politics* 48:239–267.
- Powell, Robert. 2006. "War as a commitment problem." *International organization* 60(1):169.
- Reed, William & Daina Chiba. 2010. "Decomposing the relationship between contiguity and militarized conflict." *American Journal of Political Science* 54(1):61–73.
- Schultz, Kenneth A. 2014. "What's in a Claim? De Jure versus De Facto Borders in Interstate Territorial Disputes." *Journal of Conflict Resolution* 58(6):1059–1084.
- Siverson, Randolph M & Harvey Starr. 1991. *The diffusion of war: A study of opportunity and willingness*. University of Michigan Press.
- Smith, Alastair. 1996. "To Intervene or Not to Intervene A Biased Decision." *Journal of Conflict Resolution* 40(1):16–40.
- Starr, Harvey. 2005. "Territory, proximity, and spatiality: The geography of international conflict1." *International Studies Review* 7(3):387–406.
- Vasquez, John A. 1993. *The war puzzle*. Cambridge University Press.
- Vasquez, John & Marie T Henehan. 2001. "Territorial disputes and the probability of war, 1816-1992." *Journal of Peace Research* 38(2):123–138.
- Werner, Suzanne & Amy Yuen. 2005. "Making and keeping peace." *International Organization* 59(02):261–292.
- Wolford, Scott. 2012. "Power, Preferences, and Balancing: The Durability of Coalitions and the Expansion of Conflict1." *International Studies Quarterly* .
- Wolford, Scott. 2014. "A Theory of Neutrality Rights in War." *Unpublished manuscript, University of Texas* .