Conflict externalization and the quest for peace: theory and case evidence from Colombia

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Abstract

I study the relationship between the likelihood of a violent domestic conflict and the risk that such a conflict “externalizes” (i.e., spreads to another country by becoming an international dispute). I consider a situation in which a domestic conflict between a government and a rebel group externalizes. I show that the risk of externalization increases the likelihood of a peaceful outcome, but only if the government is sufficiently powerful relative to the rebels, and if the risk of externalization is sufficiently high. I show how this model helps to understand the recent and successful peace process between the Colombian government and the country’s most powerful rebel group, the FARC, that ended 52 years of armed conflict.

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1 Introduction

Existing theoretical literature on civil wars often assumes that a group’s decision of whether or not to fight depends exclusively on the domestic context, i.e. on other domestic groups’ decisions.\(^1\) However, as increasing empirical literature on conflict is demonstrating, the regional context also has an important effect on domestic conflicts.\(^2\) Researchers are well aware of the regional dimensions of conflicts in Burma, Nicaragua, Kosovo, Sudan, Lebanon and Iraq, and more recently, Ukraine, for example.\(^3\)

To fill this gap, I develop a simple model of conflict externalization, and provide new case-study evidence from Colombia. The objective of the model is not merely to formalize an already existing theory, but to also propose a new mechanism through which the possibility that an external party participates in an internal conflict could significantly affect the outcome of the conflict. Besides illustrating the applicability of the model, the Colombian case provides new evidence on this topic.

In the model, a government and a group of rebels simultaneously choose whether or not to use violence against each other. Violence is costly, but can also decrease the opponent’s military resources, which increases the probability of victory for the aggressor. Crucially, the use of violence might cause a third (foreign) actor to join in the conflict. When this happens, I say that the domestic conflict “externalizes.”

This externalization changes the power dynamic between the two domestic actors. I assume that only the government’s use of violence can trigger such externalization. For example, consider a group of rebels strategically located along a porous border, where the neighboring country shares the same ideology or ethnicity as the rebels. Given the porosity of the border, an attack on the rebels by the domestic government might imply a violation of the sovereignty of the neighboring country. Given the sympathies between the rebels and the neighboring country’s government, the aggression could motivate a military response, starting a conflict spiral that might lead to an international war.\(^4\) In case of an external conflict, the domestic government faces an additional decrease in its military resources, which indirectly favours the rebels. I take the probability of participation by the external party as given, and focus on how the threat of an external intervention affects the likelihood of peace.

The first main contribution of the paper is to show that the risk of externalization increases the likelihood of peace, but that this only happens if the domestic government is sufficiently powerful relative to the rebels, and if the risk of externalization is sufficiently high.

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\(^1\)See Blattman and Miguel (2010) and Jackson and Morelli (2011) for reviews of the literature. See Kydd (2010) (and below in this introduction) for a review of some of the few exceptions in formal models.

\(^2\)See Mason et al. (1999), Hegre and Sambanis (2006), Gleditsch (2007), Balch-Lindsay et al. (2008) and Cunningham et al. (2009, 2011) for evidence showing that the regional context (e.g. a conflict in a neighboring country, a highly autocratic region, trans-boundary ethnic groups, or direct intervention of external parties) matters for the onset, incidence and duration of civil war.

\(^3\)See South (2008) for the conflict in Burma, Gleditsch and Beardsley (2004) for the Nicaragua-Contras conflict, Crawford (2001); Kuperman (2008) for Kosovo, Ali et al. (2005) for Sudan, Bouckaert and Houry (2007) for Lebanon, and Gunter (2008) and Morelli and Pischedda (2013) for the Iraqi-Kurdish conflict.

\(^4\)As I will argue later, this situation perfectly matches the recent dynamic of the Colombian internal conflict, but it is not exclusive to this case. Burma-Thailand border clashes prompted by Burma’s pursuit of Karen National Liberation Army rebels across the border into Thailand is another example. See South (2008, 2012).
The second main contribution of the paper is to provide new case-study evidence from Colombia. Colombia suffered one of the longest internal conflicts in the world. Although many armed groups participated in the conflict, the left-wing Revolutionary Armed Forces of Colombia (FARC) always was the largest non-government actor. The conflict was accompanied by a permanent process of government negotiations with all groups, including three failed peace talks with the FARC. In September 2012, after an all-out military campaign against the FARC during which this group suffered the worst blows in its history, the Colombian government announced the start of new peace negotiations. This announcement surprised many analysts and national leaders, who expected a few more years of war, ending with a government victory. In July 2016, Colombian President Juan Manuel Santos and the FARC signed a historic peace deal, formally bringing the country’s more-than-50-year-long civil war to an end.

Despite its relevance, to the best of my knowledge no rationalist explanation has been proposed to account for both the onset and success of this Colombia’s historic peace process with the FARC. I show that the risk of externalization of the Colombian conflict (particularly intervention by Venezuela) was at the root of the peace negotiations, creating what some literature on conflict has called a “ripe for resolution” situation.\footnote{See Zartman (2000) and Pruitt (2005).}

My argument is as follows. In the years preceding the peace talks, the geography of the Colombian conflict changed dramatically: the FARC lost presence in regions in the interior of the country, and strategically moved toward border areas with Venezuela and Ecuador. An ideological affinity between the FARC and these two countries’ governments, as well as the porosity of the borders in these regions, was crucial to the government’s decision to engage in peace talks. The movement of the FARC opened the door to an externalization of the conflict: a violation of the Venezuelan territorial sovereignty by the Colombian army was very likely if the conflict continued, as well as a military response from Venezuela if this aggression were to occur.

Once aware of the high risk of interstate war, the Colombian government changed its strategy: the presence in Venezuela of the FARC’s top leaders would be tolerated, and peace talks would be encouraged. I argue that this decision was optimal from the government’s perspective: a FARC defeat was impossible without risking a war with Venezuela, and a revolution was very unlikely. Since for the FARC a peace settlement was also the best response given its limited chance of victory, I argue that the context was very favourable for a peaceful outcome.

My model examines third-party intervention, and it is related to the few but increasing theoretical studies on this topic (see Fearon, 1998; Carment and Rowlands, 1998; Werner, 2000; Crawford, 2003; Carment and Rowlands, 2006; Amegashie and Kutsoati, 2007; Grigoryan, 2010; Yuen, 2009; Kydd and Straus, 2013). The model is consistent with what this literature calls the “deterrence” hypothesis: the idea that an external party can play a crucial role in the outcome of an internal conflict by deterring one of the domestic parties from making a decision that harms his opponent (see Fearon, 1998; Carment and Rowlands, 1998; Werner, 2000; Crawford, 2003). In the model, peace is possible because the risk of externalization deters the government from attacking the rebels, given that it could prompt externalization that could make rebels stronger. Although the argument does not account
for “moral hazard” — that an external intervention biased in favour of one party might make this party more belligerent\(^6\) — the model can be easily extended to include this possibility.\(^7\) However, in the context of the Colombian conflict, this phenomenon does not seem to play an important role, and despite its simplicity, the model is able to provide non-trivial and new and empirical predictions. In particular, as in Kydd and Straus (2013), I find that the fact that a biased external intervention makes war less likely depends on whether power is balanced, but unlike them, I find that peace is more likely when the government is stronger, even if an intervention strengthens the rebel group.

The outline of the paper is as follows. Sections 2 and 3 present the model. Section 4 presents and analyzes the case study based on the model. Section 5 concludes.

## 2 Model

In this section, I develop a simple model that illustrates how the risk of a domestic conflict externalizing can affect the outcome of the conflict. In the model, the world is composed of two countries, \(H\) (home) and \(F\) (foreign), possibly neighbors. The population of \(H\) is divided between two groups: one in power (\(G\), for government), the other in opposition (\(R\), for rebels). It is assumed that \(F\) is homogeneous in its composition.

The government and rebels play a simultaneous-move game in which each group decides whether or not to use violence against the other. The model focuses on this interaction, taking the probability of action by \(F\) (provided that the government uses violence) as given. However, \(F\) will be crucial for the analysis: an eventual conflict between \(G\) and \(R\) might externalize, forcing \(F\) to intervene. The game has two possible outcomes: a violent conflict or peace. In both cases, the outcome depends on the relative resources or military strength of each party, which (with some abuse of notation) are initially set to \(G\), \(R\) and \(F\) for the government, rebels and foreign country, respectively.

A violent conflict occurs if either \(G\) or \(R\) decides to attack the other party. When both parties decide not to attack, peace occurs and no party incurs a cost. The outcome of the game is determined by the initial strength of each party.

The use of violence implies a fixed cost \(C > 0\) for both parties. In addition, if either \(G\) or \(R\) attacks, the resources of the attacked party decreases by some amount \(L > 0\). \(L\) can be interpreted as the relative gain (in resources or power) for attacking.\(^8\)

Crucially, the use of violence creates the possibility that the conflict externalizes, which means that \(F\) enters the game as an additional enemy of \(G\). This happens with probability \(\phi\), and can occur only if \(G\) attacks. The consequence of \(F\) entering the game is an interstate dispute between \(G\) and \(F\). An interstate conflict favours \(R\) by decreasing \(G\)'s resources or

\(^6\)See Carment and Rowlands (2006); Amegashie and Kutsoati (2007); Yuen (2009); Grigoryan (2010); Kydd and Straus (2013).

\(^7\)As I will discuss later, it is enough to assume that the costs of using violence are different for the government and rebels. In this case, a high risk of externalization will give the rebels more incentives to attack when attacked. The inclusion of this possibility does not change the key findings.

\(^8\)The assumption that \(C\) and \(L\) are the same for both the government and the rebels seem restrictive. However, when properly constrained, the results are robust to a possible difference. This assumption simplifies the analysis, and allows one to focus on more interesting results.
power by (with some abuse of notation) $F$. Consider, for example, an internal conflict where some members of the opposition are located close to a border that $H$ shares with $F$ (see Figure I). Then, given the proximity of $R$ to $F$, and the mobility of $R$ between the two countries because of either porous borders or sympathy from $F$, an offensive action by $G$ in $R$'s controlled territory might harm the citizens of $F$ or be interpreted by $F$ as a violation of its sovereignty.

Figure I

I assume that all players know $G$, $F$ and $L$, but have imperfect information about $R$. In particular, I make the following assumption about $R$:

**ASSUMPTION 1.** $R$ is a continuous random variable with domain $\mathbb{R}$, cumulative distribution function $Z$, density $z$, and mean $\bar{R}$. In addition, $Z'' < 0$, and $Z(x) = 0$ for all $x \leq 0$.

In other words, the resources or power of the opposition are unknown to both the opposition and the government. It intends to capture the idea that the opposition is somewhat informal, in the sense that its resources (in terms of arms or troops) are less known than those of the government. This is particularly true when borders are porous, and if there is uncertainty about how effectively $F$ surveils its border, as the level of arms or troops flowing in from $F$ is unknown.

Finally, I assume that the domestic group with the most power wins the game. This means that if the resources of the government and rebels are $A$ and $B$, respectively, the government’s probability of victory is $Pr[A > B]$.

**Timing**

1. $G$ and $R$ decide simultaneously whether to attack each other; if either decides to attack, a conflict occurs.

2. If neither party attacks, peace occurs; in this case, a party wins with a probability that depends on its relative initial resources.

3. If there is a violent conflict, there are some exogenous costs $C > 0$ for both parties.

   In addition, the resources of a party decrease in $L$ if it is attacked by its domestic

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9 Note that I assume that all $R$ is unknown. This is without a loss of generality; the results do not change if I instead assume that a part of these resources is random.

10 Note that although this assumption could make the war technology very sensitive to the resources of the parties, it seems a reasonable modelling given that the resources of only one of the parties has a stochastic component. For a discussion on the theoretical foundations of conflict technologies and, in particular, their stochastic derivations, see Jia (2008) and Jia and Skaperdas (2012). As Jia (2008) shows, if I instead assume that the resources of both parties have an stochastic component, a more natural choice would be a proportional form (i.e. $\frac{f(A)}{f(A)+f(B)}$).
opponent. If \( G \) decides to attack \( R \), the conflict externalizes with a probability \( \phi \). If this occurs, an interstate conflict between \( G \) and \( F \) begins; if that happens, the resources of \( G \) reduce by \( F \) (in addition to \( L \)).

4. The conflict ends. Each group gets its payoff according to the outcome.

**Payoffs**

As previously noted, the outcome of the game (and payoffs) when either peace or conflict occurs depends on the relative resources or power of each party. These resources determine the probability of victory in either case. Once the conflict is resolved, the winner gets \( V \) and the loser gets \( W \), where \( V > W \).

The first line in (1) represents \( G \)’s payoff in the event of victory, with \( \phi \text{Pr}[G - L - F > R - L] \) representing its probability of victory in the event that the conflict externalizes, and \((1 - \phi) \text{Pr}[G - L < R - L]\) representing the probability of victory in the event that the conflict does not externalize. In the second line of (1), \( \phi \text{Pr}[G - L - F < R - L] \) is the probability that \( R \) wins if \( F \) intervenes, and \((1 - \phi) \text{Pr}[G - L < R - L] \) is the probability that there is no such intervention. In order to simplify the notation, and without a loss of generality, I assume that \( V = 1 \) and \( W = 0 \). Note that by Assumption 1, \( \text{Pr}[X < R] = Z(X) \). Thus, by replacing these expressions in (1) and rearranging, it is easy to see that (1) is equivalent to

\[ \phi Z(G - F) + (1 - \phi) Z(G) - C \]

Let us use \( a \) to denote a decision to use violence (i.e. attack), and let \( p \) represent a decision not to use violence (i.e. peace). Then, let us use \( g, r \) and \( f \) to denote the actions taken by \( G \), \( R \) and \( F \) respectively, where \( g, r, f \in \{a, p\} \).

The payoffs for all the cases, after having rearranged and omitting some constants, are given in Table I.

|       | \( r = a \)                                             | \( r = p \)                                             |
|-------|--------------------------------------------------------|--------------------------------------------------------|
| \( g = a \) | \( G: \phi Z(G - F) + (1 - \phi) Z(G) - C \) | \( G: \phi Z(G + L - F) + (1 - \phi) Z(G + L) - C \) |
| \( R \) | \( -[\phi Z(G - F) + (1 - \phi) Z(G)] - C \)           | \( R: -[\phi Z(G + L - F) + (1 - \phi) Z(G + L)] - C \) |
| \( g = p \) | \( G: Z(G - L) - C \)                                  | \( G: Z(G) \)                                          |
| \( R \) | \( -Z(G - L) - C \)                                    | \( R: -Z(G) \)                                         |

3 **Equilibrium**

I now solve the model, focussing on pure strategy Nash equilibria (NE). I start with a few remarks about best responses. Then I consider a baseline case with no externalization, and study the general case.
3.1 Best Responses

Let us use $g(y)$ to denote the best response of $G$ given that $R$ plays $r = y$, and $r(x)$ to denote the best response of $R$ given that $G$ plays $g = x$. Note that for $x, y \in \{a, p\}$, $(x, y)$ is a NE if and only if $g(y) = x$ and $r(x) = y$.

Note first that it is always the case that

$$r(a) = a$$

(3)

This follows directly from Table I, observing that given $g = a$, $R$ always prefers to play $r = a$ under the assumption that $L > 0$ and $Z' > 0$. The intuition is that once $g = a$, an attack by $R$ is costless (since $g = a$ implies that $C > 0$ for both parties), and by playing $r = a$, $R$ can increase its probability of victory. Note that (3) implies that $(a, p)$ cannot be an equilibrium.

Now I introduce an assumption that rules out the possibility that violence is a strictly dominant strategy for both parties.

**ASSUMPTION 2.** (i) $G > L$ and (ii) $Pr[R > L] \geq (1 - C)$.

Assumption 2 states that the harm that $R$ and $G$ can cause by using violence is limited by their own resources. Part (i) says that the harm that $R$ can cause cannot exceed its own resources. The intuition behind this assumption is that governments experience important constraints in the proportion of their resources they can spend on warfare. Part (ii) captures the idea that rebels are informal armies and therefore have fewer constraints about the methods they can employ, but they also have some resource limitations. Specifically, part (ii) states that although the probability that $R$ is greater than $L$ is not 1 (which would be the case if they operated like the government), this probability is lower bounded. This bound decreases with $C$, which means that when $R$ has more to lose (greater $C$), $R$’s constraints are more severe. This threshold also guarantees that $C$ is not too small to make a violent conflict unavoidable.

Crucially, Assumption 2 implies that $r(p) = p$.

That $r(p) = p$ is always true could make Assumption 2 to look too strong, since in reality there may be circumstances in which rebels attack even if they are not attacked. However, this assumption is not essential for the main result, and helps us to eliminate some uninteresting cases. For instance, without Assumption 2, $C$ can be large enough to make $r = a$ a strictly dominant strategy for the rebels (i.e. that $r(x) = a$ for $x \in \{a, p\}$). Under these circumstances, peace is not possible. It is easy to see that $r = a$ occurs for a sufficiently small $G$ (but $G > L$), which is also true in my main result. Thus, instead of saying that peace is impossible for a sufficiently small $G$, I say that where $G$ is small, peace is very unlikely.

Summarizing, Assumptions 1 and 2 result in $r(a) = a$ and $r(p) = p$. In next two subsections I will identify $g(a)$ and $g(p)$.

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11See “Proof of Proposition 1” in the Appendix.
12The fact that $r(a) = a$ and $r(p) = p$ for all $\phi$ implies that $R$’s actions are insensitive to the likelihood of an external intervention. This rules out the possibility of “moral hazard,” i.e., that an external intervention biased in favour of the rebels motivates them to be more belligerent. This result depends on the assumption that the costs of violence are the same for the government and rebels. This allows us to focus on more interesting results.
3.2 No Externalization

In this subsection I examine the case where $\phi = 0$, which serves as a baseline model for the study of the impact of the risk of externalization on the outcome of conflict. Table II shows the payoff matrix for this case, which results from replacing $\phi = 0$ in Table I.

|       | $r = a$                          | $r = p$                          |
|-------|----------------------------------|----------------------------------|
| $g = a$ | $G : Z(G) - C$                   | $G : Z(G + L) - C$               |
|       | $R : -Z(G) - C$                  | $R : -Z(G + L) - C$              |
| $g = p$ | $G : Z(G - L) - C$               | $G : Z(G)$                       |
|       | $R : -Z(G - L) - C$              | $R : -Z(G)$                      |

I examine $g(a)$ and $g(p)$ (from last subsection, we have that $r(a) = a$ and $r(p) = p$). First, note from Table II that it is always true that $g(a) = a$. This follows directly from Assumption 1, Assumption 2.(i) and the fact that $L > 0$. Since by (3) we also have that $r(a) = a$, this implies that $(a, a)$ is always a NE. The intuition behind this result is that if there is no risk of externalization, $G$ always prefers to attack when attacked; by attacking, $G$ increases its probability of victory without increasing the costs of violence, given that these costs are already present because of $R$’s action.

Second, it is also possible to show from Table II that $g(p) = p$. This new finding, combined with $r(p) = p$, implies that $(p, p)$ is also an equilibrium.

These results are summarized in the following proposition:

**PROPOSITION 1.** If Assumptions 1 and 2 hold, for the case $\phi = 0$, both peace and war are potential outcomes of the game.

*Proof. See Appendix.*

This proposition essentially says that if $\phi = 0$, we have a stag-hunt game with two strict equilibria, $(a, a)$ and $(p, p)$. Note that Assumption 2 is crucial for the existence of two equilibria. If we instead assume that $C$ can be very small and $L$ very large, the only equilibrium is $(a, a)$ and we have a prisoner’s dilemma. As mentioned previously, the assumption that $C$ is not too small to make a violent conflict unavoidable allows us to focus on more interesting cases.

3.3 General Case

I now study the case where $1 \geq \phi \geq 0$. For this situation to occur, a potential externalization and corresponding attack by $F$ must be able to effectively harm $G$. However, the harm doesn’t have to be catastrophic; it is enough that an attack by $F$ causes more harm to $G$ than that caused by $R$. More formally, we need:

\footnote{By Assumption 1 and the fact that $L > 0$, $Z(G) \geq Z(G - L)$, and by Assumption 2.(ii), $G > L > 0$, so $Z(G) > Z(G - L)$.}
ASSUMPTION 3. $F > L$

The intuition for this condition and its relevance is the following. If $F \leq L$, the payoff that $G$ gets when attacking and when externalization occurs is greater than the payoff it gets when $G$ does not attack, but is attacked by the rebels. In other words, when $F \leq L$, attacking is a strictly dominant strategy for $G$, because the harm it suffers from $F$ in the worst-case scenario (where it is attacked by $F$) is smaller than the harm he can suffer from $R$ in the worst-case scenario (where $R$ attacks). Thus, when $F \leq L$, the outcome of the game is the same regardless of the risk of externalization, so $\phi$ can only have an impact when $F > L$.

We can now establish a first simple result, which only requires Assumptions 1, 2 and 3:

**PROPOSITION 2.** As $\phi \to 1$, there is always peace.

*Proof.* See Appendix. \hfill $\square$

I now explore what happens when $\phi < 1$. I introduce the following assumption about $F$; although it is not required for the main result, it simplifies the proof, and does not alter the main argument.

**ASSUMPTION 4.** $F \geq G$

This assumption states that the foreign country is at least as powerful as the domestic government.

I can now establish the main result. It includes the following threshold:

$$\phi = 1 - \frac{Z(F - L)}{Z(F)}$$

(4)

**PROPOSITION 3.** If Assumptions 1 to 4 hold, we have that:

1. If $\phi > \phi$, there exists a unique threshold $\bar{G}(\phi, L, F)$ defined by
   $$\zeta(\bar{G}, L, F, \phi) = 0$$
   (5)

   such that

   (1.1) Peace is the only outcome of the game if $G > \bar{G}(\phi, L, F)$

   (1.2) Both peace and war are potential outcomes of the game if $G \leq \bar{G}(\phi, L, F)$

2. If $\phi \leq \bar{\phi}$, both peace and war are outcomes of the game regardless of $G$.

*Proof.* See Appendix. \hfill $\square$

The intuition of Proposition 3 is as follows. The risk of externalization increases the tolerance of the government to an attack from rebels: when this tolerance is sufficiently large, such that the costs of a violent response are too high, peace is chosen. This is coherent with the “deterrence” hypothesis referred to in the introduction.

What is interesting about this simple mechanism is that the risk of externalization affects the level of tolerance only when the government is sufficiently powerful. A weak government,
when attacked by the rebels, can be seriously harmed, so it prefers to attack too, even if the risk of externalization is very high. In this case, peace is unlikely and the risk of intervention is irrelevant. Conversely, a strong government will not lose a lot when attacked only by the rebels, so it prefers to tolerate this violence rather than risk serious harm in the event of externalization.

To the best of my knowledge, this result is new in the literature. In Section 4, I show that it is crucial to understanding intriguing peace deal between the Colombian government and the FARC. First, however, I expand on the implications of Proposition 3 means, and establish some additional consequences from comparative statics.

**How powerful must the government be to ensure peace?**

In Proposition 3, we have that peace is the only outcome if the government is sufficiently powerful relative to a threshold, denoted by $G$ and implicitly defined in (5). However, it is not clear what this threshold means and, in particular, how is it related to the strength of the government’s main enemy. In the following proposition, I compare $G$ with the expected power of the rebels, that in Assumption 1 was denoted by $R$. Crucially, the result depends on whether $L \geq R$.

**PROPOSITION 4.** For $L \geq R$, it is always the case that $G > R$. For $L \leq R$, there exists a $\phi' \geq \phi > 0$ such that $G < R$ for all $\phi > \phi'$ and $G \geq R$ for all $\phi \leq \phi'$.

**Proof.** See Appendix.

Proposition 4 states that whether or not the government must be significantly more powerful than the rebels in order to ensure peace depends on the relation between $L$ and $R$. On the one hand, when $L > R$, the government must be significantly more powerful than the rebels (such that $G > R$). On the other hand, when $L \leq R$, provided that the risk of externalization is large enough, the government does not need to be more powerful (i.e. $G \sim R > G$), and could even be slightly weaker (such that $R > G > G$).

**3.4 Comparative statics**

In this subsection I characterize $\phi$ and $G$ as defined in (4) and (5), and establish some comparative statics. First, by implicitly differentiating (5), we have the following important consequence:

**COROLLARY 1.** $\frac{\partial G}{\partial \phi} < 0$

**Proof.** See Appendix.

Corollary 1, together with Proposition 1, allows us to characterize the different equilibria as a function of $G$ and $\phi$. This is shown in Figure II. Peace is the only outcome of the game when both $\phi$ and $G$ are large enough. Otherwise, as in the case of no externalization, peace and war are both possible. With a sufficiently small $G$, an increase in the risk of externalization does not affect the probability of peace.
The following corollary establishes the dependence of $G$ and $\phi$ on $F$ and $L$.

**COROLLARY 2.** (i) $\frac{\partial \phi}{\partial F} < 0$; (ii) $\frac{\partial G}{\partial L} > 0$; (iii) $\frac{\partial G}{\partial L} > 0$

**Proof.** See Appendix.

Part (i) of Corollary 2 says that an increase in the resources of the foreign country makes peace more likely by decreasing the risk of externalization necessary to ensure peace. Parts (ii) and (iii) state that an increase in the efficiency of attacks makes peace less likely by increasing both the risk of externalization and the strength of government necessary to ensure peace.

## 4 Case study evidence from Colombia

In this section, I provide case-study evidence from Colombia, a country recently exemplifying the dynamics of the model proposed in the previous section.\textsuperscript{14} I use information from the main actors in the Colombian conflict, as well as from the secondary academic literature. The evidence suggests that in the historic and successful peace negotiations between Colombia and the FARC, occurred between 2010 and 2016 and that ended 52 years of armed conflict, the risk of an interstate conflict with Venezuela and Ecuador, caused by a strategic retreat of the FARC to Colombia’s border regions, played a crucial role. In this section, I argue that the mechanism through which the risk of such interstate conflicts affects decisions is that proposed in the model.

\textsuperscript{14}Reports from Colombia’s Historical Memory Group provide useful background of the Colombian conflict. For a general overview, refer to Grupo de Memoria Histórica (2013b), and for information on the FARC, see Grupo de Memoria Histórica (2013a).
4.1 Background

The conflict between the Colombian government and the FARC dates back to the late 1950s. Its origins have been associated with the founding of the FARC, which was always Colombia’s largest and best-equipped rebel group. The FARC was never affiliated with either of Colombia’s two main political parties (Liberal or Conservative), but was ideologically aligned with the Communist Party. Other smaller rebel groups, also independent of the party system, participated in Colombia’s conflict. These include other left-wing insurgents, and right-wing paramilitaries. Between 1958 and 2012, the conflict claimed at least 220,000 lives.

Since the 1980s until its end, the Colombian conflict was accompanied by a permanent process of negotiation with all groups, including three failed peace talks with the FARC. The most recent attempt, before that occurred between 2010 and 2016 on which I will focus in this section, was known as the “Caguán” peace process, and took place from 1998 to 2002 between the government and the FARC. These talks resoundingly failed. A relatively strong rebel group, amateurish bargaining teams and spoilers (actors who use violence to undermine peace talks) are some of the explanations given for Caguán’s failure. The breakdown of the Caguán peace process led to the election of a relatively new hawkish and far-right president, Alvaro Uribe, and started a period of intense war between the government and the FARC.

4.1.1 Government empowerment

During the 2000s and early 2010s, Colombia’s government pursued an all-out military effort against the FARC. Due to an increase in defense spending and a significant improvement in military effectiveness, the Colombian government achieved relative success: during this period, the FARC suffered the worst blows in its history. According to the Colombian Ministry of Defense, an average of 40 FARC members were captured or killed annually from 2002 and 2011. In the same period, roughly 17 members deserted the FARC each year, and the number of FARC combatants was halved. The government’s military victories also included the killing of several FARC leaders, including its top leader, in an action characterized by the Colombian president as “the most devastating blow that this group has suffered in its history.” These actions were deeply resented by the FARC.

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15 See Grupo de Memoria Histórica (2013b, Chap.. 2).
16 See Palacios and Safford (2002, p. 355) and Grupo de Memoria Histórica (2013a, p. 62).
17 The most important left-wing insurgent other than the FARC is the National Liberation Army (ELN), and among the right-wing paramilitaries, the main group was the United Self-Defense Forces of Colombia (AUC), which officially demobilized in 2006.
18 See Grupo de Memoria Histórica (2013b, p. 31).
19 See Sanchez (2001), Chernick (2009) and Nasi (2006, 2009).
20 See Nasi (2006, 2009) and Kline (2007).
21 See Ministerio de Defensa (2009) and https://www.youtube.com/watch?v=vnuqZ0w0Boo. The exact number of FARC members captured, killed and deserting have been debated by analysts (Avila, 2013; Rico, 2013) and the FARC (FARC-EP, 2013b, February 12), but analysts agree with the government that the number of combatants fell by roughly a half during the 2000s.
22 Translation by the author from https://www.youtube.com/watch?v=UI0CJzJLaU.
23 See http://www.rebelion.org/noticia.php?id=138858.
During this period, the FARC lost presence in key regions in the center of the country (i.e. in the departments of Cundinamarca, Tolima, Boyacá and Santander) and retreated to border areas with Venezuela and Ecuador (i.e. to the departments of Nariño, Cauca, Caquetá, Norte de Santander and Arauca). FARC’s decision to move to the periphery of the country was strategic, given ideological similarities between the FARC and Venezuela’s and Ecuador’s governments, and the porosity of the borders with these two countries. The FARC’s decision, combined with a hawkish military strategy by the Colombian government, brought the three countries to the brink of war. I argue that it also raised the likelihood of a peaceful solution.

4.1.2 On the brink of war

In March 2008, Colombian security forces crossed the border into Ecuador to assault an outpost of the FARC. More than two dozen rebels were killed, including a high-ranking rebel leader thought by many to be FARC’s second-in-command. The Colombian government also captured computers with documents indicating that Venezuela had been supporting the FARC.

The assault caused a serious diplomatic incident between Colombia and Ecuador. Ecuador immediately broke off diplomatic relations with Colombia. Venezuela, in solidarity with Ecuador, expelled Colombia’s ambassador and other diplomats. Venezuela and Ecuador also sent troops to the Colombian border, advising that any additional violations of their sovereignty would result in war. The highest point of tension was in reached in July 2010 when, some weeks before a change in Colombia’s government, the Colombian press secretary provided evidence of a FARC presence in Venezuela to international authorities.

In the following days, the Colombian Ambassador to the Organization of American States (OAS) presented a series of photographs, maps, coordinates, and videos proving the presence of illegal armed groups in Venezuelan territory. Venezuela reacted by breaking off diplomatic relations with Colombia, sending more troops to the border and ordering them to be on full alert. Venezuelan President Hugo Chavez said:

To maintain our dignity, we do not have any other option but to sever diplomatic ties with Colombia ... We will be on alert — I have ordered the maximum alert along our border ... Uribe is a threat for peace. He is even able to establish a fake camp in our territory and raid it to start a war.

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24See IISS (2011) and, in particular, Avila (2013).
25See Owen (2010, p. 257).
26See IISS (2011).
27See The New York Times (2008, March 4).
28See https://www.youtube.com/watch?v=Xp7Gs1-tmlw.
29According to the Colombian press secretary, “For six years the Colombian government sustained a patient dialogue with the Venezuelan government, on various occasions providing it information on the location of terrorists in that territory. All was unsuccessful with respect to terrorist leaders. We must once again consider taking the matter to international authorities.” See Presidencia de Colombia (2010, July 16).
30See OAS (2010, July 22) and https://www.youtube.com/watch?v=J2W0EO27yEY.
31Translation of the author from https://www.youtube.com/watch?v=ql_AFMvwg9U. See also https://www.youtube.com/watch?v=_pMDx1ihhQo
The Colombian government was aware of the high risk of war, particularly if it violated a neighbor’s sovereignty. The Colombian Minister of Defense at the time, Gabriel Silva, said:

I say privately to President Uribe, “If you authorize, I bring Marquez and everyone who are there [in Venezuela], without troops, and I guarantee that these people are in Colombia [...] he did not authorize. He said it was too risky for the country and for national security ... I do believe that a war with Venezuela was very close.” 32

4.1.3 A moment in history

In July 2010, Colombia severed diplomatic relations with Venezuela. Two weeks later, a new Colombian president, Juan Manuel Santos, took office. Elected with a mandate to continue Uribe’s hard-line policies, and closely associated with Uribe’s successful military campaigns against the FARC, Santos was known for his strategic pragmatism. 33

From his early days in office, Santos combined an extremely aggressive campaign against the FARC with an effort to improve diplomatic relations with Venezuela. Ten days after he was sworn in, diplomatic relations with Venezuela were restored, 34 and approximately one month later, Santos announced the death of the FARC’s second-in-command and leader of its strongest fighting division. One year later, the FARC’s top leader, who went by the nom de guerre of Alfonso Cano, was killed. The FARC’s choice for Cano’s replacement, whose nom de guerre was Timochenko, was also influential in the future of the conflict: Timochenko was known for operating along the border with Venezuela, 35 and for having lived there previously. 36 In addition, many people had raised concerns about the close ties between Timochenko and important figures in the Venezuelan government. 37

In September 2012, almost one year after Timochenko had become FARC’s leader, the Colombian president announced that his government and the FARC had agreed to start a peace process. The announcement surprised analysts and important national leaders. 38 These peace talks were the first open negotiations in a decade. In July 2016, Colombian President Juan Manuel Santos and the FARC signed a historic peace deal, formally bringing the country’s more-than-50-year-long civil war to an end. 39 In October 2016, Juan Manuel Santos was awarded the Nobel Peace Prize for his efforts to bring the Colombian civil war to an end. 40

4.2 Analysis

Why did the FARC and the Colombian government decide to pursue peace? I suggest that the risk of externalization of the Colombian conflict to Venezuela is at the root of the peace

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32See Davila (2014, p. 89-91).
33See Revista Semana (2010, June 12).
34This decision would lead to a rupture in Santos’s relationship with Uribe (Davila, 2014, p. 90).
35See El Tiempo (2011b, November 15).
36See El Tiempo (2011a, November 19).
37Timochenko was called the FARC’s “ambassador” to Venezuela (see Caracol Noticias, 2010, March 2).
38See Revista Semana (2012, September 3) for initial reactions.
39See The New York Times (2016a, September 26).
40See The New York Times (2016b, October 7).
deal, creating what some literature on conflict has called a “ripe for resolution” situation.\footnote{See Zartman (2000); Pruitt (2005).}

FARC’s motivations for the last attempt at peace seems to have been clear: it suffered significant setbacks between 2002 and 2011.\footnote{See Pardo (2012), Vargas (2012) and Aljazeera (2012, August 30).} FARC’s leader spoke to the relevance of these setbacks: “I can’t deny we’ve received serious blows — and extremely painful ones. The deaths of four members of the National Secretariat can’t be minimized ... it’s obvious that conditions of today are not the same as those a decade ago.”\footnote{See Carlos Lozano’s website (2012, September 19, 2012), translation of the author.} FARC’s prior losses mean that its costs to have continued the conflict would be very high.

In terms of the model proposed in this paper, FARC’s best response to peace is peace (i.e., $r(p) = p$). It is possible that this had always been FARC’s strategy.\footnote{According to the FARC’s leader, the FARC “negotiate because a political solution has always been our objective, and also that of the people’s movement.” (See Carlos Lozano’s website (2012, September 19, 2012), translation of the author).} In any case, the FARC seems have been aware of the costs of their actions. Asked for the reasons why they decided to negotiate with Santos, the FARC’s leader, Timochenko, said:

Whatever may come, persistent conflict will entail many more deaths and great destruction, more sorrow and tears, more poverty and misery for some and greater wealth for others. Imagine the lives that could have been saved these 10 years. That’s why we seek negotiations, a solution without blood, and an understanding through political routes.\footnote{See Carlos Lozano’s website (2012, September 19, 2012), translation of the author.}

This awareness was also recognized by FARC’s representative of the peace delegation, Pablo Catatumbo:

We are ready to start preparing the way that will lead us towards the expression of our regret for what has happened ... No doubt there has also been harshness and pain caused from our side.\footnote{See FARC-EP (2013a).}

The Colombian government’s motivations for negotiating with the FARC seems to have been less apparent. However, analysts and the Colombian government have highlighted an increase in the power of Colombian forces relative to those of the FARC. At this respect, Colombian president Santos said in 2012, “If we can talk about peace now ... it is because of the effectiveness of our armed forces.”\footnote{See Presidencia de Colombia (2012b, October 25, 2012), translation of the author.}

But if the Colombian government was winning the war, why wouldn’t it continue fighting the FARC for a few more years, as advocated for by former president Uribe?\footnote{See Caracol Noticias (2012, October 28, 2012).} War is costly and unpredictable, so rational agents should have incentives to reach peaceful settlements that all would prefer to the war.\footnote{See Fearon (1995) and Jackson and Morelli (2011).} However, from the point of view of the majority of the Colombian population, media, and important leaders (mostly from the right), just before the peace talks were made public, the FARC were close to being defeated. Thus, the government’s
cost of war could be perceived as being very low. In fact, at the time, a peace process seemed riskier. I argue that the reason the government chose peace is because of a high risk of an international conflict with Venezuela.

In the terms of the model, it is clear that just before the start of the peace talks, the strength of the government, $G$, was significantly greater than the strength of the rebels, $R$ (i.e $G \gg R$). According to Proposition 4, this should be sufficient for having $G > \bar{G}$. In Proposition 3, I showed that having $G > \bar{G}$ is not a sufficient condition for peace. There also needs to exist a possibility that the domestic conflict could externalize, and that the risk of such event, $\phi$, is sufficiently high. The evidence suggests that these conditions existed in Colombia.

In subsection 4.1.2, I showed that just before Santos took power, the risk of an interstate conflict between Colombia and Venezuela was extremely high. This risk was directly related to the presence of the FARC in Venezuelan territory, the very likely possibility that Colombia might violate Venezuelan sovereignty to pursue the rebels, and Venezuela’s determination to respond in the event this happened. Thus, in terms of the model, it is clear that $\phi$ was very high just before the start of the peace talks.

The theory proposed in Sections 2 and 3 is supported by the fact that Venezuela played an important role in the peace process. Although four different countries were officially “accompanying the process,” both the FARC and the Colombian government recognized that Venezuela played a crucial role. “Venezuela’s role here has been fundamental,” a member of the FARC peace delegation said. “Had it not been for Commander Chávez, the FARC would not have had the necessary trust to talk.”

This “trust” was so important that any difference between the two countries’ governments might put the talks in jeopardy. When the Venezuelan government announced that it might “rethink” its role in the peace process after a meeting between the Venezuelan opposition leader and the Colombian president, the peace process was in crisis; the FARC expressed very serious concerns about the future of negotiations, and the leader of the Colombian delegation said that the situation was “very worrying.”

But how did Venezuela get the FARC to “trust” in the peace talks? The source is likely not solely Venezuela’s ideological support. Cuba also participated in the process and is ideologically very close to the FARC, but has not been as influential. Given the precedents described in subsection 4.1.2, geographical proximity is likely what mattered. Colombian

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50 In the speech announcing the opening of peace talks, Santos said, “There comes a moment in history when you have to take risks to arrive at a solution.... This is one of those moments.” (See Presidencia de Colombia, 2012a, September 4, 2012, translation of the author).
51 The countries are Cuba, Chile, Norway and Venezuela (see Presidencia de Colombia 2013b, November 7, 2013).
52 The Colombian president stated, “If we go into a solid peace project, with clear and concrete progress, progress achieved ever before with the FARC, is also due to the dedication and commitment of Chavez and the government of Venezuela.” (see Presidencia de Colombia (2013a, March 5, 2013)). The FARC also emphasized the role played by Venezuela: “We ought to recognize the invaluable cooperation of the government of the Bolivarian Republic of Venezuela, at the head of Mister President Hugo Rafael Chávez Frías, which has been decisive to come to this Agreement.” (see FARC-EP, 2012).
53 See Semanario voz (2013, March 11), translation of the author.
54 See Caracol Noticias (2013).
intelligence documents leaked in 2014 are consistent with this hypothesis.\textsuperscript{55} These documents, which Colombian government officials were aware of, show that the improvement in the relations between Colombia and Venezuela did not imply a deterioration in relations between Venezuela and the FARC. It is plausible that during the peace talks many of the FARC’s top leaders, including Timochenko, lived in Venezuela. Also, an important number of FARC fronts moved along the border.\textsuperscript{56} According to the same leak, the Venezuelan government was also aware of this information.

Thus, Venezuela’s role in building the FARC’s trust was probably based on its support, which was not only ideological, but mostly material, given the geography of the conflict. This support made it very difficult and extremely risky for the Colombian government to capture FARC leaders, as well as fight rebels moving along the border. The Colombian government knew this and, in particular, knew that despite its strength (i.e. $G > \overline{G}$), a victory for the government necessarily implied a risk of a conflict with Venezuela. Given Venezuela’s commitment to respond to a violation of its sovereignty, this risk was very high (i.e. $\phi > \overline{\phi}$). Thus, the best response for the Colombian government was to tolerate the activities of the FARC along the border (i.e. $g(x) = p$ for $x \in \{a,p\}$); its probability of losing power was very low, provided that there was not an interstate conflict with Venezuela. Thus, as shown in Sections 2 and 3, this should have implied a peaceful outcome.

\section{Conclusion}

In this paper, I develop a simple model of conflict externalization and provide new evidence from Colombia. The main contribution of the paper is to show that the risk of externalization of a domestic conflict increases the likelihood of peace, but that this only happens if, on the one hand, the domestic government is sufficiently powerful relative to its opposition, and on the other hand, the risk of a foreign party intervening is sufficiently high.

In the second part of the paper, I use the model to examine the development of the Colombian internal conflict. I focus on the peace talks, occurred between 2010 and 2016, between the Colombian government and the FARC. I show that the risk of externalization of the conflict to Venezuela played crucial role in the historic success of these talks.

Although the theory is inspired by the Colombian conflict, its application is not limited to this case. The argument can be applied to any internal conflict in which governments, undertaking cross-border counterinsurgency actions, initiate military actions against neighboring states. While other explanations exist to explain how Colombian peace talks evolved, such as less ideological extremism and less militarism from both parties, I argue that there is enough evidence to believe that the possibility of externalization should be taken into account in any discussion of the issue.

\textsuperscript{55}See Davila (2014).
\textsuperscript{56}See Davila (2014, p. 103-116).
Appendix

Proof of Proposition 1. We know that \( r(a) = a \) and \( g(a) = a \). Thus, war (i.e. \((a,a)\)) is a NE. We first show that \( r(p) = p \), then that \( g(p) = p \), both implying that peace (i.e. \((p,p)\)) is a NE too.

Let’s define the functions \( l, m \) and \( s \), as

\[
\begin{align*}
\rho(G, L) &= Z(G) - Z(G - L) - C \quad \text{(6)} \\
\zeta(G, L, F, \phi) &= \phi Z(G - F) + (1 - \phi) Z(G) - Z(G - L) \quad \text{(7)} \\
\eta(G, L, F, \phi) &= \phi Z(G + L - F) + (1 - \phi) Z(G + L) - Z(G) - C \quad \text{(8)}
\end{align*}
\]

These functions are constructed directly from Table I, by comparing each player’s choices. The sign of each function determines the corresponding best response. Specifically,

\[
\begin{align*}
r(p) = p &\iff \rho < 0 \\
g(p) = p &\iff \eta < 0 \\
g(a) = p &\iff \zeta < 0
\end{align*}
\]

By (9) and (10), note that \((p,p)\) is a NE when \( \rho < 0 \) and \( \eta < 0 \); by (3) and (11), \((a,a)\) is a NE when \( \zeta > 0 \); and by (9) and (11), \((p,a)\) is a NE when \( \rho > 0 \) and \( \zeta < 0 \). Also note that \((p,p)\) can be unique only when, in addition to \( \rho < 0 \) and \( \eta < 0 \), we have \( \zeta < 0 \).

A close look at \( \rho(G, L) \) in (6) shows that, with respect to \( G \), \( \rho \) is inverse U-shaped with an unique maximum at \( L \). To see this, note in (6) that for \( G < L \), \( \rho(G, L) = Z(G) - C \), since \( Z(x) = 0 \) for all \( x < 0 \). Thus, since by Assumption 1, \( Z' > 0 \), we have that \( \rho_G(G, L) = Z'(G) > 0 \) for all \( G < L \). For \( G > L \), note that \( \rho_G(G, L) = Z'(G) - Z'(G - L) < 0 \), since by Assumption 1, \( Z'' < 0 \).

Let us now look at \( r(p) = p \), which we noted is implied by Assumption 2. To see this, note first that \( Pr[R > L] = 1 - Pr[L > R] = 1 - Z(L) \). Replacing this expression in Assumption 2.(ii), we get \( Z(L) - C \leq 0 \). Then observing that since \( \rho(L, L) = Z(L) - C \leq 0 \), and \( \rho(G, L) \) has a (unique) maximum at \( G = L \), we have \( 0 \geq \rho(L, L) > \rho(G, L) \) for all \( G > L \). Thus, \( 0 \geq \rho(G, L) \), which by (9) implies that \( r(p) = p \).

Finally, \( g(p) = p \) follows from Assumption 1 and Assumption 2.(ii), by noting that from both (6) and (8), we have that \( \rho(G, L) < 0 \Rightarrow \eta(G, L, 0) < 0 \). Since we already found that \( \rho(G, L) < 0 \), by (10), we have the result. To see this, note that \( \eta(G, L, 0) < 0 < \rho(G, L) \) if and only if

\[
Z(G + L) + Z(G - L) < 2Z(G)
\]

and by the strict concavity of \( Z \) (Assumption 1), we have that

\[
\frac{Z(G + L)}{2} + \frac{Z(G - L)}{2} < Z\left(\frac{(G + L)}{2} + \frac{(G - L)}{2}\right) = Z(G)
\]

Proof of Proposition 2. Let \( \phi \to 1 \) in (7) and (8). First, note that this implies that \( \zeta < 0 \) and \( \eta < 0 \), because \( Z' > 0 \) and \( F > L \) by Assumptions 1 and 3 respectively. Thus, by (10) and (11) we have that: \( (i) \ g(p) = p; \) this implies that \((p,p)\) is an equilibrium (since by Assumptions 1 and 2 we know that \( r(p) = p \)); and \( (ii) \ g(a) = p; \) this guarantees that \((p,p)\) is unique (since the other possible equilibrium was \((a,a)\)).
Proof of Proposition 3. We show that $(p, p)$ exists, and then we establish the conditions under which it is unique. The proof for the existence of $(p, p)$ is as follows. Note that by (10), it is sufficient to show that $\eta(G, L, F, \phi) < 0$, which implies that $g(p) = p$, since we know that $r(p) = p$. Re-writing (8), we have that $\eta(G, L, F, \phi) < 0$ is equivalent to

$$\phi > \frac{Z(G + L) - Z(G) - C}{Z(G + L) - Z(G + L - F)}$$

(12)

Note that (12) is always true since the term on the right is negative. To see this, note that the numerator of the expression on the right is equal to $\eta(G, L, \cdot, 0) < 0$, and as shown in the proof of Proposition 1, $\rho(G, L) < 0 \Rightarrow \eta(G, L, \cdot, 0) < 0$.

I now establish the conditions for the existence of an equilibrium of $(a, a)$. Note that $(a, a)$ exists if and only if $g(a) = a$, which by (11) is equivalent to $\zeta(G, \phi) \geq 0$. Equivalently, $(p, p)$ is unique if and only $g(a) = p$ which by (11) is equivalent to $\zeta(G, L, F, \phi) < 0$. I first show that if $\phi$ is large enough, there exists an unique cut off point $\overline{G}(\phi, L, F)$ implicitly defined by $\zeta(\overline{G}, L, F, \phi) = 0$, such that $\zeta(G, L, F, \phi) < 0$ for all $G > \overline{G}$, and $\zeta(G, L, F, \phi) \geq 0$ for all $G \leq \overline{G}$.

To establish the existence of $\overline{G}$, let us define the following threshold for $\phi$

$$\overline{\phi} = 1 - \frac{Z(F - L)}{Z(F)}$$

(13)

I argue that $\overline{G}$ exists if and only if $\phi > \overline{\phi}$. Note that by (8), the condition $\phi > \overline{\phi}$ is equivalent to $\zeta(F, L, F, \phi) < 0$. Thus, $\phi < \overline{\phi}$ implies that $\zeta(F, L, F, \phi) \geq 0$. If $\phi > \overline{\phi}$, the proof that there is an unique $\overline{G}$ such that $\zeta(\overline{G}, L, F, \phi) = 0$ is as follows.

First, note that $\zeta(L, L, F, \phi) > 0$. To see this, note that $F > L$ (true by Assumption 3) and Assumption 1 implies that

$$\zeta(L, L, F, \phi) = \phi Z(L - F) + (1 - \phi)Z(L) - Z(L - L)$$

$$= (1 - \phi)Z(L)$$

$$> 0$$

Second, note that $\zeta(G, L, F, \phi)$ is strictly decreasing in $G$ for $L < G \leq F$. This follows directly from the fact that $Z(G - F) = 0$ and Assumption 1. Differentiating $\zeta(G, L, F, \phi)$ with respect to $G$, we get

$$\zeta_G(G, L, F, \phi) = (1 - \phi)z(G) - z(G - L)$$

and by Assumption 1, $z(G - L) > z(G)$, so $\zeta_G(G, L, F, \phi) < 0$. Third, recall that $\phi > \overline{\phi}$ implies $\zeta(F, L, F, \phi) < 0$.

We can now argue that $\overline{G}$ exists and is unique for $\phi > \overline{\phi}$: $\zeta(L, L, F, \phi) > 0$, $\zeta(F, L, F, \phi) < 0$, $\zeta_G(G, L, F, \phi) < 0$ for $L < G \leq F$ and the continuity of $\zeta$ with respect to $G$ implies that there exists a unique $\overline{G}$ such that $\zeta(\overline{G}, L, F, \phi) = 0$ for $L < G \leq F$. Note that $L < \overline{G} \leq F$. Note also that $\zeta_G(G, L, F, \phi) < 0$ implies that $\zeta(G, L, F, \phi) < 0$ for all $G > \overline{G}$.

We have shown that if $\phi > \overline{\phi}$, there is an unique $\overline{G}$ such that $\zeta(G, L, F, \phi) < 0$ for all $G > \overline{G}$. We now prove that if $\phi \leq \overline{\phi}$, or if $\phi > \overline{\phi}$ but $G \leq \overline{G}$, then $\zeta(G, L, F, \phi) \geq 0$. The proof is straightforward. Since $\zeta(G, L, F, \phi)$ is strictly decreasing for all $L < G \leq F$, the fact that $L \leq \overline{G} \leq F$ implies that $\zeta(G, L, F, \phi) \geq 0$ for all $G \leq \overline{G}$. Now suppose that $\phi \leq \overline{\phi}$. Note that by (13), this implies that $\zeta(F, L, F, \phi) \geq 0$. For $L < G \leq F$, since $\zeta(G, L, F, \phi)$ is strictly decreasing with a minimum at $G = F$, thus $\zeta(G, L, F, \phi) \geq 0$.

We conclude that (i) if $G > \overline{G}$ and $\phi > \overline{\phi}$, $g(p) = p$, $g(a) = p$, $r(p) = p$, which implies that $(p, p)$ is unique; (ii) if $\phi \leq \overline{\phi}$ or $\phi > \overline{\phi}$ but $G < \overline{G}$, we have two equilibria, $(a, a)$ and $(p, p)$.

□
Proof of Proposition 4. For the case \( L \geq R \), it is trivially true that \( G > R \); by Assumption 2, \( G > L \) for all \( G \), particularly for \( \overline{G} \). For \( L < R \), it is crucial that \( G \) is a function of \( \phi \). Note that \( \phi \geq \overline{\phi} \), since for \( \phi < \overline{\phi} \), \( \overline{G} \) might not exist.

Let’s first assume that \( R < F \). Note that in (7), taking the limit when \( \phi \to 1 \), we have, by Assumptions 1 to 4, that \( \lim_{\phi \to 1} G(\phi, L, F) \leq L \). Also note that \( G \) is strictly decreasing in \( \phi \) (see proof of Corollary 1). Then there is a \( \phi'' \geq \overline{\phi} \) such that \( G(\phi'', L, F) = F \). Thus, since by the continuity of \( \zeta \), \( G(\phi, L, F) \) is continuous in \( \phi \), and there exists a \( \phi^* \geq \overline{\phi} \) such that \( G(\phi^*, L, F) = \overline{R} \).

Proof of Corollaries 1 and 2. The proof is a direct application of the implicit function theorem. Note that by the definitions of \( \zeta(G, L, F, \phi) \) and \( \overline{G} \),

\[
\frac{\partial \overline{G}}{\partial \phi} = -\frac{\frac{\partial \zeta}{\partial \phi}}{\frac{\partial \zeta}{\partial G}} = \frac{Z(G) - Z(G - F)}{(1 - \phi)z(G) - z(G - L)} < 0
\]

and

\[
\frac{\partial \overline{G}}{\partial L} = \frac{\frac{\partial \zeta}{\partial L}}{\frac{\partial \zeta}{\partial G}} = -\frac{z(G - L)}{(1 - \phi)z(G) - z(G - L)} > 0
\]

and finally, differentiating (13), we get

\[
\frac{\partial \phi}{\partial L} = \frac{z(F - L)}{Z(F)} > 0
\]

\[
\frac{\partial \phi}{\partial F} = \frac{z(F)Z(F - L) - z(F - L)Z(F)}{(Z(F))^2} < 0
\]

where the second relation is true since \( Z'' < 0 \) implies that \( \frac{z(x)}{Z(x)} \) is monotone decreasing, so the numerator is negative. □
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