Economic Interdependence and International Interactions: The Impact of Third-Party Trade on Political Conflict and Cooperation

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Abstract

This article presents an empirical analysis of the relationship between economic interdependence and international third-party interactions. If countries seek to protect their trade gains, the trade-conflict model predicts that trade reduces conflict between pairs of countries, designated “actors” and “targets”. This paper extends the trade-conflict model to garner implications concerning trade and conflict interactions where third parties are involved. The theoretical propositions supported by proofs are as follows: (1) Increasing trade by an “actor” with a third party will decrease conflict with a “target”, if the third party and target are “friends”, who already have a negative level of mutual conflict. (2) Increasing trade with a third party will increase conflict with a target, if the third party and target are “rivals”, having a positive level of mutual conflict. A similar relationship is also discussed and tested if conflict increases or decreases between the actor and third party. The empirical results of tests using a 30-country sample from the
Conflict and Peace Data Bank (COPDAB) generally support the hypotheses. Trade increases communication between states and promotes peace. Therefore, according to the implications of structural balance theory, the imbalance in a triadic relationship can be resolved by international trade. Thus, increasing world trade will give positive effect to the maxim: “a friend of a friend is a friend”.

**Keywords:** Conflict, Cooperation, Trade, Third Party, International Interaction

1. Introduction

Although at first sight the world may seem as primitive as ever, much has changed. Technological progress and the continuing process of economic internationalization have enlarged the human horizon considerably. A catch-word for the effects on the human environment is “interdependence” which includes the effects on social, economic, cultural, and military relations. Growing interdependence in an international context can be regarded as a process of enlarging the system in which human beings organize themselves. The traditional inter-state system has turned more and more into a complex social system with a much greater variety of actors.¹ This brings us to a question: Is the rapid quantitative (more

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actors) and qualitative (complex interdependence between actors) expansion of the international system, sufficiently reflected in the international legal standards which would guide and correct the behavior of the individual actors in the international system? A legal system can be regarded as successful if it can play its part in securing the stability and survival of the social system to which it belongs. But, what can we do if the international legal system cannot work well? If dyadic disputes can not be resolved through bilateral negotiations, it raises a further question: Does growing international interdependence create opportunities for the strengthening of mechanisms for peaceful settlement of international disputes through obligatory third party intervention? The central question in the investigation would be whether and how a correlation exists between emerging high levels of interdependence between states and their acceptance of compulsory third party dispute settlement procedures. The main purpose of this research will focus on the importance of economic interdependence among countries in relation to international interactions.

In an interdependent system, violent conflict anywhere threatens the very stability of the system, and thus effective diplomatic processes are required to prevent the outbreak of widespread violence and chaos within the global system. Once a conflict arises, international negotiation is the primary method by which social actors settle their disputes. There has been a surge of interest in

2. There are three modes for conflict resolution: (I) unilateral, (II) bilateral, (III) third-party assistance and three categories of mediators— (i) individuals, (ii) states, (iii) governmental or nongovernmental institutions and organizations (e.g., the UN, GATT/WTO, IMF). For details, see Jacob
analyzing the role of the third party in international interactions. Countries can employ the assistance of some third party to help them resolve their conflicts. Third parties can play a variety of roles in an ongoing dispute (Young, 1967; Mitchell, 1988). The third party actively participates in the settlement process, but only offers suggestions for a possible solution. Mediation basically is a variant of negotiation (Touval, 1982). As pointed out by Hopmann [1996, pp.232]: “The role of the mediator, then, is to facilitate mutual and simultaneous flexibility. The mediator may begin by attempting to clarify the fundamental interests of the two parties as well as their limits to acceptable agreement.”

However, sometimes third parties have variable motives for mediating a dispute. They probably become principals in a triangular bargaining process where they work toward an outcome favorable to their own national objectives, regardless of the grievances voiced by actors.


(2000) also developed a modified model and suggested that the attacker’s ability to choose the stakes of war can weaken the third-party defender’s ability to deter an attack. Hopmann (1996, ch.12) further presented some criteria regarding who should be selected as a third party and five major kinds of roles that mediators can play in international negotiations. The focus on an obligatory role for a third party in dispute settlement facilitates an assessment on the basis of empirical observation of the degree to which states are willing to accept the international legal system or rule as the basis for their behavior (e.g., Huth and Russett 1988; Bercovitch and Langley 1993; Raymond, 1994; Smith, 1996; Dixon, 1996; Bercovitch and Schneider, 2000; Jackson, 2000). For example, Dixon (1996) proposed seven forms of third-party techniques of conflict management in relation to the de-escalation of disputes and their peaceful settlement. Jackson (2000) provided empirical evidence to examine some important factors that affect negotiation

The acceptance of third-party dispute settlement procedures, and their application in practice, can serve as a more or less unbiased proxy for the extent to which states are prepared to subject themselves to the rule of international law.

Some substantial literatures that examine the likelihood of third parties joining in wars (e.g., Altfield and Bueno de Mesquita, 1979; Holsti et al., 1973; Kim, 1995; Sabrosky, 1980; Singer and Small, 1966a, b; Siverson and King, 1979, 1980; Smith, 1996). Altfield and Bueno de Mesquita (1979) use an expected utility model to predict that intervention depends on the utility gained from one or the other party winning. If a third party gains considerable utility from country i winning instead of country j, then intervention is more likely. Studies incorporating third parties model alliance formation as a function of potential wealth increases through gains from trade (e.g. Altfield, 1984; Morrow, 1991; Simon and Gartzke, 1996). Many alliances contain both large and small countries. Small countries have an incentive to join such an alliance due to the security a large country can offer. Large countries may not gain substantial security from allying with a small country, but may gain a market for the export of goods. These export markets provide large countries with gains from trade and increased wealth.

Smith (1996) further referred the idea of alliance reliability and concluded that nations with unreliable allies are more likely to surrender if attacked than are nations with reliable allies.

In spite of numerous attempts by third parties to analyze international political interactions, these studies obviously neglect the role of economic interdependence in third-party relations. The neoliberals claim that trade reduces conflict between countries (e.g. Polachek, 1978, 1980, 1997; Blaine; 1988; Neff, 1990; Domke, 1988; Mansfield, 1994; Oneal et al., 1996; Reuveny and Kang, 1996; Russet et al., 1998; Dorussen, 1999; Oneal and Russett, 1999; Polachek et al., 1999; Hegre, 2000; Russett and Oneal, 2001; Chang, forthcoming). This argument can be traced to Emeric Cruce, Francois Qesnay, Adam Smith, David Hume, Cobden, John Bright, John Stuart Mill, and Baron de Montesquieu who discuss similar themes. Subsequently, the trade-conflict literature has been extended to examine other questions. For example, as is well known, democracies fight each other less than non-democracies. This topic


can also be extended to discuss the third-party relationship. For example, Dixon (1993) indicated that democratically governed countries are more likely than others to resolve their disputes with the assistance of third parties. Raymond (1994) provided evidence that the presence of joint democracy in war-prone dyads has a strong positive effect on the probability of referring interstate disputes to binding third-party settlement, even when controlling for alliance bonds and geographic proximity. However, few studies that examine the trade-conflict relationships also address international

third-party interactions. Polachek, Robst and Chang (1999) extended the trade-conflict model by incorporating foreign aid, tariffs, contiguity, and country size, while treating the terms of trade as given variables. Their brief results generally support the developed hypotheses, but many empirical questions were left unanswered. This research will extend the trade-conflict model that treats trade as an independent variable, in order to focus on the third-party conflict associated with trade. In addition to deriving the theoretical hypotheses, the empirical results will be examined.

The paper is structured as follows. This section serves as a simple introduction and a brief literature review. Section 2 presents the basic trade-conflict model of Polachek (1978) that is extended to derive third-party interactions. Section 3 discusses the sources of data. Section 4 provides the methodology and empirical results, and Section 5 concludes.

2. The Model

A world system encompasses numerous countries, many trading with each other because the virtues of trade make each country better off economically. What results is a system of inter-country interdependencies, which if based on free market principles including free trade and the full mobility of resources, would result in maximal global output. Any country breaking off such a trade relationship would decrease its own long-run economic well-being, as well as perhaps the well-being of its trading partners and of other countries (Anderton and Carter, 2001). As such, reneging on a trade relationship is costly from a private as well as a global perspective.
2.1 The Trade-Conflict Analytics

To see how these potential welfare losses lead to greater cooperation and less conflict, more structure needs to be introduced. First, an actor country’s social welfare function is defined as $W(C, Z)$. The variable $C$ is total domestic consumption which is defined as:

$$C = Q - \sum_{i=1}^{n} x_i + \sum_{i=1}^{n} m_i$$

(1)

where $Q$ is domestic production of a representative commodity, $x_i$ are exports of a representative commodity to country $i$, and $m_i$ are imports of a representative commodity from country $i$. By including $C$, as defined, our approach is consistent with economic theory paradigms that describe how countries maximize their collective well-beings. The variable $Z = (z_1, z_2, ..., z_n)$ represents a militarized and political interstate conflict vector where each $z_i$ stands for conflict towards a particular country $i$. If $z_i$ is greater than zero, this implies that there is more conflict than cooperation, while a $z_i$ that is less than zero implies there is more cooperation than conflict. Realist theories that emphasize the importance of national security motive include the political relations variable $Z$ (Keohane and Nye, 1989). Typically:

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9. We can have $m$ commodities as in Solomon W. Polachek, “Conflict and Trade,” *Journal of Conflict Resolution*, No.24(1980), pp.55-78. However, introducing such complications does not alter the analysis, merely the number of subscripts.
\[ \frac{\partial W}{\partial C} = W_c > 0 \]  

(2)

denotes increased welfare achieved through increased domestic consumption. Similarly:

\[ \frac{\partial W}{\partial Z} = W_z \]  

(3)

defines welfare associated with conflict. \(W_z\) can be positive if an actor gains satisfaction when behaving conflictually towards another country.

In the beginning, countries face a trade pattern based on expected or existing international relations (i.e., relations based on conflict or cooperation). There are a variety of methods through which conflict may influence trade, including tariffs, quotas, embargoes, or other trade prohibitions. For simplicity, we view conflict as making trade more costly by affecting import and export prices. That is conflict is assumed to affect the terms of trade. If a target country responds to an actor’s conflict by decreasing the price it will pay for the actor’s exports, then conflict (on the part of an actor) raises the costs of trade. This implies decreased trade and a loss of the usual “gains from trade”. Similarly gains from trade are lost if a conflictual actor has to pay higher prices for imports from a target recipient of its conflict. This means that export price \(p_x\) and import price \(p_m\) are a function of conflict such that \(\dot{p}_x(z_i)<0\), \(\dot{p}_m(z_i)<0\) and \(\ddot{p}_x(z_i)<0\), \(\ddot{p}_m(z_i)<0\). Thus, the implicit price of being hostile is the diminution of welfare associated with potential trade losses.
Under this trade-conflict relationship, the actor country will choose an optimal level of conflict towards the ith target country \((z_i)\) so as to maximize the social welfare function with positive but diminishing marginal utility of consumption and marginal utility of conflict; such that \(W_c > 0, W_{cc} < 0, W_z > 0, W_{zz} < 0,\) and \(W_{zzz} = W_{zz}.\) For simplicity, we assume that the social welfare function is separable in \(C\) and \(Z\) (i.e., \(W_{zc} = 0\)), implying that the consumption of conflict and the consumption of other commodities are independent. Materialistic goals clearly imply that greater consumption yields higher welfare levels. The first derivative \(W_z\) is the innate marginal benefit of additional conflict towards another country, namely, the benefit (if it exists) of hatred.\(^{11}\) The second partial derivative \(W_{zz}\) depicts how this hatred is affected by increased conflict towards


\(^{11}\) In international relations, it might be argued that if nations feel forced to choose conflict as the “least undesirable” course of action available to them, there should always be some positive marginal benefit attached to this choice. One could further simplify by assuming that there is no direct welfare gain from conflict, i.e., \(W_z = 0.\) However, because we will define allies in terms of cross-effects (\(W_{zz}\)), we allow for \(W\) to be a function of \(Z\) Solomon W. Polachek, John Robst and Yuan-Ching Chang, “Liberalism and Interdependence: Extending the Trade-Conflict Model,” *Journal of Peace Research*, Vol.36, No.4(1999), pp.405-422, For the possibility that \(W_z < 0,\) see Solomon W. Polachek, “Dyadic Dispute”, *op. cit.*; Solomon W. Polachek, “Conflict and Trade,” *Journal of Conflict Resolution*, No.24(1980), pp.55-78.
a third party. For example, $W_{zi}>0$ implies that actor conflict vented towards country $j$ reinforces the benefits of an actor’s conflict towards country $i$. Thus if rival target countries $i$ and $j$ are friends with each other but rivals of the actor, conflict with one reinforces conflict with another. This relationship is consistent with the maxim “a friend of a rival is a rival”. Alternatively, cooperation with one reinforces cooperation with another or “a friend of a friend is a friend”. On the other hand, $W_{zi}<0$ implies the opposite, namely that increased conflict with one country decreases the satisfaction of conflict with the other. This negative partial derivative is consistent with “a rival of a rival is a friend”. Alternatively, one can interpret this negative sign to imply that cooperation with another country (e.g. country #1) decreases the satisfaction of cooperation with a second country (country #2) or “a rival of a friend is a rival”.$^{12}$

Given this structure, the actor’s domestic welfare is as high as possible when it chooses conflict $Z$ to maximize $W(C, Z)$ subject
to the balance of payments constraint, \( \sum_{t=1}^{n} I_t x_t = \sum_{t=1}^{n} I_t m_t = 0 \). That is, if the actor only considers the purely direct effect of trade gains on conflict, it faces the following maximization problem:

\[
\text{Max } L = W(Q + \sum_{t=1}^{n} m_t - \sum_{t=1}^{n} x_t, Z) + \left( \sum_{t=1}^{n} I_t x_t - \sum_{t=1}^{n} I_t m_t \right)
\]

(4)

First order conditions imply, for \( i=1 \) to \( n \),

\[
W_{x_i} + \lambda (x_i p'_i - m_t p'_m) = 0
\]

(5)

The FOCs simply state that, at the margin, an actor country chooses an amount of conflict with country \( #i \) so as to equate the conflict’s marginal costs \( (m_i p'_m - x_i p'_c) \)

\[\text{[Footnote]}\]

and marginal benefits \( (W_z/\lambda) \). For simplicity, we can assume that an actor interacts with only two possible targets. In this simple two-country case, the comparative statics shows (see Appendix):

\[
\frac{\partial z_1}{\partial x_1} < 0 \text{ and } \frac{\partial z_1}{\partial m_1} < 0.
\]

Thus the actor’s conflict towards the target falls as exports from the actor to the target and/or imports from the target to the actor

\footnote{We assume the marginal welfare gain from trade \( \lambda \) is positive and constant across countries. While questionable, this assumption is necessary to reach the conclusions from the model (Solomom W. Polachek, John Robst and Yuan-Ching Chang, \textit{op. cit.})}
increase. This is the neoliberalists’s o-called result that trade reduces conflict.

The above optimality conditions can be illustrated graphically for the first target in Figure 1. A similar depiction is given in Polachek (1978, 1980). The MC curve depicts the marginal cost of conflict. It is upward sloping since the second derivative of the balance of payments constraint is positive, which indicates that higher levels of conflict result in higher costs. The MG curve depicts the marginal welfare gains from conflict. The optimal amount of conflict towards the ith target country is where the MG and MC curves intersect at point A. This outcome comes from the first order condition (FOC) of the model.

One can apply Figure 1 to illustrate how trade affects conflict. Greater levels of trade imply either greater exports $x_1$, greater imports $m_1$, or both. Import and export values are contained in the marginal cost function. Since $p_m'$ is positive, greater import levels imply a larger $m_1$ and a higher MC curve. In turn, this higher marginal cost curve implies less conflict and more cooperation since the MC* curve now intersects the MG curve further to the left at point B. Similarly, since $p_x'$ is negative, greater $x_1$ values also imply a higher MC curve and hence lower levels of conflict.

Next we consider how trade with one country may influence conflict with another country.

2.2 Trade and Third Party Conflict

By expressing conflict vented towards the various countries separately (i.e., by considering $W(\cdot, Z(z_1,z_2,\ldots,z_n))$, one can examine the effect of trade with one country on the conflict with another.
As was stated earlier, $W_{z_1 z_2} > 0$ and $W_{z_1 z_2} < 0$ have political interpretations. From an actor country’s vantage, $W_{z_1 z_2} > 0$ implies that an actor’s conflict vented towards country #1 reinforces the marginal benefits of an actor’s conflict towards country #2. Thus if target countries #1 and #2 are friends, a conflict with one reinforces the conflict with the other. We claim that defining $W_{z_1 z_2} > 0$ to occur when countries #1 and #2 are friends implies that increasing trade with country #1 decreases the conflict with country #2, i.e., trade decreases the conflict with friends of a trading partner. This relationship is consistent with the maxims “a friend of a rival is a rival” or “a friend of a friend is a friend”. In other words, if the actor and target #1 become friendlier (increase trade), and countries #1 and #2 are friends, we predict that the actor and target #2 will become friendlier (conflict decreases). Furthermore, $W_{z_1 z_2} < 0$ implies that conflict towards country #1 decreases the conflict’s marginal benefit towards country #2 which suggests that countries #1 and #2 are rivals. We claim that an increase in trade between an actor and target #1 reduces conflict with target #1, thereby increasing the marginal benefits of conflict with country #2. This is consistent with “a rival of a friend is a rival” or “a rival of a rival is a friend”, and one can show that increased trade with country #1 actually increases conflict with country #2.

The stated above can be explained by the following comparative statics (see Appendix):

$$\frac{\partial z_2}{\partial x_1} > 0 \text{ if } W_{z_1 z_2} > 0 \text{ and } \frac{\partial z_2}{\partial m_1} < 0 \text{ if } W_{z_1 z_2} < 0.$$  (7)
Thus increasing exports to country #1 will decrease conflict with country #2 ($\frac{\partial z_2}{\partial x_1} < 0$), if countries #1 and #2 are friends ($W_{z_1 z_2} > 0$).

Increasing exports to country #1 will increase conflict with country #2 ($\frac{\partial z_2}{\partial x_1} > 0$), if countries #1 and #2 are rivals ($W_{z_1 z_2} < 0$). Similar relationships hold for imports. The above clearly states that (1) increasing trade with a third party will decrease conflict with a target, if the third party and the target are friends, and (2) increasing trade with a third party will increase conflict with a target, if the third party and the target are rivals.

3. The Data

Prior research typically uses war data such as the Correlate of War (COW) or the Militarized Interstate Dispute (MID) data set. The COW defines a war as a conflict with 1,000 or more battle deaths, limiting analysis to a small portion of international interactions. MID defines a militarized dispute as an international interaction involving threats, displays, or actual uses of military force; it must be explicit, overt, government sanctioned, and not accidental.

Our primary source of data on conflict and cooperation is the Conflict and Peace Data Bank (COPDAB). COPDAB is an extensive, longitudinal collection of more than 350,000 daily and yearly events reported by dyad.\(^{15}\) Events are obtained as reported from 72

newspaper and journal resources. These events are coded on the 15-point scale representing different kinds of cooperation and conflict. We concentrate on annual measures of conflict and cooperation for each dyad in a 30-country sample, with data pooled for the years 1958-1967. COPDAB is distinct from the COW and MID data sets in at least two ways. First, it contains information on both cooperative and conflictual events. Second, it contains data on both severe and mild forms of conflict and cooperation. In addition, the sample period is set in a time of antagonistic power blocs aligned with the United States and the Soviet Union. As such, it will provide an enhanced portrayal of friendly and rival relationships among countries and thus strengthen the reliability of the empirical tests.

One problem with this type of data is that certain countries are more newsworthy than other countries. If newspapers concentrate on certain countries, these countries will have more conflict and cooperation in our data. These types of selectivity issues are reduced by looking at relative conflict, i.e., the frequency of conflict minus the frequency of cooperation for a dyad. In this way, under or over reporting is reduced by concentrating not on the absolute frequency of reported events, but instead on the relative amount of conflict. We define net conflict (NETF) as the frequency of conflictual events (those in categories 9 to 15) minus the frequency

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of cooperative events (those in categories 1 to 7). A positive value implies a net conflict, while a negative value implies a net cooperation. Consistent with Azar (1978), on average, countries cooperate more than they conflict, with the average dyad having 1.62 conflictual events and 2.71 cooperative events each year. This measure is criticized since a dyad with a high degree of interaction (both high conflict and cooperation) might have the same net conflict as a dyad with no interaction.\(^{17}\) In both cases, net conflict is zero despite differences in dyadic interaction. As such, some argue that war data are more appropriate for examining international interactions. However, war data have a similar problem as dyads with a high degree of interaction, and appear the same as dyads that only conflict and do not cooperate.

Import and export data on a country directional basis in U.S. dollars are compiled by Gillespie and Zinnes (n.d.). Sources for these data are found in the International Monetary Fund series of annual volumes under the heading “Direction of Trade”. Standardized variables are included to hold other factors that may affect both trade and conflict constant. Banks’ (1973) Cross-National Time-Series Data Archive is used to select 13 country attributes over each of the years. These attributes are selected primarily because

they have the least missing information. In addition, the data on defense expenditures (compiled mostly from the UN Statistical Yearbook by Gillespie and Zinnes) that are used to standardize for general levels of country militancy are included.

4. Empirical Results

In order to keep the exposition as clear as possible, the theory section has used a single subscript to denote targets. The remainder of the paper uses two subscripts to denote the actor, the target and the third party. As illustrated in Figure 2, and discussed in the theoretical model section, an increase in trade between an actor and target #3 (assuming target #3 is the third party) will influence the conflict between the actor and target #2. Conflict will decrease if target #2 and target #3 are friends, while conflict will increase if target #2 and Target #3 are rivals. A similar relationship is likely to hold if conflict changes between the actor and target #3. A change in conflict between the actor and target #3 will influence the conflict between the actor and target #2 according to whether targets #2 and #3 are friends or rivals. In other words, the empirical work will test a broader interpretation of the hypothesis
that considers conflict and trade as measures of whether the actor and target #3 are becoming more or less friendly.

We develop a measure of trade (conflict) between the actor and target #3 ($X_{13}, M_{13}, Z_{13}$) and a measure of whether target #2 and target #3 are friends or rivals ($Z_{23}$). If the target’s net conflict towards the third party is greater than zero ($Z_{23} > 0$), it is assumed the target and third party are rivals. If the net conflict is less than zero ($Z_{23} < 0$), then the target and third party are friends. The test will treat each country as a third party. Thus for each dyad there are 28 observations. I would apply ordinary least squares (OLS) multivariate regressions to test the hypotheses. First I examine the actor-third party relationship based on conflict and equation (8) is performed.

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18. We use the target’s conflict towards the third party to measure whether they are friends or rivals. One could also use the third party’s conflict towards the target.
where \( Z_{12} = \) the frequency of net conflict from actor country towards the target country; 

\( Trade_{12} = \) exports from the actor country to the target country (\( X_{12} \)), or imports of the actor country from the target country (\( M_{12} \)); 

\( A_1 = \) a vector of actor country attributes; 

\( A_2 = \) a vector of target country attributes; 

\( Z_{13} = \) frequency of net conflict initiated by the actor country towards the third party; 

\( Z_{23} = \) frequency of net conflict initiated by the target country towards the third party; 

\( \varepsilon = \) a random error term normally distributed with mean zero.

\[ Z_{12} = \beta_0 + \beta_1 Trade_{12} + \beta_2 A_1 + \beta_3 A_2 + \beta_4 Trade_{13} + \beta_5 Z_{23} + \varepsilon \] (8)

Country attributes are considered to be exogenous and are used to identify the equations. The coefficients of country attributes can be thought of as other aspects of a price vector for conflict. The intercept terms reflect levels of conflict that would result independently of attributes and trade. In this study, we neglect the impact of country attributes and concentrate solely on the signs and magnitudes of the coefficients of third-party trade and net conflict.  

First, the coefficients of $X_{12}$ and $M_{12}$ in Table 1 are negative and match the neoliberalists’ view which claims that trade promotes peace between countries. The results in column (1) of Table 1 show that, when controlling for exports, an increase in conflict from the actor towards other countries ($Z_{13}$) reduces actor to target conflict. Increases in conflict from the target towards other countries ($Z_{23}$) increase actor to target conflict. In column (2) we control for imports and find that actor-third party and target-third party conflict increase actor-target conflict. The above results provide some evidence that actor to target conflict depends on the actor’s conflict towards other countries and the target’s conflict towards other countries. We include an interaction between $Z_{13}$ and $Z_{23}$ to explicitly test the proposition. The interaction will show whether the change

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in actor to target conflict due to a change in the actor’s conflict towards other countries depends on the relationship between the target and other countries. The results in column (3) are statistically significant and somewhat consistent with the proposition.22

From column (3):

\[
\frac{\partial \tilde{Z}_{12}}{\partial \tilde{Z}_{13}} = -0.0186 - 0.00476*Z_{23} < 0 \text{ if } Z_{23} > -3.91 \\
> 0 \text{ if } Z_{23} < -3.91.
\]

Thus an increase in conflict with target #3 has an impact on conflict with #2, and the strength of this relationship depends on the relationship between the target and the third party when controlling for exports.

In the theoretical section, we consider four different maxims based on whether countries #2 and #3 are friends or rivals. It is worthwhile discussing how consistent the results are with the theory. First, consider the case where we have an increase in \(Z_{13}\), implying that countries #1 and #3 are becoming less friendly or more conflictual. This will influence the conflict between countries #1 and #2 depending on the relationship between countries #2 and #3. If \(Z_{23}\) is positive, this implies that countries #2 and #3 are rivals and an increase in conflict between countries #1 and #3 will lead to a decrease in conflict between countries #1 and #2. This is consistent with the maxim “a rival of a rival is a friend”. If \(Z_{23}\) is negative, this implies that countries #2 and #3 are friends,

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22. The results in column (4) controlling for imports will not discuss as the coefficient of \(Z_{13}\) is insignificant.
but $Z_{23}$ must be less than $-3.91$ to result in an increase in conflict between countries #1 and #2. This is somewhat consistent with the maxim “a friend of a rival is a rival”.

Let us consider the case where $Z_{13}$ is decreasing, implying that countries #1 and #3 are becoming friendlier. Again if $Z_{23}$ is positive, this implies they are rivals and a decrease in conflict between countries #1 and #3 leads to an increase in conflict between countries #1 and #2. This is consistent with the maxim “a rival of a friend is a rival”. Lastly, $Z_{23}$ being negative (again $Z_{23}$ must be less than $-3.91$) leads to a decrease in conflict between countries #1 and #2. This is somewhat consistent with the maxim “a friend of a friend is a friend”.

Separate regressions controlling for $Z_{13}$ are estimated for observations where the target and third party are friends or rivals. As stated earlier, when the target and third party are friends ($Z_{23}<0$), we expect the coefficient of $Z_{13}$ to be positive, and when the target and third party are rivals ($Z_{23}>0$), we expect it to be negative. The empirical results are provided in Table 2. In column (1) the target and third party are friends and when controlling for exports, we find a positive, but insignificant relationship between actor to third party conflict ($Z_{13}$) and actor to target conflict($Z_{12}$). A positive and significant relationship is found in column (2) when controlling for the imports and matches our prediction, because the actor will increase conflict towards the target as actor-third party conflict increases when the target and third party are friends. Columns (3) and (4) look at cases where the target and third parties are rivals. Column (3) controls for actor’s exports and shows that an increase in actor-third party conflict significantly reduces actor-target conflict.
Column (4) finds similar results when controlling for actor’s imports. These results in both columns are consistent with the proposition.23

The hypotheses are actually based on the relationship between the actor and target #3 being measured by trade, not conflict. Thus we again perform the above analysis using trade to measure the actor-third party relationship (i.e., X_{13} and M_{13}) and equation (9) is estimated.

\[
Z_{12} = \beta_0 + \beta_1 Trade_{12} + \beta_2 A_1 + \beta_3 A + \beta_4 Trade_{13} + \beta_5 Z_{23} + \varepsilon
\]  (9)

where Trade_{13} = exports from the actor country to the third party (X_{13}), or imports of the actor country from the third party (M_{13}).

Table 3 includes interactions between actor-third party exports/imports and target-third party conflict. The positive and significant coefficients of X_{13} may indicate that the existence of alternative markets for the actor reduces the costs of a conflict with a given target. Column (2) includes an interaction between X_{13} and Z_{23}, however the coefficient is insignificant. The coefficient of M_{13} in column (3) is marginally significant, thus imports from third parties are not as important as exports in determining actor to target conflict. As similar as column (3), the results in column (4) are marginally significant. From column (4):

23 It may be noted that the sample size is much smaller in Table 2 than in Table 1 as there are a large number of observations where target-third party net conflict equals zero.
\[
\frac{\partial Z_{12}}{\partial M_{13}} = 0.0000842 + 0.00000298Z_{23} < 0 \quad \text{if} \quad Z_{23} < -28.26 \\
> 0 \quad \text{if} \quad Z_{23} > -28.26.
\]

For the entire sample, approximately 6,000 observations in relation to \(Z_{23}\) are less than \(-28.26\). If \(Z_{23}\) is positive, this implies that countries #2 and #3 are rivals, and an increase in imports from the third party leads to an increase in the actor’s conflict towards target #2. If \(Z_{23}\) is negative and must be less than \(-28.26\) in this case, this implies that countries #2 and #3 are friends, and an increase in imports from the third party leads to a decrease in the actor’s conflict towards target #2. Countries #2 and #3 must be highly cooperative with each other, otherwise when increasing trade, actor country #1 will still on average increase conflict towards country #2. Thus for the vast majority of observations for which it is implied that the target and third party are typically friends, an increase in imports from the third party leads to an increase in actor-target conflict.

As before, we run separate regressions for observations where the target and third party are friends or rivals. As the hypotheses stated, if the target and third party are friends (\(Z_{23} < 0\)), we would expect that the coefficients of \(X_{13}\) and \(M_{13}\) on actor-to-target conflict (\(Z_{12}\)) will be negative, and if the target and third party are rivals (\(Z_{23} > 0\)), we would expect that they will be positive. Column (1) looks at actor-third party exports, but does not find a significant relationship. Column (2) looks at actor-third party imports and finds that actor-third party trade reduces actor-target conflict when the target and other countries are friendly. The results in columns
(3) and (4) consider the cases where the target and third party are rivals. In these cases, the positive coefficients of $X_{13}$ and $M_{13}$ show that an increase in trade between the actor and other countries will increase actor-target conflict and support the propositions.\(^{24}\)

The most explicit test parts of the hypotheses are summarized in the Table 5. Except the coefficients that are not significant, all other coefficients in the empirical tests match the expectation.

Since in our sample the mean of net conflict equals $-1.09$, the dyads tend to be more cooperative on average. As such, if the target and third party are rivals, it shows stronger and more consistent results which strengthen the propositions.

5. Summary

This article presents an initial step in the analytical study of the impact of multilateral trade on international interactions. In the process, it develops a theoretical framework for subsequent empirical investigation. In 1978, Solomon Polachek developed the trade-conflict model which claimed that increased trade between countries reduces conflict. The purpose of this paper is to illustrate the static nature of the underlying links between trade and conflict where third party relationships are considered. In so doing, we extend the basic trade-conflict model to analyze international interactions involving third parties. An actor country maximizes its plausible social welfare function subject to a balance of payments

\(^{24}\) It is worth noting that the empirical tests apply to average results. This research does not discuss the potential heterogeneity between nations that will cause different international interactions.
constraint. We derive a theorem whereby, under reasonable assumptions, trade between the actor and a third party will affect conflicts between the actor and the target. A similar relationship is discussed for conflicts which may change between the actor and the third party.

According to the theory of structural balance in international polities, changes in international relationships between two states affect a third nation. Heider (1946) and Cartwright and Harary (1956) formulated the postulates of this theory which focused on the tendency toward balance in a triadic relationship. Imbalance is an important factor in attitude change. The imbalance can be resolved either by all nations becoming friends or by two deciding to like each other and to dislike the third member of the trio, who responds negatively to both. This research essentially highlights the importance of accounting for how the changes in trade or conflict between countries affect the international multilateral relationships. The policy implication here is straightforward. Encouraging free trade tends to decrease conflict and increase cooperation. The classical liberal thesis that trade promotes peace between states is based on two ideas: trade between two states increases the economic costs of waging war, and an inherent facet of increased trade is increased communication between states. The increased communication between states reduces the possibility of misunderstanding and fosters peaceful resolution of conflict (Hegre, 2000, p.5). Baron de Montesquieu (1990, p.316) stated that “Peace is the natural effect of trade. Two nations who traffic with each other become reciprocally dependent: for if one has the interest in buying, the other has the interest in selling; and thus their union
is founded on the mutual necessities.” With democracy being a worldwide trend, most contemporary leaders cling to this longstanding belief that expanding economic ties will increase the bonds of friendship and eliminate the thought of a resort to arms (Mansfield and Pollins, 2001, p.855). If the trade gains increase countries’ welfare and serious conflict among countries disrupts trade, trade will promote peace and increased world trade will make the maxim “a friend of a friend is a friend” a reality. As such, the international system will be very structurally balanced.

This is a preliminary study that leaves some questions unanswered, especially in empirical work. That trade changes caused by tariffs, foreign aid, transportation costs, etc., indirectly influence third party interactions needs to be investigated. Further research is suggested to develop along two key lines. First, more sophisticated measurements of the appropriate variables need to be developed. Second, a more thorough understanding of the interaction of these variables and their relative importance is necessary. How far it will take us in understanding the relationship between third party trade and international interactions remains to be determined by future researches.
Table 1

The Conflict Relationship among Actor, Target and Third Parties Dependent Variable: Net Conflict ($Z_{12}$)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>- 1.71**</td>
<td>- 1.08**</td>
<td>- 1.72**</td>
<td>- 1.08**</td>
</tr>
<tr>
<td></td>
<td>(- 33.7)</td>
<td>(- 31.8)</td>
<td>(- 33.8)</td>
<td>(- 32.0)</td>
</tr>
<tr>
<td>$X_{12}$</td>
<td>- 0.0088**</td>
<td>- 0.0087**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(- 55.4)</td>
<td>(- 55.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_{21}$</td>
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<td>1.4x10^{-6}**</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(42.0)</td>
<td>(41.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Z_{13}$</td>
<td>-0.00772**</td>
<td>0.0123**</td>
<td>- 0.0186**</td>
<td>- 0.00354</td>
</tr>
<tr>
<td></td>
<td>(-2.50)</td>
<td>(5.55)</td>
<td>(-5.92)</td>
<td>(1.57)</td>
</tr>
<tr>
<td>$Z_{23}$</td>
<td>0.013**</td>
<td>0.00624**</td>
<td>0.00216</td>
<td>-0.00275</td>
</tr>
<tr>
<td></td>
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<td>(3.04)</td>
<td>(0.67)</td>
<td>(-1.32)</td>
</tr>
<tr>
<td>Pop-actor</td>
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<td>1.9x10^{-5}**</td>
<td>3.3x10^{-6}**</td>
</tr>
<tr>
<td></td>
<td>(54.1)</td>
<td>(12.9)</td>
<td>(53.8)</td>
<td>(12.5)</td>
</tr>
<tr>
<td>Pop-target</td>
<td>- 5.4x10^{-6}**</td>
<td>- 1.7x10^{-6}**</td>
<td>- 5.5x10^{-6}**</td>
<td>- 1.8x10^{-6}**</td>
</tr>
<tr>
<td></td>
<td>(-14.2)</td>
<td>(-6.95)</td>
<td>(-14.5)</td>
<td>(-7.40)</td>
</tr>
<tr>
<td>GNP-actor</td>
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<td>7.8x10^{-9}***</td>
<td>- 1.2x10^{-8}**</td>
<td>-7.8x10^{-9}**</td>
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<tr>
<td></td>
<td>(-46.8)</td>
<td>(-43.8)</td>
<td>(-47.0)</td>
<td>(-44.1)</td>
</tr>
<tr>
<td>GNP-target</td>
<td>8.6x10^{-9}***</td>
<td>1.6x10^{-9}**</td>
<td>8.6x10^{-9}***</td>
<td>1.6x10^{-9}**</td>
</tr>
<tr>
<td></td>
<td>(33.3)</td>
<td>(9.33)</td>
<td>(7.19)</td>
<td>(9.18)</td>
</tr>
<tr>
<td>Distance</td>
<td>1.0x10^{-4}**</td>
<td>1.2x10^{-4}**</td>
<td>1.0x10^{-4}**</td>
<td>1.2x10^{-4}**</td>
</tr>
<tr>
<td></td>
<td>(6.55)</td>
<td>(11.0)</td>
<td>(6.57)</td>
<td>(11.1)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.094</td>
<td>0.104</td>
<td>0.097</td>
<td>0.109</td>
</tr>
<tr>
<td>N</td>
<td>93376</td>
<td>93805</td>
<td>93376</td>
<td>93805</td>
</tr>
</tbody>
</table>

T-statistics are in parentheses, * indicates significant at the 10 percent level, ** significant at the 5 percent level.
### Table 2

The Conflict Relationship Among the Actor, Target and Third Parties Dependent Variable: Net Conflict (Z\(_{12}\))

<table>
<thead>
<tr>
<th>Variable</th>
<th>(Z_{23} &lt; 0)</th>
<th>(Z_{23} &gt; 0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>(-2.21^{**}) ((-27.3))</td>
<td>(-1.29^{**}) ((-25.3))</td>
</tr>
<tr>
<td>(X_{12})</td>
<td>(-0.0097^{**}) ((-11.4))</td>
<td>(-0.0097^{**}) ((-17.5))</td>
</tr>
<tr>
<td>(Z_{13})</td>
<td>(0.00493) (1.08)</td>
<td>(0.0358^{**}) (11.7)</td>
</tr>
<tr>
<td>(M_{12})</td>
<td>(-0.0076^{**}) ((-56.6))</td>
<td>(-0.0080^{**}) ((-23.8))</td>
</tr>
<tr>
<td>Pop-actor</td>
<td>(2.8\times10^{-5^{**}}) (49.4)</td>
<td>(5.0\times10^{-6^{**}}) (13.1)</td>
</tr>
<tr>
<td>Pop-target</td>
<td>(-5.4\times10^{-6^{**}}) ((-9.39))</td>
<td>(-1.6\times10^{-6^{**}}) ((-4.57))</td>
</tr>
<tr>
<td>GNP-actor</td>
<td>(-1.4\times10^{-4^{**}}) ((-32.8))</td>
<td>(-7.1\times10^{-9^{**}}) ((-27.2))</td>
</tr>
<tr>
<td>GNP-target</td>
<td>(8.8\times10^{-9^{**}}) (25.5)</td>
<td>(2.0\times10^{-9^{**}}) (8.86)</td>
</tr>
<tr>
<td>Distance</td>
<td>(9.8\times10^{-5^{**}}) (4.12)</td>
<td>(1.2\times10^{-4^{**}}) (8.10)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.108</td>
<td>0.109</td>
</tr>
<tr>
<td>N</td>
<td>49689</td>
<td>50168</td>
</tr>
</tbody>
</table>

T-statistics are in parentheses, * indicates significant at the 10 percent level, ** significant at the 5 percent level.
**Table 3**

The Conflict Relationship Among the Actor, Target and Third Parties Dependent Variable: Net Conflict ($Z_{12}$)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>- 1.73**</td>
<td>- 1.74**</td>
<td>- 1.12**</td>
<td>- 1.12**</td>
</tr>
<tr>
<td>($-$ 32.2)</td>
<td>($-$ 32.3)</td>
<td>($-$ 31.3)</td>
<td>($-$ 31.3)</td>
<td></td>
</tr>
<tr>
<td>$X_{12}$</td>
<td>- 0.0090**</td>
<td>- 0.0090**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>($-$ 55.8)</td>
<td>($-$ 55.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_{12}^2$</td>
<td>$1.5\times10^{-6}$**</td>
<td>$1.5\times10^{-6}$**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(42.4)</td>
<td>(42.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$X_{13}$</td>
<td>0.000236**</td>
<td>0.000231**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2.98)</td>
<td>(2.90)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Z_{13} \times Z_{23}$</td>
<td>0.00000417</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.39)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$M_{12}$</td>
<td></td>
<td></td>
<td>- 0.0069**</td>
<td>- 0.0069**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>($-$ 70.3)</td>
<td>($-$ 70.3)</td>
</tr>
<tr>
<td>$M_{12}^2$</td>
<td></td>
<td></td>
<td>$1.0\times10^{-6}$**</td>
<td>$1.0\times10^{-6}$**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(53.8)</td>
<td>(53.8)</td>
</tr>
<tr>
<td>$M_{13}$</td>
<td></td>
<td></td>
<td>- 0.00009**</td>
<td>0.0000842*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>($-$ 5.92)</td>
<td>(1.74)</td>
</tr>
<tr>
<td>$M_{13} \times Z_{23}$</td>
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<td></td>
<td></td>
<td>0.00000298*</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>(1.81)</td>
</tr>
<tr>
<td>$Z_{23}$</td>
<td>0.00954**</td>
<td>0.00782**</td>
<td>0.00348</td>
<td>0.00203</td>
</tr>
<tr>
<td>(2.93)</td>
<td>(2.24)</td>
<td>(1.67)</td>
<td>(0.91)</td>
<td></td>
</tr>
<tr>
<td>Pop-actor</td>
<td>$1.9\times10^{-5}$**</td>
<td>$1.9\times10^{-5}$**</td>
<td>$4.2\times10^{-6}$**</td>
<td>$4.2\times10^{-6}$**</td>
</tr>
<tr>
<td>(52.1)</td>
<td>(52.1)</td>
<td>(14.2)</td>
<td>(14.2)</td>
<td></td>
</tr>
<tr>
<td>Pop-target</td>
<td>- $5.0\times10^{-6}$**</td>
<td>- $5.0\times10^{-6}$**</td>
<td>- $1.2\times10^{-6}$**</td>
<td>- $1.0\times10^{-6}$**</td>
</tr>
<tr>
<td>($-$ 12.5)</td>
<td>($-$ 12.6)</td>
<td>($-$ 4.89)</td>
<td>($-$ 4.91)</td>
<td></td>
</tr>
<tr>
<td>GNP-actor</td>
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<td>- $1.2\times10^{-6}$**</td>
<td>- $8.2\times10^{-9}$**</td>
<td>- $8.2\times10^{-9}$**</td>
</tr>
<tr>
<td>($-$ 45.8)</td>
<td>($-$ 45.7)</td>
<td>($-$ 44.4)</td>
<td>($-$ 44.3)</td>
<td></td>
</tr>
<tr>
<td>GNP-target</td>
<td>$9.0\times10^{-9}$**</td>
<td>$9.0\times10^{-9}$**</td>
<td>$1.7\times10^{-9}$**</td>
<td>$1.7\times10^{-9}$**</td>
</tr>
<tr>
<td>(32.8)</td>
<td>(32.7)</td>
<td>(9.25)</td>
<td>(3.18)</td>
<td></td>
</tr>
<tr>
<td>Distance</td>
<td>$1.0\times10^{-4}$**</td>
<td>$1.0\times10^{-4}$**</td>
<td>$1.1\times10^{-4}$**</td>
<td>$1.1\times10^{-4}$**</td>
</tr>
<tr>
<td>(6.36)</td>
<td>(6.36)</td>
<td>(9.91)</td>
<td>(9.90)</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
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<td>0.0985</td>
<td>0.111</td>
<td>0.111</td>
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<tr>
<td>N</td>
<td>85318</td>
<td>85318</td>
<td>84283</td>
<td>84283</td>
</tr>
</tbody>
</table>

T-statistics are in parentheses, * indicates significant at the 10 percent level, ** significant at the 5 percent level.
Table 4

The Conflict Relationship Among the Actor, Target and Third Parties Dependent Variable: Net Conflict (Z_{12})

<table>
<thead>
<tr>
<th></th>
<th>Z_{23}&lt;0 (1)</th>
<th>Z_{23}&lt;0 (2)</th>
<th>Z_{23}&gt;0 (3)</th>
<th>Z_{23}&gt;0 (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-2.24** (-29.9)</td>
<td>-1.35** (-28.2)</td>
<td>-2.33** (-12.1)</td>
<td>-1.47** (-11.1)</td>
</tr>
<tr>
<td>X_{12}</td>
<td>-0.0098** (-47.2)</td>
<td>-0.0098** (-18.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X_{12}^2</td>
<td>1.6x10^{-6}** (34.2)</td>
<td>1.5x10^{-6}** (12.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>X_{13}</td>
<td>0.0000484 (0.38)</td>
<td></td>
<td>0.000699** (3.17)</td>
<td></td>
</tr>
<tr>
<td>M_{12}</td>
<td>-0.0076** (-63.4)</td>
<td></td>
<td>-0.0078** (-23.1)</td>
<td></td>
</tr>
<tr>
<td>M_{13}</td>
<td>1.1x10^{-6}** (47.5)</td>
<td></td>
<td>1.1x10^{-6}** (17.5)</td>
<td></td>
</tr>
<tr>
<td>Pop-actor</td>
<td>2.7x10^{-5}** (54.0)</td>
<td>6.7x10^{-5}** (17.2)</td>
<td>2.2x10^{-5}** (15.4)</td>
<td>-7.8x10^{-7} (-0.63)</td>
</tr>
<tr>
<td>Pop-target</td>
<td>-4.9x10^{-6}** (-9.46)</td>
<td>-1.1x10^{-6}** (-3.59)</td>
<td>-1.7x10^{-5}** (-2.18)</td>
<td>-3.0x10^{-7} (-0.58)</td>
</tr>
<tr>
<td>GNP-actor</td>
<td>-1.4x10^{-8}** (-37.1)</td>
<td>-7.8x10^{-9}** (-32.8)</td>
<td>-1.5x10^{-8}** (-14.8)</td>
<td>-7.4x10^{-9} (-10.4)</td>
</tr>
<tr>
<td>GNP-target</td>
<td>9.2x10^{-9}** (28.3)</td>
<td>2.2x10^{-9}** (10.5)</td>
<td>6.6x10^{-9}** (8.87)</td>
<td>1.5x10^{-9} (2.93)</td>
</tr>
<tr>
<td>Distance</td>
<td>1.1x10^{-4}** (5.11)</td>
<td>1.2x10^{-4}** (8.25)</td>
<td>2.0x10^{-4}** (3.31)</td>
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<td>R-squared</td>
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<td>0.099</td>
<td>0.106</td>
</tr>
<tr>
<td>N</td>
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<td>8258</td>
<td>8509</td>
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</table>

T-statistics are in parentheses, * indicates significant at the 10 percent level, ** significant at the 5 percent level.
Table 5
The Summary of the Tests of Hypotheses

<table>
<thead>
<tr>
<th>Friends or Rivals</th>
<th>Controlling Variable</th>
<th>Coefficient</th>
<th>Expected Effect on Net Conflict</th>
<th>Predicted Effect on Net Conflict</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Z_{23} &lt; 0$</td>
<td>$X_{12}$</td>
<td>$Z_{13}$</td>
<td>+</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>$M_{12}$</td>
<td>$Z_{13}$</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>$X_{12}$</td>
<td>$X_{13}$</td>
<td>-</td>
<td>N.S.</td>
</tr>
<tr>
<td></td>
<td>$M_{12}$</td>
<td>$M_{13}$</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$Z_{23} &gt; 0$</td>
<td>$X_{12}$</td>
<td>$Z_{13}$</td>
<td>-</td>
<td>-</td>
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<tr>
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<td>$X_{12}$</td>
<td>$X_{13}$</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>$M_{12}$</td>
<td>$M_{13}$</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

N.S. indicates Not Significant; “+”: The Actor Increases Net Conflict Towards the Target; “-”: The Actor Decreases Net Conflict Towards the Target; $Z_{23} > 0$: The Target and Third Party Are Friends; $Z_{23} > 0$: The Target and Third Party Are Rivals.

（收件：2003年3月17日，修正：2003年7月11日，採用：2003年7月15日）
Appendix: Procedures for Comparative Statics

In order to satisfy the second order conditions for maximization, the Hessian matrix must be negative definite. In other words, the principal minors $|H_1|, |H_2|, |H_3|, \ldots, |H_n|$ must alternate in sign:

\[
|H_1| = W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*) < 0,
\]

\[
|H_2| = \begin{vmatrix}
W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*) & W_{z_1z_j} \\
W_{z_1z_j} & W_{z_jz_j} + \lambda(x_jP_{x_j}^* - m_jP_{m_j}^*)
\end{vmatrix}
\]

\[
= [W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*)][W_{z_jz_j} + \lambda(x_jP_{x_j}^* - m_jP_{m_j}^*)] - W_{z_1z_j}^2 > 0
\]

\[
|H_3| = 3 \text{ 3 determinant value} < 0, \quad \text{et cetera.}
\]

For a simple two-country case, the solving procedures are:

\[
\frac{\partial z_1}{\partial x_1} = -\frac{\lambda P'_{x_1}[W_{z_1z_2} + \lambda(x_2P_{x_2}^* - m_2P_{m_2}^*)]}{[W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*)][W_{z_2z_2} + \lambda(x_2P_{x_2}^* - m_2P_{m_2}^*)] - W_{z_1z_2}^2} < 0, \quad \text{similarly}
\]

\[
\frac{\partial z_1}{\partial m_1} = \frac{\lambda P'_{m_1}[W_{z_1z_2} + \lambda(x_2P_{x_2}^* - m_2P_{m_2}^*)]}{[W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*)][W_{z_2z_2} + \lambda(x_2P_{x_2}^* - m_2P_{m_2}^*)] - W_{z_1z_2}^2} < 0,
\]

\[
\frac{\partial z_2}{\partial x_1} = \frac{\lambda P'_{x_1}(W_{z_2z_2})}{[W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*)][W_{z_2z_2} + \lambda(x_2P_{x_2}^* - m_2P_{m_2}^*)] - W_{z_1z_2}^2} > 0 \text{ if } W_{z_1z_2} > 0,
\]

and similarly,

\[
\frac{\partial z_2}{\partial m_1} = \frac{-\lambda P'_{m_1}(W_{z_2z_2})}{[W_{z_1z_1} + \lambda(x_1P_{x_1}^* - m_1P_{m_1}^*)][W_{z_2z_2} + \lambda(x_2P_{x_2}^* - m_2P_{m_2}^*)] - W_{z_1z_2}^2} < 0 \text{ if } W_{z_1z_2} > 0.
\]
References


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經濟互賴與國際互動：
第三國貿易對政治衝突與合作的影響

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摘 要

本文提出經濟互賴與第三國國際互動之實證研究分析。如果國家要保護貿易利得，貿易衝突模型主張貿易可以減少本國與目標國之間的衝突，進而影響其國際關係。理論上證明：(1)如果第三國與目標國是夥伴關係，則本國增加與第三國之貿易，將會減少與目標國之衝突；(2)如果第三國與目標國是敵對關係，則本國增加與第三國之貿易，將會增加與目標國之衝突。本研究運用了「衝突與和平資料庫」(COPDAB)三十國的樣本，實證結果大體上支持了理論的假設。貿易可以增加國與國之間的交往，並提升國際和平關係。根據結構平衡理論，三角不平衡關係可以經由國際貿易來改善。因而遞增的世界貿易也會增強箴言：「朋友的朋友也是朋友」的哲理。

關鍵詞：衝突、合作、貿易、第三國、國際互動