附件一

行政院國家科學委員會補助專題研究計畫 □ 成 果 報 告 □期中進度報告

（計畫名稱）

貿易，互地理緣近與國際互動

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計畫主持人： 張 原 卿（張 晁 烽）
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計畫參與人員：

成果報告類型(依經費核定清單規定繳交)：□精簡報告 □完整報告

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中 華 民 國 97 年 9 月 28 日

計畫中文摘要：如下

本文檢視國家間距離與貿易之交叉互動效果對國際衝突與合作之影響。全文導出四個可以實證檢驗的假說(1) 兩國距離愈近，則貿易可以減少兩國之間更多衝突；(2) 兩國的貿易少，則兩國愈近愈增加衝突；(3) 兩國距離愈遠，則貿易可以增加兩國之間更多合作(4) 兩國的貿易少，則兩國愈近愈增加合作。總結而言，地理距離的效果須視國家間的貿易，而定 貿易的效果則因地理的距離而不同。當兩國距離相近，則貿易減少衝突的效果較大，而當兩國的距離愈遠，則貿易增加合作的效果會較大。 當兩國的貿易稀少時，則地理緣近增加衝突與合作更甚。

關鍵詞: 衝突，合作，貿易，地理緣近，距離，國際互動，國際關係

計畫英文摘要：如下

This paper examines the interactive effect of distance and trade on international conflict and cooperation. Four hypotheses are derived and tested: (1) Trade leads to a greater reduction in conflict for closer dyads than more distant dyads; (2) Geographic proximity leads to a greater increase in conflict for dyads with little or no trade; (3) Trade leads to a larger increase in cooperation for distant dyads than close dyads; (4) Geographic proximity leads to a greater increase in cooperation for dyads with little or no trade. To summarize, the effect of geographic distance depends on trade, while the effect of trade varies with geographic distance. Trade reduces conflict to a greater extent when dyads are geographically close, but has a greater effect on cooperation when countries are more distant. Geographic proximity increases conflict and cooperation more among non-trading dyads.

Key words: conflict, cooperation, trade, geographic proximity, distance, international interactions, international relations

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Introduction

Studies of international conflict frequently disagree on causes of war. However, one factor consistently found to enhance a war's likelihood is geographic proximity (Diehl, 1991). Closer countries fight more than distant countries. There exist several potential reasons for this relationship (Vasquez, 1995). First, it may be difficult or even impossible for distant countries to fight each other, manly because military operations become expensive at great distances. This is particularly true for small or less developed countries. Second, closer countries have more territorial disputes, leading to more conflictive behavior. Territorial disputes may involve resource contained in a given territory that affects a state's willingness to fight (Barbieri and Petersen, 2001). Third, and most relevant to our paper, closer countries interact more by nature of their proximity. More interactions provide an opportunity for more conflicts of interest, which can result in more rivalry and strife. Such incentives for conflict contradict neoliberal strands of thought, namely that the greater trade exhibited by closer countries should reduce conflict. This leads to a paradox; On one hand, geographic proximity intensifies conflict, but on the other geographic proximity leads to economic trade which according to neoliberalists diminishes conflict.

The point of this paper is to rectify his paradox by examining how trade and geographic distance work *together* to influence international interaction. We do so by showing that trade mitigates the increased conflict brought about by geographic proximity (a well as mitigates the effects of distance in diminishing cooperation). As we hope to illustrate, our findings are important both to the geography and conflict as well as to the trade and conflict literatures because we show how geography and trade work together in influencing international interactions. Further Mansfield and Pollins (2001:840-841) argue "too little effort has been made to assess whether the interdependence-conflict relationship is bounded by space… "

Background

These exists substantial evidence that closer countries are more likely to engage in conflict behavior. According to Vasquez the opportunity for conflict of interest type disagreements between two countries increases with the number of interactions. Since "contiguity is the single largest factor promoting interactions, contiguous states are more likely to have serious disputes and war." [Vasquez, 1995, p.280] In addition, not only are contiguous countries more likely to have initial disputes, such disputes between neighboring countries are more likely to evolve into enduring rivalries (Stinnett and Diehl, 2001). The resolution of an initial conflict may not end the rivalry between countries, allowing other issues to escalate into disputes. On the other hand, contiguous nations face low transportation costs leading to enhance economic trade (Gowa, 1994). Similarly empirical estimation of gravity models finds that the distance between countries is inversely related to international trade (Leamer and Levinson, 1995; Egger, 2002).

Theoretical neoliberal models (Polachek 1980) examine how trade influences conflict using an expected utility model. Polachek, Robst, Chang(1999) extend the model to include an indirect effect of distance on conflict. In their paper, distance reduces trade due to increased transportation costs, with the reduction in leading to an increase in conflict. However, their model ignores the direct effect that distance has on conflict. Others consider situations where trade may be more or less important to international conflict. For example, Dorussen (1999,2002) develops a

multi-country model to show that trade is most important when there are few barriers to trade, when countries will not trade post- conflict, and when there are more countries in the system. Hegre (2004) uses an expected utility framework to show that trade has a stronger effect when there is a symmetrical dependence on trade. Morrow (1999) presents a game theoretic model that examines how trade influences the relative resolve of both initiators and targets of disputes. Trade reduces the initiator's willingness to fight, but also reduces the target's willingness to fight. The reduction in target's willingness to fight increases the incentive for the actor to initiate conflict and bargain for concessions from the target. As such, trade has an indeterminate effect on conflict. Similarly, Gartzke, Li, and Boehmer (2001) also discuss how trade (or threatening to restrict trade) may be used as a signal of resolve without resorting to violent conflict. As such, trade may reduce violent military conflict but actually increase nonmilitary conflict, particularly if one country is more hesitant to fight.

The relationship between trade and conflict has received substantial empirical investigation as well. While there is little disagreement that closer countries fight more, the question of whether trade reduces conflict is debated in the literature. On one side, Barbieri (1996, 2002) argues that bilateral trade increases dyadic conflict. On the other side, numerous studies have found that trade reduces dyadic conflict (Polachek, 1980; Oneal, et al.1996; Oneal and Ray, 1997;Oneal and Russett, 1997, 1999a, 1999b). Several studies have attempted to reconcile the disparate finding in the literature (Gartzke and Li, 2003b), but the debate continues (see Gertzke and Li, 2003c; Oneal, 2003; Barbieri and Peters, 2003). Much of the debate centers on measurement issues, particularly how to measure economic linkages. Such economic links and interdependences are complex and difficult to quantify with different measures used in the literature. Gertzke and Li(2003b) show that the of different measures of economic interdependent can account for the contradiction findings in the literature.

While the importance of developing meaningful measures of economic interdependence is clear, this paper does not seek to contribute to this discussion. The point of the paper is not to consider whether trade in general is important to international conflict, rather this paper attempts to disentangle the contradiction incentives that trade and geographic proximity provide for countries to engage in conflict. We argue that while proximity provides incentives for conflict, trade mitigates these incentives. As such, trade and geographic proximity interact to determine the level of international conflict (and cooperation).

There are at least two potential ways to examine the interactive role of trade and distance in determining international interactions. First, geographic distance has a dual role as it influences conflict directly trough reasons discussed by Vasquez and others, and second geographical distance also affects conflict indirectly by influencing trade. As such, one could examine how distance affects trade, which then affects conflict. As geographic distance falls, trade increases, which is expected to reduce conflict. Chang, Polachek, and Robst (2004) use this approach to show that conflict between closer dyads would be even greater if not for the economic gains due to trade. That paper attempts to address the potential endogeneity of trade by estimating a simultaneous equations system modeling trade and conflict. The selection of instruments, however, was not based on a theoretical relationship nor is it clear the instruments meet necessary economic criteria.

While we revisit the issue of simultaneity later in the paper, the primary purpose of the paper

is to consider an alternative perspective by examining whether trade affects conflict differently depending on distance. This finding has implications with regard to the trade-conflict literature in general. There is now research on how the effects of trade vary depending on the particular commodities traded. Whereas Polachek (1980) concentrated on strategic commodities such as oil, Reuveny and Li (2004) examine a large of different commodities. This paper shows that the effects are not uniform in another way, namely by geographic distance. This implies that the "Kantian Tripod" is more complicated than a simple triangulation because the way or triangulates variables with distance. In other words, instead of focusing on the main effect of trade or geographic distance as in prior research, one can look at the interactive effects of trade and distance on conflict. In particular, we focus on the questions of whether the effect of trade depends on the distance between countries, and whether the effect of geographic proximity on conflict depends on the level of trade.

Hypotheses

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 interdependence, 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 relation would decrease its own long-run economic well-being as well as perhaps the well-being of its trading partners and other countries (Anderton and Carter, 2001). Nations, however, often do not operate to maximize global output and instead may act to maximize their own welfare. For example, trade may be used as a strategic tool to signal other countries about intentions. In general, much research has examined trade in the context of game theory, with trade creating harmony between countries or a prisoners' dilemma in which countries interact with a risk of cheating.

At the same time the geographic distance between countries affects the optimal amount of interaction between countries. We define interactions to include both cooperative and conflictive events. As such, incentives for interaction may increase conflict, or cooperation, or both. Neighboring countries have more opportunities and incentives for interaction, both conflictive and cooperative. Some of incentives for conflict were discussed in Vaquez (1995) and were mentioned earlier in this paper. Incentives for cooperation also exist for neighboring countries. For example, Seigle (1988) and Winters (1997) discuss how nearby countries may cooperate in order to increase regional security.

Polachek (1980) and Polachek, Robst, and Chang (1999) present an analytical model based on expected utility theory to examine the optimal level of conflict. In this paper we present a diagrammatic representation of the model in Figures 1 and 2. The expected utility model is based on countries behaving in a way to maximize utility subject to constraints. While the discussion in this paper is based on conflict (and cooperation) being determined by equating the marginal gains and marginal costs of conflict (and cooperation), we also incorporate some of the theoretical advances in recent research.

One can apply Figure 1 to show how distance and trade affect conflict. Trade increases the marginal cost of conflict from MC to MC*. The marginal cost rises because conflict reduces the gains from trade either through a direct reduction in trade or indirectly through tariffs or quotas.

The increase in the marginal cost depends on whether trade resumes post-conflict (assuming the target remains in existence). If trade resumes post-conflict the long-term cost is less than if trade does not resume (Dorussen, 1999). Trade often does resume post-conflict (Barbieri and Levy, 1999) but there are still significant short-run disruptions in trade (Anderton and Carter, 2001). In addition, a potential actor is unlikely to know with certainly whether the target will resume trade post-conflict. A greater commitment by the target not to resume trade, the greater the actor's perceived marginal cost to conflict (Dorussen, 2002).

The slope of the marginal cost curve is steeper for more distant dyads. This is both because finding an alternative source of trade gets more expensive with distance and because moving a given piece of military equipment a greater distance is more costly. For these reasons the cost for relatively mild forms of conflict such as recalling an ambassador may not differ substantially between close and distant dyads, but certainly these differences rise when large amounts of trade are lost or great amounts of military equipment are be used. Thus severe conflict is much more costly when the countries are far apart. These marginal cost curves are designated with a prime (MC' and MC'*) when referring to an actor dealing with a distant target, and are designated by an asterisk (MC and MC*) when referring to an actor dealing with a close target. Given the marginal gain curve (MG), trade lowers the optimal level if conflict for both nearby and distant dyads.

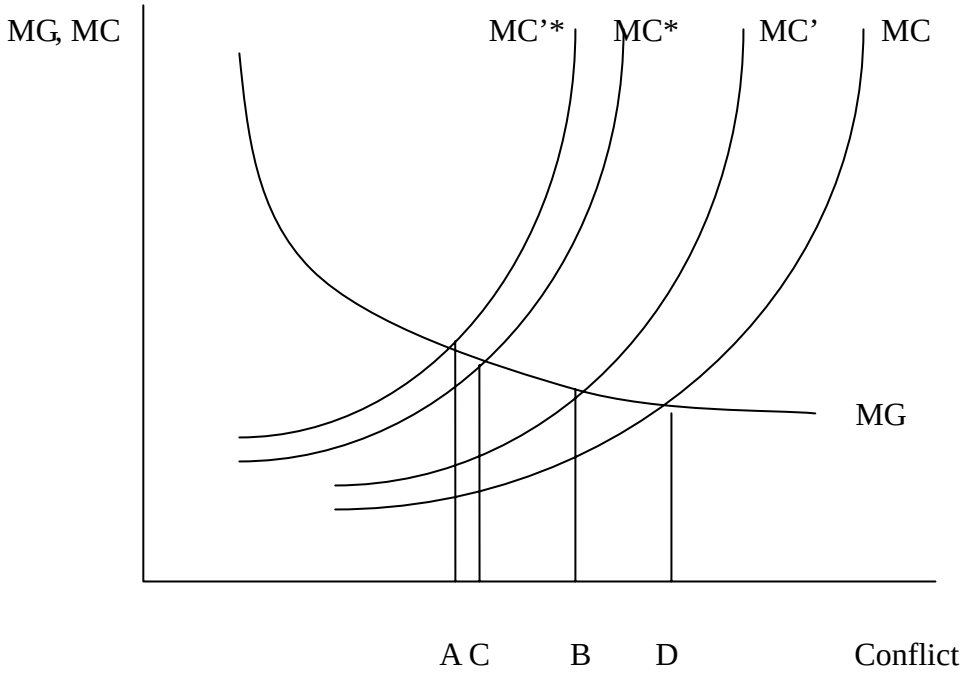

Figure 1: Optimal conflict for neighboring and distant dyads.
Optimal conflict: Pt. A--Dist dyad, trade; Pt. B-- Dist dyad, no trade;
Pt. C—Close dyad, trade; Pt. D—Close dyad, no trade.

Before discussing some of the hypotheses, the concept of trade from this theoretical perspective merits further discussion. Trade and its impact on conflict are very complex and a function of many different factors. First, expected utility models often assume that trade is determined exogenously. Clearly, the level of prior conflict between countries affects the amount of existing trade. As such, the model is a static model that examines decisions in time t given past economic and political conditions, but could be expanded to incorporate the endogeneity of trade. Second, as Copeland (1996) discusses, observed trade is less important to the decision process than expected trade. In this case, countries must make decisions incorporating expectations about future economic and political relationships. Expectations about the future are likely to be a function of past behavior and signals about future behavior. Third, existing trade and expectations about future trade are likely to be a function of signals from trading partners. Trading partners may forgo gains from trade in order to signal their resolve in a potential or actual dispute. Potential targets with greater resolve can impose greater costs to conflict on actors or may reduce current trade in an effort to signal its resolve and discourage potential conflict by the actor (Gartzke and Li, 2003a). Overall, trade is a complex decision variable much like conflict itself. Distance, while an important factor in determining international conflict and cooperation, is not a choice variable; it is a given exogenous factor. In spite of these issues, Figure 1 leads to two testable hypotheses.

Hypotheses #1: Trade leads to a greater reduction in conflict for closer dyads than more distant dyads.

Given Figure 1, optimal conflict falls from point D to C for closer dyads and from point B to A for more distant dyads. But we also can indicate if the MC curve shifted up in a parallel way, "we would still see trade diminishes conflict, though the effort of greater trade would be the same for dyads near and far. "

The depiction of the MC curve in Figure 1 is consistent with the current literature. For example, the same hypothesis can be derived from Dorussen (1999, 2002) and Hegre (2002) who take a completely different approach. They model conflict as a function of the ratios of the probabilities of victory with p_λ denoting the minimum required probability of victory with trade while p_o the minimum required probability without trade:

$$\frac{p_\lambda}{p_o} = 1 + \lambda(n-1)z$$

where

$$z = \frac{r^2(1-p_s)(1-\phi)}{r(r-1)(1-p_s)(1-\phi)+c}$$

Thus, the probability ratio is a function of gains from trade with trade restrictions (λ), the number of countries in the system (n), resources (r), the probability of a stalemate(p_s), a discount factor that reflects the rate of time preference(Φ), and the cost of conflict (c). Dorussen(2002) and Hegre (2002) take the derivative of the ratio with respect to n, the number of countries in the system, to show the pacifying effect of trade is greater when there are more states. In other words,

as the number of countries in the system increases, the minimum required probability of victory increases more when there is trade than when there is no trade for the actor to initiate conflict. In term of our paper, we take the derivative with respect to c, the cost of conflict. Taking the partial derivative of the ratio with respect to cost leads to the prediction that the pacifying effect of trade is greater when the cost of conflict is lower:

$$\partial\left(\frac{p^{\lambda}}{p^{o}}\right)\Big/\partial c = -\frac{\lambda(n-1)\left[r(1-p_s)(1-\phi)\right]}{\left[r(r-1)(1-p_s)(1-\phi)+c\right]^2} < 0$$

If the cost of conflict is lower for closer countries, trade has a greater pacifying effect. Thus, our use of the expected utility model is not the only model that could be used to derive the hypotheses tested in this paper.

Hypothesis #2: Geographic proximity leads to a greater increase in conflict for dyads with little or no trade.

Optimal conflict increases from point A to C for trading dyads and from point B to D for non-trading dyads. Geographic proximity increases the incentives for conflict regardless of whether countries trade. Conflict increase more for non-trading dyads both because the marginal cost curves are horn-shaped and because we expect the marginal gain from conflict to diminish less quickly when the target of the conflict is closer.

There are several extensions that could be incorporated into the presentation. The marginal gain to conflict may be lower for distant dyads due to the smaller potential for security or land gains through conflict. Control over resources is more difficult to obtain and retain when there is a greater distance between countries (Anderton, Anderton, and Carter, 1999). In addition, trade is assumed to increase the MC of conflict, but such an increase may differ based on distance. For example, the composition of trade differs for nearby and distant countries. Hanson and Xiang (2004) present evidence that closer countries tend to trade goods that have higher transportation costs and fewer substitutes. As such, for a given level of trade, the gains from trade may be greater for nearby countries, implying a greater cost to a disruption in trade.

Another extension would consider whether the marginal gain from conflict differs across trading dyads. One reason for trade to exist is that one country has a resource or commodity that the other country desires. As such, the ability to gain control over the desires resource may be viewed as a potential benefit to conflict, but only if the actor would actually be successful in such an attempt. If the actor was unsuccessful, then access to the desired resource through trade might also be lost. If the actor perceived a high likelihood of gaining control over the resource and the resource was sufficiently valued, the MG to conflict could increase to the point that optimal conflict would increase. There is another reason to expect higher marginal gains to conflict for some actors. The MG to non-military conflict among trading partners may also be greater if a target faces a particularly high cost to conflict. As such, an actor may have an incentive to initiate a degree of conflict in order to negotiate a greater share of the gains from trade.

Figure 2 considers the distance-trade0cooeration relationship. In this case, curve MC depicts the marginal cost of cooperation while MG is the marginal gain from cooperation. The optimal level of cooperation is determined by the intersection of the two curves (point A). As the

distance between countries decreases, there are greater benefits to cooperative behavior. One possible reason for this is the security that can be acquired through cooperation with neighboring countries (Seiglie, 1988 ; Schiff and Winters,1997). A country gains greater security through cooperating with a nearby country, increasing the benefits to cooperative behavior. For example, Sandler(1999) argues that one reason for the formation of alliances is the mutual security that arises when interior borders require less protection. This implies a shift in the MG curve to MG' and an increase in optimal cooperation to point C.

We assume that trade also affects the marginal gain to cooperation. Countries that trade often cooperate in order ways, for example by forming military alliances. In other words, the presence of trade and the mutual benefits of trade can strengthen other forms of cooperative behavior such as alliances. An ally that would potentially lose gains from trade would be expected to provide stauncher support for a country facing conflictive behavior from a third party. Thus, trading partners have a greater marginal gain from cooperation regardless of geographic distance. Graphically this is depicted by MG* and MG'*. Introducing trade for geographically close countries increases optimal cooperation from point C to D, while trade increases optimal cooperation among distant countries from point A to B. This leads to two additional testable hypotheses.

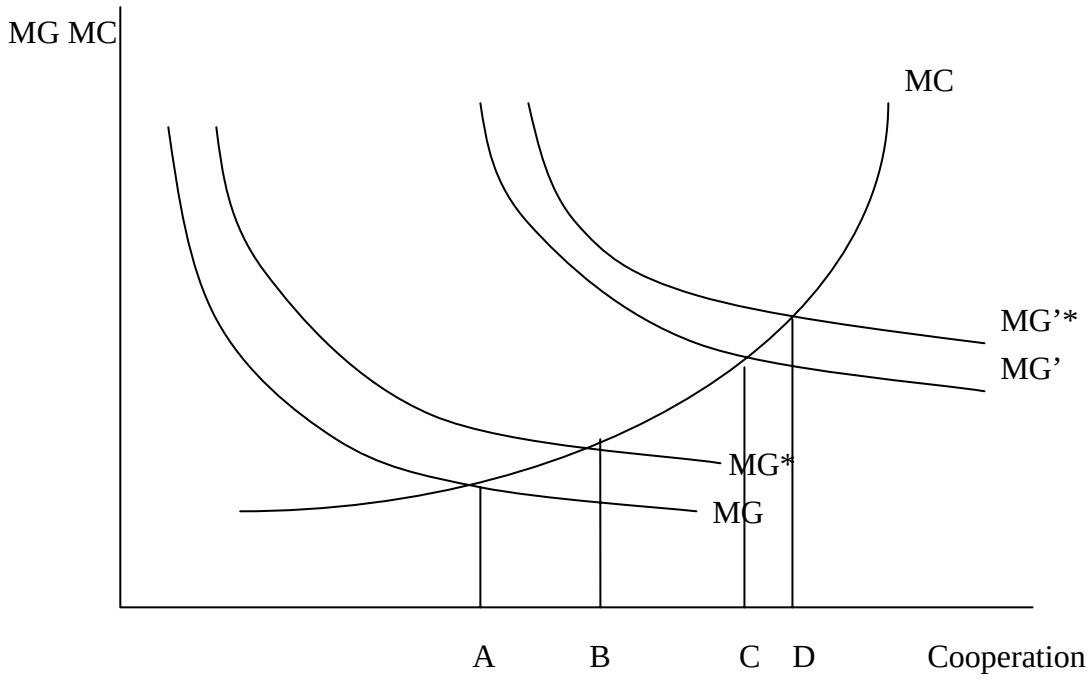

Figure 2: Optimal cooperation for neighboring and distant dyads.
Optimal cooperation: Pt. A--Dist dyad, no trade; Pt. B-- Dist dyad, trade;
Pt. C—Close dyad, no trade; Pt. D—Close dyad, trade.

Hypothesis #3: Trade leads to a larger increase in cooperation for distant dyads than close dyads.

Optimal cooperation increases from point C to D for close dyads and from point A to B for distant dyads. This may counterintuitive, but suggests that closer dyads already have an incentive to cooperate. Introducing trade increase the incentive to cooperate, but trade has a larger marginal effect when the countries are more distant and have little incentive to cooperate based on proximity .

Hypothesis #4: Geographic proximity leads to a greater increase in cooperation for dyads with little or no trade.

Optimal cooperation falls from point D to B for trading dyads and from point C to A for non-trading dyads. Countries that trade have an incentive to cooperate. Proximity has a larger effect on cooperative behavior when the incentives to cooperate derived from trade are absent.

To summarize, trade increases cooperation and decreases conflict. Proximity increases conflict and increases cooperation. Trade mitigates the increased conflict and operation brought about by proximity. The effects of this mitigation lessons as distance rises. A given level of trade from a close country need not result in the same reduction of conflict as trade from a distant country because trade need not shift the marginal gain of conflict and cooperation equally. In short, the conflict-trade model has two parts: First is the marginal cost of conflict, and second is the direct utility associated with conflict. The direct utility associated with conflict is not independent of distance. By the same token, a given level of trade need not have the same effect in increasing cooperation as it does in decreasing conflict. Here increases in the marginal cost of conflict brought on by a given level of trade need not equal the increased marginal gains.

Conclusion

To summarize, both trade and distance are important determinants of international interactions. This paper shows that distance and trade have interactive as well as main effects on conflict. The main effects of distance may be due to a variety of reasons, including territorial disputes, the inability of small or developing countries to conflict with distant countries, and greater interactions between neighboring countries. The interactive effect suggests that the importance of economic interdependence depends on geography and that the importance of geographic proximity depends on economic interdependence. Both factors play important and interconnected roles in determining international interactions.

The results have a number of policy implications. Distance is a given that countries cannot not do much to alter (though in theory a country can move its capitol), while trade is a choice variable. As such, trade is a variable that countries can alter, with the effect of trade

varying depending on the distance between countries. While trade may be used to affect many relationships between countries, we focus on international conflict and cooperation. Trade has a greater effect on conflict when countries are closer. As such, trade mitigates the incentives for conflict that exist between close countries. On the other hand, close countries already have an incentive to cooperate with each other. Trade has a greater effect on cooperation when countries are more distant and the incentives for cooperation that exist for close countries are not present.

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