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Of Iron or Wax? The Effect of Economic Integration on the Reliability of Military Alliances[***]

In this paper we analyze what determines if a military alliance represents a credible commitment. More precisely, we verify if economic integration of military allies increases the deterrent capability of an alliance, and its effectiveness in the case of third-party aggression. We propose that growing intra-alliance trade creates audience costs and sunk costs for political leaders who venture to violate conditions of an alliance treaty. Therefore, intensive trade can be regarded as a signal of allies' determination to aid one another in the case of third party aggression, and a deterrent of such aggression. Regression analysis of bilateral fixed-term mutual defense agreements concluded between 1945 and 2003 reveals that large trade volumes among military allies indeed reduce the likelihood that their political leaders will breach alliance commitments. Intra-alliance trade also displays a number of interesting interaction effects with the other common predictors of military alliance reliability such as shared allies' interests and values, symmetry of their military capabilities, their geographic location and domestic political institutions.

Introduction

In 2014, the annexation of Crimea and the military actions of the Russian armed forces and pro-Russian separatists in Eastern Ukraine elevated questions of national security to the top of political leaders' agendas across Eastern Europe. One such question concerns a credible demonstration of the commitment by the North Atlantic Treaty Organization (NATO) to defend

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[***] The title of this paper refers in part to a XIV c. diplomatic letter by Gediminas, Grand Duke of Lithuania, in which he assured German merchants that "Iron would sooner turn to wax, than the Lithuanian ruler would renege on his promise."

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its eastern allies – both for potential enemies[1] and for the citizens of Eastern European NATO member countries.[2]

This question—whether military alliances are reliable in the face of threats to the sovereignty or the territorial integrity of their members—has been the subject of much research. In addition to studying variation in the reliability of military agreements (Alan N. Sabrosky[3], Alastair Smith[4]), scientists have focused on various factors that determine the efficiency of military alliances, including polarity of the international system (Louis Rene Beres[5]), the different types and specifications of alliance agreements (Brett Ashley Leeds, Andrew G. Long and Sara McLaughlin Mitchell[6]), domestic politics and political institutions within allied countries (Kurt Taylor Gaubatz[7]; Erik Gartzke and Kristian Skrede Gleditsch[8]; Leeds, Michaela Mattes and Jeremy S. Vogel[9]), and the symmetry of military capabilities of allied states (James D. Morrow[10]; Jaewook Chung[11]).

The aim of our paper is to contribute to the existing literature by answering whether the reliability of military agreements depend upon the economic integration of allied countries. More precisely, we study whether larger volumes of intra-alliance trade, *ceteris paribus*, lead to a longer successful existence of an alliance and to the fulfilment of its obligations under the provisions of a military alliance agreement.

Treaties that regulate military obligations of countries often overlap

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[1] LRT Radijo laida „Ryto garsai", *D. Grybauskaitė: prie mūsų artėja grėsmė, todėl būtina imtis priemonių [D. Grybauskaite: A Threat Is Approaching Us, Thus It Is Necessary to Take Actions],* 2014 July 22, http://www.delfi.lt/news/daily/lithuania/d-grybauskaite-prie-musu-arteja-gresme-todel-butina-imtis-priemoniu.d?id=65353372, 2014 09 15.

[2] www.DELFI.lt, *Lietuviai nori NATO karių [Lithuanians Want NATO Soldiers],* 2014 August 1, http://www.delfi.lt/news/daily/lithuania/lietuviai-nori-nato-kariu.d?id=65455574, 2014 09 15.

[3] Sabrosky A.N., "Interstate Alliances: Their Reliability and the Expansion of War" in Singer J.D., ed., *The Correlates of War II: Testing Some Realpolitik Models*, New York: Free Press, 1980, p. 161-198.

[4] Smith A., "Alliance Formation and War", *International Studies Quarterly* 39, 1995, p. 405-425.

[5] Beres L.R., "Bipolarity, Multipolarity, and the Reliability of Alliance Commitments", *The Western Political Quarterly* 25 (4), 1972, p. 702-710.

[6] Leeds B.A., Long A.G. & McLaughlin Mitchell S., "Reevaluating Alliance Reliability: Specific Threats, Specific Promises", *The Journal of Conflict Resolution* 44 (5), 2000, p. 686-699.

[7] Gaubtaz K.T., "Democratic States and Commitment in International Relations", *International Organization* 50 (1), 1996, p. 109-139.

[8] Gartzke E. & Gleditsch K.S., "Why Democracies May Actually Be Less Reliable Allies", *American Journal of Political Science* 48 (4), 2004, p. 775-795.

[9] Leeds B.A., Mattes M. & Vogel J.S., "Interests, Institutions, and the Reliability of International *Commitments*", *American Journal of Political Science* 53 (2), 2009, p. 461-476.

[10] Morrow J.D., "Alliances and Asymmetry: An Alternative to the Capability Aggregation Model of Alliances", *American Journal of Political Science* 35 (4), 1991, p. 904-933.

[11] Chung J., "The Power Distribution between Allies, Alliance Politics and Alliance Duration", Doctoral Thesis Defense at Rice University, Houston, August 11, 2014.

with agreements that govern international trade. Of 571 bilateral military alliances signed between 1816 and 2000, 52 agreements also liberalized trade between alliance members[12]. Regional trade agreements are also often similar to military alliances: trading countries promise not to fight each other and not to support any attacks by third parties on their trade partners[13]. Such treaties are usually economically effective: countries that cooperate militarily and economically with each other report a higher growth in bilateral trade volume than countries without analogous treaties[14]. However, small but politically important allies sometimes impose protectionist measures on larger alliance partners[15] and piggyback on their investments into military capabilities[16].

Joanne Gowa and Edward D. Mansfield[17] propose that the links between military and trade affairs can be explained by the security that a military alliance provides for trade partners. Business communities do not expect allies to engage in hostile actions against each other; therefore they invest in trade between their home markets and those of their allies. However, this explanation does not answer the question of why leaders who sign military alliance agreements sometimes commit themselves to liberalizing trade with their allies rather than simply allowing trade to evolve, as the Gowa and Mansfield[18] mechanism would suggest. We claim that leaders of allied countries seek to expand mutual trade because it signals commitment to fulfilling mutual military obligations.

Although the economic and military power of allies is an important factor in the successful existence of an alliance, this power can only have an effect when potential aggressors believe that powerful allies will actually help each other. For example, Germany's decision to attack Poland in 1939 was determined not by the lack of military strength of Poland's allies—the United Kingdom and France—but by Hitler's belief that the large European countries would not

[12] Poast P. & Koremenos B. "When Will States Include Trade Cooperation Provisions In Military Alliance Treaties? Relative Capabilities and the Enforcement Problem", October 25, 2007, http://sitemaker.umich.edu/nis2007/archive/da.data/00000000000000000000000000000000000000000002072774/File/trade_alliances_-_12.0.doc, 2014 09 15.

[13] Powers K.L., "Regional Trade Agreements as Military Alliances", *International Interactions* 30, 2004, p. 373-395.

[14] Long A.G. & Leeds B.A., "Trading for Security: Military Alliances and Economic Agreements", *Journal of Peace Research* 43, 2006, p. 433-451.

[15] Wolford S. & Kim M., "Alliances and the High Politics of International Trade", May 3, 2012, http://spot.colorado.edu/~moonhawk/research/WolfordKim-Alliances.pdf, 2014 09 15.

[16] Sandler T. & Shimizu H., "NATO Burden Sharing 1999-2010: An Altered Alliance", *Foreign Policy Analysis* 10, 2014, p. 43-60.

[17] Gowa J. & Mansfield E.D., "Alliances, Imperfect Markets, and Major-Power Trade", *International Organization* 58 (4), 2004, p. 775-805.

[18] *Ibidem*, p. 775-805.

fulfil their promise to help Poland if its independence was in danger[19].

In our opinion, growing volumes of trade send a signal to potential enemies that members of a military alliance are likely to help each other if conditions specified in the alliance agreement occur. Hence, together with the impact of economic integration on alliance power dynamics, the signaling effect of growing trade should reduce the probability of aggression against trading allies and increase the probability that, if such aggression occurs, those allies will fight together.

We detail this hypothesis in the following part of our paper. Next we conduct an empirical study, comparing trade volumes between member states of 61 fixed-term bilateral military alliances, with the probability that these alliances successfully performed their functions up to their termination date. The demonstration of such an empirical link would be important not only as a contribution to the academic literature, but also as instruction for political leaders. If economic integration truly gives pause to potential enemies and ensures the fulfilment of alliance obligations, countries should create strong incentives for businesses to establish close connections with partners in other alliance member-states.

1. Theoretical Argument

Following the example of Leeds, Jeffrey M. Ritter, McLaughlin Mitchell and Long, we define a military alliance as a "written agreement, signed by official representatives of at least two independent states, that include promises to aid a partner in the event of military conflict, to remain neutral in the event of conflict, to refrain from military conflict with one another, or to consult/cooperate in the event of international crises that create a potential for military conflict" [20]. Such agreements can be interpreted as signals by country leaders that they will use military action in support of their allies under the conditions specified in their alliance treaties[21].

Since fulfillment of such obligations inevitably results in considerable material and human cost, the leaders that sign military agreements may not

[19] Ferguson N., "The Pity of Peace: The Origins of the Second World War Revisited ", April 19, 2006, http://dev.wcfia.harvard.edu/sites/default/files/Ferguson_PityofPeace.pdf, 2014 09 15.
[20] Leeds B.A., Ritter J.M., McLaughlin Mitchell S. & Long A.G., "Alliance Treaty Obligations and Provisions, 1815-1944", *International Interactions* 28, 2002, p. 238.
[21] Morrow J.D., "Modeling the Forms of Cooperation: Distribution Versus Information", *International Organization* 48, 1994, p. 387-423.

want to meet these obligations in the future. We assume that country leaders enter military alliances, hoping that the joint power of allies and the demonstrated commitment to its use will deter possible aggressors, allowing the leaders to avoid not only the obligation to defend their partners, but also a military attack on their own territory. From this perspective, a successful military alliance is not the one that provides support to a member under attack, but rather an alliance that does not have to face any of the contingencies laid out in its treaty[22]. Potential aggressors, however, might underestimate the determination of allies to defend each other. Therefore, we assume that a successful alliance is either capable of deterring third-party attacks on its members or is prepared to fight together in the case of such an attack.

Yet, it is obvious that the deterrent qualities of an alliance may appeal not only to reliable partners who would help each other when needed, but also to opportunistic country leaders who would violate the treaty obligations in the face of military aggression. So why then should potential enemies believe that a military alliance is worth more than the paper on which it is signed? How can military alliances founded upon credible commitments be differentiated from cheap talk?

Under anarchy, typical of international politics, a country's commitment is perceived as credible if that country's leader incurs cost after breaking it[23]. The higher a leader's cost of breaking a commitment, the more credible the country's commitment becomes. Two common ways to ensure that a leader will get punished for breaking provisions of an international commitment are audience costs and sunk costs[24].

Leaders who sign mutual defense agreements incur audience costs because they publicly commit themselves to providing military support for their allies, should the circumstances listed in the treaty occur[25]. If politicians did not fulfil this obligation, voters could punish them for undermining a country's international prestige. Such a mechanism for punishing unreliable leaders is, of course, more typical of democracies where citizens can influence whether political leaders remain in power[26]. However, more recent studies propose that voters do not have a unanimous opinion on changes in their country's foreign

[22] Bueno De Mesquita B., *Principles of International Politics,* Washington, DC: CQ Press, 2009.
[23] Slantchev B.L., *Military Threats: The Costs of Coercion and the Price of Peace*, Cambridge: Cambridge University Press, 2011.
[24] Fearon J.D., "Signaling Foreign Policy Interests: Tying Hands versus Sinking Costs", *Journal of Conflict Resolution* 41, 1997, p. 68-90.
[25] *Ibidem.*
[26] Tomz M., "Domestic Audience Costs in International Relations: An Experimental Approach", October 2005, http://web.stanford.edu/~tomz/pubs/tomz-audcosts-2005-10-26a.pdf, 2014 09 15.

policy, and thus politicians who have broken military agreements do not necessarily get punished during elections[27].

The reputation of a leader who has not fulfilled his obligations can be undermined not only in the eyes of voters, but also of an "audience" comprised of leaders of other alliance members or leaders of third countries. For example, the refusal of the United States of America, despite the previous agreement by the Eisenhower administration to provide military support for France fighting the communist Vietnamese insurgency in 1954, lead President de Gaulle to decide that the U.S. was an unreliable partner, and became one of the reasons to terminate French membership of NATO[28].

An alternative way of punishing a commitment-breaking leader has to do with sunk costs. If a country has invested a lot of resources in strengthening the military capabilities of an alliance, the failure to fulfil its alliance-related obligations in an event of military aggression will result in the loss of these investments[29]. Such an "advance payment" of future defense costs increases the possibility that signatories of a military alliance will help each other and, therefore, has the potential to deter enemies.

A good example of sunk costs is the exceptionally close coordination of the military capabilities of NATO countries. Such efforts, encompassing not only joint military exercises but also the acquisition of compatible armament and the rotation of military staff, is highly expensive[30]. If, in the face of external aggression, the NATO countries refused to help a member under attack, these huge expenditures would be lost without producing any tangible benefit. In this way, by investing in the development of joint military capabilities, the leaders of allied countries send a credible signal to their opponents that they are determined to defend their allies should the circumstances listed in the NATO treaty occur. This is one of the reasons why the NATO countries have not yet experienced an attack from a third country on their own territory.

In our opinion, economic integration of military allies creates potential audience costs as well as sunk costs for their leaders, and, therefore, serves as an indicator of alliance reliability to third countries. Bilateral trade creates interest groups in the domestic politics of allied nations that would experience

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[27] Wolf A.B., "Rethinking the Audience Costs Argument", February 4, 2011, http://www.socsci.uci.edu/files/internationalstudies/docs/grofman2011.pdf, 2014 09 15.

[28] Bueno De Mesquita (see 23). An equally important reason for the withdrawal was the conviction of the French leaders that the US would protect Western Europe from the aggression of the Communist block, even with France outside of the Alliance.

[29] Fearon (see 24).

[30] Bueno De Mesquita (see 22).

considerable losses if their trading partners were to be attacked by third countries. These interest groups might become an attentive audience, monitoring the behavior of political leaders, informing voters of treaty non-compliance, forming negative public opinion for the failure to fulfill treaty obligations, and otherwise punishing politicians for harming business by reneging on their promises to allies.

Although the history of international relations lacks known examples of business communities lobbying governments to honor pledges to military allies, there is no doubt that commercial interests play a role in the formation of foreign policy. Already in the 19th century, Cecil Rhodes (supported by Nathaniel de Rothschild) not only influenced Great Britain's decisions to engage in armed conflicts, but also privately financed wars in Central Africa to benefit his diamond business[31]. More recently, business communities have had a profound impact on their countries' stance in the negotiations over international trade and the liberalization of capital and information flows[32]. Therefore, it is logical to think that the position of powerful business organizations on the fulfilment of alliance obligations could affect the behavior of alliance leaders.

As noticed by Lawrence R. Jacobs and Benjamin I. Page[33], business organizations have a stronger influence on foreign policy formation than experts, trade unions, or in particular, public opinion. Therefore, even if various interest groups within allied countries have different opinions on the fulfilment of military obligations, business associations with their relatively large resources and experience with political influence should be perceived by re-election-minded politicians as a punishment-capable, and therefore, important audience.

Economic integration can also generate sunk costs for politicians who do not comply with alliance agreements. Policies that stimulate international trade, including reduction or outright elimination of protective tariffs, require significant financial resources. The military defeat of an allied economic partner would destroy the benefits of economic integration, thus "sinking" the resources that a country's leaders have previously invested in the development of economic ties.

Assuming that a country's resources are limited, active economic integration with its alliance partners may generate opportunity costs that can also be treated as sunk costs. Resources spent on stimulating trade with an ally cannot always be used for economic integration with other markets. Thus, if a

[31] Ferguson N., *Empire How Britain Made the Modern World* , London: Allen Lane, 2002.
[32] Bueno De Mesquita (see 22).
[33] Jacobs L.R. & Page B.I., "Who Influences U.S. Foreign Policy?", *The American Political Science Review* 99 (1), 2005, p. 107-123.

country has abandoned its ally to third-party aggression, it then must finance aggressive penetration of alternative markets so as to compensate for the loss of an important economic partner. In the short run, such efforts would produce high and perhaps unplanned costs for the country. Such costs would naturally create political costs for country leaders.

Having considered the costs of military aggression on business communities and on the public finances of economically integrated allies as well as the consequent political costs on the leaders of these countries, we suggest that expansion of intra-alliance trade incentivizes leaders of allied states to honor their military agreements and deters potential third-party aggressors. Therefore trading military alliances should be more successful (i.e., experience third-country aggression less frequently and fight together in the event of such an aggression) than military alliances with weak commercial ties.

2. Empirical Study

Since we are interested in the reliability of alliances' defensive role(s), we limit our inquiry in this section only to those military alliance agreements that stipulate for active military support in the event of a conflict, or, in other words, to mutual defense agreements[34]. More precisely, we examine whether the volume of trade between allied states is responsible for the successful performance of alliance functions (i.e., avoiding military conflicts specified in the alliance agreement and defending allies when such conflicts arise) in the case of 61 bilateral fixed-term mutual defense agreements during the period of 1945 through 2003[35]. Of these alliances, 32 (or 52.5%) have concluded their term without violating their commitments.

Such a study, to be sure, has some limitations. Bilateral alliances constitute 77% of all mutual defense agreements signed between 1945 and 2003 (fixed-length bilateral alliances constitute 62% of these agreements).[36] There is a reason to believe that trade flows among countries in multilateral alliances

[34] Bueno De Mesquita (see 22).

[35] During the timespan of our study, 95 bilateral fixed-term mutual defense agreements have been signed. Unfortunately, the lack of data on bilateral trade flows prevents us from analyzing all the alliances that meet our study criteria. The sample consists of 61 military alliances, members of which have reported their trade data for the duration of an alliance with no more than two missing data points (years) as accounted by the database *The Correlates of War Project (COW).* The missing data have been imputed by means of calculating a linear trend between the values on both sides of the missing data.

[36] Leeds B.A., Rice University, *The Alliance Treaty Obligations and Provisions Project (ATOP)*, July 2005, http://atop.rice.edu/, 2014 09 15.

send less accurate signals to potential aggressors than in the case of bilateral alliances. For example, in a trilateral alliance, if countries A and B trade intensively with one another but not with their ally C, a potential aggressor might start doubting whether countries A and B are willing to fulfill their alliance obligations to country C. Therefore growth in bilateral trade between some members of a multilateral alliance may not necessarily have a deterring effect against attacks on other allies (and thus on the alliance as a whole).

However, taking into consideration the measurement complications of aggregate trade flows and their variation—in time as well as among the members of multilateral alliances—we have limited our sample to bilateral military alliance agreements, leaving the possible effect of trade on the reliability of multilateral alliances for future research. Verification of our hypothesis in the context of bilateral military alliance agreements will allow for formulating better hypotheses about multilateral alliances.

Concerns about the validity of our findings might also be raised by the fact that 49% of the members of bilateral military alliances in our sample have simultaneously belonged to multilateral mutual defense agreements. Of particular concern are the 21% of bilateral alliances formed by the members of the Warsaw Pact. It is reasonable to assume that participation in the same multilateral alliance might influence the reliability of a bilateral military partnership. Especially in the case of the Warsaw Pact, bilateral mutual defense agreements of its member states could be dismissed as uninformative for the purpose of our study, since foreign policies of the socialist countries depended to a large degree on instructions from the USSR. Despite the strength of economic ties between any two countries of the communist bloc, their behavior in the event of an aggression against their ally would be determined by Moscow and not by the lobbying of directors of domestic state-owned enterprises.

Nevertheless, there are reasons to question the confounding effect of simultaneous membership in several alliances. Out of eight multilateral military agreements overlapping with bilateral alliances in our sample, four have been terminated due to a "violation of provisions by one or more members, including willful abrogation before the scheduled termination date."[37] Such a failure to meet alliance commitments implies a limited reliability and deterrent capacity of these multilateral military agreements. In fact, it is not inconceivable that leaders enter bilateral mutual defense agreements in order to compensate for perceived ineffectiveness of multilateral alliances their countries belong to. To control for the effect of simultaneous alliance membership,

[37] *Ibidem.*

we have estimated a version of our empirical model with a categorical variable representing overlapping alliances: we observed no statistically significant relationship between membership in multilateral alliances and reliability of a bilateral alliance and the effects of all other variables remained unchanged.

Finally, it is worthwhile mentioning the issue of a possible endogenous relationship between trade and military alliances[38]. Since allies are both likely to trade with one another, it may seem that our proposed causal relationship between trade and alliance reliability can be interpreted conversely: the more reliable a military alliance, the more mutual trade business communities of the alliance conduct. We believe, however, that such an endogenous mechanism does not exist. Although business leaders can easily see whether their countries are linked with their trading partners through a military alliance, they cannot easily tell if the alliance obligations are credible or if they are just a cheap talk. The dependent variable of our hypothesis is the deterrent potential of an alliance rather than the existence of an alliance *per se*, and we do not think that this relatively obscure factor can influence the choices of trade markets. On the contrary, we believe that externally induced choices of export and import markets signal determination of allies to fulfill obligations laid out in an alliance treaty.

The model of our empirical study is listed below:

$$VIOLATION=\alpha+\beta_1 TA+\beta_2 TSD+\beta_3 SR+\beta_4 ND+\beta_5 MA+\beta_6 N+\beta_7 INTER+\varepsilon$$
$$INTER \in \{\emptyset; TA*TSD; TA*SR; TA*ND; TA*MA; TA*N\}$$

The dependent categorical variable VIOLATION is coded as 1 if an alliance was terminated because of a violation of its treaty obligations by one or more member countries, and 0 otherwise. This variable appropriately measures the reliability of a military alliance because reliable alliances (i.e., the ones that signal credible commitments to defending the allies) come under third-party aggression less frequently, thus losing an opportunity to violate treaty obligations. If an enemy disregards the demonstrated determination to fight together, reliable allies should not fail to provide their partners with military support. The values of this variable have been obtained from the database *The Alliance Treaty Obligations and Provisions Project (ATOP)*[39].

The independent variable TA indicates the average share of trade (im-

[38] Long A.G. & Leeds B.A., "Trading for Security: Military Alliances and Economic Agreements", http://atop.rice.edu/download/publications/LongLeedsJPR.pdf, 2014 09 15.
[39] Leeds (see 36).

ports and exports) between alliance member countries out of the total trade of these countries during the term of a military alliance. Our hypothesis suggests that an increase in the average trade volume will have a significant negative effect on the possibility that an alliance will terminate due to violations of treaty provisions. The values of this variable can be found at the database *The Correlates of War Project (COW)*[40].

The variable TSD denotes variation of trade volumes, measured as a standard deviation of the variable TA during the alliance term. High values of this variable indicate that the volume of trade between allies had been fluctuating from year to year. Assuming that unstable trade translates into a lower interest of business communities in preserving the trade market, we believe that an increase in the values of the variable TSD will have a positive impact on the possibility that allies will violate their obligations.

The variable SR represents the values of the Signorino-Ritter score calculated on the global scale. Ranging from –1 to 1, the Signorino-Ritter score shows the extent of an overlap between alliance portfolios of military partners.[41] Higher values of the SR variable mean that both allies have signed many separate military cooperation agreements with the same third countries[42]. In such a way, the Signorino-Ritter score indicates that interests and values of alliance partners coincide with each other.

The similarity of alliance portfolios is important to our analysis due to its potential effect on a country's determination to defend an alliance partner. Similar interests and values might also influence the trade volumes of allies, possibly creating a problem of correlation between independent variables (collinearity) for our empirical study. We have ruled this concern out, however, as correlation between the Signorino-Ritter score and the average share of bilateral trade (TA) has turned out to be very weak ($r = 0.2$, $p = 0.13$.) Therefore, we have included SR in the empirical model, expecting this variable to have a significant negative effect on the possibility that allies will violate the obligations laid out in the treaty. The values of SR can be obtained from the database *The Expected Utility Generation and Data Management Project (EUGene)*[43].

The variable ND is a categorical variable that takes the value of 1 if at le-

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[40] *The Corrlelates of War Project*, June 20, 2006, http://www.correlatesofwar.org/, 2014 09 15.

[41] Signorino C.S. & Ritter J.M., "Tau-b or Not Tau-b: Measuring the Similarity of Foreign Policy Positions", *International Studies Quarterly* 43 (1). 1999, p. 115-144.

[42] D'Orazio V., "Advancing Measurement of Foreign Policy Similarity: Draft v.4", September 5, 2013, http://vitodorazio.weebly.com/uploads/1/3/0/2/13026085/policy_similarity.pdf , 2014 09 15.

[43] Bennett D.S. & Stam, III, A.C., *The Expected Utility Generation and Data Management Project (EUGene*), June 9, 2000, http://www.eugenesoftware.org/, 2014 09 15.

ast one allied country was non-democratic (as indicated by a *Polity* score equal to or lower than 6) for at least one year during the alliance term. ND takes the value of 0 when two democracies sign and maintain a military alliance agreement. Some scholars suggest that autocratic leaders are less dependent upon the public opinion in their countries,[44,45] and they are therefore less susceptible to audience costs associated with the breaking of alliance commitments. For this reason, we believe that variable ND will have a significant positive effect on the probability of treaty provision violations. The values of this variable can be obtained from the database *The Polity IV Project: Political Regime Characteristics and Transitions, 1800-2013*[46].

The variable MA denotes the asymmetry of allies' military capabilities. According to Morrow[47], asymmetric alliances last longer and are more successful than symmetric ones. This is due to different goals pursued by allies of different military capabilities: a stronger country guarantees the security of a smaller country in exchange for its "autonomy" and the opportunity to influence the foreign policy of the smaller country. Such a "barter" agreement might remain beneficial for both sides for a long time as the power balance between the two countries does not change quickly. Smaller allies do not abandon their powerful partners (partially because of their restricted "autonomy"), while the defense of the smaller allies does not cost much for the stronger ones. Symmetric alliances, where both members seek security and are unwilling to forego "autonomy", are less reliable due to the partners' ability to change allies and due to the relatively high costs of fulfilling obligations.

The variable MA can also be interpreted as an indirect measure of alliance military capabilities. In our sample, the most asymmetric alliances were formed between the two poles of the global system (the US and the USSR) and their smaller allies. No symmetric alliance was able to exceed the military power of alliances formed by these superpowers. Unsurprisingly, variable MA is very strongly correlated with the military power of the strongest alliance member ($r = 0.99$, $p = 0.00$). If we perceive the military power of an alliance as another deterrent factor, we must expect variable MA to have a significant negative effect on the probability of alliance treaty violations. The indicator of countries' military power can be found in the database *The Correlates of War*

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[44] Bueno de Mesquita B., Morrow J.D., Siverson R.M. & Smith A., "An Institutional Explanation of the Democratic Peace", *American Political Science Review* 93 (4), 1999, p. 791-807.

[45] Reiter D. & Stam A.C., *Democracies at War*, Princeton: Princeton University Press, 2002.

[46] Marshall, M.G., *The Polity IV Project: Political Regime Characteristics and Transitions, 1800-2013*, June 6, 2014, http://www.systemicpeace.org/polity/polity4.htm, 2014 09 15.

[47] Morrow (see 10).

Project (COW)[48] under the name *CINC (Composite Index of National Capability).*

The variable N shows whether allied countries are neighbors, i.e., are separated by a land border, by a river or by no more than 24 miles of water[49] (in which case, N = 1; otherwise N = 0). Since country leaders should perceive aggression against their allied neighbors as more dangerous than aggression against their geographically-distant allies, we expect variable N to have a significantly negative effect on the probability of violations of military alliance treaties. The values of the variable can be obtained from the database *The Correlates of War Project (COW)*[50].

Variables belonging to the group "INTER" indicate the joint effect that the variable TA has with every other predictor on the dependent variable VIOLATION. Table 1 contains the components of the interaction variables.

Table 1. **Components of Interaction Variables and Their VIF Indicators**[51]

Model	Components of Variable INTER	VIF
1	–	–
2	TA * TSD	12,65
3	TA * SR	11,46
4	TA * ND	14,9
5	TA * MA	4,12
6	TA * N	3,31

The interaction variables and their interpretation are discussed in detail by Thomas Brambor, William Roberts Clark and Matt Golder[52]. In the context of our work, these variables show how growth in the average trade volume (TA) affects the probability of the violation of alliance obligations, as the values of other independent variables are allowed to vary. For example, in the second model, the coefficient β_1 indicates how growth in trade affects the possibility that alliance partners will break their commitments, *but only if* TSD = 0, or in other words, if trade volume is stable year after year throughout the alliance term. In a more realistic case where TSD is equal to any positive number, for example X, the effect of TA on VIOLATION would be equal to $\beta_1 + X^*\beta_8$. Other interaction variables can be interpreted similarly.

[48] *The Corrlelates of War Project*, June 20, 2006, http://www.correlatesofwar.org/, 2014 09 15.
[49] The specific water-distance has been taken from the classifications of the *EUGene* database.
[50] *Ibidem.*
[51] Authors' calculations.
[52] Brambor T., Clark W.R. & Golder M., "Understanding Interaction Models: Improving Empirical Analyses", *Political Analysis* 14, 2006, p. 63-82.

We expect that an increase in bilateral trade will have a particularly strong negative impact on the probability of an alliance ending in a violation if trading allies have similar alliance portfolios (SR is close to 1); if military power of allied countries is asymmetric (high values of MA); and if allies have a common land or water border (N = 1). On the other hand, we believe that the effect of trade on alliance reliability will be less pronounced if trade volume between allies is unstable (high values of TSD) or when at least one ally is non-democratic (ND = 1).

It should be noted that in some cases the inclusion of the variable INTER in the model has resulted in collinearity of the independent variables (see the VIF indicators in Table 1). The consequence of this correlation is an increase in the error terms of the regression coefficients[53], which can lower the statistical significance of the coefficients. However, replication of the regression analysis without interaction variables does not change the signs of the coefficients or their significance.

We estimate our model by means of a logit regression method that assesses the probability that a dependent variable is equal to 1 (in the case of this study – the probability that an alliance is terminated due to violations of treaty provisions), assuming this probability to be a logistic function of independent variables[54]. Regression coefficients obtained by this method indicate a change in a logit (a natural logarithm of an odds ratio of the dependent variable) when an independent variable changes by one unit, keeping all other variables constant. The exponents of regression coefficients, then, indicate changes in the actual relative risk that an alliance will end due to treaty violations, attributable to variation in the independent variables. In other words, a statistically significant positive coefficient implies a positive effect of an independent variable on VIOLATION.

The goodness of fit statistics listed below indicate that our models explain from 17% to 31% of the variation in the dependent variable and correctly predict from 79% to 84% of the alliance termination cases. All versions of the model show that the empirical data correspond to the expectations of our hypothesis. Notably, in all models, an increase in the average amount of trade (TA) has a statistically significant negative effect on the probability that an alliance will terminate due to the unwillingness of its leaders to fulfil obligations laid out in the alliance treaty.

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[53] Robinson C. & Schumacker R.E., "Interaction Effects: Centering, Variance Inflation Factor, and Interpretation Issues", *Multiple Linear Regression Viewpoints* 35 (1), 2009, p. 6-11.

[54] Long J.S. & Freese J., *Regression Models for Categorical Dependent Variables Using Stata*, 3rd ed. College Station, TX:Stata Press, 2014.

As expected, the variation of trade volume (TSD) has a significant positive impact on the probability of treaty violations. However, these variables (TA and TSD) do not interact with each other: the negative effect of an increase in the average amount of trade does not change when variation in trade volume goes up or down; likewise, the positive effect of the variability in trade volume remains stable irrespective of the amount of intra-alliance trade.

Table 2. **The Effect of Bilateral Trade and Other Variables on the Probability of the Violations of Alliance Obligations**[55]

Variables	Models						
	1	1al[1]	2	3	4	5	6
TA	–119.14*** (41.94)	–117.13*** (42.31)	–123.17*** (43.90)	385.61** (168.13)	94.74 (63.22)	–122.77*** (42.63)	–48.87 (53.13)
TSD	237.94*** (72.32)	230.77*** (75.96)	166.19 (122.82)	384.93*** (119.24)	274.23*** (85.58)	238.58*** (71.92)	208.27** (81.39)
SR	–4.09** (1.83)	–3.93** (1.87)	–4.03** (1.81)	–1.51 (1.52)	–4.55** (2.22)	–4.12** (1.84)	–3.94** (1.69)
ND	1.87 (1.48)	1.93 (1.48)	1.95 (1.56)	3.57*** (1.18)	4.42*** (1.66)	1.89 (1.48)	1.74 (1.27)
MA	–18.20** (8.01)	–18.57** (8.04)	–17.73** (8.17)	–33.21*** (11.12)	–21.89** (10.18)	–20.64* (11.59)	–16.40* (8.84)
N	196** (0.77)	1.94** (0.78)	1.91** (0.75)	2.00** (0.95)	1.98** (0.81)	1.91** (0.79)	3.03*** (1.12)
MLA		–0.21 (0.63)					
TA*TSD			1495.16 (2294.79)				
TA*SR				–638.94*** (196.05)			
TA*ND					–239.62*** (87.39)		
TA*MA						180.71 (373.98)	
TA*N							–123.59** (57.06)

[1] Here we report the estimates of model 1, obtained while controlling for the participation of the members of some bilateral alliances in multilateral mutual defense agreements.

[55] Authors' calculations.

Table 3. **Goodness of fit indicators**[56]

Diagnostic indicators	Models						
	1	1a	2	3	4	5	6
Pseudo R^2	0.20	0.17	0.18	0.31	0.22	0.17	0.21
Akaike Criterion	67.76	69.71	69.52	58.43	66.12	69.68	66.54
Correct predictions %	78.70	80.30	82.00	83.60	80.30	78.70	82.00

Consistent with our expectations, the similarity of allies' values (expressed by the overlap of alliance portfolios – the Signorino-Ritter score) has a statistically significant negative effect on the dependent variable VIOLATION. Also this variable displays an interesting interaction with trade volume. If countries do not share many similar values (and, accordingly, have not entered into many agreements with common allies outside the alliance), then an increase in trade between such countries has a strong *positive* effect on the possibility that at least one of the countries will not meet its obligations in the event of a military conflict. However, if countries share similar values and have the same friends outside the alliance, an increase in trade has a significant negative effect on the probability of VIOLATION.

If at least one of the allies is non-democratic, the probability of the failure to meet alliance obligations increases. However, contrary to our expectations, the growth of intra-alliance trade, when at least one non-democratic member is involved, *decreases* the chance that an alliance agreement will be violated. It seems that trade can be an antidote to the opportunistic international policies of non-democratic leaders. If powerful economic interest groups are present even in dictatorships, as proposed by scholars of authoritarian regimes[57], they might exert pressure on dictators to fulfill their obligations to alliance partners. We are puzzled, however, by the apparent absence of a significant negative relationship between trade and the violation of alliance commitments in democratic countries. Perhaps this absence can be explained by a small number of alliances consisting of only democratic countries in our sample (12%).

Consistent with our expectations, differing military capabilities of allies decrease the possibility that an alliance will be terminated due to the failure of its members to meet treaty obligations. However, contrary to our expectations, the variable MA does not interact with trade volume. This result indirectly confirms Morrow's conclusion that asymmetric alliance members have diffe-

[56] Authors' calculations.

[57] Steinberg D.A. & Shih V.C., "Interest Group Influence in Authoritarian States: The Political Determinants of Chinese Exchange Rate Policy", *Comparative Political Studies* 45 (11), 2012, p. 1405-1434.

rent motives[58]. If a more powerful country agrees to defend its weaker ally so as to expand its political "autonomy" by military means, trade relationships between the two countries may not have an important role in the strategic calculations of the more powerful country.

At first sight, the effect of variable N seems to contradict our expectations, as it shows that neighbors are more likely to violate alliance treaty provisions than geographically distant allies. However, after considering the interaction coefficient, it becomes clear that the negative effect of N exists only in the very unrealistic case when the average trade between alliance partners is equal to 0. In a more realistic case where there is some trade between allies, the effect of variable N on VIOLATION becomes significantly negative.

To sum up, the results of the empirical study fail to reject our hypothesis that intra-alliance trade provides political leaders with incentives to defend their military allies in contingencies defined by alliance treaties and deters potential enemies from escalating such contingencies.

Conclusions and Future Research

Our study suggests that trade is truly important for security. Bilateral fixed-term alliances formed by trading partners remain effective until the end of their term significantly more often than military alliances formed between countries not linked by significant trade flows. Such a result is consistent with our hypothesis that bilateral trade serves as a signal of the resolve to defend allies, deters potential aggressors, and ensures the fulfilment of treaty obligations in the event of a military conflict.

Our findings, however, raise the question of the effect of economic integration on the reliability of multilateral military alliances. It is logical to think that intensive trade among all members of an alliance would enhance its reliability. However, equally intensive trade with all allies, especially with the ones that are geographically distant and small, can contradict economic logic[59]. Can military allies enjoy the deterrent effect of trade while trading with just a few members of their alliance? If so, with which ones?

Our study proposes answers to some of these questions. For example, the symmetric growth in trade between allies who share similar interests and values as well as a common border is most beneficial for the viability of bila-

[58] Morrow (see 10).
[59] Anderson J.E., "The Gravity Model", Annual Review of Economics 3, 2011, p. 133-160.

teral fixed-term alliances. Alternatively, intra-alliance trade does not seem to increase the reliability of bilateral alliances consisting of countries with asymmetric military capabilities. Thus, it seems that members of multilateral alliances might not need to trade with their most powerful allies, but rather with their key neighboring allies that share similar political and economic interests in order to maximize the deterrent effect of trade. The full development and verification of this proposal, however, is the subject of a separate study on multilateral alliances.

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