Trade Patterns as a Source of Militarized Conflict[*]

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Abstract

The analysis of the effects of international trade on conflict has almost exclusively focused on the volume of trade flows, disregarding any consideration related to the content of trade flows. This paper empirically explores the determinants of bilateral conflict taking into account several measures describing relevant dimensions of trade flows at the product level, as the degree of complementarity between the two countries, the extent of substitutability of the partner as a destination market and an import provider, and the level of rivalry between the members of each pair as exporters and importers in third markets. Proposing an innovative instrument to address the endogeneity of trade variables, I estimate a directed model of conflict, taking advantage of a continuous event-based measure of interstate conflict. Results show that the three considered dimensions of patterns of trade are relevant causes of conflict, and their effects differ when referred to imports and exports, and also vary when explaining the frequency or the hostility level of conflict events. Thus, liberal and realist approaches emerge as coexisting explanations of the consequences of trade on political relations between countries.

Keywords: international conflict, international trade, trade patterns, rivalry, trade substitutability, trade complementarity

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1 Introduction

The recent proliferation of international conflicts in some regions highlights the need for a better understanding of the determinants of international conflict. This paper focuses on the role that trade specialization patterns, i.e. the specific groups of products imported from and exported to each partner, may have on the level of conflict between countries. Estimating a reduced form model of international conflict, we found that conflict is less likely to be observed between partners that find it harder to substitute away their exports towards other countries, and more likely to be observed between countries that compete with each other as exporters to third markets. Moreover, countries tend to fight more with complementary destinations, while they have lower conflict with highly complementary origins of goods.

The rationale behind these empirical results is straightforward. To understand the first result, note that not every conflict embeds the same opportunity costs. The loss should be larger when the goods are harder to substitute[1]. For a given country some partners are hardly substitutable as providers of imported products or as destinations for specific exports, while other partners can be easily replaced in both roles. For origins of imports a different logic could prevail, since higher conflict seems to be directed to harder to easier to substitute origins. For destinations of exports a different logic could prevail, since evidence shows the effects of substitutability are either inexistent or with the opposite sign.

Also, conflict could pursue a utility gain in terms of strategic trade interests with respect to the role of the target country on the entire trade network. Countries may have incentives to have more conflict with trade competitors in third countries. The degree of rivalry between countries in terms of the kind of products they buy and sell in international markets can also significantly increase the expected level of conflict in a country-pair.

Finally, if trade is already disrupted by some degree of conflict, exports and imports will not reflect anymore the degree of strategic importance of a market. But the pattern of trade could still be relevant in order to explain new variations in the level of conflict. Still, both positive and negative effects are possible since these variables inherit the trade and conflict debate. Countries could react to a high complementarity caring about opportunity costs of conflict or could also react aggressively against the partners that make them vulnerable.

To understand the causal links behind international militarized conflict, in particular to weigh the role of the pattern of products countries trade as a source of political disrupts, is important for many reasons. Countries' development is somehow related to their capacity to produce a very diverse set of goods, while least developed countries typically produce a narrow basket of some primary goods. So development could be seen as a process in which among other things countries diversify their production, acquiring new capacities to produce more sophisticated goods. The political dimension of this process, in terms of the reactions it will produce in trade partners who could be benefited or

[1] We refer to countries' utilities in a wide sense, it can represent the welfare level for all the economy, which would coincide with the case of a political leader maximizing social utility, or can also be thought as the result of lobbying groups, where some would beneficiate from increased trade and then lobby for peace, while others would lobby for war as a means to obtain private gains.

hindered, have not been systematically explored. We contribute to the literature on the determinants of conflict, which seeks to explain the reasons why countries fight with each other as a means to improve peace promoting policies, and we alert about the relevance of the trade patterns mechanisms that could trigger militarized disputes. It is politically relevant to know if some kinds of trade instead of promoting peace promote conflict, and our findings suggest considering theories where some forms of trade can promote conflict. Our approach also contributes to the debate over the liberal peace, where the asymmetry of our variables allows giving new insights on the different roles of imports and exports in promoting peace or conflict. Showing that more conflict should be expected the more substitutable the partner we are giving support to the liberal interpretation on the gains from trade as a component of the opportunity cost of conflict. Nonetheless, we also find that while more exports to a partner can foster peace, more imports from a partner can be the source of higher conflict levels, which could be evidence in favor of a realist approach, as is the role of trade rivalries as a source of conflict.

The main challenges we faced are related to the measurement of the conflict variable and to the endogeneity of trade variables within a conflict model.

The relevant dimensions of trade patterns are necessarily asymmetric; since the degree of commercial rivalry or dependency is not the same when country i evaluates country j than when the reciprocal evaluation is observed. This means we need a directed dataset, in which observations are directed dyads, so i, j and j, i are two separate observations and each variable is defined accordingly when possible. Trade enters naturally in this scheme, since exports are directed flows by definition. The usual variables of conflict observe Militarized Interstate Disputes (MIDs), which are symmetric. Therefore we need to build a new conflict variable revealing the asymmetric nature of conflict. We propose such a measure based on events data of material military actions taken by official actors in each country towards official actors of every partner. An additional advantage comes from the proposed variable being continuous, since this involves a possibility to capture the seriousness of the actions countries engage in, and also appreciably increases the nonzero values in comparison with the typical binary variables for war or MID. The rarity of conflict could lead to statistically significant results for theoretically irrelevant coefficients. We describe this conflict variable and compare it with traditional conflict variables in Section 3.1.

The empirical assessment of the effects of trade patterns on conflict needs to control for the volume of bilateral trade for each directed dyad, but reverse causality is a serious problem since many authors have shown the deterrent effects of conflict on trade (even if this conclusion is subject of debate). We address this endogeneity issue through an Instrumental Variable (IV) approach, proposing original excluded instruments that measures exports to synthetic destinations and imports from synthetic origins, being these synthetic partners built as an average of neighbor countries in terms of the gravity model predictions . Considering a large enough number of countries in the averages, neighbors are so diverse that a synthetic directed trade flow should not be associated with the directed conflict in the dyad. We describe these synthetic trade variables in more detail in Section 3.2.

Summing up, we use the proposed instruments for trade, while controlling for the substitutability, complementarity and rivalry with each trade partner. In order to build the needed variables we turn to the distances between countries in different bipartite networks, where links are defined as probabilities and e.g. country *j* is more complementary for *i*'s exports the higher the probability of *j*

importing a product that *i* exports. Analogous measures are defined for substitutability and rivalry in trade. We describe these variables in Section 3.3.

Related literature has mainly developed around the liberal/realists debate over the existence of pacifying effects of trade. Liberals argue that interdependence between two countries tend to reduce the probability of conflict between them, operationalizing interdependence with trade values. The argument is based on the dissuading role of the opportunity cost of conflict in terms of losing the potential gains from trade during hostility times (Russett and Oneal, 2001)[2]. Realists show many channels through which dependence from another country would encourage the use of force (Waltz, 1979). Marxist argue that trade promotes conflict because specialization and interdependence produce insecurity and vulnerability to external events (Choucri and North, 1975).

Empirical studies give mixed results, with papers showing trade reduces conflict[3], others obtaining that trade increases conflict[4], and some that reveal no statistical relation[5]. Here we give an empirical insight on the relationship between aggregate bilateral trade on conflict, contributing to the existent literature in terms of a more thorough control for patterns-of-trade issues and with lifting the restriction of equal effects of exports and imports. Still, this is not the central contribution of this paper, focused on the analysis of the mechanisms through which the kind of products that countries trade matter for the expected level of conflict.

Interdependence is a theoretically debated concept[6], and it has been operationalized in different manners, using volumes of total bilateral trade or relative measures of bilateral trade (in terms of total trade of each country, or in terms of their GDPs). But the notion of interdependence is much richer if we take the content of each flow into account. Intuitively, political leaders would care more about relations with those countries exporting the very kind of products their country imports, and also when trade flows include goods that are hard to buy or sell elsewhere. Some literature has addressed this distinction through the notions of "sensitivity interdependence" and "vulnerability interdependence" (Keohane and Nye, 1977). Blanchard and Ripsman (1996) proposed to evaluate vulnerability of a country to trade disruptions looking at the potential for each country to mitigate the costs of a cut-off by considering the availability of alternative suppliers, the prospects of increasing domestic production, the prospects of conservation, and the potential for substitution. Our measure focus on alternative suppliers and adding the alternative buyers we use disaggregated product information to weigh how exclusive is each partner in terms of the particular products composing the bilateral trade flows.

Few studies have explored the effects of the content of trade on conflict, most of them decomposing trade by sector. Literature on resource-conflict relationship, asking whether some specific resources

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[2] Gasiorowski (1986) emphasizes that measures of aggregate bilateral trade reflect interconnectedness rather than interdependence, since the latter concept requires not only trade but countries' vulnerability to its disruption, which depends of the specific pattern of trade in terms of goods and number of partners.

[3] See Polachek (1980, 1997); Pollins (1989a, 1989b); Oneal, et al. (1996); Oneal and Russett (1997, 1999), Russett and Oneal (2001); Mansfield and Pevehouse (2000); Gartzke and Li (2003); and Oneal, et al. (2003).

[4] See Gasiorowski (1986) and Barbieri (1996, 2002).

[5] See Beck, Katz, and Tucker (1998); Goenner (2004); Keshk, Pollins, and Reuveny (2004); and Kim and Rousseau (2005).

[6] For an extensive review see Baldwin (1980).

increase the probability of conflict, is mostly based on qualitative approaches and case studies.[7] In an early cross-country approach, Reuveny and Kang (1998) find that while trade Granger-causes conflict for some sectors, the reverse causality holds for other sectors' trade, describing a pattern that leads to the strategic-goods literature.[8]

More recently Goenner (2010) identified six groups of strategic goods (at the SITC 4-digits level) showing that an increase in trade in energy, non-ferrous metals, and electronics increases conflict, while more trade in chemicals and arms reduces conflict. Coinciding with Dorussen (2006), he shows that homogeneous commodities (highly elastic import demand and export supply curves) are less likely to reduce conflict than trade of more differentiated products (inelastic curves). Dorussen (2006) finds pacifying effects for apparel, low-tech, high-tech, and machinery, and he fails to find the expected pacifying effect for chemicals and electronics.

Goenner (2010) also shows that trade in strategic commodities is more likely to lead to conflict when the exporter is concentrated in a few commodities to a few destinations or also when production is concentrated within a country, since in these cases the producing country is a potential target for plundering. Concentration of international trade partners is especially important for goods with very high transportation costs that are almost exclusively traded with neighbors, as in the case of electricity.

Another relevant hypothesis recently put forward by Peterson and Thies (2012) suggests that the effect of trade on conflict depends on whether trade is intra-industry or inter-industry. In the first case, trade is associated with reduced conflict propensity, because exchange of similar products resulting from economies of scale and consumer tastes for variety is mostly a cooperative sort of relationship. On the other side, inter-industry trade provokes vulnerability in trading partners. Peterson and Thies (2012) find empirical support for this distinction.

These last papers address the issue of the content of trade by means of a decomposition of trade by sectors, a strategy that makes particularly difficult to deal with endogeneity concerns and only allows extracting conclusions on the role of particular sectors. Here we propose a different approach, taking advantage of theoretically founded descriptive measures of the content of trade for each dyad. Therefore we propose to qualify trade flows instead of decomposing them. The main advantage is it expands the possibilities for dealing with endogeneity, and it also avoids arbitrary selection of sectors.

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[7] Empirical studies on renewable resources are mostly about water scarcity, and show that states tend to cooperate when they have shared water resources. Empirical studies on non-renewable resources are mostly focused on the effects of oil or diamonds abundance on local conflict. They identify two causal mechanisms: resource scarcity for renewable resources (with low market value) leads to fight-for-survival conflicts rarely observed in quantitative studies; while resource abundance of non-renewable resources has been clearly documented but leads mostly to local (internal) conflicts as shown by Homer-Dixon (1999). Koubi, Spilker, Bohmelt and Bernauer (2014) present the essential findings in these studies.

[8] Reuveny and Kang (1998) use time series information (quarterly data) for 20 dyads, decomposing trade in a 10 sectors classification.

2 A reduced model for conflict and trade patterns

In the line of Polachek (1980, 1992), many authors used the expected utility approach assuming that the level of trade directly increases the cost of conflict (Polachek, Robst, and Chang, 1999; Robst, Polachek, and Chang, 2007). In these models the cost of lost trade comes from conflict reducing a country's supply for its imports and demand for its exports, increasing thus the domestic price of imported products and decreasing the price received for exported products, i.e. a terms of trade effect.[9] Even if the elasticities vary across countries and in time their variance is greater across products (Broda, Greenfield, and Weinstein, 2006; Broda, Limao, and Weinstein, 2008). Therefore substitution possibilities depend mainly on the commodities content of trade flows. Coinciding with Goenner (2010), we will argue that interdependence ties created by different kinds of goods could increase or decrease conflict, depending on the substitutability and ease of expropriating each particular traded commodity.

Li and Reuveny (2011) propose a more general model, in which Polachek's approach becomes a particular case, admitting the possibility of differential effects of conflict on the demand of imports of a country and the supply of these same products by a partner.[10]

Depending on the magnitudes of the shifts produced by conflict on a partial equilibrium demand and supply model, and depending also on the price elasticities of these curves, the effect of conflict on the price of imports/exports can be positive or negative. Thus, rational political leaders who maximize social utility (subject to trade balance in each good) will respond to higher exports with higher conflict when the price of exports rises with conflict, and will respond to higher exports with lower conflict when the price of exports decreases with conflict. An analogous reasoning works for imports, where faced with higher imports the leader responds with higher conflict if the price of imports decreases with conflict and responds with lower conflict if the price of imports increases with conflict. Since elasticities vary by sector, their strategy is to decompose trade selecting specific sectors and use the elasticities estimated in Reuveny (2001) to verify if the effects of each sector trade flow is the expected one.

Our approach is built taking Li and Reuveny's model as a general setting in which we propose a conceptually relevant extension, including network effects in agents' utilities, at the high cost of losing analytical tractability. Nevertheless, our complementarity, substitutability and rivalry variables allow weighing the role of the main trade-patterns effects in a reduced model of conflict. Our main departure from the original model is assuming N countries instead of two, even if we maintain the focus on one directed bilateral relation from country i to country j.

As in Li and Reuveny (2011) all demand and supply functions are assumed to be linear in the coefficients, which are sector specific (even if the notation omits this index). i's import demand of product p from j (M_{ij}^{Dp}), and j's export supply of product p to i (M_{ij}^{Sp}), would be given by:

[9] These price effects depend on the elasticities of import demand and export supply, being higher the easier to find alternative sources or destinations or the easier to substitute a particular product with other products.

[10] Another important contribution of this paper is the use of directed-dyad information, since this allows analyzing the differential effects of imports and exports, instead of aggregate trade in both directions.

$$M_{ij}^{Dp} = \beta_0 - \beta_1 PM^p + \beta_2 Y_i - \beta_3\left(C_{ij} + C_{ji}\right) + \sum_{h \neq i,j} \varphi_{ih}^{Mp} \beta_4 (C_{ih} + C_{hi}) - \beta_5 \sum_{h \neq i,j} M_{ih}^{Dp} \quad (1)$$

$$M_{ij}^{Sp} = \alpha_1 PM^p + \alpha_2 Y_j - \alpha_3\left(C_{ij} + C_{ji}\right) + \sum_{h \neq i,j} \varphi_{jh}^{Xp} \alpha_4 \left(C_{jh} + C_{hj}\right) - \alpha_5 \sum_{h \neq i,j} M_{jh}^{Sp} \quad (2)$$

Where except for the last two terms in each equation these are typical linear demand and supply functions depending on prices (PM^p) and incomes (Y_i, Y_j). The $\left(C_{ij} + C_{ji}\right)$ term in each equation gathers the effect of conflict in shifting supply or demand to the left as a consequence of conflict. [11] We are modifying Li and Reuveny's equations in adding the reverse conflict term which we think fosters intuition since it is hard to argue that this effect is not present, but because of the empirical challenge the term represents we will also omit the reverse conflict in our empirical approach.

The penultimate term in (1) considers the effects of conflict between i and every other country on imports i does from j, taking into account the fact that i's conflict with a third country h could reduce imports of i from h, and these would be redirected to other sources being j one of them. The coefficients φ_{ih}^{Mp} measure how substitutable is h as a source of imports for i in every product p. If there is some substitutability, a fraction of demand will be redirected towards j. Something analogous occurs in equation (2), where conflict between j and another destination of exports h different from i makes j reduce his supply to h and redirect a fraction to country i.

The last term in equations (1) and (2) turns the equations into residual demands/supplies, since the relevant demand/supply is what is left after subtracting all the demands/supplies of good p made by the rest of the countries not in the dyad. This term introduces a notion of rivalry, since if some country h is having a very high demand on j's good p, this shifts the demand faced by j and thus increases the price that i has to pay for good p to j.

An analogous reasoning can be done to obtain i's supply of product p to j, as well as j's demand for product p exported from i.

$$X_{ij}^{Sp} = \gamma_1 PX^p + \gamma_2 Y_i - \gamma_3\left(C_{ij} + C_{ji}\right) + \sum_{h \neq i,j} \varphi_{ih}^{Xp} \gamma_4 (C_{ih} + C_{hi}) - \gamma_5 \sum_{h \neq i,j} X_{ih}^{Sp} \quad (3)$$

$$X_{ij}^{Dp} = \delta_0 - \delta_1 PX^p + \delta_2 Y_j - \delta_3\left(C_{ij} + C_{ji}\right) + \sum_{h \neq i,j} \varphi_{ih}^{Mp} \delta_4 \left(C_{jh} + C_{hj}\right) - \delta_5 \sum_{h \neq i,j} X_{jh}^{Dp} \quad (4)$$

The inclusion of these last two terms introduces a huge complexity in terms of maximization of country i's utility. Using trade balance conditions ($M_{ij}^{Dp} = M_{ij}^{Sp}$; $X_{ij}^{Sp} = X_{ij}^{Dp}$), it is easy to obtain expressions of PX^p and PM^p since the agent should simultaneously choose the optimal combination of conflict with all its (potentially $H-1$) trade partners taking into account the effects on imports and exports from/to each one of them. In the case of many goods this is even worse, since maximization

[11] As the authors argue, this can be a consequence of many things, as political decisions to restrict trade in order to decrease own dependence on a foe or restrict the opponent gains from trade, increased trade costs (because of risk, delays or damages), or bargaining strategies.

has to be simultaneously done for the (potentially P) imported goods and the (potentially P) exported goods. An analytical solution is not reachable in this setting, so we propose an alternative strategy, where we estimate for the $H * (H-1)$ dyads a model for directed conflict using directed exports and imports at an aggregated level, but we build the necessary variables to qualify these aggregated trade flows in terms of the substitutability and rivalry issues caused by the kind of products encompassed bilateral relation.

Note that for many products k it will be the case that $X_{ij}^{Sp} = 0$, and this could happen because i does not export p at all (say $X_i^{Sp} = 0$) or because he does produce but with a potential CIF price that makes entrance to j impossible. An extensive trade literature has treated the zero trade issue in this last sense, being Helpman, Melitz and Rubinstein (2008) an obliged reference. We will focus on the first reason for zero trade, which is directly linked to the pattern of trade.

It could obviously be also the case of the less theoretically treated situation where $X_{ij}^{Dp} = 0$ when j does not demand p to i. Again we will focus on the situation in which j simply does not buy p at all ($X_j^{Dp} = 0$), since the case where the demanded quantity is satisfied with other providers in the world is somehow treated through the use of residual demands.

The fact that quantities exported of p can only be greater than zero if both $X_i^{Sp} > 0$ and $X_j^{Dp} > 0$ poses a matching problem, with extreme situations of full coincidence when the set of products i exports is the same than the one j imports, and minimum coincidence when –broadly speaking- just one product exported by i is imported by j (and we omit the trivial case of no coincidence where aggregated exports will be zero). In the former case conflict will affect supplies and demands in every traded product, in the latter conflict will only affect one of the products exported by i. Thus, opportunity costs of conflict will be higher if the complementarity between the two countries is higher.

Our reduced model of conflict will explain the directed bilateral level of conflict using as the main explanatory variables the complementarity of the destination country as an exporter ($complX_{ij}$) and as an importer ($complM_{ij}$), i.e. as a provider of imports and a destination of exports respectively; the substitutability of the destination country as a provider of imports ($substM_{ij}$) and as a destination of exports ($substX_{ij}$); and the trade rivalry with the destination country in each particular third market for each specific product, both as exporters ($rivalX_{ij}$) and importers ($rivalM_{ij}$).

In the next section we propose an operationalization of these variables, built using the notions of countries spaces (Flores and Vaillant, 2013), and we also present the set of control variables included in matrix $\boldsymbol{X}_{ij}$ in equation (5), where the main theoretical explanations of conflict are taken into account. Notably, bilateral imports and exports variables are encompassed in matrix $\boldsymbol{X}$.

$$conf l_{ij} = \gamma_0 + \alpha_1 complX_{ij} + \alpha_2 complM_{ij} + \beta_1 substX_{ij} + \beta_2 substM_{ij} + \delta_1 rivalX_{ij} + \delta_2 rivalM_{ij} + \boldsymbol{\gamma X}_{ij} + \varepsilon_{ij} \quad (5)$$

We clearly expect $\delta_1 > 0$ and $\delta_2 > 0$. We should expect $\alpha_1 > 0$ and $\alpha_2 > 0$ from a Polachek's model approach, but given we admit prices can increase or decrease in each market we could also find $\alpha_1 \leq 0$ and $\alpha_2 \leq 0$. Finally, from a liberal point of view it should be the case that $\beta_1 > 0$ and $\beta_2 > 0$ since an easier substitution of the trading partner would mean a lower opportunity cost of conflict,

i.e. a less costly outside option. On the contrary, a realist or Marxist approach would expect $\beta_1 \leq 0$ and $\beta_2 \leq 0$ since countries would tend to increase conflict with those partners with which dependency and vulnerability are the highest, in an extreme case a unique provider/consumer of some strategic good. This last result, together with the direct effects of exports and imports on conflict, will give an innovative insight over the old liberal peace debate. We will come back to this after presenting the empirical strategy in the next section.

3 Empirical strategy

The estimation of equation (5) involves three major challenges. The first and obvious one is how to measure the variables we named $complX_{ij}$, $complM_{ij}$, $substX_{ij}$, $substM_{ij}$, $rivalX_{ij}$, and $rivalM_{ij}$, never included in a conflict model and that we will show are relevant omitted variables.

The second one is a shared problem in the "trade and conflict" literature, mainly guided by the debate over the liberal peace and centered on testing the trade coefficient in a conflict model (while a vast empirical literature shows the existence of a deterring effect that conflict has on trade). Many recent papers have addressed the endogeneity of trade through the estimation of a simultaneous equations model, other have proposed instrumental variable methods. We will follow this second strategy, exploiting an innovative instrument for trade.

Finally the fact of conflict being measured with a binary variable of war, or MID of a certain type, is constraining from a theoretical point of view since it forces to model the probability of initiation, or the probability of escalation as a discrete phenomenon. It is also empirically constraining, since many problems are difficult to treat in the case of a limited dependent variable. Additionally, the fact of using an undirected conflict variable is restrictive too, since it makes useless to model the decision of one part if all the information used is at the pair-level, and it makes impossible to consider how asymmetries affect each part of the pair. These two problems are addressed here through the construction of a continuous and directed conflict variable.

For the ease of presentation we treat these three challenges starting from the latter.

3.1 Conflict as a continuous and directed magnitude

In the existing literature international conflict is generally measured as a discrete (often binary) and symmetric phenomenon. To capture the heterogeneity that may exist across types of conflicts and the potential asymmetry of conflict for a given country-pair, we first focus on obtaining a continuous and asymmetric variable of conflict.

The availability of a directed variable for conflict allows taking advantage of the directedness both in trade and trade patterns variables when it comes to explain the directed conflict from each origin towards each destination. This feature is extended to the various controls to be used, and more importantly, makes natural to consider asymmetry issues, hidden in the undirected "dyad averages" habit.

The availability of a continuous variable of conflict is important for many reasons. First, it makes possible to observe the evolution of conflict at early stages before it eventually becomes a Militarized Interstate Dispute (MID).[12] Second, sometimes we may observe high level of conflict but an absence of war, which indicates that the involved countries have found a pacific way to manage their disputes. Third, empirical results can be sensitive to the use of a continuous variable. Fourth, it makes possible to estimate a linear model, and this has many advantages, since parameters interpretation becomes direct, it is easier to treat potential misspecification problems, simplifies an adequate treatment of individual unobserved heterogeneity in panels, allows including richer dynamic specifications, and eventually makes also easier to estimate a system of equations with conflict and trade as dependent variables.

Additionally, a generalized limitation is that there are few observations of MIDs in comparison with the pacific dyad-year observations, so estimation using MIDs could be based in very few particular cases and this is even worse when using war dummies (Lin and Seiglie, 2014).

In order to build a continuous variable of conflict we use event data, a major source of international conflict information alternative to MIDs. Our event data come from the GDELT database[13] of coded international press and newswire agencies cables (daily records).

The Goldstein Scale classifies events as conflict (negative) or cooperation (positive) actions[14]. An issue of protracted debate is about the adequacy of considering that cooperation and conflict are the opposite extremes of a single scale (see Pollins, 1989). Even if this could be intuitively reasonable, it has been shown that when observing countries behaviour it is usually found that cooperation and conflict coexist, and country dyads cannot be divided in a group of cooperative ones and another group of conflictive country-pairs. In this paper we define cooperation not as pure cooperation actions (events where actors unite their efforts towards a certain goal, like giving humanitarian or economic aid, sharing intelligence information or providing military aid) but as specific kinds of cooperative actions that lead to a de-escalation in conflict levels (like declaring truce or ceasefire, surrendering, demobilizing armed forces, receiving peacekeepers or easing military or administrative sanctions). In the same manner, conflict events can be of pure conflict or just a dismantling of

[12] MIDs are one of the two typical sources of conflict data, the other being events datasets. MIDs are defined as events of conflict consisting in a "threat, display or use of military force by one state, explicitly directed towards the government, official representatives, official forces, properties or territories of another state". The variable has five potential hostility levels: 1-no militarized action, 2-threat to use force, 3-display of force, 4-use of force, and 5-war. In this context a War is a MID causing the death of more than 1000 soldiers in battle (Gochman and Maoz, 1984; Jones, Bremer, and Singer 1996).

[13] The Global Data on Events, Location and Tone (GDELT) Project is an extended version of CAMEO. The complete database contains more than 200 million events, most of them geolocated, and covers daily news for a variety of international press and newswire agencies from 1979 to present. Sources employed to identify events include all international news coverage from AfricaNews, Agence France Presse, Associated Press Online, Associated Press Worldstream, BBC Monitoring, Christian Science Monitor, Facts on File, Foreign Broadcast Information Service, United Press International, and the Washington Post. Additional sources examined include all national and international news coverage from the New York Times, all international and major US national stories from the Associated Press, and all national and international news from Google News with the exception of sports, entertainment, and strictly economic news (Leetaru and Scrhodt, 2013).

[14] The Goldstein scale is designed for the three digit WEIS event types (61 categories) and is compatible with CAMEO events codification. It is based on the assessment of a panel of international relations faculty, who place the different possible events along a single scale from "extreme conflict" to "extreme cooperation".

cooperation among actors. As our focus is on conflict, and because a number of forms of pure cooperation are already left aside in the CAMEO verbs dictionary, we drop all the events classified as pure cooperation, as well as those conflict events identified as dismantling cooperation. Pure conflict events are assigned positive values, while de-escalation cooperation events are given negative values. After this selection of events, the two can be additively combined into indexes of net conflict.

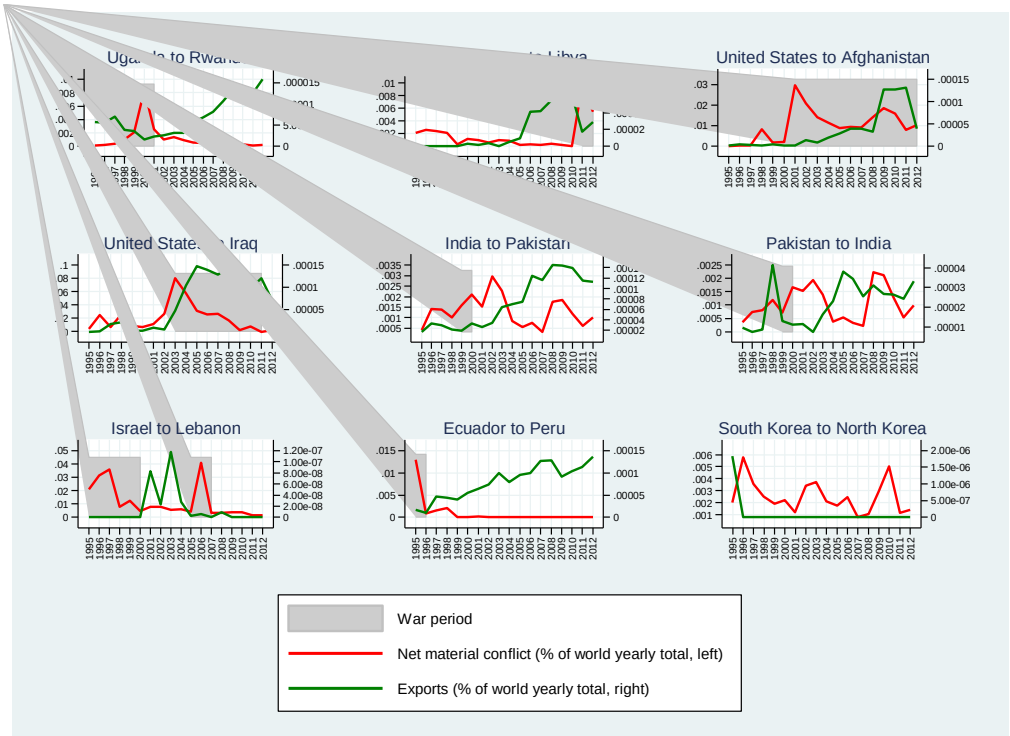
Another distinction done by the Goldstein Scale (GS) is between material and verbal actions. We work only with material actions, and more specifically with a subgroup of military-related events (the detail of the type of events used is in Appendix 2). This decision is based on our focus on militarized conflict, as it is the one involving the more serious costs and receiving most theoretical and empirical attention. Also, GDELT actors' dictionary allows identifying official national actors, and we keep only the events involving this kind of actors. This means we drop all the sub-national or supra-national actors, as well as non-official national actors. This decision is based on our focus on interstate conflict, and has the value of comparability with other studies in the field.

For most dyads there are many events in a year, each one with a score given by the Goldstein Scale. Thus, a whole distribution of GS events' values is available for each directed dyad-year observation, and the new conflict variable requires choosing an appropriate summary measure, being the count, the mean, the median, the maximum and the sum all natural candidates. Given we want to capture both the extensive and the intensive margins of conflict (variations in the number of events and in its seriousness, respectively), we work with the sums of GS scores for the events found in each directed-dyad-year observation.

In Figure 1 we show the evolution of the material net conflict variable for some particular cases, together with the evolution of bilateral trade and the existence of war between the two involved countries.

Figure 1

Conflict and trade evolution for selected bilateral cases



In general the graphics show that our conflict variable is successful in signalling the case of wars, since high values of net conflict can be observed in almost all cases. The India – Pakistan case shows the difference between working with wars and other sources on conflict data. The war between the two countries took place in 1999, but our conflict variable shows that much more acute confrontation took place in 2001-2002 with the first India – Pakistan standoff, and even in 2008 with a second stand-off between the two nations following the 2008 Mumbai attacks, but then confrontation was defused by diplomatic efforts. On the other side, sometimes war still a status (in general coinciding with military occupations) but the conflict level is reduced in comparison with the peaks attended at the beginning of the conflict. The cases of the United States – Afghanistan or United States – Iraq show this pattern.

In the case of Uganda – Rwanda, the "six days war" has run from August 1999 to June 2001, and the graphic shows that our conflict variable really reflects such kind of hostilities. The United States - Libya or Israel – Lebanon cases gives another example of the deterring effects of conflict on trade. The evolution of Ecuador – Peru relations show the association between absence of conflict and the slow increase of trade. Even if symmetry is not always observed the graphics for India and Pakistan show a fairly symmetric evolution of conflict.

3.2 Endogeneity of trade: A "synthetic partners" IV approach

Endogeneity of trade variables (exports and imports) is supported by an extended literature on the deterring effects of conflict for bilateral trade; therefore consistent estimation requires a source of exogeneity.

In order to obtain such a variable we build what we call synthetic partners, where e.g. a synthetic destination $\tilde{j}$ is the result of averaging K neighbors of j in terms of size as measured by GDP. An analogous reasoning applies for imports, and in both cases neighbors are selected minimizing the difference between the two countries' GDPs. The idea is that countries of similar economic sizes will tend to have similar bilateral flows with third countries.

Thus, the K-neighbors for j will be the K countries ($k = 1, \dots, K$) for which the differences between GDPs are lower:

$$min_k\{abs(gdp_{jt} - gdp_{kt})\} \tag{6}$$

Once neighbors have been chosen we average exports from the origin country i to the different destination countries included in the synthetic destination $\tilde{j}$, and this counterfactual flow is used to instrument the exports from i to the real j.

$$exp_{i\tilde{j}t} = \frac{1}{K}\sum_{k=1}^{K} exp_{ikt} \tag{7}$$

Analogously, synthetic origins for exports average exported values from j's neighbors to i, and the resulting counterfactual flow will be used to instrument exports from j to i, i.e. imports of i from j:

$$imp_{i\tilde{j}t} = \frac{1}{K}\sum_{k=1}^{K} imp_{ikt} \quad (8)$$

We argue that these variables should not be correlated with conflict from i to j, since this criterion excludes their bilateral trade, and none of it components should be systematically related to $confl_{ijt}$. Our instrument would be questionable if e.g. disrupted trade after an increase in i's conflict towards j was systematically redirected to countries similar in size with j. Even if this can eventually happen in many cases, our identification strategy relies on the assumption of random distribution of spillovers among country sizes. In other words, we are supposing that the trade-network effects of an increase in $confl_{ijt}$ to not have any special tendency follow size similarity, so the averaged neighbors $\tilde{j}$ randomly receive negative, null, and positive effects. Also, risks are minimized when using enough neighbors to construct the synthetic partners.

As shown in Table 1 for selected countries j, the groups of neighbors include countries that are very different from the synthetized country in terms of political international communities and predictable spillovers, so there is no reason to suspect that conflict with Israel would affect trade with an average composed by countries as different as Hong Kong, Chile, Finland, Pakistan or South Africa.

Table 1

Synthetic partners

15-neighbors for selected countries

USA	FRA	CHE	ISR	ARG	KEN	MOZ
CHN	GBR	ARG	HKG	CHE	SYR	KHM
JPN	BRA	SAU	EGY	SWE	GHA	SEN
DEU	RUS	SWE	PHL	IRN	LTU	JAM
FRA	ITA	IRN	CHL	NOR	PAN	COG
GBR	IND	NOR	GRC	POL	ETH	ISL
BRA	CAN	NLD	FIN	SAU	MAC	PNG
RUS	DEU	POL	SGP	NGA	LBN	GEO
ITA	AUS	TUR	PAK	NLD	TUN	TCD
IND	ESP	NGA	PRT	TUR	TKM	PRK
CAN	KOR	AUT	IRL	AUT	CRI	ZWE
AUS	MEX	IDN	MYS	ARE	SVN	ALB
ESP	IDN	ARE	DZA	ZAF	YEM	GNQ
KOR	TUR	ZAF	KAZ	VEN	JOR	BIH
MEX	NLD	VEN	DNK	COL	URY	BRN
IDN	SAU	COL	CZE	THA	BHR	MUS

Given we analyze the decision in country i with respect to every partner j we prefer to use synthetic versions of j while using the actual country i. Thus, our main instrumental variables will be exports from i to $\tilde{j}$ (*exp_synth_d)* and imports of i from $\tilde{j}$ (*imp_synth_o)*, and we will use also the exports from $\tilde{\imath}$ to j (*exp_synth_o)* as an additional instrument that allows testing for overidentification restrictions. The same reasons that make *exp_synth_d* exogenous are valid in the cases of our two other instruments.

The other main condition for an instrument is that it must be relevant, meaning that it has to be correlated with the instrumented variable. Table 2 shows that our instruments are effectively correlated with the instrumented variables.

Table 2

Correlations between the instruments and trade variables

	lexp	lexp_syn_o	lexp_syn_d
lexp	1		
lexp_syn_o	0.7394	1	
lexp_syn_d	0.7464	0.7761	1

	limp	limp_syn_o	limp_syn_d
limp	1		
limp_syn_o	0.7679	1	
limp_syn_d	0.8153	0.7668	1

In each case we will also report under-identification tests as well as weak instruments tests, showing the instruments have a reasonably good performance in the model.

3.3 Trade-pattern motives for conflict

The estimation of our reduced model of conflict requires the inclusion of three big dimensions of the patterns of trade: how complementary, how substitutable and how rival is the trade partner should affect supply and demands in each market and thus affect the incentives leaders have for increasing conflict. In this section we propose an innovative way of operationalizing these three dimensions, we do it in a common setting, and we briefly describe the constructed variables.

3.3.1 Complementarity

To measure the extent of complementarity between exports and imports at the bilateral level we will focus only on goods in which the exporter has a comparative advantage (RCAX) and the importer has a comparative disadvantage (RCDM). If the importer has a comparative disadvantage in products in which the exporter has a comparative advantage then we observe some degree of trade complementarity. For brevity's sake we will refer to a country exporting a product when he does it with RCAX, and the same for the case of importing.

A frequency-of-products approach is used to calculate the probabilities of countries exporting or importing products (where the index p refers to HS 6-digit products). The probability of j importing a product i exports, i.e. the complementarity of j as an importer when evaluated from i is given by:

$$complM_{ij} = Pr\left(RCDM_j = 1 \middle| RCAX_i = 1\right) = \frac{\Pr\left(RCDM_j = 1 \cap RCAX_i = 1\right)}{\Pr(RCAX_i = 1)} = \frac{\sum_{p=1}^{P} RCDM_{jp}.RCAX_{ip}}{\sum_{p=1}^{P} RCAX_{ip}} \quad (9)$$

The second one is the probability of j exporting a product i imports, i.e. the complementarity of j as an exporter when evaluated from i:

$$complX_{ij} = Pr\left(RCAX_j = 1 \middle| RCDM_i = 1\right) = \frac{\Pr\left(RCAX_j = 1 \cap RCDM_i = 1\right)}{\Pr(RCDM_i = 1)} = \frac{\sum_{p=1}^{P} RCAX_{jp}.RCDM_{ip}}{\sum_{p=1}^{P} RCDM_{ip}} \quad (10)$$

Given these are new measures for complementarity, in Appendix 3 we compare our results with two other complementarity measures proposed by Anderson and Nordheim (1993) and Michaely (1996). Comparing product shares in exports and imports, both measures take into account the value of

trade in each good. This is the main difference with the index proposed here, since trade complementarity obtained from the country spaces responds almost exclusively to changes in the extensive margin of trade (only reacting to changes in the intensive margin that lead a product to surpass the specific threshold considered in the definition of the RCA).

3.3.2 Substitutability

As we theoretically argued, an important determinant of bilateral conflict is its opportunity cost. The volume of bilateral trade aims at capturing this, but the true opportunity cost is likely also to depend on the ease with which one country can substitute imports from and export to a belligerent partner with imports from and exports to other partners. In other words, we need a measure of how dependent is each country on its trade with potentially belligerent partners. We propose an asymmetric substitutability measure, based on the probability for exporter i and importer j of finding alternative partners h. We compute the probability for exporter i of finding alternative destinations for the products exported to j; as well as alternative origins for the products imported from j.[15] Thus, j's degree of substitutability as a destination for exports is given by the probability of finding a country h exporting the products i imports and j exports:

$$substX_{ij} = Pr\left(RCAX_h \middle| RCDM_i, RCAX_j\right) = \frac{\Pr\left(RCAX_h \cap RCDM_i \cap RCAX_j\right)}{\Pr\left(RCDM_i \cap RCAX_j\right)} = \frac{\frac{1}{H}\sum_{h=1}^{H}\sum_{p=1}^{P} RCAX_{hp}.RCDM_{ip}.RCAX_{jp}}{\sum_{p=1}^{P} RCDM_{ip}.RCAX_{jp}} \quad (11)$$

Analogously, j's degree of substitutability as an origin of imports is given by the probability of finding a country h importing the products i exports and j imports:

$$substM_{ij} = Pr\left(RCDM_h \middle| RCAX_i, RCDM_j\right) = \frac{\Pr\left(RCDM_h \cap RCAX_i \cap RCDM_j\right)}{\Pr\left(RCAX_i \cap RCDM_j\right)} = \frac{\frac{1}{H}\sum_{h=1}^{H}\sum_{p=1}^{P} RCDM_{hp}.RCAX_{ip}.RCDM_{jp}}{\sum_{p=1}^{P} RCAX_{ip}.RCDM_{jp}} \quad (12)$$

The higher is the first probability the easier for country i to substitute country j as an origin for its imports, the higher is the second one the easier for country i to substitute country j as a destination for its exports. Then, both are inverse measures of trade dependency, and their inclusion in a model for conflict should reflect this strategic dimension of the trading partner for each of the members of the dyads.

The effects of substitutability on conflict could be subject of debate, being associated with higher conflict from a liberal approach paying attention to outside options and opportunity costs. Contrarily, a realist approach would expect higher conflict in the cases of low substitutability, because of risk

[15] The proposed measures are based on the different country networks taken from Flores and Vaillant (2013) and Flores (2014), an extension in turn to what Hidalgo, Klinger, Barabási and Hausmann (2007) define as the Product Space.

and vulnerability reasons. Also, this is related to the logic of Carlson (1995), who shows that a state that can demonstrate high "cost tolerance" has an advantage in bargaining.

3.3.3 Rivalry

Finally, we seek to capture rivalry relations in every specific third market. These measures are based on the probability of country i and country j coinciding as common exporters or common importers in any third market h. Even if we name these measures as "rivalry" we have to acknowledge that coincidence in third markets could increase competition and thus rivalry, or could also reflect greater cooperation or even participation in global value chains, in which case we would expect that coincidence fosters peace instead of conflict.

Market rivalry with j as seen by i as an exporter, will be given by the probability of j exporting a product that i exports and h imports:

$$rivalX_{ij} = Pr\left(RCAX_j \middle| RCAX_i, RCDM_h\right) = \frac{\Pr\left(RCAX_j \cap RCAX_i \cap RCDM_h\right)}{\Pr(RCAX_i \cap RCDM_h)} = \frac{\sum_{h=1}^{H}\sum_{p=1}^{P} RCAX_{jp}.RCAX_{ip}.RCDM_{hp}}{\sum_{h=1}^{H}\sum_{p=1}^{P} RCAX_{ip}.RCDM_{hp}} \quad (13)$$

Analogously, market rivalry with j as seen by i as an importer will be given by the probability of j importing a product that i imports and h exports:

$$rivalM_{ij} = Pr\left(RCDM_j \middle| RCDM_i, RCAX_h\right) = \frac{\Pr\left(RCDM_j \cap RCDM_i \cap RCAX_h\right)}{\Pr(RCDM_i \cap RCAX_h)} = \frac{\sum_{h=1}^{H}\sum_{p=1}^{P} RCDM_{jp}.RCDM_{ip}.RCAX_{hp}}{\sum_{h=1}^{H}\sum_{p=1}^{P} RCDM_{ip}.RCAX_{hp}} \quad (14)$$

The role played by different partners in the trade network could also affect the probability of bilateral conflict. Indeed, the effects of trade on conflict could be very different when the two countries in the dyad are providers of primary products or when one of them is a provider of primary products and the other an industrial economy. In other words the proximity of specialization patterns among countries in the networks could be an important characteristic when evaluating rivalries. We will use these measures as a robustness check.

3.4 Estimable model and data

Instrumenting trade with synthetic partners' trade, and considering the magnitude of the outside options in each trade flow as well as complementarity and rivalry reasons for conflict, we estimate a reduced model based on equation (5). We include a large set of control variables gathering the main theoretical explanations for conflict. These controls are needed in order to avoid the effects of unobserved confounders, i.e. variables that could affect both trade (lagged) and conflict and would cause trade variables to be endogenous and so all the estimated coefficients inconsistent.

$$
\begin{aligned}
confl_{ijt} = \gamma_0 + \delta_1 substX_{ijt} + \delta_2 substM_{ijt} + \alpha_1 proxCXS_{ijt} + \alpha_2 proxCMS_{ijt} + \beta_1 rivalX_{ijt} \\
+ \beta_2 rivalM_{ijt} + \gamma_1 exp_{ijt} + \gamma_2 imp_{ijt} + \gamma_3 alliance_{ijt} + \gamma_4 comcur_{ijt} \\
+ \gamma_5 wto\_both_{ijt} + \gamma_6 wto\_one_{ijt} + \gamma_7 (gdp_{it}/gdp_{jt}) + \gamma_8 polity_{it} \\
+ \gamma_9 polity_{jt} + \gamma_{10} pop_{it} + \gamma_{11} pop_{jt} + \gamma_{12} distcap_{ij} + \gamma_{13} border_{ij} \\
+ \gamma_{14} comrelig_{ij} + \gamma_{15} comleg_{ij} + \gamma_{16} comlang_{ij} + \gamma_{17} smctry_{ij} \\
+ \gamma_{18} colony_{ij} + \varepsilon_{ijt}
\end{aligned} \tag{15}
$$

Like in most of the empirical literature on international conflict we use a gravity-type specification, where the likelihood of conflict depends on country size and geographic distance (Boulding, 1962; Hegre, 2008). As usual, distance is complemented with a contiguity dummy variable signaling the existence of a common border between the two countries. In a recent opposing view, Keshk, Reuveny, and Pollins (2010) have argued that distance is not important in conflict models using trade. Turning to country sizes, they are at the same time measures of power and measures of market size and income level. If power takes precedence, the size of the origin country should be positively associated with conflict, while the size of the destination country should discourage conflict, or even relative power has been found to matter (mainly in the realist approach). Looking at market sizes, the same effects should be expected, since the larger the market, the more important it is as a provider and as a destination for own production, and then the higher the opportunity cost of conflicts (liberal approach).

We are including the two typical liberal variables, measuring trade and democracy. Trade is supposed to measure interdependence, so high current bilateral trade flows mean higher opportunity costs in case of disruption of trade because of bilateral conflict. The opposing realists approach affirms that trade intensifies competition and can increase dependence on strategic goods, an argument strongly related to the substitutability measures included here. To correctly test the significance and sign of this theoretically loaded coefficient is one of the objectives of this paper.

The operationalization of dependence is an issue of debate: some authors use traded values while others argue in favor of the ratio of trade over the GDP (or total trade) of the country or countries. We use traded values since some flows can be perceived as strategically important (or important for some lobbying groups) even if their weight is insignificant in terms of country's GDP.[16] A distinctive feature of our approach is that directedness of the model allows including separate effects for exports and imports, being thus possible to empirically test the usual restriction of equal coefficients.

Democracy variables are also important, as shown by the extensive literature on the "democratic peace" hypothesis. Also trade literature has shown that democracies tend to trade more than autocracies (Russett and Oneal, 2001; Bueno de Mesquita and Lalman 1992; Maoz and Russett, 1993; Ellis, Mitchell, and Prins, 2010). Also, joint democracy should be associated to less conflict, since in these cases disputes are expected to be diplomatically settled, and this pattern has been empirically

[16] Also, as shown by Goldsmith (2012), while GDP shares of bilateral trade can be relevant in the explanation of conflict onset they are hardly associated to escalation, while traded volumes can have a reasonable role both in conflict onset and escalation.

observed (Barbieri, 1996; Goenner, 2004; Oneal and Russett, 1999). Finally, some evidence exists on the joint authoritarian dyads sharing this same pacifying effect (Peceny, Beer, and Sanchez-Terry, 2002). We use Polity IV data, where the $polity_i$ variable is a combined score of institutionalized democracy and autocracy in the country, resulting from the subtraction of the autocracy score from the democracy score. The resulting variables vary in a range from -10 to +10, so we add 11 to the result before taking logs.

Typically realist variables are also generally accepted as part of conflict models. One of these are variables gathering the existence of alliances between countries (Leeds, 2003; Leeds, Long, and Mitchell, 2000). We use the COW Formal Interstate Alliance Dataset (Gibler, 2013) to build a dummy variable for any type of alliance between the countries of each pair.

Another typically realist variable comes with some relationship between the two countries military capacities. In order to control for those dimensions we include alliance variables and a relative capacity variable built as the log of GDPs of the origin country over the destination country.[17] Note that this is an asymmetric version of the usual balance/unbalance variable used in undirected settings, and here we can distinguish the power unbalance in favor of the origin or the destination country. Empirical literature shows that balance of power increases the probability of conflict, while unbalanced relations are less prone to conflict (see Lemke and Reed, 1996; Xiang, Xu, and Keteku, 2007; and Hegre, 2008).

The number of years of peace (years since the end of the last war) has been widely used since Beck, Katz, and Tucker (1998) recommended to introduce it in a natural cubic spline when estimating a nonlinear model for a binary dependent variable. As we have a linear model for a continuous variable we just include the variable *peacyears* linearly (and the inclusion of powers of the variable keep the rest of the results unchanged). We use COW MID database (version 4.01) to compute the number of cumulated consecutive years of peace since 1816 for each dyad-year observation.

Other included variables are typical in the gravity models of trade literature, and we kept them in our model because of a possible association with conflict. A variable for common religion is probably the most important one from a theoretical point of view, especially after Huntington's (1996) "clash of civilizations". Nonetheless, Russett, Oneal, and Cox (2000) have found that country-pairs split across civilizational boundaries are no more likely to engage in conflict than other states. Also, we have included dummies for common currency, common language, common legal system, having been the same country in the past or having ever been in a common colonial relationship. Finally, we added a set of three dummies for WTO affiliation. All these dummy variables are provided by CEPII gravity datasets.

We will use fixed effects to control for an important part of the unobserved heterogeneity which is not part of our focus or is unobservable. Equation (15) leaves aside some popular variables, like major power dummies (which signal a few large and powerful countries particularly prone to participate in conflicts). In our econometric specification these time-unvarying country-specific variables will be subsumed within origin and destination fixed effects. More important variables are

[17] Usually COW's Composite Index of National Capability (CINC) is used to build a measure of balance of power. Due to differences in data availability, the inclusion of these variables would lead to a non-negligible loss of observations and so we use GDPs as proxies.

those of internal conflict or "civil war", since the relationship between internal and international conflict has been widely documented (Ref) and also internal conflict could disrupt trade. Even though this topic would require an analysis in its own, and we just include the variables in robustness checks). The specification with time-varying origin and destination fixed effects controls for the role played by this type of variables in explaining international conflict. Finally, the inclusion of preferential agreements variables is as relevant as problematic, since several papers show a reverse causality issue, where different kinds of RTA are more probable among potentially conflictive countries (Vicard, 2008; Martin, Mayer, and Thoenig, 2010).

Very different patterns can be observed in the dynamic relation of trade and conflict, as Figure 1 eloquently showed. Trade could decrease even before conflict starts, or at a very early stage of disputes, since agents can anticipate an escalation and also leaders can use trade cuts as a signaling tool to show resolve. The dynamic relationship is even more complicated, since if a signaling cut of trade is credible then it could even decrease conflict in case the other country feels seriously threatened (even before the cut being implemented). Also trade can increase after some years of war, and this is the case observed when military occupations take place. So, the dynamic patterns of coevolution can be really complicated and will not be studied here, a longer dataset being recommended.

Our database includes 151 countries over the period 1995-2012 (see the list of countries in Appendix 1), which means 22,650 country pairs in 18 years (407,400 observations). The original variables are highly disaggregated both in conflict[18] and exports[19] dimensions. Trade data comes from CEPII's BACI database (Harmonized System, 6 digits), and CEPII's gravity database provides information on economic, geographic, historical, cultural and institutional variables. GDPs are mainly from WDI, but some other sources had to be used to fill some missing countries especially relevant for conflict analysis. Correlates of War (COW Project; Gochman and Maoz, 1984; Jones, Bremer, and Singer, 1996) databases are used to include war data (enemies and allied), major power dummies and alliances data (version 4.1).

4 Results

As instruments, trade with synthetic partners variables should be uncorrelated with conflict once controlled for the exogenous regressors, which means that the specification of the model should be as complete as possible, avoiding also the endogeneity problem that could come from relevant omitted variables. Our strategy will be to estimate the model with some theoretically relevant regressors and with different kinds of fixed effects.

[18] Including continuous and asymmetric measures for verbal, material, and militarized conflict; in each case disaggregated by official and non-official actors. Each observation in these variables must be a synthetic measure obtained in a distribution of seriousness of the events observed from every origin country to every destination.

[19] Overall and disaggregated in many forms up to 6 digit HS, including i) sectors of activity at different aggregation levels; ii) intra-industry vs. inter-industry trade; iii) sophisticated vs. non sophisticated trade (using Hidalgo and Hausmann's (2009) "Method of Reflections"); iv) capital vs. intermediate vs. consumption goods (using BEC classification); v) relative factor intensities from the Leamer classification.

In particular, this will lead to the identification of two different parameters, often confounded in the trade and conflict literature. Some fixed effects (as importer and exporter fixed effects, or even importer and exporter time-varying fixed effects) will preserve the cross-section identification, showing the effects of the regressors on the expected level of conflict for different dyads. When using country pair fixed effects, the panel estimation will lead to identification in time for a generic dyad, showing the effects of the regressors on the evolution of conflict in time.

4.1 Determinants of conflict and the role of trade patterns

We estimate equation (15) both as a pooled cross-section and by means of panel data techniques. We include different kinds of fixed effects: Exporter and Importer FE (XMFE), Exporter and Importing Time Varying FE (XMTVFE), Country-pair FE (CPFE), and these last two kinds of FE together (XMTV+CPFE). Fixed effects allow controlling for different sorts of unobservables, and country-pair fixed effects allow controlling for unobservable heterogeneity at the dyad level, providing a Within estimator and thus identifying the parameter vector based on time variation for each dyad. In all the regressions we include year fixed effects.[20]

For the sake of simplicity we omit in variables names any reference, but all the non-binary variables are transformed in logs and we take three-year lags in all the time-varying regressors in order to avoid simultaneous reverse causality (in the next section we test for robustness for the selection of lags). All the estimations include year fixed effects.

To test our instruments' performance we run overidentification tests to see if excluded instruments are distributed independently of the error term, i.e. the validity of the instruments. This has been done with Sargan-Hansen J statistic (note that a rejection indicates that the instruments have been improperly excluded from the regression model). Additionally, being identified by the order and rank conditions, with weak instruments an equation may be effectively unidentified in a finite sample, so we need to test for the weakness of the instruments in our context even if we now that first stage F-tests are significant at the usual levels (Staiger and Stock, 1997).[21]

Table 3 presents the estimations of equation (15), first without including trade-patterns variables (column 1), without controlling for endogeneity of trade variables (columns 1 and 2), and without any kind of fixed effects (columns 1 to 3). Results clearly show that specialization patterns are relevant to explain bilateral militarized conflict and instrumental variables appreciably affect the results. We will focus our analysis in columns 4 and 5, where we use XMFE and TVXMFE to control for every importer and exporter unobserved characteristics. Columns 6 and 7 show two within estimators' results since we use CPFE; in the second case controlling additionally for time varying importer or exporter characteristics. In these last two specifications we identify the effects in time for a given dyad, so the meaning of the coefficients changes, and results show that the fixed effects absorb a relevant part of our main regressors' variation.

[20] Given the selection in the sample, random effects model were also estimated but their validity was rejected by Hausman tests.

[21] We test for weak instruments using Cragg-Donald Wald F statistics as well as Kleibergen-Paap rk Wald F statistic. In both cases the null hypothesis is that instruments are weak, and both tests allow for the presence of non-i.i.d. errors. We use Stock and Yogo (2005) critical values.

Table 3

Determinants of International Conflict

OLS and IV estimations using different fixed effects

	OLS		IV				
VARIABLES	Pooled	Pooled	Pooled	XMFE	TVXMFE	CPFE	TVXM_CPFE
L3.lcomplX		1.796***	-0.335	-1.548***	-2.187***	0.069	1.406
		[0.229]	[0.267]	[0.333]	[0.534]	[0.370]	[1.529]
L3.lcomplM		1.175***	-0.052	0.878***	1.441***	-0.262	0.174
		[0.192]	[0.274]	[0.235]	[0.324]	[0.229]	[0.651]
L3.lsubstX		-1.329***	1.086***	0.137	0.471	0.130	0.073
		[0.275]	[0.329]	[0.252]	[0.424]	[0.234]	[0.321]
L3.lsubstM		-7.592***	-1.875***	-1.515***	-0.938*	-1.442***	-1.485***
		[0.609]	[0.713]	[0.428]	[0.516]	[0.460]	[0.525]
L3.lrivalX		-0.547***	-0.507**	1.562***	2.081***	0.115	-1.756***
		[0.181]	[0.219]	[0.108]	[0.135]	[0.180]	[0.395]
L3.lrivalM		-0.223	0.351*	-0.104	-0.300**	0.084	-0.001
		[0.177]	[0.199]	[0.105]	[0.150]	[0.158]	[0.218]
L3.lexp	0.048***	0.021***	-0.175***	-0.157***	-0.183***	0.001	-0.001
	[0.004]	[0.004]	[0.030]	[0.037]	[0.052]	[0.047]	[0.102]
L3.limp	0.053***	0.029***	0.375***	0.254***	0.297***	0.089*	-0.044
	[0.004]	[0.004]	[0.030]	[0.038]	[0.050]	[0.051]	[0.099]
L3.peaceyears	-0.006***	-0.006***	-0.006***	-0.003***	-0.003***	-0.002***	-0.001***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
L3.all_any	0.312***	0.372***	0.233***	0.397***	0.389***	-0.361***	-0.259***
	[0.044]	[0.042]	[0.045]	[0.017]	[0.020]	[0.040]	[0.049]
L3.comcur	0.308***	0.278***	0.238***	0.111***	0.068**	-0.358***	-0.340***
	[0.068]	[0.066]	[0.078]	[0.030]	[0.030]	[0.052]	[0.066]
L3.wto_both	-0.184***	-0.214***	-0.472***	-0.120**	-0.160***	-0.239***	-0.315***
	[0.058]	[0.057]	[0.071]	[0.047]	[0.031]	[0.050]	[0.051]
L3.wto_one	-0.055	-0.087	-0.222***	-0.026		-0.085*	
	[0.059]	[0.057]	[0.071]	[0.032]		[0.044]	
L3.lrel_gdp	0.017***	0.090***	0.065***	0.006		-0.005	
	[0.005]	[0.006]	[0.009]	[0.017]		[0.016]	
L3.polity_o	-0.889	-1.657*	-3.226***	-1.634***		-1.373***	
	[0.882]	[0.884]	[0.939]	[0.509]		[0.491]	
L3.polity_d	-1.931**	-3.824***	-9.999***	-2.300***		-2.385***	
	[0.808]	[0.793]	[1.039]	[0.488]		[0.485]	
L3.lpop_o	0.109***	0.072***	0.018*	-0.944***		-1.010***	
	[0.009]	[0.010]	[0.011]	[0.077]		[0.079]	
L3.lpop_d	0.140***	0.156***	0.048***	-0.849***		-0.950***	
	[0.009]	[0.009]	[0.011]	[0.075]		[0.075]	
ldistcap	-0.400***	-0.397***	-0.301***	-0.397***	-0.388***		
	[0.016]	[0.017]	[0.019]	[0.017]	[0.030]		
border	-0.069	0.012	0.008	0.351***	0.329***		
	[0.062]	[0.059]	[0.069]	[0.023]	[0.025]		
comrelig	-0.077***	-0.075***	-0.086***	-0.043***	-0.032***		
	[0.028]	[0.027]	[0.030]	[0.011]	[0.011]		
comleg	-0.111***	-0.077***	-0.083***	0.023*	0.029*		
	[0.026]	[0.025]	[0.029]	[0.012]	[0.016]		
comlang_off	-0.030	0.072*	0.006	0.196***	0.184***		
	[0.037]	[0.037]	[0.041]	[0.018]	[0.022]		
smctry	-0.715***	-0.680***	-0.642***	-0.252***	-0.232***		
	[0.095]	[0.090]	[0.112]	[0.037]	[0.039]		
colony	0.756***	0.696***	0.560***	0.395***	0.396***		
	[0.072]	[0.071]	[0.077]	[0.026]	[0.028]		
Constant	2.801***	4.473***	5.371***	37.230***	5.984***	37.533***	5.369***
	[0.221]	[0.278]	[0.328]	[1.648]	[0.552]	[1.696]	[0.649]
Observations	93,987	93,629	93,629	93,629	93,629	93,629	93,629
R-squared	0.301	0.318	0.137	0.456	0.539	0.689	0.791
HansenJ pval			0.389	0.663	0.256	0.655	0.822
Underid K-P pval			0	0	0	0	2.34e-10
Weakid K-P Fval			149.8	73.33	38.94	47.56	11.72
Weakid CD Fval			566.6	96.25	54.76	80.27	20.19

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Trade complementarity has relevant but opposite effects when evaluating a partner as an exporter or as an importer. A negative sign in the first case means that countries fight less with partners exporting the products they import. Contrarily, conflict will be higher with those partners whose imports are similar to one's exports. In summary, countries tend to be more peaceful with partners selling what they buy and more belligerent with partners buying what they sell. These effects are apparently not present in the timing of conflict for a given dyad (within-dyad estimator).

The degree of substitutability of a trade partner as a provider of imports, i.e. as an exporter, should be interpreted in terms of the liberal notions of (inverse) exit costs or (direct) outside options, since the positive sign shows that more substitutable partners tend to be the target of a higher conflict. But our results cast doubts on the significance of this coefficient. There is stronger evidence of an opposite effect with respect to the substitutability of a destination market, saying that countries would have higher conflict with these markets that are hardly substitutable as buyers of the products the country exports, which is more alike to a realist. The within-dyad estimator shows that this effect is also important in choosing the time for a conflict.

Trade rivalries as exporting countries are statistically and economically significant as a cause of conflict when the cross-section dimension is considered, telling which dyads tend to have higher conflicts. Evidence is inconclusive for rivalry as importers, where we could at most suspect the existence of a negative effect, saying that dyad with high matching in the products they buy are more peace-prone. The results for the within estimators are weak or even of opposite sign, but we fear that the estimation including TVXM and CPFE, the fixed effects absorb too much of the variance and leave almost nothing to the patterns-of-trade variables.

In sum, the full set of six trade-pattern variables say that countries evaluate their partners both as importers and exporters of different kinds of goods, having lower conflict with complementary providers of imports and higher conflict with complementary destinations for exports, hardly substitutable as such, and rivals as exporters.

Import and exports are another theoretically relevant result, and we obtain opposite effects of exports and imports on conflict. Countries tend to have higher levels of conflict with the origins of their imports and lower levels with the destination of their exports. This seems to reflect a mercantilist approach on trade balance, since $(exp - imp)$ would be the true figure orienting leaders' decisions, instead of the liberal peace hypothesis of the mutually cancelling $(exp + imp)$ term as the critical variable to be considered.

A central policy recommendation derives from the previous result. Since total world imports and exports numerically coincide, the best strategy to promote peace is not just to promote trade, but mostly promote balanced trade relations among nations. Where large trade deficits appear relationships start to be in risk of significantly increasing their level of conflict.

Other control variables have the expected signs and tend to be significant. The gravity forces are at work with the expected signs for distance (negative) and border (positive). Note that the effect of size is in fact opposite to the gravity notion, since an increase in country size (as measured by population) will reduce both emitted and received conflict. The effects of alliances is interesting, since it shows a higher conflict in case of countries having formal alliances, but this is not completely surprising since "non-aggression" alliances are also included, and are typical of potentially conflictive dyads. The sign of this effects changes for the within estimator, telling that a country will have less

conflict with a given partner, when he enters a formal alliance. The same kind of effects are obtained for common currencies, conflict is higher when allowing cross-section variation, and turns to negative in the within estimation. Democracy variables show the usual pacifying effect, democracies tend to have lower conflict levels with others and receive lower conflict from them, but our results add that the second effect is stronger. The common religion dummy has also a negative effect, showing that religion divides matter. Finally, countries that shared colonial relationships, currently or in the past, tend to have more conflict, while countries that have been the same country in the past tend to be peaceful.

4.2 Frequency and intensity of conflict

Some dyads can have few actions of conflict with a very high hostility level; while others can maintain very frequent low-intensity actions for long periods. So far we considered the volume of conflict for each dyad-year observation, adding the scores of every action occurred in the period. This measure ignores the composition of conflict in terms of frequency of events and seriousness of the actions.

Table 4 shows that the main conclusions obtained for the volume of conflict hold for the frequency (count of events of pure conflict minus count of events of deescalation) and the intensity (mean of GS scores for the observed events). The same set of instruments is used for these new IV estimations, and their performance stills acceptable (at 90% confidence). All the regressions include time fixed effects.

Results for the frequency of actions are remarkably similar to those shown for the volume of conflict in Table 3, partially reproduced in the first two columns of Table 4. The only relevant difference is that frequency results emphasize the pacifying effect of importing the same kind of products, which as we said could reflect cultural proximity and similar levels of development. A country will carry less frequently actions against partners with similar imports baskets; nonetheless if conflict starts it should be expected to be more serious, as also happens with rivals as exporters.

Regarding the intensity of conflict, changes in coefficients' significance seem to suggest that the evaluation of the partner as an exporter (as a provider of goods) gains relevance. While substitutability of the partner as an importer makes events less frequent, the intensity is guided by the substitutability of the partner as a provider of goods, with less conflict the harder to substitute it bilateral trade.

Note that exports and imports clearly maintain their signs in the explanation of the frequency of events, but the intensity of events does not depend on exports, and evidence is mixed regarding imports, where a positive effect could exist. Besides some minor and reasonable changes in in the effects of institutional variables (WTO affiliation and common legislation), the other change in the model for intensity is in the distance coefficient. While countries close to each other have more frequent conflict events, the seriousness of the actions is lower than in the case of long distance conflict which tends to be more severe.

Table 4

Determinants of frequency and intensity of conflict

IV estimations using different fixed effects

	Volume of Events		Frequency of Events		Intensity of Events	
VARIABLES	XMFE	TVXMFE	XMFE	TVXMFE	XMFE	TVXMFE
L3.lcomplX	**-1.548*** **	**-2.187*** **	-1.360***	-1.881***	-0.144*	-0.416***
	[0.333]	*[0.534]*	*[0.306]*	*[0.479]*	*[0.075]*	*[0.125]*
L3.lcomplM	**0.878*** **	**1.441*** **	0.889***	1.434***	-0.066	-0.030
	[0.235]	*[0.324]*	*[0.216]*	*[0.293]*	*[0.052]*	*[0.074]*
L3.lsubstX	**0.137**	**0.471**	-0.062	0.335	0.211***	0.305***
	[0.252]	*[0.424]*	*[0.236]*	*[0.391]*	*[0.055]*	*[0.093]*
L3.lsubstM	**-1.515*** **	**-0.938***	-1.502***	-0.886*	-0.051	-0.072
	[0.428]	*[0.516]*	*[0.403]*	*[0.482]*	*[0.089]*	*[0.108]*
L3.lrivalX	**1.562*** **	**2.081*** **	1.379***	1.854***	0.125***	0.161***
	[0.108]	*[0.135]*	*[0.100]*	*[0.125]*	*[0.024]*	*[0.031]*
L3.lrivalM	**-0.104**	**-0.300** **	-0.261***	-0.464***	0.120***	0.108***
	[0.105]	*[0.150]*	*[0.098]*	*[0.139]*	*[0.023]*	*[0.034]*
L3.lexp	**-0.157*** **	**-0.183*** **	-0.153***	-0.175***	0.005	-0.006
	[0.037]	*[0.052]*	*[0.034]*	*[0.047]*	*[0.008]*	*[0.012]*
L3.limp	**0.254*** **	**0.297*** **	0.242***	0.271***	0.002	0.025**
	[0.038]	*[0.050]*	*[0.035]*	*[0.045]*	*[0.009]*	*[0.012]*
L3.peaceyears	**-0.003*** **	**-0.003*** **	-0.003***	-0.003***	-0.000***	-0.000***
	[0.000]	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*
L3.all_any	**0.397*** **	**0.389*** **	0.379***	0.373***	0.015***	0.013***
	[0.017]	*[0.020]*	*[0.016]*	*[0.019]*	*[0.004]*	*[0.005]*
L3.comcur	**0.111*** **	**0.068** **	0.074***	0.037	0.021***	0.016**
	[0.030]	*[0.030]*	*[0.028]*	*[0.028]*	*[0.007]*	*[0.007]*
L3.wto_both	**-0.120** **	**-0.160*** **	-0.150***	-0.180***	0.036***	0.014**
	[0.047]	*[0.031]*	*[0.043]*	*[0.029]*	*[0.010]*	*[0.007]*
L3.wto_one	**-0.026**		-0.027		0.008	
	[0.032]		*[0.029]*		*[0.007]*	
L3.lrel_gdp	**0.006**		0.008		0.001	
	[0.017]		*[0.015]*		*[0.004]*	
L3.polity_o	**-1.634*** **		-1.732***		-0.243**	
	[0.509]		*[0.475]*		*[0.110]*	
L3.polity_d	**-2.300*** **		-2.104***		-0.335***	
	[0.488]		*[0.457]*		*[0.102]*	
L3.lpop_o	**-0.944*** **		-0.916***		-0.010	
	[0.077]		*[0.072]*		*[0.017]*	
L3.lpop_d	**-0.849*** **		-0.794***		-0.073***	
	[0.075]		*[0.070]*		*[0.017]*	
ldistcap	**-0.397*** **	**-0.388*** **	-0.403***	-0.401***	0.006	0.018***
	[0.017]	*[0.030]*	*[0.016]*	*[0.027]*	*[0.004]*	*[0.007]*
border	**0.351*** **	**0.329*** **	0.341***	0.328***	0.004	-0.001
	[0.023]	*[0.025]*	*[0.022]*	*[0.023]*	*[0.005]*	*[0.005]*
comrelig	**-0.043*** **	**-0.032*** **	-0.039***	-0.031***	-0.003	-0.000
	[0.011]	*[0.011]*	*[0.010]*	*[0.010]*	*[0.002]*	*[0.002]*
comleg	**0.023***	**0.029***	0.033***	0.043***	-0.014***	-0.019***
	[0.012]	*[0.016]*	*[0.012]*	*[0.015]*	*[0.003]*	*[0.004]*
comlang_off	**0.196*** **	**0.184*** **	0.202***	0.193***	0.002	-0.004
	[0.018]	*[0.022]*	*[0.017]*	*[0.020]*	*[0.004]*	*[0.005]*
smctry	**-0.252*** **	**-0.232*** **	-0.232***	-0.209***	-0.004	-0.007
	[0.037]	*[0.039]*	*[0.034]*	*[0.036]*	*[0.007]*	*[0.008]*
colony	**0.395*** **	**0.396*** **	0.403***	0.409***	-0.003	-0.011*
	[0.026]	*[0.028]*	*[0.025]*	*[0.026]*	*[0.005]*	*[0.006]*
Constant	**37.230*** **	**5.984*** **	34.094***	4.366***	3.211***	1.604***
	[1.648]	*[0.552]*	*[1.533]*	*[0.507]*	*[0.364]*	*[0.123]*
Observations	93,629	93,629	92,554	92,554	104,313	104,313
R-squared	0.456	0.539	0.481	0.563	0.052	0.151
HansenJ pval	0.663	0.256	0.587	0.328	0.0980	0.300
Underid K-P pval	0	0	0	0	0	0
Weakid K-P Fval	73.33	38.94	75.15	41.18	74.47	36.96
Weakid CD Fval	96.25	54.76	98.42	57.63	98.39	51.79

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

4.3 Robustness checks

We performed a set of robustness checks modifying the dependent variable, taking the sums of GS scores for verbal actions (in addition to the material actions considered as far), and for non-official actors (in addition to the official actors considered as far). Table A4.1 in Appendix 4 shows IV estimations using the same set of instruments for the XMFE and TVXMFE models, and the first two columns replicate the results shown in Table 3 using sums of material actions taken by official actors. With slight variations in coefficients values, and almost no variation in significance levels, it is possible to assert our results are robust to the kind of actions and actors considered.

In a second set of robustness checks we estimate the model using different lags for the RHS variables, from no lags to four years lags. Table A4.2 in Appendix 4 shows IV estimations using the same set of instruments for the XMFE and TVXMFE models, and the fourth and fifth columns replicate the results shown in Table 3 using three lags for each time-varying regressor. Again, results are very robust to changes in this arbitrarily chosen lag-length.

5 Conclusions

The analysis done in previous sections show one main result: the direction of trade matters, both for the effects of the bilateral value of trade and for the effects that the patterns of trade have on bilateral conflict.

Regarding the effects of traded values, countries tend to have less conflicts with destinations to which they export a lot, but they will have more conflict with the origins of high imports values. This gives empirical support to a mercantilist view, where the relevant variable in terms of traded values is not the total trade in both directions but the trade balance. A high trade deficit leads to a high risk of conflict. Also, these effects induce more frequent conflicts but are not relevant in the explanation of events' intensity. However, the examination of the effects of the value of trade is not our central purpose, which inquires about the consequences of the contents of trade flows on conflict.

Our main results show that when country i evaluates the optimal level of conflict with country j it takes into account three particular dimensions regarding the content of trade flows. For one side countries observe how complementary each partner is, choosing a higher conflict level when country j is a complementary (potential) destination for i's products and lower conflict level when j is a complementary (potential) provider of imports, but just this second effect explains the seriousness of the events.

Regarding the substitutability of trade partners, country i will choose a higher frequency of conflicts when partners are harder to substitute as importers of i's goods, while choosing higher hostility levels with those countries that are easy to substitute as a provider of imports. The first result concords with a realist approach on the relations with exports destinations, and the second one corresponds with a liberal interpretation of opportunity costs of conflict with origins of imports.

Finally, rivalry as exporters causes both more frequent and intense conflict, while coincidence in the kind of products imported by two countries affects negatively the frequency of conflict between them, while exacerbating hostilities in case of engaging in bilateral conflict. Together with the

previous results, the bottom line is that rivalry on the export side increases conflict and rivalry on the import side makes it less frequent but more serious.

The main limitation of our analysis resides in estimating a linear model for the restricted sample of positive conflict observations. The frequency of zeros in the dependent variable is a problematic feature for the estimation of equation (15), since non-zero observations in our conflict variable are only the 26.18%. This means 106,731 positive values which is significantly more than the usual positive values of MIDs studies. One possibility for a better treatment of this problem would be to estimate the model by Poisson Cuasi Maximum Likelihood method (as proposed for the case of trade by Santos Silva and Tenreyro, 2006), or with a Zero Inflated Poisson Model if required. Also a Tobit model would correct for distributional issues, and a selection model could allow assessing the endogeneity of the selection stage. However, methods for binary dependent variables and selection models are complex to implement in panels and the required treatment exceeded the scope of this paper.

Two other limitations worth to be mentioned and would be important lines for future research. For one side we have specified static models, while the relationship between conflict and trade variables probably requires exploring more complex dynamic specifications. Furthermore, the directed database would admit a better treatment of the reverse effects, i.e. how $confl_{jit}$ affects $confl_{ijt}$, thus including an assessment on the reciprocation effects explaining escalations and deescalations. Brief, further research should shed light on how temporal and spatial correlations affect our main results.

References

Acemoglu D, Antràs P, Helpman E, 2006. Contracts and technology adoption. American Economic Review, 97(3): 916-943

Anderson K, Nordheim H, 1993. From imperial to regional trade preferences: Its effects on Europe's intra and extra-regional trade. Weltwirtschaftliches Archiv, 129(1): 78-101

Baldwin DA, 1980. Interdependence and power: A conceptual analysis. International Organization, 34(4): 471-506

Barbieri K, 1996. Economic interdependence: A path to peace or a source of interstate conflict?. Journal of Peace Research, 33(1): 29-49.

Barbieri K, 2002. The liberal illusion. Does trade promote peace. The University of Michigan, Ann Arbor Press

Beck N, Katz JN, Tucker R, 1997. Beyond ordinary Logit. Taking time seriously in binary TS-CS models. California Institute of Technology, Social Science Working Paper, No. 1017

Beck N, Katz JN, Tucker R, 1998. Taking time seriously: TS-CS Analysis with a binary dependent variable. American Journal of Political Science 42(4): 1260-1288.

Blanchard JMF, Ripsman NM, 1996. Measuring economic interdependence: A geopolitical perspective. Geopolitics, 1(3): 225-246

Boulding KE, 1962. Conflict and defense: A general theory. New York: Harper & Brothers.

Broda C, Greenfield J, Weinstein DE, 2006. From groundnuts to globalization: A structural estimate of trade and growth. NBER Working Paper Series, No. 12512

Broda C, Limao N, Weinstein DE, 2008. Optimal tariffs and market power: The evidence. American Economic Review, 98(5): 2032-65

Bueno de Mesquita B, Lalman D, 1992. War and reason: Domestic and international imperatives. New Heaven: Yale University Press.

Carlson L, 1995. A theory of escalation and international conflict. Journal of Conflict Resolution, 39: 511-534.

Choucri N, North RC, 1975. Nations in Conflict: National Growth and International Violence. San Francisco: W.H. Freeman & Co.

Dorussen H, 2006. Heterogeneous trade interests and conflict: What you trade matters. Journal of Conflict Resolution, 50(1): 87-107

Ellis G, Mitchell SM, Prins BC, 2010. How democracies keep the peace: Contextual factors that influence conflict management strategies. Foreign Policy Analysis, 6(4): 373-398

Flores M, 2014. Asimetrías en el modelo gravitatorio de comercio: Una reconsideración empleando el espacio de países. Unpublished. Master Thesis, Universidad de la República, Uruguay.

Flores M, Vaillant M, 2013. Geographic nature of trade specialization: Economic distance in the country space. Paper presented at the Arnoldshain Seminar XI, University of Antwerp, Belgium, June.

Gartzke E, Li Q, 2003. All's well that ends well. A reply to Oneal, Barbieri & Peters. Journal of Peace Research, 40(6): 727–732.

Gasiorowski M, 1986. Economic interdependence and international conflict: Some cross-national evidence. International Studies Quarterly, 30(1): 23-38

Gibler DM, 2009. International military alliances, 1648-2008. CQ Press.

Gochman CS, Maoz Z, 1984. Militarized interstate disputes, 1816-1976. Procedures, patterns, and insights. Journal of Conflict Resolution, 28(4): 585-616

Goenner CF, 2004. Uncertainty of the liberal peace. Journal of Peace Research, 41(5): 589-605.

Goenner CF, 2010. From toys to warships: Interdependence and the effects of disaggregated trade on militarized disputes. Journal of Peace Research, 47(5): 547-559.

Goldsmith BE, 2013. International trade and the onset and escalation of interstate conflict: More to fight about, or more reasons not to fight?. Defence and Peace Economics, 24(6): 555-578

Hegre H, 2008. Gravitating toward war. Preponderance may pacify, but power kills. Journal of Conflict Resolution, 52(4): 566-589

Helpman E, Melitz M, Rubinstein Y, 2008. Estimating trade flows: Trading partners and trading volumes. The Quarterly Journal of Economics, 123(2): 441-487

Hidalgo CA, Hausmann R, 2009. The building blocks of economic complexity. PNAS, 106(26): 10570-10575

Hidalgo CA, Klinger B, Barabási AL, Hausmann R, 2007. The product space conditions the development of nations. Science, 317(5837): 482-487

Homer-Dixon TF, 1999. Environment, scarcity, and violence. Princeton, NJ: Princeton University Press.

Huntington SP, 1996. The clash of civilizations?. Foreign Affairs, 72(3)

Jones DM, Bremer SA, Singer JD, 1996. Militarized interstate disputes 1816-1992. Rationale, coding rules and empirical pattern. Conflict Management and Peace Science, 15(2): 163-213

Keohane RO, Nye JS, 1977. Power and interdependence. World politics in transition. Boston: VS Verlag für Sozialwissenschaften.

Keshk OMG, Pollins BM, Reuveny R, 2004. Trade still follows the flag. The primacy of politics in a simultaneous model of intedependence and armed conflict. The Journal of Politics, 66(4): 1155-1179.

Keshk OMG, Reuveny R, Pollins BM, 2010. Trade and conflict: Proximity, country size and measures. Conflict Management and Peace Science, 27(1): 13-27

Kim HM, Russeau DL, 2005. The classical liberals were half right (or half wrong): New tests of the 'liberal peace', 1960-1988. Journal of Peace Research, 42(5): 523-543

Koubi V, Spilker G, Bohmelt T, Bernauer T, 2014. Do natural resources matter for interstate and intrastate conflict?. Journal of Peace Research, 52: 227-243.

Leeds BA, 2003. Do alliances deter aggression? The influence of military alliances on the initiation of militarized interstate disputes. American Journal of Political Science, 47(3): 427-439

Leeds BA, Long AG, Mitchell SM, 2000. Reevaluating Alliance Reliability: Specific Threats, Specific Promises. Journal of Conflict Resolution, 44: 686-699

Leetaru K, Schrodt PA, 2013. GDELT: Global Data on Events, Location and Tone, 1979-2012. Paper presented at the International Studies Association meetings, San Francisco, April.

Lemke D, Reed W, 1996. Regime types and status quo evaluations: Power transition theory and the democratic peace. International Interactions, 22(2): 143-164

Li Q, Reuveny R, 2011. Does trade prevent or promote interstate conflict initiation?. Journal of Peace Research, 48(4): 437-453.

Lin SY, Seiglie C, 2014. Same evidences, different interpretations -A comparison of the conflict index between the interstate dyadic events data and militarized interstate disputes data in peace-conflict models. Peace Economics, Peace Science, and Public Policy, 54(4): 421-433

Mansfield ED, Pevehouse JC, 2000. Trade blocs, trade flows and international conflict. International Organization 54(4): 775–808.

Maoz Z, Russett BM, 1993. Normative and Structural Causes of Democratic Peace 1946-1986. American Political Science Review, 87(3), 624-638

Martin P, Mayer T, Thoenig M, 2008. Make trade not war?. Review of Economic Studies, 75(1): 865-900.

Martin P, Mayer T, Thoenig M, 2010. The geography of conflicts and regional trade agreements. American Economic Journal: Macroeconomics, 4(4): 1-35.

Michaely M, 1996. Trade preferential agreements in Latin America: An ex ante assessment. World Bank Policy Research Working Paper, No. 1583.

Oneal JR, Oneal FH, Maoz Z, Russett BM, 1996. The liberal peace: Interdepence, democracy, and international conflict, 1950-1985. Journal of Peace Research, 33(1): 11-28.

Oneal JR, Russett BM, 1997. The classical liberals were right. Democracy, interdependence and conflict, 1950-1985. International Studies Quarterly, 41(2): 267-294.

Oneal JR, Russett BM, 1999. Assessing the liberal peace with alternative specifications. Trade still reduces conflict. Journal of Peace Research, 36(4): 423-442.

Oneal JR, Russett BM, Berbaum ML, 2003. Causes of peace. Democracy, interdependence, and IGOs, 1885-1992. International Studies Quarterly 47(3): 371-393

Peceny M, Beer CC, Sanchez-Terry S, 2002. Dictatorial peace?. The American Political Science Review, 96(1): 15-26

Peterson TM, Thies CG, 2012. Beyond Ricardo. The link between intra-industry trade and peace. British Journal of Political Science, 42(4): 747-767

Polachek SW, 1980. Conflict and trade. Journal of Conflict Resolution, 24(1): 55-78

Polachek SW, 1992. Conflict and trade. An economics approach to political international interactions. In W. Isard and C.H. Anderton, eds. Economics of Arms Reduction and the Peace Process. New York: Elsevier Science. pp. 89-120

Polachek SW, 1997. Why democracies cooperate more and fight less. The relationship between international trade and cooperation. Review of International Economics, 5(3): 295-309.

Polachek SW, Robst J, Chang YC, 1999. Liberalism and interdependence: Extending the trade-conflict model. Journal of Peace Research, 36(4): 405-422.

Pollins BM, 1989. Conflict, cooperation, and commerce: The effect of international political interactions on bilateral trade flows. American Journal of Political Science, 33(3): 737-761.

Pollins BM, 1989. Does trade still follow the flag?. American Political Science Review, 83(2): 465-480.

Reuveny R, 2001. Bilateral import, export, and conflict/cooperation simultaneity. International Studies Quarterly 45(1): 131-158.

Reuveny R, Kang H, 1998. Bilateral trade and political conflict/cooperation: Do goods matter?. Journal of Peace Research 35(5): 581-602.

Robst J, Polachek SW, Chang YC, 2007. Geographic proximity, trade, and international conflict/cooperation. Conflict Management and Peace Science, 24(1)

Russett BM, Oneal JR, 2001. Triangulating peace. Democracy, interdependence and IGOs. The Norton Series in World Politics, New York

Russett BM, Oneal JR, Cox M, 2000. Clash of civilizations, or realism and liberalism déja vu? Some evidence. Journal of Peace Research, 37(5): 583-608.

Santos Silva JMC, Tenreyro S, , 2006. The log of gravity. The Review of Economics and Statistics, 88(4): 641-658

Staiger D, Stock JH, 1997. Instrumental variables regression with weak instruments. Econometrica, 65(3): 557-586

Stock JH, Yogo M, 2005. Testing for weak instruments in linear IV regression. In Andrews DWK Identification and Inference for Econometric Models. New York: Cambridge University Press

Vicard V, 2008. Trade, conflict, and political integration: Explaining the heterogeneity of regional trade agreements. European Economic Review, 56(1): 54–71

Waltz KN, 1979. Theory of International Politics. Addison-Wesley series in Political Science. Reading, Mass.: Addison-Wesley Pub. Co.

Xiang J, Xu X, Keteku G, 2007. Power: The missing link in the trade conflict relationship. Journal of Conflict Resolution, 51(4): 646-663

Appendix 1: Sample of countries

Afghanistan (AFG)
Angola (AGO)
Albania (ALB)
United Arab Emirates (ARE)
Argentina (ARG)
Armenia (ARM)
Australia (AUS)
Austria (AUT)
Azerbaijan (AZE)
Burundi (BDI)
Benin (BEN)
Burkina Faso (BFA)
Bangladesh (BGD)
Bulgaria (BGR)
Bahrain (BHR)
Bosnia and Herzegovina (BIH)
Belarus (BLR)
Bolivia (BOL)
Brazil (BRA)
Bhutan (BTN)
Central African Republic (CAF)
Canada (CAN)
Switzerland (CHE)
Chile (CHL)
China (CHN)
Ivory Coast (CIV)
Cameroon (CMR)
Congo (COG)
Colombia (COL)
Costa Rica (CRI)
Cuba (CUB)
Cyprus (CYP)
Czech Republic (CZE)
Germany (DEU)
Djibouti (DJI)
Denmark (DNK)
Dominican Republic (DOM)
Algeria (DZA)
Ecuador (ECU)
Egypt (EGY)
Eritrea (ERI)
Spain (ESP)
Estonia (EST)
Finland (FIN)
Fiji (FJI)
France (FRA)
Gabon (GAB)
United Kingdom (GBR)
Georgia (GEO)
Ghana (GHA)
Guinea (GIN)
Gambia (GMB)
Guinea-Bissau (GNB)
Equatorial Guinea (GNQ)
Greece (GRC)
Guatemala (GTM)
Guyana (GUY)
Honduras (HND)
Croatia (HRV)
Haiti (HTI)
Hungary (HUN)
Indonesia (IDN)
India (IND)
Ireland (IRL)
Iran (IRN)
Iraq (IRQ)
Israel (ISR)
Italy (ITA)
Jamaica (JAM)
Jordan (JOR)
Japan (JPN)
Kazakhstan (KAZ)
Kenya (KEN)
Kyrgyzstan (KGZ)
Cambodia (KHM)
South Korea (KOR)
Kuwait (KWT)
Laos (LAO)
Lebanon (LBN)
Liberia (LBR)
Libya (LBY)
Sri Lanka (LKA)
Lithuania (LTU)
Latvia (LVA)
Morocco (MAR)
Moldova (MDA)
Madagascar (MDG)
Mexico (MEX)
Macedonia (MKD)
Mali (MLI)
Myanmar (MMR)
Mongolia (MNG)
Mozambique (MOZ)
Mauritania (MRT)
Mauritius (MUS)
Malawi (MWI)
Malaysia (MYS)
Niger (NER)
Nigeria (NGA)
Nicaragua (NIC)
Netherlands (NLD)
Norway (NOR)
Nepal (NPL)
New Zealand (NZL)
Oman (OMN)
Pakistan (PAK)
Panama (PAN)
Peru (PER)
Philippines (PHL)
Papua New Guinea (PNG)
Poland (POL)
North Korea (PRK)
Portugal (PRT)
Paraguay (PRY)
Qatar (QAT)
Romania (ROM)
Russia (RUS)
Rwanda (RWA)
Saudi Arabia (SAU)
Sudan (SDN)
Senegal (SEN)
Singapore (SGP)
Solomon Islands (SLB)
Sierra Leone (SLE)
El Salvador (SLV)
Suriname (SUR)
Slovakia (SVK)
Slovenia (SVN)
Sweden (SWE)
Syria (SYR)
Chad (TCD)
Togo (TGO)
Thailand (THA)
Tajikistan (TJK)
Turkmenistan (TKM)
Trinidad and Tobago (TTO)
Tunisia (TUN)
Turkey (TUR)
Taiwan (TWN)
Tanzania (TZA)
Uganda (UGA)
Ukraine (UKR)
Uruguay (URY)
United States of America (USA)
Uzbekistan (UZB)
Venezuela (VEN)
Yemen (YEM)
South Africa (ZAF)
Dem Rep Congo (ZAR)
Zambia (ZMB)
Zimbabwe (ZWE)

Appendix 2: CAMEO, Goldstein Scale and Conflict variable

Table A2.1 shows the CAMEO codes used in GDELT database, as well as the Goldstein Scale scores in each case and the frequency of observed events for the whole set of national, subnational and supranational actors. Some of the listed categories will be dropped when restricting our conflict variable to actions among official actors.

Table A2.1

Correlations between complementarity measures and with trade variables

CAMEO Description	GS Score	Frequency (1979-2013)
Retreat or surrender militarily	**10**	7'802
Allow international involvement, not specified below	**9**	378
Receive deployment of peacekeepers	**9**	494
Receive inspectors	**9**	118
Allow humanitarian access	**9**	61
De-escalate military engagement	**9**	539
Declare truce, ceasefire	**9**	1'457
Ease military blockade	**9**	180
Demobilize armed forces	**9**	363
Return, release, not specified below	**7**	9'363
Return, release person(s)	**7**	15'410
Return, release property	**7**	749
Ease economic sanctions, boycott, embargo	**7**	1'442
Ease administrative sanctions, not specified below	**5**	2'892
Ease restrictions on political freedoms	**5**	37
Ease ban on political parties or politicians	**5**	8
Ease curfew	**5**	72
Ease state of emergency or martial law	**5**	2
Ease political dissent	**5**	323
Impose administrative sanctions, not specified below	**-5**	10'684
Impose restrictions on political freedoms	**-5**	1'304
Ban political parties or politicians	**-5**	309
Impose curfew	**-5**	312
Impose state of emergency or martial law	**-5**	255
Arrest, detain, or charge with legal action	**-5**	60'032
Expel or deport individuals	**-5**	3'855
Halt negotiations	**-7**	3'756
Expel or withdraw, not specified below	**-7**	398
Expel or withdraw peacekeepers	**-7**	9
Expel or withdraw inspectors, observers	**-7**	32
Coerce, not specified below	**-7**	1'601
Demonstrate military or police power, not specified below	**-7.2**	4'202
Increase police alert status	**-7.2**	524
Increase military alert status	**-7.2**	901
Mobilize or increase police power	**-7.2**	704
Mobilize or increase armed forces	**-7.2**	4'124
Impose embargo, boycott, or sanctions	**-8**	3'938
Use as human shield	**-8**	13
Attempt to assassinate	**-8**	316
Use tactics of violent repression	**-9**	1'600
Use unconventional violence, not specified below	**-9**	7'864
Abduct, hijack, or take hostage	**-9**	8'983
Sexually assault	**-9**	786
Torture	**-9**	1'477
Seize or damage property, not specified below	**-9.2**	590
Confiscate property	**-9.2**	1'355
Destroy property	**-9.2**	2'483

Table A2.1 (cont')

Correlations between complementarity measures and with trade variables

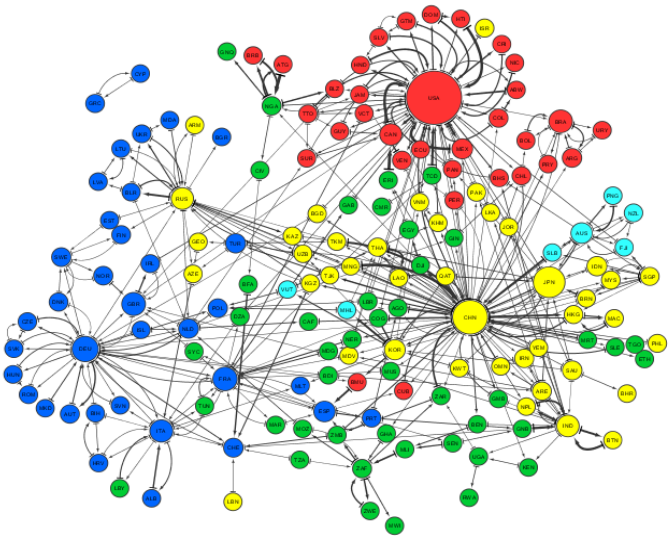
CAMEO Description	GS Score	Frequency (1979-2013)
Physically assault, not specified below	**-9.5**	4'942
Impose blockade, restrict movement	**-9.5**	1'409
Occupy territory	**-9.5**	7'242
Violate cease fire	**-9.5**	73
Engage in mass expulsion	**-9.5**	36
Kill by physical assault	**-10**	548
Conduct suicide, car, or other non-military bombing, NES	**-10**	1'689
Carry out suicide bombing	**-10**	302
Carry out vehicular bombing	**-10**	225
Carry out roadside bombing	**-10**	12
Assassinate	**-10**	3'618
Use conventional military force, not specified below	**-10**	77'945
Fight with small arms and light weapons	**-10**	18'493
Fight with artillery and tanks	**-10**	3'465
Employ aerial weapons, not specified below	**-10**	3'464
Engage in mass killings	**-10**	800
Engage in ethnic cleansing	**-10**	446

Using the sums of GS scores for the events found in each directed-dyad-year observation we can represent the obtained network structure, and also compare it with the trade relations network structure. In Figure A2.1 we assume a country i has a directed link to j if the bilateral trade flow share in the exports from i plus the share in the total imports of j is greater than 15% (this has the desired effect of giving higher weight to flows in which small countries are involved, since many countries would be isolated if absolute values were used instead).

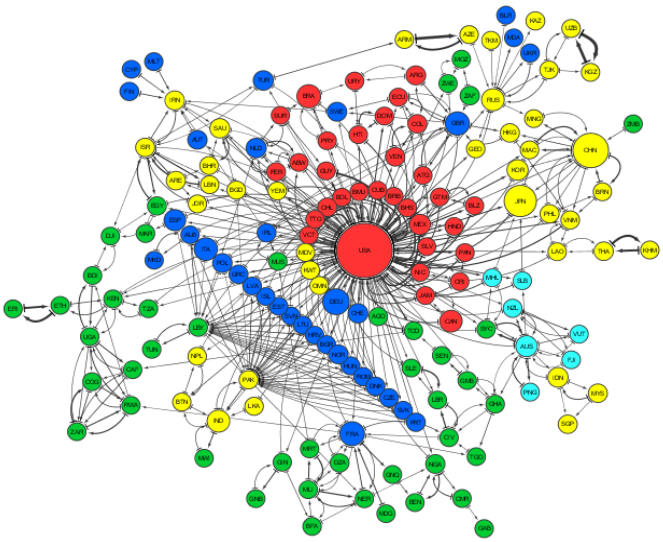
Figure A2.1

Network representations of conflict and trade relations (average 2010-2012)

Trade Network



Conflict Network



As expected, both networks have very different structures, being the conflict network much more centralized both in terms of sources and targets of conflict. Also, the United States and Europe play a crucial role in the network.

Appendix 3: Trade complementarity measures

Anderson and Nordheim (1993) develop a measure of trade intensity, which can be decomposed in a complementarity index and an unexplained country bias term. Defining product p shares in the exports from the origin country ($x_i^p = X_i^p \,/\, X_j$), in the imports to the destination country ($m_j^p = M_j^p \,/\, M_j$), and in world total imports (net of country i imports: $t_W^p = (M_W^p - M_i^p) \,/\, (M_W - M_i)$), then the complementarity index is obtained as:

$$complAN93 = \sum_{p=1}^{P} \frac{x_i^p . m_j^p}{t_W^p} \qquad \text{(A3.1)}$$

When $complAN93 > 1$ some complementarity exists between the products exported by i and those imported by j, and high values can be attained. Values near to zero indicate that the products i exports are very different from those j imports.

Michaely (1996) proposes a measure of complementarity that is being increasingly used (see e.g. UNCTAD, 2012). Using the same definitions of shares of product p in country i exports and country j imports, his index of compatibility is obtained as:

$$complM96 = 1 - \frac{1}{2}\sum_{p=1}^{P} \left| m_j^p - x_i^p \right| \qquad \text{(A3.2)}$$

Table A3.1 shows that previous complementarity measures mostly show complementarity of the other country as a destination for exports, with significant but low correlation with the complementarity of the other country as a source for imports. Michaely's measure outperforms the others, while Anderson and Nordheim's seems to be the poorest in terms of predicting exports and imports. Even if our measures have an intermediate performance in predicting trade, they have the crucial advantage of decomposing the imports and exports sides of complementarity, and Table A3.1 results allow taking them as reasonable measures.

Table A3.1

Correlations between complementarity measures and with trade variables

	lexp	limp	lcomplX	lcomplM	lcomplAN93	lcomplM96
lexp	1					
limp	0.8258*	1				
lcomplX	0.3745*	0.4992*	1			
lcomplM	0.3496*	0.3596*	0.3954*	1		
lcomplAN93	0.2547*	0.1770*	0.0691*	0.3885*	1	
lcomplM96	0.5963*	0.5090*	0.1021*	0.3950*	0.5884*	1

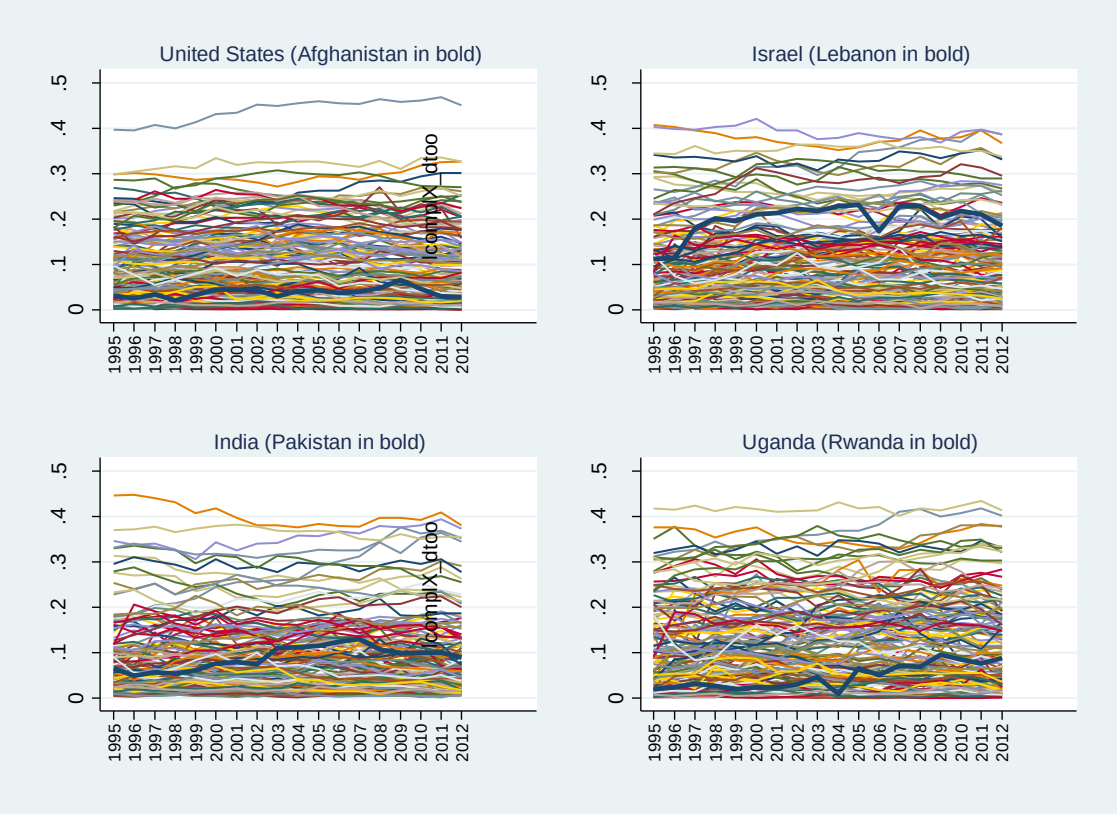
Note: Correlations are calculated for the whole period 1995-2012, with products defined by HS 6 digit classification. Stars indicate significance at a 99% confidence level.

As an illustration, in Figure A3.1 we show for some selected origin countries the evolution of the complementarity as importers for all their destinations. We also highlight some specific destination in each case, chosen because of the existence of important conflict levels in some part of the time sample. The main conclusion is that complementarity seems to be rather stable, as it reflects structural features of the economies that change slowly over time. Also, no effects of conflict appear to be evident.

Figure A3.1

Complementarity as exporter for selected countries

Evolution for each importer partner



This index takes values between zero and unity, being zero where there is no product exported by country i and also imported by country j. The index reaches unity when all the products exported by i are products that j imports, and product shares are equal in both baskets.

Appendix 4: Robustness checks

Table A4.1

Robustness Checks I: Changes in dependent variable

IV estimations using different fixed effects

	material conflict official actors		material conflict all actors		total conflict official actors		total conflict all actors	
VARIABLES	XMFE	TVXMFE	XMFE	TVXMFE	XMFE	TVXMFE	XMFE	TVXMFE
L3.lcomplX	**-1.548*** **	**-2.187*** **	-1.589***	-2.140***	-2.320***	-3.530***	-2.177***	-3.314***
L3.lcomplM	**0.878*** **	**1.441*** **	1.021***	1.739***	1.377***	2.023***	1.272***	1.975***
L3.lsubstX	**0.137**	**0.471**	0.202	0.427	0.090	0.901*	0.152	0.987**
L3.lsubstM	**-1.515*** **	**-0.938***	-1.581***	-0.995*	-1.560***	-0.784	-1.514***	-0.727
L3.lrivalX	**1.562*** **	**2.081*** **	1.520***	2.002***	1.634***	2.580***	1.612***	2.506***
L3.lrivalM	**-0.104**	**-0.300** **	-0.182*	-0.394***	-0.178	-0.428**	-0.166	-0.369**
L3.lexp	**-0.157*** **	**-0.183*** **	-0.160***	-0.200***	-0.246***	-0.263***	-0.212***	-0.234***
L3.limp	**0.254*** **	**0.297*** **	0.265***	0.310***	0.365***	0.433***	0.347***	0.420***
L3.peaceyears	**-0.003*** **	**-0.003*** **	-0.003***	-0.003***	-0.003***	-0.004***	-0.003***	-0.003***
L3.all_any	**0.397*** **	**0.389*** **	0.406***	0.405***	0.390***	0.359***	0.392***	0.363***
L3.comcur	**0.111*** **	**0.068** **	0.096***	0.060**	0.149***	0.072**	0.149***	0.087**
L3.wto_both	**-0.120** **	**-0.160*** **	-0.117**	-0.139***	-0.076	-0.184***	-0.131***	-0.174***
L3.wto_one	**-0.026**		-0.040		-0.010		-0.050	
L3.lrel_gdp	**0.006**		0.001		-0.004		0.000	
L3.polity_o	**-1.634*** **		-1.886***		-2.083***		-2.090***	
L3.polity_d	**-2.300*** **		-2.599***		-1.712***		-1.855***	
L3.lpop_o	**-0.944*** **		-1.064***		-0.957***		-0.953***	
L3.lpop_d	**-0.849*** **		-0.912***		-0.844***		-0.938***	
ldistcap	**-0.397*** **	**-0.388*** **	-0.406***	-0.410***	-0.487***	-0.438***	-0.483***	-0.434***
border	**0.351*** **	**0.329*** **	0.336***	0.316***	0.342***	0.305***	0.327***	0.287***
comrelig	**-0.043*** **	**-0.032*** **	-0.037***	-0.023**	-0.053***	-0.040***	-0.050***	-0.036***
comleg	**0.023***	**0.029***	0.032**	0.046***	0.020	0.016	0.016	0.016
comlang_off	**0.196*** **	**0.184*** **	0.187***	0.179***	0.265***	0.232***	0.263***	0.226***
smctry	**-0.252*** **	**-0.232*** **	-0.262***	-0.228***	-0.307***	-0.314***	-0.328***	-0.324***
colony	**0.395*** **	**0.396*** **	0.395***	0.399***	0.420***	0.397***	0.414***	0.390***
Constant	**37.230*** **	**5.984*** **	40.349***	6.222***	37.792***	5.628***	39.202***	5.472***
Observations	93,629	93,629	96,735	96,735	109,551	109,551	112,864	112,864
R-squared	0.456	0.539	0.460	0.539	0.425	0.482	0.447	0.501
HansenJ pval	0.663	0.256	0.855	0.331	0.779	0.781	0.499	0.923
Underid K-P pval	0	0	0	0	0	0	0	0
Weakid K-P Fval	73.33	38.94	76.80	39.95	71.03	33.38	76.39	35.32
Weakid CD Fval	96.25	54.76	99.78	55.69	94.30	47.80	100.4	50.02

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1

Table A4.2

Robustness Checks II: Lags in regressors

IV estimations using different fixed effects

	4 period lags		3 period lags		2 period lags		1 period lags		No period lags	
VARIABLES	XMFE	TVXMFE	XMFE	TVXMFE	XMFE	TVXMFE	XMFE	TVXMFE	XMFE	TVXMFE
lcomplX	-1.419***	-2.162***	**-1.548*** **	**-2.187*** **	-1.583***	-2.252***	-1.289***	-2.581***	-0.637**	-1.879***
lcomplM	0.835***	1.635***	**0.878*** **	**1.441*** **	1.193***	1.710***	1.056***	1.705***	1.275***	1.735***
lsubstX	0.347	0.489	**0.137**	**0.471**	0.179	0.146	0.445*	0.815*	-0.552**	-0.226
lsubstM	-0.091	-0.590	**-1.515*** **	**-0.938* **	-1.618***	-1.120**	-1.032**	-0.474	-1.107***	-1.239**
lrivalX	1.404***	1.982***	**1.562*** **	**2.081*** **	1.302***	2.025***	1.125***	2.096***	0.919***	2.020***
lrivalM	-0.041	-0.398**	**-0.104**	**-0.300** **	-0.200*	-0.516***	-0.004	-0.415***	-0.173*	-0.541***
lexp	-0.158***	-0.208***	**-0.157*** **	**-0.183*** **	-0.217***	-0.233***	-0.197***	-0.229***	-0.225***	-0.229***
limp	0.248***	0.304***	**0.254*** **	**0.297*** **	0.295***	0.325***	0.272***	0.346***	0.233***	0.298***
peaceyears	-0.003***	-0.003***	**-0.003*** **	**-0.003*** **	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
all_any	0.399***	0.397***	**0.397*** **	**0.389*** **	0.403***	0.389***	0.422***	0.384***	0.486***	0.421***
comcur	0.145***	0.080**	**0.111*** **	**0.068** **	0.172***	0.109***	0.188***	0.130***	0.239***	0.150***
wto_both	-0.062	-0.139***	**-0.120** **	**-0.160*** **	-0.152***	-0.163***	-0.153***	-0.140***	-0.100**	-0.108***
wto_one	-0.010		**-0.026**		-0.029		-0.028		-0.012	
lrel_gdp	0.011		**0.006**		-0.026		-0.025		-0.025	
polity_o	-1.604***		**-1.634*** **		-2.415***		-3.544***		-7.108***	
polity_d	-1.803***		**-2.300*** **		-3.286***		-3.913***		-7.759***	
lpop_o	-0.913***		**-0.944*** **		-0.949***		-0.960***		-0.828***	
lpop_d	-0.705***		**-0.849*** **		-0.802***		-0.897***		-0.774***	
ldistcap	-0.417***	-0.418***	**-0.397*** **	**-0.388*** **	-0.416***	-0.408***	-0.410***	-0.375***	-0.467***	-0.413***
border	0.356***	0.342***	**0.351*** **	**0.329*** **	0.353***	0.332***	0.343***	0.313***	0.356***	0.322***
comrelig	-0.045***	-0.032***	**-0.043*** **	**-0.032*** **	-0.035***	-0.026**	-0.033***	-0.026**	-0.031***	-0.023**
comleg	0.034***	0.044**	**0.023* **	**0.029* **	0.025**	0.032**	0.028**	0.021	0.059***	0.041***
comlang_off	0.206***	0.200***	**0.196*** **	**0.184*** **	0.211***	0.200***	0.201***	0.178***	0.220***	0.189***
smctry	-0.234***	-0.211***	**-0.252*** **	**-0.232*** **	-0.228***	-0.211***	-0.220***	-0.218***	-0.187***	-0.200***
colony	0.387***	0.394***	**0.395*** **	**0.396*** **	0.408***	0.408***	0.410***	0.398***	0.443***	0.415***
Constant	34.178***	6.337***	**37.230*** **	**5.984*** **	36.926***	6.433***	38.587***	5.604***	35.674***	6.673***
Observations	89,551	89,551	93,629	93,629	97,293	97,293	100,528	100,528	103,242	103,242
R-squared	0.463	0.533	0.456	0.539	0.421	0.514	0.433	0.502	0.443	0.527
HansenJ pval	0.218	0.00670	0.663	0.256	0.553	0.369	0.221	0.132	0.205	0.435
Underid K-P pval	0	0	0	0	0	0	0	0	0	0
Weakid K-P Fval	52.41	25.54	73.33	38.94	69.96	30.50	78.82	33.58	88.90	32.46
Weakid CD Fval	73.17	38.85	96.25	54.76	98.75	45.65	112.1	50.55	128.7	50.46

Robust standard errors in brackets

*** p<0.01, ** p<0.05, * p<0.1