

Trade and conflict: Internal Report

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The recent proliferation of international conflicts in some regions highlights the need for a better understanding of their determinants. This research project focuses on the role played by the network of international trade relationship. While most of the literature has focused on the importance of overall trade or bilateral trade on peace, the project explores the role of trade imbalances, complementarities, substitutability and rivalry in third markets as determinants of conflict.

The main questions addressed by the project are:

- 1) What is the causal impact of international trade on conflict when both the direction of trade and the direction of conflict are taken into account? In other words, is the level of conflict affected by trade imbalances between countries?
- 2) Does the causal impact of trade on conflict depend on the degree of complementarity between bilateral imports? In other words, do we observe a higher degree of conflict when the set of goods purchased by the importer tend to be similar to the set of goods exported by the exporter?
- 3) Does the causal impact of trade on conflict with a particular partner depend on the ease with which the trading partner can be substituted with the same products imported from or exported to other partners?
- 4) Does the causal impact of trade on conflict depend on the degree of rivalry in third markets (either as a seller or a buyer)? In other words, do countries that then to export the same type of products to the same countries tend to have a higher degree of conflict?

We address the first question on trade imbalances in a first paper titled: "Love the buyer and loathe the seller: a directed approach on trade and conflict". Questions 2 to 4 are addressed in a second paper titled "Trade patterns as a source of militarized conflict".

The first step to address these questions was to build a measure of international conflict that was continuous and asymmetric. This is important for at least two reasons. First, we need an asymmetric measure so that we can address the question of whether exports and imports have a different impact on conflict. A neo-mercantilistic would suggest this to be the case. Second, a continuous measure makes possible to observe the evolution of conflict at early stages before it eventually becomes a military interstate dispute (MID)¹, and therefore analyse the dynamics of conflict that will be important to identify causal impacts in our econometric strategy. Indeed, empirical results can be sensitive to the use of a continuous variable (Lin and Seiglie, 2011).

¹ MIDs are defined as events 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. 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; Lin and Seiglie, 2011). This is one of the two typical sources of conflict data, the other being events datasets.

Using event data from the GDELT database² of coded international press and newswire agencies cables (daily records), together with the Goldstein Scale (GS) of conflict-cooperation³, we have built continuous and asymmetric variables of conflict. The proposed variables come from the sum of conflict events minus sum of de-escalation and settlement events, in all cases weighted by the GS index. This criterion leaves aside events of pure cooperation or cooperation setbacks that are frequently a confounding factor in other summary measures of event data. Also, we restrict ourselves to material conflict and exclude verbal conflicts.

We are not interested in showing the correlation between trade and conflict, but on showing the causal impact of trade on conflict. Endogeneity is therefore a big problem that we need to tackle. Indeed, it is widely accepted that conflicts have disruptive effects on bilateral trade, which creates a reverse causation problem, which will tend to bias downward any causal impact of trade on conflict.⁴ Omitted variables that will be correlated with both trade and conflict such as culture or trust are also likely to bias our estimates. Addressing these endogeneity problems is therefore crucial. Surprisingly, only a few papers on the trade and conflict literature address explicitly the endogeneity problem.

We will address this by using difference-GMM estimators that allow us to treat the endogeneity using internal instruments of our empirical model. Our preferred strategy is to tackle the endogeneity using some external and exogenous variable. In order to obtain such a variable we build what we call synthetic imports and exports. We compute synthetic exports from country i to country j as the exports observed from i to a synthetic destination \tilde{j} which results from averaging K neighbors of j in terms of the similarity between their economic sizes. Thus, neighbors are selected minimizing the difference between countries' GDPs, under the idea 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:

$$\min_k \{ \text{abs}(\text{gdp}_{jt} - \text{gdp}_{kt}) \}$$

² 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 the period 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 Schodt, 2013).

³ 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".

⁴ Usual references are Pollins (1989a, 1989b); Mansfield and Bronson (1997); Keshk, Pollins, and Reuveny (2004); Blomberg and Hess (2004); Martin, Mayer, and Thoenig (2008); Glick and Taylor (2010); Anderton and Carter (2001); Russett and Oneal (2001); Oneal, Russett, and Berbaum (2003); Reuveny and Kang (1998); Reuveny (2001).

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 .

$$X_{ijt} = \frac{1}{K} \sum_{k=1}^K X_{ikt}$$

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 :

$$M_{ijt} = \frac{1}{K} \sum_{k=1}^K M_{ikt}$$

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 its components should be systematically related to C_{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 C_{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.

Because we are interested in the role played by trade complementarity, substitutability and rivalry in third markets we need measures for these three variables both on the import and export side. We propose an innovative way of operationalizing these three dimensions in a common setting.⁵

In order to discard irrelevant trade flows, we consider that a country exports a product only in the case he does it with Revealed Comparative Advantage as proposed by Balassa (1965), i.e. we require the country to export the product with a weight in his total exports that is larger than the weight of the product's trade in total world trade. Thus, for a generic country $c = i, j, h, \dots$, and for a specific product p in time t , we have an indicator variable such that:

$$RCAX_{pct} = 1 \left\{ \frac{\frac{X_{pct}}{\sum_p X_{pct}}}{\frac{\sum_c X_{pct}}{\sum_p \sum_c X_{pct}}} \geq 1 \right\}$$

⁵ 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.

The same notion is applied for the case of imports, where the dummy for Revealed Comparative Disadvantage as Importer (Ng and Yeats, 1999) is defined as:

$$RCDM_{pct} = 1 \left\{ \frac{\frac{M_{pct}}{\sum_p M_{pct}}}{\frac{\sum_c M_{pct}}{\sum_p \sum_c M_{pct}}} \geq 1 \right\}$$

where M_{pct} represents imports of product p by country c in time t .

To measure the extent of complementarity between exports and imports at the bilateral level we will focus on the existence of comparative advantages and disadvantages. 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 downstream complementarity of j , i.e. probability of j importing a product that i exports, is given by:

$$\text{complDS}_{ijt} = \Pr(RCDM_{pjt} = 1 | RCAX_{pit} = 1) = \frac{\sum_{p=1}^P RCDM_{pjt} RCAX_{pit}}{\sum_{p=1}^P RCAX_{pit}}$$

On the other hand, the upstream complementarity of j , i.e. the probability of j exporting a product i imports, is given by:

$$\text{complUS}_{ijt} = \Pr(RCAX_{pjt} = 1 | RCDM_{pit} = 1) = \frac{\sum_{p=1}^P RCAX_{pjt} RCDM_{pit}}{\sum_{p=1}^P RCDM_{pit}}$$

In order to measure the ease with which countries can substitute imports from and export to a belligerent partner with imports from and exports to other partners 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 . Thus, downstream substitutability of j is given by the probability of finding a country $h = 1, \dots, H$ importing the products i exports to j :

$$\begin{aligned} \text{substDS}_{ijt} &= \Pr(RCDM_{pht} | RCAX_{pit}, RCDM_{pjt}) \\ &= \frac{\frac{1}{H} \sum_{h=1}^H \sum_{p=1}^P RCDM_{pht} RCAX_{pit} RCDM_{pjt}}{\sum_{p=1}^P RCAX_{pit} RCDM_{pjt}} \end{aligned}$$

Analogously, upstream substitutability of j is given by the probability of finding a country h exporting the products i imports from j :

$$\begin{aligned} \text{substUS}_{ijt} &= \Pr(\text{RCAX}_{pht} | \text{RCDM}_{pit}, \text{RCAX}_{pjt}) \\ &= \frac{\frac{1}{H} \sum_{h=1}^H \sum_{p=1}^P \text{RCAX}_{pht} \text{RCDM}_{pit} \text{RCAX}_{pjt}}{\sum_{p=1}^P \text{RCDM}_{pit} \text{RCAX}_{pjt}} \end{aligned}$$

The higher the probabilities the easier for country i to substitute country j as a destination for its exports or as an origin for its imports.⁶ 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 and vulnerability reasons. Also, this is related to Carlson's (1995) observation that a state that can demonstrate high "cost tolerance" has an advantage in bargaining.

Finally, we seek to capture rivalry relations in third markets. 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.

Downstream rivalry with j is given by the probability of j exporting a product that i exports to h :

$$\begin{aligned} \text{rivalDS}_{ijt} &= \Pr(\text{RCAX}_{pjt} | \text{RCAX}_{pit}, \text{RCDM}_{pht}) \\ &= \frac{\sum_{h=1}^H \sum_{p=1}^P \text{RCAX}_{pjt} \text{RCAX}_{pit} \text{RCDM}_{pht}}{\sum_{h=1}^H \sum_{p=1}^P \text{RCAX}_{pit} \text{RCDM}_{pht}} \end{aligned} \quad (8)$$

In other words, rivalDS_{ijt} measures the proportion of i 's product-specific destination markets in which country j is also present as a provider of goods. Analogously, upstream rivalry with j will be given by the probability of j importing a product that i imports from h :⁷

$$\begin{aligned} \text{rivalUS}_{ijt} &= \Pr(\text{RCDM}_{pjt} | \text{RCDM}_{pit}, \text{RCAX}_{pht}) \\ &= \frac{\sum_{h=1}^H \sum_{p=1}^P \text{RCDM}_{pjt} \text{RCDM}_{pit} \text{RCAX}_{pht}}{\sum_{h=1}^H \sum_{p=1}^P \text{RCDM}_{pit} \text{RCAX}_{pht}} \end{aligned}$$

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

⁶ Note that with simple algebraic transformations substUS_{ijt} can be expressed in terms of complUS_{ijt} , showing that upstream substitutability of j is the share of the upstream complementarity with j in which j can be replaced by other providers (and the share is obtained in terms of product-country specific markets). The same occurs with substDS_{ijt} , which can be expressed as a share of complDS_{ijt} .

⁷ Here again, some transformations allow expressing rivalDS_{ijt} as the matching between downstream complementarities of countries i and j across third countries, and the same occurs with upstream rivalries.

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.

The main empirical results of the first paper looking at trade imbalances is that exports and imports have opposite effects on conflict. While exports lead to lower conflict against the destination, imports increase conflict against the origin. This is a novel result, which in fact puts into question the liberal idea of “peace through interdependence”, arguing in favor of a neo mercantilist interpretation where countries see imports as a source of vulnerability.

The opposite effects of imports and exports may partially cancel out if, as is often the case, trade exists in both directions within a dyad. However, a highly unbalanced bilateral trade could create conflict pressures in the country where the deficit occurs. Thus, from a policy standpoint, our main contribution is to signal that it is not aggregate bilateral trade, but bilateral trade balances, what has to be promoted in order to foster peaceful relations between countries.

The main empirical results of the second paper looking at trade complementarities, substitutability and rivalry show that countries evaluate their partners depending on the type of goods that they import and export, having higher conflict with complementary partners, with countries with which trade is difficult to substitute, and with downstream rivals.

Putting together the results of these two papers we have that a higher degree of conflict should be expected from countries with which one has a stronger bilateral trade surplus, that tend to import the goods we export and export the goods we import, which import from us goods that are more difficult to find elsewhere and export to us goods for which there are fewer buyers, and that tend to export similar kind of goods to similar markets.

The two papers that are part of this project are about to be sent for publications to a peer-reviewed international relations journal. They will also be published as a working paper of the Institute of Economics and Econometrics at the University of Geneva. The papers have been presented in several seminars and conferences including:

- 15 december 2015 **“Trade Patterns as a source of militarized conflict”**, in “RIDGE Conference – Workshop on Trade and Firms Dynamics”, Ridge Institute, Uruguay. <http://www.ridge.uy/ridge-forums/2015-december-forum/>
- 11 december 2015 **“Trade Patterns as a source of militarized conflict”**, in “Economics Department Seminar”, Departamento de Economía, Universidad de la República, Uruguay. <http://cienciassociales.edu.uy/departamentodeeconomia/investigacion/seminarios-decon/>
- 9 september 2015 **“Trade Patterns as a source of militarized conflict”**, Séminaire informel de l’Institut d’Economie et Econométrie, Université de Genève, Switzerland.
- 4 september 2015 **“Trade Patterns as a source of militarized conflict”**, in “Dynamics, Economic Growth, and International Trade (DEGIT) XX”, Université de Genève and The Graduate Institute Geneva, Switzerland. Discussed by Inmaculada Martínez-Zarzoso. <http://www.unige.ch/degit/>