

# Are Regional Trade Agreements Signed to Deter Military Conflicts?

## *Si Vis Pacem Para Mercato* \*

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### Abstract

We estimate on the 1950-2000 period a model of Regional Trade Agreement (RTA) formation where, in addition to standard trade gains, RTAs provide peace-promoting gains (i) by offering a political forum; (ii) by increasing the opportunity cost of wars. Our identification strategy discriminates between the effects of recent vs old wars and implements a theory-driven method to estimate the RTA-related trade gains. Various specifications are considered to deal with the endogeneity biases. Our results show that old war frequency *increases* the occurrence of RTA formation. We also find evidence for a sizeable complementarity between trade gains and old war frequency implying that the opportunity cost channel plays a first-order role. By contrast, recent war frequency decreases the occurrence of RTA formation suggesting the existence of windows of opportunity to lock-in RTAs. Finally multilateral trade openness increases bilateral RTA formation for country-pairs with a high frequency of old wars.

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# 1 Introduction

Regional trade agreements (RTAs) do not have a good press among a number of economists. Many scholars argue that they constitute a threat to the carefully constructed postwar multilateral trade system. Whereas multilateral trade liberalization has stalled, the number of RTAs has massively expanded during the last two decades and they are now well over 300. The well known problem with these bilateral and regional agreements is that, although they create trade, they also generate distortions by excluding countries, an economic cost known as trade diversion.<sup>1</sup> Much less attention has been paid (by economists) to the political and strategic motivations for regional integration, even though these motivations may have been key historically.<sup>2</sup> In fact the debate between economists and political scientists often interprets economic and political rationales for RTAs as mutually exclusive. In this paper, we revisit the case for regional integration by explicitly linking the economic and political rationales and we argue that both theoretically and empirically they are complement.

A key question is whether signing a regional trade agreement between two countries reduces the probability of future military conflicts between these two countries. Such a mechanism is plausible theoretically and empirically as several authors<sup>3</sup> have shown that bilateral trade dependency reduces the probability of war, the so called Liberal Peace argument. Nevertheless the empirical test of the causal effect of RTAs on peace is difficult because most RTAs were signed in the 1990s and 2000s. Due to severe endogeneity issues, this lack of historical perspective *following* RTA formation makes identification difficult in the panel dimension.<sup>4</sup> We choose a different route by asking the following question: is the geography of RTAs consistent with a model in which policy makers believe that RTAs are pacifying and therefore believe in the Liberal Peace argument? This empirical strategy allows to exploit the period *preceding* RTAs formation for identifying the relevant effects.

We first use a simple theoretical framework to illustrate the different mechanisms at work in the

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<sup>1</sup>The most recent evidence (Baier and Bergstrand, 2007 using gravity equations) on trade creation finds a relatively large effect: RTAs are on average responsible for a doubling of trade between two members after 10 years. Baier and Bergstrand (2008) use matching techniques to confirm this large effect of RTAs on trade between members. Much less is known about trade diversion and therefore the potential economic costs of these preferential agreements. Hence, the economic case for RTAs is still very much in debate.

<sup>2</sup>In the case of Europe, political scientists and historians have insisted on the fact that economic integration was viewed as an intermediate objective while its final objective was to prevent the killing and destruction of the two World Wars from ever happening again. Even the recent creation of the euro, often interpreted by economists as a logical step towards more economic integration, has been discussed in these terms. Indeed, Jacques Delors (former president of the European Commission) declared: "...people forget too often about the political objectives of the European constitution. The argument in favor of the single currency should be based on the desire to live together in peace". Before that, the 1860 Anglo-French commercial Treaty was signed to diffuse tensions between the two countries. Outside Europe, MERCOSUR was created in 1991 in part to curtail the military power in Argentina and Brazil, then two recent and fragile democracies with potential conflicts over natural resources.

<sup>3</sup>see Oneal and Russett, 1999, Polachek, 1980, Martin, Mayer and Thoenig, 2008, Spolaore and Wacziarg, 2009

<sup>4</sup>Mansfield and Pevehouse (2000) find that country pairs in RTAs are less likely to be in conflict than others. However, their cross-sectional evidence does not allow to conclude on the direction of causality.

politically costly decision by leaders whether to sign or not an RTA. In addition to standard trade gains, leaders consider that RTA provide two types of peace-promoting security gains (i) by offering a political forum which facilitates settlement of future disputes; (ii) by increasing the opportunity cost of future and potentially trade-disrupting wars. This simple framework allows us to derive several testable implications. First, a larger *probability* of war should translate into a larger propensity to form RTA; this results from the political forum channel. Second, recent *realizations* of war should reduce this propensity; this is because outbreaks of war increase the political costs of RTA formation. Thirdly, trade gains and the probability of war have a positive and complementary impact on RTA formation; this stems from the opportunity cost channel. Fourthly, RTA formation reacts positively to any exogenous increase in multilateral trade openness; the reason is that RTAs can compensate the peace-harming impact of multilateralism.

The bulk of our analysis is dedicated to estimating a model of RTA formation at the country-pair level over the 1950-2000 period. From the perspective of the identification strategy, a first concern is that many empirical determinants of wars and of the RTA-related trade gains are confounded: the gravity covariates, such as geographical distance, economic size, contiguity, cultural distance, etc., do affect the propensity to fight and the propensity to trade. This issue explains why the existing empirical literature on RTA formation has difficulty in disentangling the economic factors from the political factors. Here we propose to rely on a theory-driven estimation procedure to quantify directly the potential trade gains generated by RTAs; and this is a notable contribution of our paper. A second, and related, identification issue is that we must discriminate between the probability of war, which makes RTA more likely, and the recent outbreaks of war, which make RTA less likely. Our identifying assumption is that recent outbreaks are captured by the country-pair frequency of wars during the last 20 years, while probability can be measured by the country-pair frequency of old conflicts (over the period 1870-1945), a view which is consistent with existing evidence on the time-series autocorrelation of the war process.

Our empirical results, both in the cross-section and in the panel dimension, support our theoretical predictions. We find that trade gains and frequency of old wars have a high explanatory power and both increase the occurrence of RTA formation; their interaction term has also a positive impact and this confirms the existence of a complementarity between economic and political factors. By contrast, recent war frequency decreases the occurrence of RTA formation suggesting the presence of windows of opportunity to lock-in RTAs. Having had an intense history of warfares in the past makes a country-pair more likely to sign a RTA at the condition that their recent history is not too conflicting: Any exogenous event that prevents two ancient enemies to fight for some period improves the chances that they sign a RTA, with the consequence of reducing further the chances of conflict escalation. Finally

we find that multilateral trade openness increases bilateral RTA formation for country-pairs with a high frequency of old wars. In other words, a response to the weakening of local political ties, and its peace-harming consequences, that comes with globalization is for countries to recreate local economic ties through RTA formation. From this point of view, RTAs are a logical political consequence of globalization.

We address the endogeneity issues by controlling for various codeterminants of political affinity, conflicts and trade; by including various country, country-pair, and year fixed-effects; and by instrumenting trade gains with a time-varying remoteness index. All the results are robust to these different estimation strategies.

In the last section of the paper we quantify the effects and perform several counterfactual experiments. Those computations are not straightforward given the presence of interaction terms in a Logit econometric model where the dependent variable, the probability of RTA formation, cannot go outside the 0-1 range. Elaborating on the methodology developed by Ai and Norton (2003) we find that the complementarity between trade gains and old war is sizeable and may even dominate the direct effect of each of this variable. This means that the opportunity cost channel is a first-order determinant of RTA formation. In other words trade gains could only be an intermediate political objective of RTAs, their final goal being to pacify relations between countries. We also find that in a counterfactual world without any past history of warfare, the geography of RTAs formation would be radically different than the one actually observed. The same is true for a counterfactual world with no multilateral trade openness.

The theoretical literature on RTA formation is very large. Nevertheless existing papers focus their analysis on the economic determinants only<sup>5</sup>; the role of security gains and military conflicts being largely ignored. From an empirical point of view, several papers study the economic determinants of RTAs (Baier and Bergstrand 2004, Egger and Larch 2008) under the identifying assumption that RTA-related trade gains are closely linked to the standard gravity covariates. As discussed above, this does not allow to discriminate between the economic and political factors, which is the purpose of our study. Symmetrically Mansfield and Pevehouse (2000) and Vicard (2009) look at the impact of RTA formation on the occurrence of military conflicts ignoring the potential role of economic factors.

The next section provides a simple theoretical framework and derives several testable implications. Section 3 presents the data, discusses the empirical strategy, reports the results and performs some quantification exercises. Section 4 concludes.

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<sup>5</sup>This literature has analyzed the motives for building RTA mainly from a term-of-trade perspective (Bagwell and Staiger 1997, Ornelas 2005) and from a commitment perspective (Limao 2007, Maggi and Rodriguez-Clare 1998)

## 2 A simple framework

### 2.1 Timing and Welfare

We consider an insecure world where two countries decide whether to sign a bilateral RTA, which we interpret as a decrease in bilateral trade barriers with respect to the Most Favored Nation (MFN) tariff. We analyze hereafter how this decision is shaped by economic and political forces. To simplify the analysis, we focus, in this section, on two identical countries.

Two main characteristics describe the situation of bilateral relations between countries. First, whether they have signed an RTA or not. The variables of those who have signed an RTA are denoted with a superscript RTA; those who have not signed have no superscript. The second dimension is whether the two countries are at war or in peace.

The timing of events is as follows: in period 1, countries negotiate on the RTA. We make no particular assumption on the bargaining process but we assume that there is a political cost of negotiation  $C$  that is borne by each country. In period 2, we follow existing literature by assuming that a bilateral dispute may arise with probability  $\delta$  for exogenous reasons (the existence of a common border, natural resources, ethnic minorities...) and may escalate into a military conflict with an endogenous conditional probability:  $e$  in absence of RTA or  $e^{RTA}$  if an RTA is in force. In period 3, economic gains are realized and each country gets an aggregate welfare level which depends on the existence of an RTA, and on the realization of a war at date 2.

In the rest of our analysis we express all welfare gains or losses as a percentage of a benchmark welfare,  $U_P$ , which is realized in the state of peace in absence of RTA. In this state both countries trade bilaterally and the MFN tariff level is applied. When war occurs, we assume that bilateral trade is fully disrupted and both countries go back to bilateral economic autarky. This trade disrupting effect of war is empirically well grounded (Blomberg and Hess 2006; Martin, Mayer and Thoenig 2008). Hence, welfare under war is given by  $(1 - W)U_P$  with  $0 < W < 1$ , whether an RTA is in force or not. The parameter  $W$  captures the direct costs of war (ie. destructions, death toll, etc.) augmented with the loss associated to bilateral economic autarky (with respect to the MFN situation). When a RTA is in force, additional welfare gains with respect to the MFN situation are generated only if peace is maintained; in that case welfare is given by  $(1 + T)U_P$ . According to standard trade theory,  $T > 0$  if the trade creation effect of the RTA dominates the trade diversion effect; otherwise  $T < 0$ . One of the purposes of the empirical analysis is to estimate precisely these trade gains associated to RTA formation.

The opportunity cost of war corresponds to the welfare differential between war and peace. From the previous discussion we see that in absence of an RTA, this differential is equal to  $WU_P$  while it is equal to  $(W + T)U_P$  when a RTA is in force. As a consequence signing an RTA increases the

opportunity cost of a war by  $T/W$  percent.

## 2.2 Signing an RTA

At date 1, an RTA is signed when, for each country, the net expected surplus induced by the RTA is larger than its political cost. Noting  $V^{RTA}$  and  $V$  the *expected* welfare with and without RTA, the condition for RTA signature is:

$$V^{RTA} - V \geq C, \quad (1)$$

where  $V = (1 - \delta e)U_P + \delta e(1 - W)U_P$  and  $V^{RTA} = (1 - \delta e^{RTA})(1 + T)U_P + \delta e^{RTA}(1 - W)U_P$ . Without loss of generality, we can express the political cost as a percentage of the benchmark welfare:  $C = c.U_P$  with  $0 < c < 1$ . Below, we detail some likely determinants of the negotiation cost  $c$ . Combining those equations with equation (1), the condition for signing an RTA becomes:

$$\underbrace{(1 - \delta e^{RTA})T}_{\text{trade gains}} + \underbrace{\delta (e - e^{RTA}) W}_{\text{security gains}} \geq c, \quad (2)$$

where on the LHS we have decomposed the net expected surplus of RTA into pure economic gains and security gains. Economic gains result from the increase in welfare from  $U_P$  to  $(1 + T)U_P$  when the RTA is active; however the RTA related trade gains  $T$  are realized only in periods of peace which occur with probability  $(1 - \delta e^{RTA})$ . The security gain of an RTA is associated with the potential decrease in the probability of escalation of disputes into war from  $e$  to  $e^{RTA}$ ; this allows to save on the costs of war  $W$ .

We now analyze the differential  $(e - e^{RTA})$ . As shown by the international relations literature (see Fearon 1995 and Powell 1999 for surveys), escalation to military conflicts can be interpreted as the failure of negotiations in a bargaining game. From this perspective, the probability of escalation depends negatively on the opportunity cost of war and positively on the degree of informational asymmetry between the two countries.<sup>6</sup> The rationale for the first channel is that, as the opportunity cost of war increases, countries have more incentive to make concessions in order to avoid the escalation of a dispute into a military conflict. The rationale for the second channel is that information asymmetries imply that during negotiations, countries do not report their true outside option, in order to extract larger concessions. This may prevent negotiations to succeed and disputes may escalate into war.

The signature of an RTA affects the probability of escalation,  $e$ , through these two distinct channels. First, as discussed in the previous section, RTA potentially increases the opportunity cost of war

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<sup>6</sup> For a formal proof, see for example Martin, Mayer and Thoenig (2008) where we consider a fairly general bargaining game such that: (i) war is Pareto dominated by peace; (ii) countries have private information on the military and political strength of the other country; (iii) countries can choose any type of negotiation protocol. The negotiation is such that escalation to war is avoided whenever countries agree upon the sharing of the economic surplus under peace.

by  $T/W$  percent. This tends to reduce the probability of escalation. Second, regional integration produces a political spillover on conflict resolution by reducing the degree of informational asymmetries: Successful negotiations on economic and trade matters and the repeated interactions that follow these negotiations enable policy makers to learn about the other country. This channel has been discussed at length in the political science literature<sup>7</sup>, and many RTAs, such as the EU, ASEAN or MERCOSUR, have become venues to discuss political issues and potential disputes. Transposed to our model this discussion implies the following assumption on the probability of escalation under a RTA:

$$\frac{e^{RTA} - e}{e} = -\varepsilon_{pol} - \varepsilon_{cost} \frac{T}{W} < 0, \quad (3)$$

where  $\varepsilon_{pol}$  stands for the political spillover effect while  $\varepsilon_{cost} > 0$  corresponds to the elasticity of escalation  $e$  to the cost of war. In the rest of the paper we refer to  $(\varepsilon_{pol}, \varepsilon_{cost})$  as the security gains of RTA formation.

Under the reasonable assumption<sup>8</sup> that the RTA related trade gain  $T$  is small with respect to the cost of war  $W$ , we can combine (2) and (3) to get a first order Taylor approximation of the RTA signature condition (see appendix):

$$T + \varepsilon_{pol}(\delta e \times W) + (\varepsilon_{cost} - 1)(\delta e \times T) - c \geq 0 \quad (4)$$

This equation is our key theoretical relationship. It predicts that there are four determinants of signing RTAs:

- The first term on the left hand side of this inequality corresponds to the standard economic gains generated by the RTA on which the literature has focused. The larger these economic gains the higher the probability that the two countries sign it. The difficulty here is to produce a quantitative estimate of those trade gains for all country pairs. This is what we do in the empirical section.
- The second term corresponds to the positive political spillover of RTAs. Because signing an RTA allows to reduce the level of asymmetric information, it reduces the probability of escalation to war by  $\varepsilon_{pol}$  percent. Note that this political gain of RTAs is large when the potential welfare loss of war  $W$  is large and when the probability of war  $\delta e$  is also large.

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<sup>7</sup>This argument, under the name of issue linkage, has been developed by political scientists working in the field of international relations, see Keohan and Nye (1977), Haas (1980) and Mansfield and Pevehouse (2000).

<sup>8</sup>In the next section our empirical estimates show that the magnitude of  $T$  is approx. 1 percentage point of welfare. This is far below the existing estimates of the average cost of war  $W$  that can be found in the empirical literature (Glick and Taylor 2005)

- The third term is of ambiguous sign and depends whether the pacifying effect of RTAs through its impact on the economic opportunity cost of war is sufficiently large i.e. if  $\varepsilon_{cost} > 1$ . Two effects indeed go in opposite directions: on the one hand a high probability of conflict  $\delta e$  reduces the expected gain of an RTA because these gains are lost in times of war. On the other hand, a high probability of conflict also means that the pacifying effect of an RTA is very valuable. If policy makers believe that RTAs are indeed strong elements of pacification, this second effect should dominate. This is one of the questions that our empirical work will answer.
- The fourth term is the political cost of negotiation: it is linked to the current state of relations between the two countries and it can be affected by a myriad of institutional, political and historical factors.

### 2.3 Testable implications

From the previous discussion we are able to derive several testable implications. First consider a pure economic model where RTA formation brings no security gains. In our framework this corresponds to the case where the two elasticities  $(\varepsilon_{pol}, \varepsilon_{cost})$  are equal to zero. And the RTA signature condition (4) becomes:  $T - \delta e \times T - c \geq 0$ . This condition yields our first testable implication:

**Testable implication 1** *In absence of security gains, a larger probability of war,  $\delta e$ , reduces the probability of RTA formation*

The interpretation is straightforward. In absence of security gains, the only impact of a larger probability of conflict is to reduce the expected gain of an RTA because the RTA related trade gains are lost in times of war. This result offers a simple test of the prominent view held in the empirical literature, namely that RTA formation are determined by economic considerations only. If in our empirical analysis we find that the probability of war impacts negatively the probability of RTA signature, this is consistent with this view. Nevertheless our econometric results (see section 3.4) clearly pinpoint the opposite effect, namely a positive impact of the probability of war: this unambiguously rejects the “economics-only” view of RTA formation.

Turning back to the general case, the RTA signature condition (4) shows that the coefficient of the interaction term  $(\delta e) \times T$  depends on the magnitude of  $\varepsilon_{cost}$ , the elasticity of the probability of escalation to the opportunity cost of war, with respect to 1. This leads to our second testable implication:

**Testable implication 2** *Economic gains and the probability of war have a positive and complementary impact on the probability of RTA formation if and only if the costs of war deter sufficiently the process of escalation to war (i.e.  $\varepsilon_{cost} > 1$ ).*

We assume that the political cost of negotiation, the parameter  $c$  in condition (4), depends on the number of recent wars. The reason is that recent military conflicts make it more difficult to engage in trade negotiations: grief brought by war generates vengeful feelings in the population which increase the political cost of such negotiations. Even though difficult to measure, vengeful feelings do exist and have been shown to die off gradually over time (see Mocan, 2008). This directly leads to our third testable implication:

**Testable implication 3** *The frequency of recent wars reduces the probability of RTA formation*

The previous two results imply that the *probability* of war and the *realizations* of war potentially affect the probability of RTA formation in opposite directions. The probability of war,  $\delta e$ , tends to increase the expected gains of an RTA (when  $(\varepsilon_{pol}, \varepsilon_{cost})$  are large enough) while the realizations of war increase the political cost of negotiation. From a time-series perspective, this means that the “overall” effect of war is ambiguous: pairs of countries which are prone to war do potentially benefit the most from RTA formation but are simultaneously those where the signature of such RTAs is politically difficult. A consequence for the empirical analysis is that our identification strategy must disentangle the impact of probability of war from the one of realization of wars.

We now consider the spillover effect of multilateral trade openness on the probability of RTA formation. One theoretical and empirical result in Martin et al. (2008) is that multilateral trade openness reduces the opportunity cost of a bilateral war and therefore makes it *more likely*. The rationale is that multilateral trade openness provides alternative trade partners and reduces bilateral trade dependence with the countries with which a dispute could escalate.

For a given level of trade gains  $T$ , the effect of multilateral openness can be interpreted in expression (4) as a decrease in the cost of war  $W$ . This itself increases the probability of escalation  $e$ . Hence, the net effect of multilateral openness on condition (4) is ambiguous. Straightforward computations show that the second effect dominates the first one if  $\varepsilon_{cost}$  is large enough (see the appendix for details):

**Testable implication 4** *Multilateral trade openness and the probability of war have a positive and complementary impact on the probability of RTA formation if and only if the costs of war deter sufficiently the process of escalation to war (i.e.  $\varepsilon_{cost} > 1$ ).*

Political motives therefore imply that multilateral trade openness gives an incentive to sign RTAs to country pairs prone to conflict. The reason is that multilateral trade openness by reducing bilateral trade dependence reduces the cost of a bilateral conflict. An RTA is a way to compensate this potentially destabilizing consequence of multilateral trade openness and to bring back some bilateral trade dependence in the relation. This result supports the view that the development of multilateralism

during the 80s and early 90s could have triggered the wave of regionalism in the late 90s. This echoes a recent empirical finding by Fugazza and Robert-Nicoud (2009) of an emulator effect of multilateralism on regionalism for the US. They indeed find that the extent of post Uruguay Round PTAs (in term of included tariff lines) is positively affected by the extend of MFN tariff cuts negotiated by the US during the Urugay Round. While Fugazza and Robert-Nicoud provide no theory for their intriguing finding, our results suggest that this emulator effect of multilateralism on regionalism could be driven by security purposes. Finally note that results 2 and 4 allow to test internal consistency of our framework. Indeed both depend on the sign of  $(\varepsilon_{cost} - 1)$ . In our empirical section, if we find some evidence for complementarity between economic gains and war, we should find evidence for complementarity between multilateral trade openness and war as well. The opposite finding would refute our theory.

### 3 Empirical Analysis

#### 3.1 Data

There are two main parts to the empirical investigations of this paper. We first estimate the economic gains of RTA, which involves essentially running a gravity equation over a sufficiently long time period to be able to identify the trade creation in the within dimension. We make use of the gravity dataset constructed for Martin et al. (2008) and Head et al. (2008), and described in great detail in those two papers. Essentially, any gravity dataset requires source data for a trade flow variable, and a list of gravity controls. The trade flow source is IMF DOTS, with a procedure to extract the most possible information from mirror flow declarations.

The list of gravity controls includes the classical bilateral distances, contiguity, colonial linkages, and a common (official) language dummies. All those come from the CEPII distance database (<http://www.cepii.fr/anglaisgraph/bdd/distances.htm>). Later in the paper we also use a common legal origin dummy available from Andrei Shleifer at [http://post.economics.harvard.edu/faculty/shleifer/Data/qgov\\_web.xls](http://post.economics.harvard.edu/faculty/shleifer/Data/qgov_web.xls), and a variable for bilateral genetic distance, available from ???.

More central in our case are the regional trading agreements. RTAs are constructed from three main sources: Table 3 of Baier and Bergstrand (2007) supplemented with the WTO web site ([http://www.wto.org/english/tratop\\_e/region\\_e/summary\\_e.xls](http://www.wto.org/english/tratop_e/region_e/summary_e.xls)) and qualitative information contained in Frankel (1997).

The RTA dummy is also the dependent variable of our second and main empirical exercise, which explains their formation. In those regressions, our main variables of interest are related to old and new wars. The source data for military conflicts is the Correlates of War project (<http://www.correlatesofwar.org/>). More precisely, we use the information contained in the Militarized

Interstate Disputes database that lists all bilateral interstate conflicts from 1816 to 2001, and quantifies their intensity on a 1 to 5 scale<sup>9</sup> (for a precise description of the source data, see Martin et al. 2008). We concentrate on the 1870-2001 period because 1870 is essentially the time when most European countries have a stabilized geographical and political structure. The old wars variable calculates the percentage of years with active military conflicts between the two countries, during the 1870-1944 period. This creates an immediate problem with countries that did not exist in this period naturally. What is the historical war propensity of the pair Algeria - Nigeria for instance? Absent detailed information impossible to gather for all pairs of ex-colonies and all years prior to independence, we envision several strategies, which range from assuming peace to dropping those observations. Those strategies and results are detailed below in the results section. Recent wars are taken to be the same percentage of military conflicts, but for a moving window of 20 years before the year under consideration. For both variables, we consider only the two most severe types of wars, coded 4 and 5 in the COW database (see Martin et al. 2008 for examples).

In those regressions, there are other bilateral political variables, which serve as controls in the list of RTA determinants. Those include the correlation of roll-call votes recorded for the two countries in the General Assembly of the United Nations (from Gartzke et al., 1999), a dummy for the existence of a military alliance (from COW), and the sum of democracy indices (from Polity IV)

### 3.2 Estimating the Economic Gains of RTA

The objective of our empirical analysis is to estimate equation (4). The first task is to obtain an estimate for the economic gains of an RTA,  $T$ . The existing literature on RTA formation (Baier and Bergstrand 2004, Egger and Larch 2008) proxies those gains with the standard gravity covariates, such as economic size, geographical distance, remoteness, contiguity, etc. in a reduced-form estimation of RTA formation. Given that our purpose is to understand the relation between economic and political factors, we cannot follow the same route. Indeed it is extremely likely that the gravity covariates affect both economic and political factors. Hence we must rely on a theory-driven empirical strategy to assess the economic gains of RTA formation and to disentangle them from the political factors.

Let us consider the wide class of trade models where aggregate welfare is derived from a CES utility function.<sup>10</sup> We now use subscripts for countries and time.<sup>11</sup> Country  $i$  welfare at date  $t$  is given by

$$U_{it} = E_{it}/P_{it}, \tag{5}$$

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<sup>9</sup>The scale is the following: 1 = No militarized action, 2 = Threat to use force, 3 = Display of force, 4 = Use of force, and 5 = War, defined as a conflict with at least 1000 deaths of military personnel.

<sup>10</sup>Dixit-Stiglitz-Krugman (DSK) monopolistic competition approach is an example of such modelling, the national product differentiation approach of Anderson and van Wincoop (2003) is another example.

<sup>11</sup>One adjustment we must make to our theory when applying it empirically, is to account for heterogeneity between different country pairs, and variance in the time dimension.

where  $E_{it}$  is nominal GDP and  $P_{it}$  is the price index. The price index can be written as

$$P_{it} = \left[ \sum_k \mu_{kt} \phi_{kit} \right]^{1/(1-\sigma)}, \quad (6)$$

where  $\sigma$  is the elasticity of substitution between goods,  $\mu_{kt}$  stands for all factors in the model that makes country  $k$  a good exporter<sup>12</sup> and  $\phi_{kit}$  represents bilateral trade freeness  $\phi_{kit} \equiv \tau_{kit}^{1-\sigma}$ , where  $\tau_{kit}^{1-\sigma} > 1$  is the iceberg-type price shifter which account for all trade barriers. In this context, bilateral trade obeys the following gravity equation governing imports of  $i$  from  $j$  in year  $t$ :

$$m_{jit} = \mu_{jt} E_{it} P_{it}^{\sigma-1} \phi_{jit} \quad (7)$$

We seek to understand the welfare impact of a RTA formation between countries  $i$  and  $j$  in a partial equilibrium framework. The general equilibrium case is a fascinating issue but raises complexities that go far beyond the scope of this paper. In particular, general equilibrium has to take into account the relocation effects of all firms in the world following each signing of an RTA. Potentially, the wages in all countries can be affected as well, both effect affecting the whole distribution of nominal GDPs. Moreover the drop in tariff revenues following RTA formation affects negatively aggregate income. The economic geography literature has shown that considering those effects requires numerical simulations, since no analytical solution emerges in a multiple country world of that complexity. We stick to a framework that maintains analytical solutions that can be brought to the data. Our identifying assumption is therefore that in equation (5) the price index  $P_{it}$  is affected by the RTA while  $E_{it}$  remains unchanged. Hence our procedure considers only the price effect of RTA formation. However we see no reason for the induced measurement errors on the estimated welfare gains to be correlated with other covariates. Hence this restrictive assumption is unlikely to contaminate the rest of our econometric analysis.

The level of  $P_{it}$  depends on the existence of a RTA through the bilateral trade barriers in equation (6):  $\tau_{jit} \equiv \exp(-\Delta \text{RTA}_{jit}) \varepsilon_{jit}$ , where  $\varepsilon_{jit}$  is the exogenous component of trade costs<sup>13</sup> while  $\text{RTA}_{jit}$  is a dummy variable set equal to 1 when a RTA is in force between  $i$  and  $j$  in  $t$ . The parameter  $\Delta$  depends directly on the preferential tariff cut.

We can combine equations (5) and (6) to obtain  $T_{ijt}$ , the percentage change in utility of  $i$  following a RTA with  $j$ :

$$T_{ijt} = \left[ \frac{\sum_k \mu_{kt} \varepsilon_{kit}^{1-\sigma}}{\mu_{jt} \exp((\sigma-1)\Delta) \varepsilon_{jit}^{1-\sigma} + \sum_{k \neq j} \mu_{kt} \varepsilon_{kit}^{1-\sigma}} \right]^{1/(1-\sigma)} - 1 \quad (8)$$

<sup>12</sup>In the DSK model for instance, this term is  $n_k p_k^{1-\sigma}$ , a positive function of the number of varieties, and negative one of the price charged by firms located in  $k$ .

<sup>13</sup>In practice, we include in  $\varepsilon_{jit}$ , a set of observable trade cost variables (distance, contiguity, colonial links and common language) in addition to an idiosyncratic term.

This equation can actually be estimated using bilateral trade data. This requires several steps. First, we can use our assumption on  $\tau_{jit} \equiv \exp(-\Delta RTA_{jit})\varepsilon_{jit}$  in (7) to obtain a new version of the gravity equation

$$\ln m_{jit} = \ln \mu_{jt} + \ln (E_{it} P_{it}^{\sigma-1}) + (\sigma - 1)\Delta RTA_{jit} + (1 - \sigma) \ln \varepsilon_{jit} \quad (9)$$

This leads to estimating a panel specification of the gravity equation (9):

$$\ln m_{jit} = FE_{jt} + FE_{it} + \beta RTA_{jit} + u_{jit} \quad (10)$$

where  $u_{jit}$  is the error term,  $FE_{jt}$  is an (exporter $\times$ year) fixed effect, and  $FE_{it}$  is an (importer $\times$ year) fixed effect. This specification has the advantage of remaining flexible in terms of the exact underlying trade model, while enabling to extract the parameters of interest for the calculation of the utility change in (8). Indeed, comparing (9) and (10), one get  $\mu_{jt} = \exp(\widehat{FE}_{jt})$ ,  $\exp((\sigma - 1)\Delta) = \exp(\hat{\beta})$ , and  $\varepsilon_{jit}^{1-\sigma} = \exp(\hat{u}_{jit})$ .

Our second step retrieves those point estimates and substitute them into equation (8). This gives us our empirical estimator of the economic gains of RTA:

$$\hat{T}_{ijt} = \left[ \frac{\sum_k \exp(\widehat{FE}_{kt} + \hat{u}_{kit})}{\exp(\hat{\beta} + \widehat{FE}_{jt} + \hat{u}_{jit}) + \sum_{k \neq j} \exp(\widehat{FE}_{kt} + \hat{u}_{kit})} \right]^{1/(1-\sigma)} - 1 \quad (11)$$

using the standard calibration for the elasticity of substitution in the empirical trade literature  $\sigma = 5$ .

Table 1 and figures 1 and 2 describe our trade gains variable  $\hat{T}_{ijt}$  (see section ?? for the data description). In table 1 we report the estimated trade gains in 1956, one year before the Rome Treaty, for the subsample of 50 country-pairs (out of a sample of 8240) for which the trade gains are the largest. We report the country-pair minimum,  $\min(\hat{T}_{ijt}, \hat{T}_{jit})$  and the country-pair unweighted average,  $(\hat{T}_{ijt} + \hat{T}_{jit})/2$ . There may be a large discrepancy between these two figures, especially in asymmetric country-pairs where the smallest country tends to gain much more than the biggest country. In our econometric specifications we focus on the country-pair minimum because it is the theoretically grounded one when welfare transfers and compensation schemes between trade partners are difficult to implement after RTA formation. The interpretation of the table is the following: in 1956, USA and Canada would have increased their welfare at least by 2.2 percent if they had formed a RTA.<sup>14</sup> A look at the table confirms that the estimated trade gain are small; a feature which is consistent with standard results of trade gains estimates based on computable general equilibrium analysis.<sup>15</sup> Another striking feature is that, one year before the Rome Treaty, the country-pairs

<sup>14</sup>Regarding this USA-Canada example, the percentage increase in welfare is 2.2% for the USA and 6.1% for Canada such as the country-pair average increase is 4.15%

<sup>15</sup>REFERENCES HERE

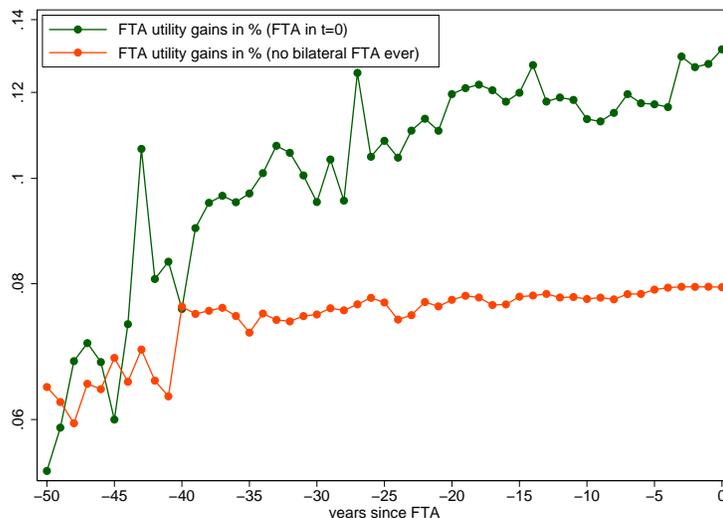


Figure 1: Utility gains RTA / no bilateral RTA

composed of the EEC founding countries (in bold) are in the group of large trade winners, but not systematically among the top ones. This is in line with our view that economic gains are important determinants of RTA formation; and the last column of the table reinforces that impression since many of those pairs will end up having a RTA in the end. However it also suggests that those economic gains are not the only determinants of RTA formation. Political issues do matter. We also add to the table geographical weighted distance between those two countries, and the minimum of their bilateral import / GDP ratios, both being in fact closely related to utility gains in CES-type models of trade.

In figure 1, we plot the average estimated trade gains of joining a RTA for two types of country pairs: i) those that do enter a bilateral RTA at some point in our sample, ii) those that do not. For the second group, we want to make it as comparable as possible to the first one, and therefore, we keep only those country pairs where both members do enter an RTA with a third country but do not sign a bilateral one.<sup>16</sup> On the horizontal axis, we show the number of years before the signature of the bilateral RTA for those who sign it and the number of years until year 2000 for the control group. The main result is the difference in trends: the RTA signatories have estimated trade gains that grow as we get closer to the actual signing, whereas nothing visible happens in the control group. This suggests that our measure of economic gains from a RTA can be used as a predictor of the decision to enter a bilateral RTA, both in the cross-section in the years before the signature, and in the within dimension, looking at when countries decide to sign.

Figure 2 focuses on the set of countries that do enter a RTA, and distinguishes the European Union

<sup>16</sup>This restriction does not affect radically the shape of the curve. When comparing with the whole set of country pairs which do not sign a bilateral RTA, the graph looks almost the same.

Table 1: Estimated Trade Gains for the top 50 country-pairs in 1956

Country pair		Trade gains		bil. open. min $\frac{\text{imports}}{\text{GDP}}$	dist. kms	ever fta?
		min $T$	mean $T$			
SUN	CHN	2.402%	3.575%	.622%	5507	No
USA	CAN	2.201%	4.146%	.748%	2079	Yes
<b>NLD</b>	<b>BEL</b>	<b>1.303%</b>	<b>1.558%</b>	<b>4.38%</b>	<b>161</b>	<b>Yes</b>
CZS	SUN	1.275%	2.326%	.323%	2388	No
POL	SUN	.917%	2.109%	.231%	2067	No
SYR	LBN	.826%	1.314%	2.917%	228	No
CAN	GBR	.789%	.89%	1.661%	5850	No
ROM	SUN	.765%	2.806%	.192%	2142	No
<b>FRA</b>	<b>DEU</b>	<b>.707%</b>	<b>.976%</b>	<b>1.019%</b>	<b>790</b>	<b>Yes</b>
POL	CZS	.704%	.868%	.743%	387	No
<b>NLD</b>	<b>DEU</b>	<b>.699%</b>	<b>1.207%</b>	<b>1.009%</b>	<b>379</b>	<b>Yes</b>
GBR	AUS	.677%	2.33%	1.128%	16602	No
<b>BEL</b>	<b>FRA</b>	<b>.677%</b>	<b>.934%</b>	<b>.559%</b>	<b>526</b>	<b>Yes</b>
BRA	ARG	.617%	.688%	.855%	2392	Yes
USA	GBR	.605%	.883%	.199%	6878	No
USA	BRA	.582%	1.658%	.191%	8089	No
GBR	NZL	.566%	2.648%	.942%	18521	No
USA	VEN	.551%	2.749%	.181%	4204	No
FRA	MAR	.526%	2.433%	.433%	1706	Yes
SUN	FIN	.478%	.823%	.119%	1635	No
BGR	SUN	.473%	2.255%	.118%	2391	No
<b>BEL</b>	<b>DEU</b>	<b>.471%</b>	<b>.975%</b>	<b>.677%</b>	<b>423</b>	<b>Yes</b>
FRA	IRQ	.466%	.476%	.383%	3805	No
CZS	CHN	.457%	.533%	.161%	7790	No
DEU	SWE	.448%	1.256%	.643%	929	Yes
USA	JPN	.437%	1.832%	.143%	10286	No
<b>DEU</b>	<b>ITA</b>	<b>.429%</b>	<b>.831%</b>	<b>.615%</b>	<b>1014</b>	<b>Yes</b>
AUT	ITA	.419%	.593%	.506%	701	Yes
GBR	SWE	.418%	.868%	.692%	1293	Yes
GBR	IND	.408%	1.431%	.676%	7324	No
GBR	NLD	.396%	.598%	.657%	468	Yes
HUN	SUN	.395%	1.315%	.098%	2334	No
USA	DEU	.388%	.882%	.127%	7595	No
JPN	PHL	.374%	.663%	.432%	2957	No
SWE	NOR	.36%	.836%	.766%	503	Yes
USA	CUB	.359%	3.327%	.118%	2581	No
POL	CHN	.356%	.357%	.125%	7457	No
GBR	DNK	.353%	1.244%	.585%	920	Yes
IRN	IND	.34%	.449%	.235%	2916	No
<b>NLD</b>	<b>FRA</b>	<b>.34%</b>	<b>.343%</b>	<b>.284%</b>	<b>661</b>	<b>Yes</b>
SAU	JPN	.339%	.391%	.512%	8854	No
ITA	SAU	.339%	.401%	.408%	3586	No
CHE	DEU	.338%	1.263%	.484%	543	Yes
JPN	IND	.331%	.433%	.372%	6003	No
SWE	DNK	.331%	.575%	.703%	450	Yes
USA	MEX	.328%	3.323%	.107%	2468	Yes
NLD	SWE	.325%	.499%	1.433%	1009	Yes
GBR	FRA	.324%	.418%	.422%	750	Yes
NOR	DNK	.323%	.326%	1.047%	560	Yes
CHE	ITA	.322%	.601%	.388%	610	Yes

Note: Lines in boldface indicate pairs that sign the Rome Treaty establishing the European Economic Community a year later.

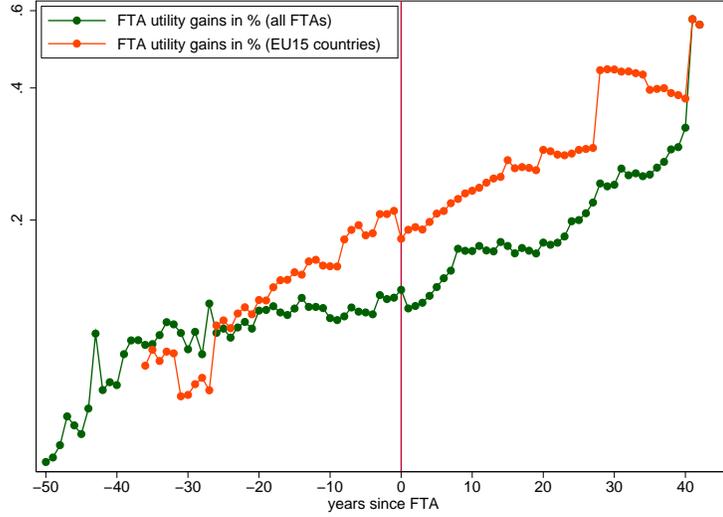


Figure 2: Utility gains average RTA / EU15

members (defined as EU15) from others. We are also able to look at what happens to our measure of trade gains after the RTA signature. One can observe that the trend before signature continues afterwards. This is not surprising: RTA gains come from trade creation, and it is therefore logical that comparing the utility before and after the RTA implementation reflects the amount of trade created within the pair. Hence there is potentially a reverse causality from RTA formation on the trade gains. This points to an important methodological issue that we have to address in our econometric analysis.

### 3.3 Empirical Model and Identification Strategy

In this section we present our strategy to identify the causal links from economic and security gains to RTA formation. In line with our theoretical equation (4), we consider a logit specification where, for a country-pair  $(i, j)$  at year  $t$ , we regress the probability of RTA formation on estimated trade gains, the probability of war and their interaction term:

$$\text{LOGIT}(RTA_{ijt}) = \alpha + \beta_1 \min(\hat{T}_{ijt}, \hat{T}_{jit}) + \beta_2 WAR_{ij} + \beta_3 \min(\hat{T}_{ijt}, \hat{T}_{jit}) \times WAR_{ij} + \mathbf{Z}_{ijt}\beta + \varepsilon_{ijt}, \quad (12)$$

The dependent variable  $RTA_{ijt}$  is a dummy coding for the existence of a *RTA* between  $i$  and  $j$  in year  $t$ . The RTA-induced economic gains are measured by,  $\min(\hat{T}_{ijt}, \hat{T}_{jit})$ , the country-pair minimum of gains; this is a natural consequence of our theoretical setup where RTA must be Pareto-improving in absence of any compensatory transfers within the country-pair<sup>17</sup>; in our robustness analysis we

<sup>17</sup>In our theoretical setup the two countries  $i$  and  $j$  are assumed to be symmetric for the sake of exposition. Relaxing this assumption and ignoring compensatory transfers, the condition (4) is now country-specific given that the trade gains  $(T_{ij}, T_{ji})$  are potentially asymmetric. A RTA is formed when the minimum of the two country-specific conditions (4) is positive.

test for the possibility of additive transfers by measuring trade gains with the country-pair average  $(\hat{T}_{ijt} + \hat{T}_{jit})/2$  rather than the minimum.  $WAR_{ij}$  is a proxy for the probability of war,  $\mathbf{Z}_{ijt}$  is a set of control variables and the residual term  $\varepsilon_{ijt}$  captures cross-dyadic heterogeneity in the political costs of negotiation.

In equation (12) we expect  $\beta_1$  to be positive. The coefficient  $\beta_2$  tests for the existence of a political spillover of RTA. It is expected to be nonnegative. The interpretation of the sign of  $\beta_3$ , the coefficient of the interaction term, can be misleading in a logit specification due to the non-linearity of this model (see Ai and Norton 2003). The logit specification also makes the handling of panel data techniques such as within estimation more complicated, while the marginal effects tend to be similar to the Linear Probability Model (LPM) in many cases as stated in Angrist and Pischke (2009, p107). Hence in all specifications of (12) where the interaction term is included, we estimate a linear probability model rather than a logit model. This standard choice also facilitates the interpretation of the coefficient.<sup>18</sup> In that case the coefficient  $\beta_3$  corresponds to a marginal effect and it can be simply interpreted as a test of (complementarity/substitutability) between economic and security gains: from result 2, complementarity ( $\beta_3 > 0$ ), is expected when the opportunity cost channel is at work (i.e.: the pacifying effect of RTAs is large so that  $\varepsilon_{cost} > 1$ ). Interestingly, we can infer from these estimates the underlying value of  $\varepsilon_{cost}$  that comes from the observed geography of RTAs. Comparing equations (4) and (12), we get  $\hat{\varepsilon}_{cost} = 1 + \hat{\beta}_3/\hat{\beta}_1$ . This estimate can give us an indication on the view of policy makers on the pacifying effect of RTAs as revealed by the choice they made on RTA formation.

The estimates of our main coefficients of interest,  $\beta_1, \beta_2, \beta_3$ , are potentially contaminated by several sources of endogeneity. For each of them, we now explain how we deal with it.

### 3.3.1 Reverse causality

Figure 2, in the previous section, highlights the possible reverse causality link from RTA to trade gains *following* RTA formation. In order to eliminate this issue that can bias the coefficient  $\beta_1$ , we need to compare  $\hat{T}_{ijt}$  across country pairs or time *before* the agreement actually takes place. Similarly, this reverse causality issue may bias  $\beta_2$  because RTA formation is likely to reduce the probability of future conflicts.

In the cross-section dimension we thus estimate equation (12) in year  $t = 2000$  for dyads where a RTA does not exist in 2000. For dyads with RTA in 2000, we consider that their RHS variables are equal to their values in the year before the RTA formation. For example, in the case of USA and Canada, this means that all the RHS variables take their 1988 values. This methodology generalizes the

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<sup>18</sup>However, an area where logit (or probit) is undoubtedly preferable to LPM is the predictions one can make when changing one or more variables more than marginally. Probabilities have to be bounded between 0 and 1 by the model then in order to yield meaningful predictions. In our quantification exercise, we hence return to the logit specification.

approach by Baier and Bergstrand (2003) and allows to control for reverse causation. Correspondingly, in the panel estimates of (12), we focus on “RTA onset”, that is we analyze, for each dyad, years up to the signature of the RTA, dropping observations after the signature. This is very similar to the method used by researchers studying the determinants of conflicts (Fearon 2005).

### 3.3.2 Measurement errors

As discussed in section (??), our estimate of the trade gains,  $\hat{T}_{ijt}$ , relies on a partial equilibrium analysis and are therefore a noisy measure of  $T_{ijt}$  the true trade gains. However we see no particular reason why the measurement error ( $\hat{T}_{ijt} - T_{ijt}$ ), which is part of the error term, should be correlated with the probability of RTA formation. Hence this is unlikely to create a bias in the estimates of  $\beta_1$  or  $\beta_3$ .

Regarding  $WAR_{ijt}$ , the probability of war within the country-pair  $(i, j)$  at date  $t$ , the measurement issue is much more important. Indeed the discussion following result 3 states that the *probability* of war tends to make RTA formation more likely while the *realization* of war, by increasing the political cost of negotiation, tends to make RTA formation less likely. If we measure  $WAR_{ijt}$  with the country-pair historical frequency of wars, then the two channels are mixed and the coefficient of  $WAR_{ijt}$  captures the net effect of the two mechanisms. This net effect could be positive or negative.

To disentangle the impact of probability from the one of realization, we assume that the political cost to negotiate an RTA between two countries which have experienced a conflict decreases with time since the end of the conflict. One way to think about this is that the feelings of vengeance and grievance that follow a war are most vivid just after a war and then “depreciate” over time. This assumption can be justified by the recent empirical findings by Mocan (2008) who shows that, for victimized individuals, the feeling of vengeance and the propensity to punish decreases through time<sup>19</sup>. On the other hand, a very robust finding of the empirical literature on conflicts is that the frequency of old wars is a strong predictor of the frequency of current wars (Collier et al. 2004): this result stems from the existence of important time-invariant determinants of disputes and war that can be observed or not by the econometrician (common border, natural resources, ethnic rivalries, cultural antagonism etc.). In light of this discussion we implement the following identifying strategy: we proxy the probability of war at date  $t$ ,  $WAR_{ijt}$ , with the country-pair frequency of bilateral wars which occurred between 1870 and 1945: we call it frequency of *old wars*. This proxy being time-invariant, we suppress the time index of  $WAR_{ijt}$  in the econometric equation (12). We proxy the realization of wars, which affect the political cost of RTA negotiation with the country-pair frequency of bilateral wars which occurred during the last 20 years: we call it frequency of *recent wars*. If this strategy is

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<sup>19</sup>Using the estimates from Mocan (2008) it can be shown that the subjective discount rate of vengeance is around 0.02

relevant we should observe that the marginal effect of recent wars to be negative as it captures the political cost of realized conflicts. The marginal effect of old wars should be positive because it mainly captures the probability channel through which RTAs are more beneficial to country pairs with a high propensity to conflicts. In our robustness analysis we test definitions of old and recent wars with alternative time spans.

Finally it should be noticed that our approach does not deny that some determinants of wars are time-varying. Some causes of disputes in the late 19th century (e.g. the building of colonial empires) have lost their explanatory power. Simultaneously, new causes have emerged in the late 20th century (oil production; water supply access; religious tensions). However, with respect to our identification strategy, those time-varying determinants imply some measurement error in the probability of war: This goes against our results by inducing a bias to zero in the estimated coefficients of interest.

### 3.3.3 Omitted variables

In specification (12), the coefficients of economic gain and of its interaction term with war,  $\beta_1$  and  $\beta_3$ , could be contaminated by omitted co-determinants of economic gains,  $\min(\hat{T}_{ijt}, \hat{T}_{jit})$ , and the unobserved political costs of RTA formation,  $\varepsilon_{ijt}$  (i.e. the residual). This may arise because the structural relationship (11) defining  $\hat{T}_{ijt}$  depends on  $\hat{u}_{jit}$ , the estimate of bilateral trade barriers retrieved from the auxiliary gravity equation (9). Indeed, several determinants of bilateral trade barriers do affect simultaneously the political affinity and consequently the political costs of RTA formation<sup>20</sup> (e.g. commonality of language and culture, economic embargo, etc.). A striking illustration is provided in Michaels and Zhi (2007) who show that the deterioration of political relations between the US and France over the 2002-2006 period resulted in a significant increase in their bilateral trade barriers following changes in attitudes towards France in the US.

To address this concern, we first add to the set of control variables  $\mathbf{Z}_{ijt}$  a series of co-determinants of bilateral trade barriers and political costs of negotiation. This encompasses the standard time invariant gravity controls (distance, contiguity, common language, etc.) and various time-varying proxies of bilateral political affinity such as a dummy variable coding for the existence of a military alliance, a standard measure of UN votes bilateral correlation and lastly the country-pair sum of democracy indices from the Polity IV database. Indeed, the democratic peace hypothesis, which has been studied by both political scientists and economists (see Levy and Razin, 2004, for a recent explanation of the hypothesis) states that democratic countries are less prone to violence. But democratic countries are also more open to trade. Second, in the panel specifications, we include country-pair fixed effects to control for all the time-invariant unobserved heterogeneity.

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<sup>20</sup>In unreported results we confirm that the correlation between  $\hat{u}_{jit}$  and our control variables for political affinity (UN vote correlation, genetic distance and military alliance) is high.

In spite of all these controls, we cannot rule out the possibility that the coefficient of trade gains,  $\beta_1$ , is still contaminated by unobserved *time-varying* co-determinants of bilateral trade barriers,  $\hat{u}_{jit}$ , and political affinity,  $\varepsilon_{ijt}$ . To solve this last problem, we directly include  $\hat{u}_{jit}$  as a control variable. This strategy allows to identify  $\beta_1$  by exploiting the variations in trade gains  $\hat{T}_{ijt}$  net of  $\hat{u}_{jit}$ . This solves the omitted variable problem because those variations are not driven by bilateral shocks and so cannot be correlated with the (residual and unobserved) political costs of negotiations  $\varepsilon_{ijt}$ . Indeed a look at the structural relationship (11) makes clear that those variations are driven by changes in the exporter fixed effects  $\widehat{FE}_{kt}$ . This strategy is in fact akin to an instrumental variable approach where the trade gains  $\hat{T}_{ijt}$  are instrumented with a remoteness index based on the exporter fixed effects  $\widehat{FE}_{kt}$  (see Anderson and Van Wincoop 2003).

Regarding  $\beta_2$  and  $\beta_3$ , the coefficients of the probability of war and of its interaction term with trade gains in the econometric specification (12), the omitted variable problem is potentially severe: Indeed any time-invariant determinant of the unobserved political costs of RTA formation  $\varepsilon_{ijt}$ , is also likely to affect  $\delta_{ij}$ , the probability of bilateral dispute, which is a component of the time-invariant probability of war,  $WAR_{ij} = \delta_{ij} \times e_{ij}$  where  $e_{ij}$  is the probability of escalation (see equation 4). For example, disputes linked to common borders, natural resources, migration waves, etc., are likely to increase the underlying probability of war and make negotiation on RTA formation politically more costly. First, note that for  $\beta_2$  this omitted variable problem induces a downward bias which goes against our result given that  $\beta_2$  is expected to be positive. Second, the various gravity and political affinity controls included in  $\mathbf{Z}_{ijt}$  are likely to absorb most of the cross-sectional variations in bilateral disputes. With that goal in mind, we also include as a control variable a measure of bilateral genetic distance. Indeed recent findings by Spolaore and Wacziarg (2009) show that genetic relatedness has a positive effect on bilateral conflict propensities in the cross-section. This is because more closely related populations, on average, tend to interact more and develop more disputes over sets of common issues. Hence we expect genetic distance to reduce the probability of war and to increase the probability of RTA formation. Thirdly, in our panel estimates, we include country-pair fixed effects. This makes impossible the identification of  $\beta_2$ , the coefficient of the time-invariant variable  $WAR_{ij}$ . However the identification of  $\beta_3$  is still possible and is now immune to the omitted variable bias: There is indeed no particular reason for the determinants of political costs  $\varepsilon_{ijt}$  to have a larger effect on RTA formation in dyads where the trade gains are larger.

### 3.4 Results

We start in Table 2 with a cross-sectional analysis of RTA determinants. By cross-sectional we mean that we take the world in the year 2000, and attempt to explain which of the country pairs are

in a RTA. Some determinants will be time invariant (distance for instance), some will have a time dimension. For the latter set of variables, we consider the variable for the year immediately preceding the signature of the RTA. For instance trade gains are taken in 1956 (the year before the Rome Treaty) for the Franco-German case, and in 1993 (the year before NAFTA) for the USA-Mexico one. Since this variable is calculated as a percentage of utility, we have a variable that is relevant at the moment of the decision, while maintaining comparability across observations.

Our first column runs logit on a very simple specification which has only the log of the estimated trade gains <sup>21</sup> and the frequency of old wars as covariates. As expected both enter positively, with a quite large overall explanatory power, and a high degree of statistical significance: remarkably, this simple two-factor model is able to explain 63 percent of RTA formations in a sample of 1697 country-pair observations. To our view this confirms the fact that our theory-driven measure of economic gains,  $\hat{T}_{ijt}$ , is empirically relevant. In this first column, the old war variable  $WAR_{ij}$  is restricted to the small number of dyads which exist before 1945. In particular, all country pairs that involves a former colony (India-Japan, Germany-Ivory Coast for instance) are dropped from this regression. In column (2) we adopt the following strategy: we set  $WAR_{ij}$ , the old war variable, to 0 for country-pairs which did not exist before 1945; we also include a dummy variable coding for those pairs. As can be seen from the comparison of columns (1) and (2), the two variables of interest have very close coefficients with this procedure and the fit is very comparable, which makes us confident that it does not alter our results while augmenting substantially the number of observations<sup>22</sup>. We maintain this procedure throughout.

Column (3) introduces bilateral trade freeness. As stated above, this is intended to circumvent any contamination of the coefficient on trade gains, by unobserved co-determinants of bilateral trade barriers and political affinity. We therefore control for  $\hat{u}_{jit}$ , the estimate of bilateral trade barriers obtained from the gravity equation (9). As expected, this variable enters positively and results in a decrease of the effect of trade gains as it purges from contemporaneous bilateral affinity which causes both the probability of signing a RTA and the trade gains to be high.

Our main variable of interest is the interaction term between old wars and RTA trade gains. Interaction terms have a non-straightforward interpretation in discrete choice models like the logit, because of their non linear nature (Ai and Norton, 2003). As explained in details above, we therefore resort to a linear probability model (LPM), which has the additional advantage of handling fixed effects more easily in our panel estimates. Column (4) is simply the LPM version of the Logit specification of column (3). While this different estimation method naturally yields different coefficients, the signs

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<sup>21</sup>We take the log because of the left-skewness of the distribution of estimated trade gains

<sup>22</sup>It can be noted that those non-existing dyads, mostly combinations of colonies at the end of the war, have been less involved in the RTA movement, as revealed by the negative coefficient of the dummy variable.

Table 2: RTA determinants, benchmark regressions

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep. Var.	FTA								
trade gains	0.554 <sup>a</sup> (0.038)	0.413 <sup>a</sup> (0.019)	0.329 <sup>a</sup> (0.021)	0.016 <sup>a</sup> (0.001)	0.014 <sup>a</sup> (0.001)	0.012 <sup>a</sup> (0.001)	0.009 <sup>a</sup> (0.001)	0.006 <sup>a</sup> (0.001)	0.002 <sup>a</sup> (0.000)
war freq. pre-1945	7.838 <sup>a</sup> (1.337)	8.335 <sup>a</sup> (1.270)	9.249 <sup>a</sup> (1.272)	1.912 <sup>a</sup> (0.115)	5.111 <sup>a</sup> (0.331)	3.713 <sup>a</sup> (0.379)	7.731 <sup>a</sup> (0.744)		
dyad did not exist pre-1945	-0.782 <sup>a</sup> (0.107)	-0.782 <sup>a</sup> (0.107)	-0.898 <sup>a</sup> (0.109)	-0.053 <sup>a</sup> (0.007)	-0.063 <sup>a</sup> (0.007)	-0.034 <sup>a</sup> (0.008)	-0.045 <sup>a</sup> (0.008)		
ln bil. trade freeness			0.214 <sup>a</sup> (0.025)	0.010 <sup>a</sup> (0.001)	0.010 <sup>a</sup> (0.001)	-0.009 <sup>a</sup> (0.002)	-0.011 <sup>a</sup> (0.002)	-0.002 <sup>a</sup> (0.001)	-0.002 <sup>a</sup> (0.000)
trade gains × wars pre-1945				0.356 <sup>a</sup> (0.035)	0.304 <sup>a</sup> (0.038)	0.451 <sup>a</sup> (0.041)	0.137 <sup>a</sup> (0.026)	0.058 <sup>a</sup> (0.011)	
war freq. $[t - 20; t - 1]$				-0.261 <sup>a</sup> (0.074)	-0.261 <sup>a</sup> (0.074)	-0.441 <sup>a</sup> (0.076)	-0.067 <sup>a</sup> (0.019)	-0.067 <sup>a</sup> (0.019)	-0.002 (0.008)
ln distance				-0.152 <sup>a</sup> (0.004)	-0.152 <sup>a</sup> (0.004)	-0.127 <sup>a</sup> (0.004)			
contiguity				0.109 <sup>a</sup> (0.019)	0.095 <sup>a</sup> (0.018)				
UN vote correlation				0.121 <sup>a</sup> (0.011)	0.077 <sup>a</sup> (0.011)	0.054 <sup>a</sup> (0.005)	0.054 <sup>a</sup> (0.005)	0.003 (0.002)	
sum of democracy indexes				0.069 <sup>a</sup> (0.007)	0.053 <sup>a</sup> (0.006)	0.024 <sup>a</sup> (0.003)	0.011 <sup>a</sup> (0.001)		
military alliance				0.081 <sup>a</sup> (0.011)	0.127 <sup>a</sup> (0.010)	0.110 <sup>a</sup> (0.007)	0.027 <sup>a</sup> (0.003)		
genetic distance				0.005 (0.004)	0.009 <sup>a</sup> (0.003)				
multi. openness				-0.021 <sup>a</sup> (0.004)	0.004 <sup>b</sup> (0.001)	0.004 <sup>b</sup> (0.002)			
multi. open. × wars pre-1945				1.535 <sup>a</sup> (0.291)	0.625 <sup>a</sup> (0.053)	0.194 <sup>a</sup> (0.024)			
Observations	1697	9890	9890	9890	9890	6426	6178	36709	35745
$R^2$	0.263	0.224	0.239	0.137	0.146	0.358	0.359	0.080	0.017

and significance levels are preserved in column (4). Column (5) introduces the interaction term of trade gains with old wars. This interaction term enters positively and significant at the 1 percent level. This supports our hypothesis that economic gains and security gains are complement: Dyads with large estimated economic gains are more likely to enter a RTA, and this effect rises with the historic intensity of wars of the partners.

In column (6) we include a number of bilateral controls (see our discussion on  $\mathbf{Z}_{ijt}$  in our econometric specification 12). We include the two most important gravity variables, namely geographical distance and contiguity, and a list of controls for political affinity: UN vote correlation, the sum of Polity IV reported democracy indices, a dummy for the existence of a military alliance and an index of genetic distance. All of those variables add to the likelihood of belonging to the same agreement. As expected, the index of genetic distance has a positive impact: a larger distance decreases the number of disputes and conflicts; this in turn increases the probability of RTA formation. However its statistical significance is small. To discriminate between the effect of probability vs realization of wars we also include the frequency of recent wars, which, according to our theoretical discussion in section 2.3, is expected to enter negatively through their deleterious effect on the political cost of negotiations. The coefficient is negative and significant at the 1 percent threshold. Comparing the coefficient of old war vs recent wars, the result suggests that a “window of opportunity” mechanism is at work. Having had a history of conflicts in the past makes a country-pair more likely to sign a RTA at the condition that their recent history is not too conflicting: Any exogenous event that prevents two ancient enemies to fight for some period improves the chances that they sign a RTA, with the consequence of reducing further the chances of conflict escalation. We quantify precisely the size of those effects later in the paper.

In spite of the inclusion of all these control variables and the resulting reduction by one third of the sample size, all the coefficients of interest in column (6) keep the expected sign and remain statistically significant at the 1 percent threshold. In particular the coefficient of economic gains is unaffected: this confirms that unobserved heterogeneity is already filtered out by the inclusion of  $\hat{u}_{jit}$  in previous specifications. Regarding the coefficient of old wars, it is reduced significantly but it remains positive and significant.

Column (7) tests implication 4 of our theoretical setup in section 2.3, namely that multilateral trade openness and the probability of war have a positive and complementary impact on the RTA decision. As expected, the coefficient of the interaction term between multilateral openness and old war is positive; and it is significant at the 1 percent threshold. Column (7) establishes our main results with a substantial set of controls, and we consider it as our benchmark specification. Remarkably the five coefficients of interest have all the expected sign and are statistically significant at the 1 percent

threshold. According to our theoretical discussion in section 2.3, the fact that the coefficients of the two interaction terms are both positive confirms the internal consistency of our theoretical setup. As discussed in section 3.2 we can also infer from those coefficients that the point estimate of the theoretical elasticity  $\hat{\varepsilon}_{cost}$  is 49.1. This estimate gives us an indication on the view of policy makers on the pacifying effect of RTAs: they believe that a trade-related increase of 1 percent of the opportunity cost of war translates into a 49 percent decrease in the probability of escalation to war.

The two remaining columns extend the sample to the panel dimension. Both specifications include country-pair fixed effects. This makes impossible the identification of the coefficient of the time-invariant variable old wars. Nevertheless the identification of its interaction term is still possible and, as discussed earlier, the estimate is now immune to the omitted variable problem. For each dyad, we average data over non-overlapping time windows of 5 years, a method comparable to Egger and Larch (2008) and Martin et al. (2008) in related work. Column (8) takes all time windows for all country-pairs. In column (9), we restrict the estimation to the period preceding the onset of the RTA for country-pairs which formed a RTA before the year 2000; for other country-pairs we keep all time windows. This last specification is very demanding and, in spite of the five year averaging procedure, it is highly sensitive to measurement errors in the time-series dimension. With respect to the benchmark cross-sectional estimates in column (7), all the coefficients of interest keep their expected sign and are statistically significant at the 1 percent threshold. The only exception is the coefficient of new wars which becomes statistically not significant in the RTA onset specification; this surely reflects how demanding is this last specification. An important change is also the size of the coefficient on trade gains, when going from RTA (in col. 8) to RTA onset (in col.9) as a dependent variable. This was to be expected from our analysis of Figure 2 and from our discussion of the reverse causality issue: RTAs boost trade volumes, which reinforces even more the RTA-related economic gains after the signature.

Table 3 pushes further the robustness investigation. Those regressions take column (7) of Table 2 as a benchmark specification (with gravity controls unreported). In the first column, we re-estimate this benchmark specification using logit instead of LPM. It can be seen that all signs of the relevant variables are the same, that the global explanatory power is very high, and that the level of significance of the interaction term between old wars and trade gains is now slightly above ten percent (10.6% exactly). This Logit estimate is the one which we use in the quantification section.

In the second column, we return to LPM and extend the set of gravity controls to include common language or legal system, colonial linkages, landlockness and remoteness of the country pair. All our variables of interest keep the same sign. Column (3) changes the definition of bilateral trade gains to be the average of the two countries RTA-related trade gains rather than the minimum. Given that the minimum is always smaller than the average, this translates mechanically into a decrease in the

coefficient of trade gains.

Column (4) adds a set of dummy variables coding for each country, a feature which can be properly identified in our cross-sectional sample of (non directional) country pairs. These dummy variables control for all time-invariant unobserved characteristics of a country that might make it more likely to fight wars in the past and to sign RTAs now. The global fit naturally increases substantially while leaving most of our results of interest remarkably similar. Column (5) adds a dummy to control for the fact that the two countries belong to the same geographical region of the world (following the World Bank definition of regions). This increases the probability of RTA significantly, while again leaving our results on trade gains and conflictuality unaffected.

Column (6) removes intra-EU observations by excluding all country-pairs where both countries belong to the EU. This is intended to check that our results are not entirely driven by European countries, which are characterized both by a rich history of warfares and by the creation of the worldwide deepest trade agreement. In this specification, all variables related to wars have slightly smaller coefficients, but they remain very significant.

Column (7) extends our definition of old wars by including a variable that accounts for war frequency 20 to 40 years before RTA signature. This results into a smoother representation of the history of wars with very recent ones, those that are more than one generation old, and the very old wars (before 1945). The pattern of coefficients is that recent wars tend to reduce the RTA probability, less recent ones tend to slightly promote them, while old wars have a much stronger positive effect. This finding matches well with our identification strategy: the political and subjective costs imposed by recent wars during RTA negotiation is gradually overturned by the positive strategic effect of war history.

### **3.5 Quantification and counterfactual experiments**

Up to this point, we have mostly analyzed the signs and statistical significance of coefficients. We now want to quantify the magnitude of the effects we have identified. In order to calculate counterfactuals we need to resort to a Logit econometric model where the RTA probability cannot go outside the 0-1 range. But the presence of interaction terms, which are the core of our analysis, makes computations not straightforward. Indeed Ai and Norton (2003) show that in a logit or probit model the signs of the interaction effects depend on the position on the probability curve.

In all that follows we adopt the following strategy. We start by running a benchmark regression using logit (column 1 of Table 3), to estimate the coefficients of interest and to estimate the benchmark probability of signing RTA for each country pair in the sample. We then select a group of observations and we run a counterfactual by attributing them other values for one or more explanatory variables.

Table 3: RTA determinants, robustness

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep var	RTA	RTA	RTA	RTA	RTA	RTA	RTA
war freq. pre-1945	44.959 <sup>a</sup> (15.876)	7.977 <sup>a</sup> (0.741)	4.575 <sup>a</sup> (0.887)	5.967 <sup>a</sup> (0.660)	5.877 <sup>a</sup> (0.652)	3.692 <sup>a</sup> (0.666)	5.848 <sup>a</sup> (0.653)
trade gains	0.296 <sup>a</sup> (0.042)	0.007 <sup>a</sup> (0.001)	0.003 <sup>b</sup> (0.002)	0.005 <sup>a</sup> (0.001)	0.005 <sup>a</sup> (0.001)	0.004 <sup>a</sup> (0.001)	0.005 <sup>a</sup> (0.001)
trade gains × wars pre-1945	1.626 (1.007)	0.453 <sup>a</sup> (0.041)	0.303 <sup>a</sup> (0.071)	0.323 <sup>a</sup> (0.037)	0.315 <sup>a</sup> (0.036)	0.187 <sup>a</sup> (0.037)	0.316 <sup>a</sup> (0.036)
war freq. [ $t - 20; t - 1$ ]	-7.440 <sup>a</sup> (2.132)	-0.465 <sup>a</sup> (0.076)	-0.500 <sup>a</sup> (0.081)	-0.189 <sup>a</sup> (0.069)	-0.173 <sup>b</sup> (0.068)	-0.155 <sup>b</sup> (0.066)	-0.323 <sup>a</sup> (0.106)
multi. open. × wars pre-1945	17.425 <sup>a</sup> (5.997)	1.653 <sup>a</sup> (0.290)	0.778 <sup>b</sup> (0.325)	1.415 <sup>a</sup> (0.256)	1.366 <sup>a</sup> (0.254)	0.843 <sup>a</sup> (0.253)	1.344 <sup>a</sup> (0.254)
multi. openness	-2.005 <sup>a</sup> (0.232)	-0.020 <sup>a</sup> (0.004)	-0.027 <sup>a</sup> (0.005)	-0.222 <sup>a</sup> (0.012)	-0.215 <sup>a</sup> (0.012)	-0.217 <sup>a</sup> (0.011)	-0.217 <sup>a</sup> (0.012)
# of landlocked in dyad		-0.000 (0.005)	-0.004 (0.006)	0.665 <sup>a</sup> (0.166)	0.665 <sup>a</sup> (0.164)	0.042 (0.156)	0.663 <sup>a</sup> (0.164)
common language		-0.019 <sup>b</sup> (0.008)	-0.012 (0.009)	-0.021 <sup>a</sup> (0.008)	-0.015 <sup>c</sup> (0.008)	-0.012 (0.008)	-0.015 <sup>c</sup> (0.008)
colonial link		-0.031 (0.019)	-0.029 (0.020)	-0.074 <sup>a</sup> (0.017)	-0.065 <sup>a</sup> (0.017)	-0.051 <sup>a</sup> (0.017)	-0.065 <sup>a</sup> (0.017)
common legal origin		-0.002 (0.006)	-0.010 (0.007)	-0.003 (0.005)	-0.018 <sup>a</sup> (0.005)	-0.012 <sup>b</sup> (0.005)	-0.018 <sup>a</sup> (0.005)
remoteness		0.084 <sup>a</sup> (0.011)	0.097 <sup>a</sup> (0.013)	-0.124 <sup>a</sup> (0.025)	-0.152 <sup>a</sup> (0.024)	-0.079 <sup>a</sup> (0.024)	-0.151 <sup>a</sup> (0.024)
same region					0.117 <sup>a</sup> (0.010)	0.053 <sup>a</sup> (0.010)	0.119 <sup>a</sup> (0.010)
war freq. [ $t - 40; t - 20$ ]							0.170 <sup>c</sup> (0.092)
Method	logit	OLS	OLS	cty FE	cty FE	cty FE	cty FE
Observations	6178	6178	5275	6178	6178	6097	6178
$R^2$	0.576	0.366	0.350	0.570	0.580	0.515	0.580

For instance we take the country pairs in the lowest decile of the frequency of old war variable and we assign to them a fake history of wars. Using the logit formula with the benchmark estimated coefficients, we recalculate their RTA probability and compare it with the benchmark probability to evaluate the magnitude of the effect of the altered variable. This procedure ensures that the probability remains in the admissible range, while doing a “what if” experiment: What if low conflict dyads had had an intense past history of warfare, keeping everything else constant?

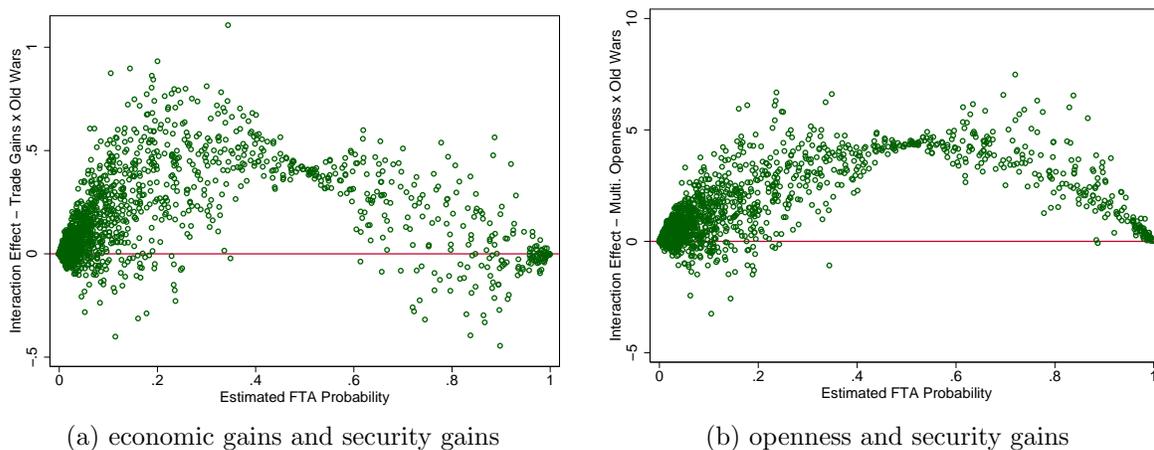
### 3.5.1 Complementarity is a first-order effect

We first quantify the main result of the paper, that is the complementarity between old wars and trade gains in the formation of RTAs.

The coefficient of the interaction term between trade gains and old wars is positive both in our benchmark LPM specification (col.7, table 2) and in our benchmark Logit specification (col. 1, Table 3). However Ai and Norton (2003) show that interaction terms have a sign that can be deceptive in a logit framework. To investigate this question more fully, we calculate the “true” marginal effect of this interaction term for the whole range of benchmark probabilities. In our case, we need to take care of the fact that old wars is interacted with trade gains, but also with multilateral openness. This complicates somewhat the computation of the marginal effects with respect to Ai and Norton (2003) and we report the details in appendix. Results are graphed in figure 3. Each of the panels reports the marginal effects for each of the two interaction terms; the dots correspond to observed country-pairs. We see that the marginal effects of the two interaction terms are very dominantly positive. It also confirms (see the computation in appendix) that, due to the functional form of the logit probability distribution, the reversal of the sign of the marginal effects is more likely when the estimated probabilities are located in the neighborhood of 0 and 1. Since in our sample those estimated probabilities are quite concentrated at those two extreme values, verifying that those marginal effects were indeed positive is important.

We turn now to the quantification of the interaction term. To this purpose we choose pairs of countries that are located inside the middle decile of those two variables, that is around the median level of old wars and trade gains. We then calculate the ratio of counterfactual to benchmark probabilities of RTA formation following the procedure just described, and spanning over the 10th to 95th percentiles of each variable. Results are in figure 4. In panel (a), it is clear that trade gains increase the probability of signing a RTA, and that the effect increases strongly with old wars. Panel (b) allows to better illustrate the effect. On the x axis it reports trade gains; on the y-axis it reports the ratio of counterfactual to benchmark probabilities; each curve corresponds to different levels of old wars. For a dyad that moves from the median to the top 20% of trade gains, the RTA probability is multiplied

Figure 3: The interaction terms



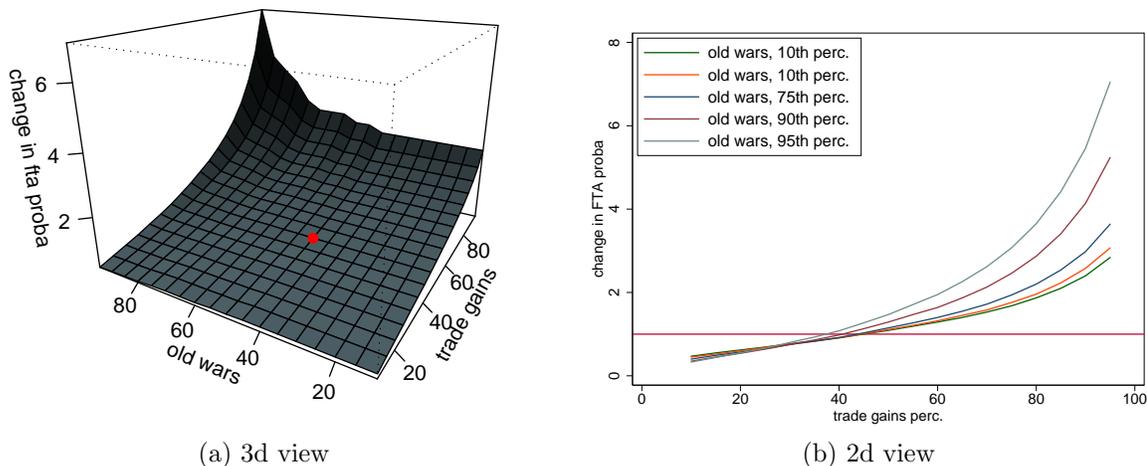
by two (1.96) if the dyad is in the middle range of old wars, while the ratio is almost 3 if the same dyad is in the top 10% of war history.<sup>23</sup> Both the individual and the interaction effects of trade gains and old wars are quantitatively large. In particular we see that the interaction term has a first-order magnitude which may be larger than the direct individual effect. This confirms our intuition that trade gains are important mostly because they allow to increase security gains from RTA formation.

### 3.5.2 Windows of opportunity

Our second simulation uses the same method described at the start of this section to quantify the effect of the *probability* of war, measured by the frequency of old wars, and to compare it with the effect of the *realization* of war, measured by the frequency of recent wars. This is intended to highlight the existence of windows of opportunity during which interrupted conflict between old enemies may help sign a RTA and "lock in" a more peaceful bilateral relation. The left panel of figure 5 is very similar as the one in figure 4. We take the whole set of dyads with no history of recent nor old wars, and gradually move them into the war space, looking at the changes in RTA probability. As expected from the point estimates in tables 2) and 3, recent wars reduce the probability of RTA formation, while old ones increase it. Again the magnitude of the effects is quite substantial. Panel (b) uncovers an interesting trade off that leaves the change in RTA probability unchanged. Panel (b) is a contour plot, where each curve represents a chosen probability ratio from panel (a). Old wars are on the x axis, recent wars on the y axis. Assume a country goes from no old wars to the median level. This multiplies its benchmark RTA probability by almost five if there has been very little recent wars,

<sup>23</sup>The benchmark probabilities of signing a RTA in this precise sample have an average value of 7.7%. The median is much lower at 0.75%, which shows that most country pairs in the world have a very low RTA probability, while a few of them have a quite high one (ten percent of the sample has a benchmark probability higher than 20%).

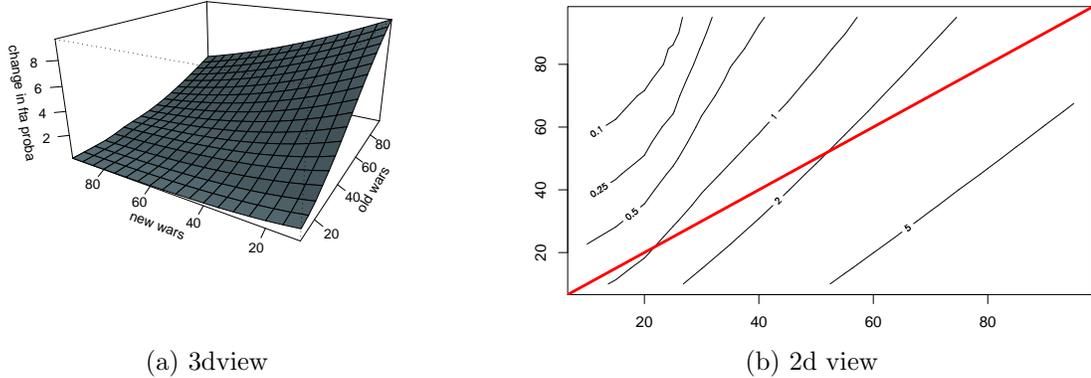
Figure 4: Complementarity between economic gains and security gains



while it leaves the probability unchanged if the level of recent wars is moved to the top 20%. This shows that a change in old wars has in general a larger effect than an equivalent change in recent ones (as revealed by the 45 degree line in red). In other words, if a country-pair recent history of warfare perfectly reflects its long run history, then the net, overall effect of war is to increase the probability of RTA formation. By contrast, suppose now we assign the top 5% level of old wars to a country pair with no old wars. This multiplies by 10 its RTA probability if recent wars are very rare, but only by 3.5 if the country is also in top 5% of recent conflicts.

An illustrating example of the previous discussion is the case of India and Pakistan which at the moment have not formed a RTA in spite of their geographic proximity and their large economic sizes. The reason could simply be that both are recent countries, with a pretty large number of low- and high-intensity conflicts since their creation in 1948. Hence the political costs of signature are potentially so high that they deter any RTA creation. A related case is the one of France and Germany in 1957 who signed the Treaty of Rome although they experienced three intense bilateral wars in less than 90 years. With respect to our statistical evidence, the French-German case seems to be a "fortunate" outlier. Here is a way of reconciling it with our evidence. It is possible that the Cold War, the influence of the US, and the Soviet Bloc as a common enemy, helped to mitigate the deleterious impact of the French-German wars on the political costs of the Treaty signature without harming its strategic stakes. In other words, the Cold War offered a window of opportunity for RTA formation to the European countries. We come back to this pro-RTA effect of the Cold War in the next section.

Figure 5: Old wars and new wars



### 3.5.3 A world without wars

We consider now the reverse counterfactual experiment. Instead of taking the peaceful dyads and make them fight, we make every country pair peaceful. That is the frequencies of old wars, recent wars and all their interaction terms are set to zero, and the resulting, counterfactual probabilities of RTA formation are estimated. Results are reported in figure 6, where the benchmark probability is on the x axis, while the y axis gives the counterfactual one (the dashed line corresponds to the 45 degree line). Each dot is a dyad, and some are singled out by symbols: Blue diamonds represent intra-EU pairs; red crosses represent country-pairs that were part of the communist bloc at some point; grey squares represent pairs that have a nonzero frequency of recent wars.

Both EU and former communist country pairs experience a drop in their counterfactual probability of RTA formation with respect to the benchmark one. This is, we believe, another illustration of the window of opportunity channel. Indeed, in both cases, both parts of the European continent in fact, the history of old wars is very intense. But the history of recent wars is very calm probably because the cold war made the two blocs very stable internally between the end of WWII and the collapse of the USSR. Those 45 years of “forced” peace between countries that used to fight a lot seems to have promoted the RTA wave in the region to a large extent.

Regarding the detrimental impact of recent wars, the examples of India-Pakistan and Egypt-Israel are probably the most illustrative. Those two pairs do have a very low level of benchmark probability of RTA formation; and this would jump to among the highest levels if one could cancel their history of recent wars. Greece-Turkey is another striking example.

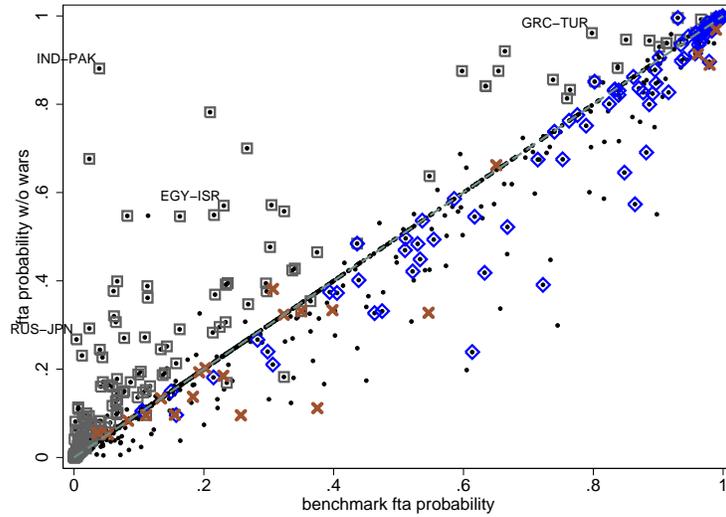


Figure 6: The world without military conflicts

### 3.5.4 Multilateralism triggers regionalism

In this quantification exercise, we look at the impact on RTA formation of multilateral trade openness. We simply cancel out multilateral globalization by setting multilateral trade openness to zero for all pairs of countries. Then we estimate the resulting, counterfactual probability of RTA formation that we compare to the benchmark probability. Results are reported in figure 7 where the grey triangles represent country pairs with an initial level of multilateral openness above the median level and where green diamonds represent pairs of countries belonging to Mercosur.

We see that in a counterfactual world without multilateral trade openness, most country pairs would experience a sharp decrease in their probability of RTA formation. This confirms our view (see section 2.3) that the wave of regionalism observed in the late 90s could be a policy response to the destabilizing, and conflict-promoting, effect of the development of multilateralism as experienced during the post world war period. This mechanism is particularly relevant for explaining the formation of Mercosur - a fact that has been widely discussed by policy practitioners (see Manzetti 1993).

## 4 Conclusion

In this paper we show that the complementarity between economic and security gains is a first-order determinant of RTA formation: trade gains positively predict RTA formation but this is especially strong for country pairs that have an intense history of warfares. Hence economic and political objectives of RTAs should not be seen as substitutes or opposite. This suggests that trade gains could only be an intermediate political objective of RTAs, their final goal being to pacify relations

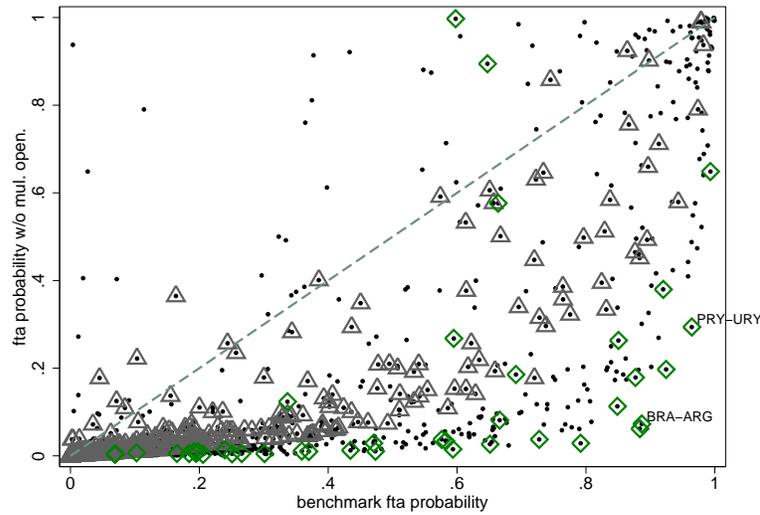


Figure 7: The world without multilateral trade

between countries.

We also find supportive evidence for the existence of windows of opportunity in RTA formation: country pairs with a long-run history of bilateral conflicts have a larger propensity to sign RTA; nevertheless, in the short-run, the recurrence of conflicts can make their political implementation not feasible. Only periods of interrupted conflict, experienced by chance between old enemies, may help sign a RTA and "lock in" a more peaceful bilateral relation.

A last important finding is that globalization, in the form of higher multilateral trade openness, increases the political incentives to form RTA. This stems from the fact that multilateral openness weakens regional economic dependence and therefore increases the risk of regional wars. For country pairs with a already high risk of conflicts, a natural policy response is thus to form regional trade agreements in order to counteract the destabilizing impact of multilateralism. In other words, a response to the weakening of local political ties that comes with globalization is for countries to recreate local economic ties through RTA formation. From this point of view, RTAs are a logical political consequence of globalization.

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## 6 Appendix

### 6.1 Theoretical Setup

In absence of RTA the expected welfare of a country is equal to  $V = (1 - \delta e)U_P + \delta e(1 - W)U_P$ . Indeed peace occurs with probability  $(1 - \delta e)$  and in that case the country trades under MFN tariff with its partner and gets the benchmark welfare  $U_P$ . War occurs with probability  $(\delta e)$ ; in that case trade is fully disrupted and some destructions happen; the country gets  $(1 - W)U_P$ . If a RTA is in force the logic is similar and the expected welfare of the country is equal to  $V^{RTA} = (1 - \delta e^{RTA})(1 + T)U_P + \delta e^{RTA}(1 - W)U_P$ . Plunging those two expressions into the RTA formation condition,  $V^{RTA} - V \geq C$ , and rescaling by the benchmark welfare  $U_P$  we easily get the condition (2).

Empirically we know that the probability of war is small:  $\delta e \sim 1\%$ . It is also likely that the cost of negotiation represents only a small fraction of the total welfare:  $C/U_P \equiv c \sim 1\%$ . We assume now that the RTA-related trade gains are small with respect to the cost of wars such that:  $T/W \sim 1\%$ . In spite of this reasonable assumption, we do not want to rule out the possibility for a RTA of having a first-order impact on the probability of escalation both through the opportunity cost channel and trough the political spillover channel. This means that we also have to assume in equation (3):  $(\varepsilon_{pol}/\varepsilon_{cost}) \sim (T/W)$ . Combining (2) and (3) we get:

$$(1 - \delta e)T + (\delta e)W(1 + \frac{T}{W})\frac{e^{RTA} - e}{e} \geq c \quad (13)$$

$$(1 - \delta e)T + (\delta e)W\varepsilon_{cost}(1 + \frac{T}{W})(\frac{\varepsilon_{pol}}{\varepsilon_{cost}} + \frac{T}{W}) \geq c \quad (14)$$

A first order approximation of this equation leads to

$$(1 - \delta e)T + \delta e(\varepsilon_{pol}W + \varepsilon_{cost}T) \geq c \quad (15)$$

which corresponds to equation (3) in the main text.

Let consider the effect of multilateral openness. As discussed in the main text, multilateral openness corresponds to a decrease in the cost of war from  $W_0$  to  $W = (1 - \omega)W_0$  and to an increase in the probability of escalation from  $e_0$  to  $e = (1 + \varepsilon_{cost}\omega)e_0$ . Substituting into equation (3) we get:

$$T + \varepsilon_{pol}\delta e_0W_0 + (\varepsilon_{cost} - 1)(\delta e_0 \times T) + (\varepsilon_{cost} - 1)(\varepsilon_{pol}W_0 + \varepsilon_{cost}T)(\delta e_0 \times \omega) \geq c \quad (16)$$

In the previous equation the coefficient of the interaction term ( $\delta e_0 \times \omega$ ) is positive when  $\varepsilon_{cost} > 1$ . This proves the testable implication 4.

## 6.2 Marginal Effect and Interaction

Let denote  $x_1, x_2, x_3$  our three variables of interest and  $\mathbf{Z}$  the vector of covariates. Our Logit preferred specification (12) writes as

$$\hat{P} = \frac{1}{1 + \exp[-\beta_1 x_1 - \beta_2 x_2 - \beta_3 x_3 - \beta_{12} x_1 x_2 - \beta_{13} x_1 x_3 - \mathbf{Z}^t \beta]} \quad (17)$$

where  $\hat{P}$  is the estimated probability of FTA formation. Simple computations lead to

$$\frac{\partial^2 \hat{P}}{\partial x_1 \partial x_2} = \hat{P}(1 - \hat{P})\beta_{12} + \hat{P}(1 - \hat{P})(1 - 2\hat{P})(\beta_2 + \beta_{12}x_1)(\beta_1 + \beta_{12}x_2 + \beta_{13}x_3) \quad (18)$$

## 6.3 Further country pairs in trade gains table

Table 4: Estimated Trade Gains for the 51th-100th country-pairs in 1956

Country pair		Trade gains		bil. open.	dist.	ever fta?
		min $T$	mean $T$	min $\frac{\text{imports}}{\text{GDP}}$	kms	
USA	COL	.322%	2.76%	.105%	4251	No
<b>FRA</b>	<b>ITA</b>	<b>.318%</b>	<b>.42%</b>	<b>.261%</b>	<b>892</b>	<b>Yes</b>
THA	IDN	.318%	.378%	.615%	2306	Yes
GBR	DEU	.318%	.36%	.526%	809	Yes
NLD	IDN	.309%	.679%	1.363%	11346	No
CAN	VEN	.308%	.325%	.683%	4647	No
BEL	SWE	.303%	.372%	.941%	1152	Yes
DEU	DNK	.297%	1.044%	.425%	538	Yes
CZS	BGR	.293%	.891%	.307%	1084	No
GBR	ZAF	.291%	1.811%	.481%	9489	Yes
JPN	IDN	.286%	.904%	.329%	5482	No
FRA	SWE	.282%	.325%	.231%	1616	Yes
HUN	ROM	.279%	.291%	.128%	540	Yes
SAU	IND	.277%	.372%	.191%	3509	No
DEU	AUT	.275%	1.67%	.393%	592	Yes
CHN	LKA	.272%	.528%	.095%	4914	No
CHN	JPN	.269%	.372%	.167%	1975	No
FRA	CHE	.265%	.705%	.217%	474	Yes
ARG	GBR	.265%	.372%	.438%	11137	No
CZS	ROM	.263%	.565%	.275%	902	No
HUN	BGR	.262%	.318%	.278%	693	Yes
GBR	IRL	.259%	2.642%	.429%	425	Yes
BRA	SWE	.259%	.307%	.545%	10185	No
IND	PAK	.258%	.336%	.178%	1238	No
VEN	NLD	.258%	.28%	.571%	7972	No
POL	AUT	.252%	.263%	.227%	549	Yes
BGR	ROM	.249%	.319%	.105%	370	Yes
BRA	URY	.24%	.704%	.368%	2168	Yes
SDN	EGY	.239%	.797%	.462%	1736	Yes
USA	BEL	.239%	.744%	.078%	7303	No
BRA	DNK	.236%	.237%	.365%	9776	No
ROM	EGY	.236%	.246%	.1%	1792	No
POL	HUN	.236%	.37%	.196%	520	Yes
ARG	ITA	.234%	.37%	.281%	11214	No
CHL	ARG	.229%	.419%	.255%	1157	Yes
SYR	SAU	.226%	.345%	.686%	1463	No
BRA	FIN	.222%	.272%	.34%	10749	No
HUN	CHN	.221%	.417%	.077%	7710	No
GBR	BEL	.22%	.517%	.363%	448	Yes
IDN	AUS	.218%	.262%	.501%	5078	No
CHE	AUT	.217%	.344%	.587%	576	Yes
ARG	DEU	.216%	.586%	.309%	11646	No
BRA	ESP	.215%	.25%	.206%	7821	No
LBN	SAU	.214%	.281%	.648%	1417	No
HND	SLV	.212%	.34%	.519%	244	Yes
JPN	AUS	.212%	.5%	.346%	7827	No
SYR	JOR	.21%	.393%	.733%	373	No
BRA	NOR	.208%	.21%	.324%	10018	No
AFG	PAK	.208%	.318%	.104%	806	No
ITA	SWE	.207%	.241%	.248%	1833	Yes

Note: Lines in boldface indicate pairs that sign the Rome Treaty establishing the European Economic Community a year later.