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The effect of international relations on bilateral trade flows of 188 countries

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Abstract

This paper tries to empirically analyze what the effect is of international relations and politics on bilateral trade flows. To be able to measure international relations, the relationship between trade and three other variables were analyzed: the existence of an alliance, the number of intergovernmental organizations where membership is shared and the existence of diplomatic exchange. This research used yearly data from 188 countries in the period from 1950 until 2014. With the use of pseudo-Poisson regression models with multiple high-dimensional fixed effects, it was found that all three variables seem to be positively and significantly related to bilateral trade, especially during the Cold War. This implies that, overall, international relations are positively related to bilateral trade flows.

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

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Introduction

With globalization being at its peak, trade has become an even more important subject in international politics. To understand how trade and international relations are related, we need to look at some history. Ever since the first nations and kingdoms started to form, international relations were for the most part being established for security reasons (Masala, 2009). In these times, there were constantly multiple conflicts happening around the world, for the main part in Europe and Asia (World History Encyclopedia, 2023). Because of this, it was essential to have alliances, or at least have good relationships with other nations. Trade naturally played a role as well at the time but was less important than it is now. It wasn't until after the two World Wars that the reasons for having good international relations started to change a bit. The creation of the North Atlantic Treaty Organization (NATO) in 1949 played a crucial role in this. It was created with the intention of preventing another World War from ever happening again. The organization, consisting of European and North American countries, does not only protect its own members. With ongoing operations in Kosovo, Iraq and Africa, it tries to keep peace and security around the world (NATO, 2022). NATO became one of the reasons why after the Second World War, security became less important for having good international relations with other countries. This gave rise to trade for being a more important subject in the matter.

If this paper was written two years ago, we could have said that international relations were becoming less important for reasons where conflict is involved. With the Russian invasion of Ukraine in February 2022, this view drastically changed around the world. All of a sudden, Western countries had to work together again, just like they did during the Cold War. The way they are 'fighting' Russia exactly shows how trade and international relations are related. To prevent a world war from happening, instead of taking military action, the West is trying to hurt Russia financially by imposing economic sanctions (European Council, 2023). With the current level of globalization, countries have become very dependent on each other when it comes to goods, products and services. This means that imposing export and import restrictions would be very effective in this day and age. Looking at this whole situation from our perspective: bad international relations between the Western Countries and Russia have

led to less trade between them. Naturally, this situation is an extreme case, but it does show that countries realize the importance of the link between international relations and trade.

That good relations are so essential for trade, is reflected well by the relationship between the West and China. After Mao Zedong took over the government with the Chinese Communist Party in 1949, China became a communist country (Mark, 2012). Ever since that day, the relations between the democratic West and communist China have been shaky. However, in the first few decades, this relationship was not something the West was particularly worried about. The real communist threat was the Soviet Union and China had no significant role on the world stage at the time. It wasn't until 2001 that 'the rise of China' really started. In that year China entered the World Trade Organization (WTO) and began transforming into a global leader when it comes to advanced technologies (World Politics Review, 2023). Today, China is the highest exporting country with more than 16% of all the exports in the world being from China (WITS, 2020). Being one of the most important trade partners in the world goes along with having more influence on international politics. These developments are creating an interesting situation: even though their political institutions are completely the opposite, the West and China want to stay 'friends' since each other's trade is so essential. This is one of the reasons why China can get away with so many things. Think of the Uyghurs-situation: it is estimated that China has detained more than a million Uyghurs in 're-education camps' and sent hundreds of thousands to prison (BBC, 2022). Some countries, like the US, have accused China of genocide, but that is really all they have done. They are afraid that more action would result in a deteriorating relationship with the communist country, which could negatively affect trade. This leads us to the societal relevance of this study. This paper will help in better understanding the relationship between international relations and trade. This way, it can help policy makers in making better educated choices when it comes to international politics.

That good relations can be a reason for countries to trade, isn't something that is captured well within theory. The reasons for trade that are referred to more, lie within the Ricardian and the Heckscher-Ohlin (HO) model. According to Ricardo, technology differences between two countries is the reason for trade. In the HO model, trade is the result of factor endowment differences (Leamer & Levinsohn, 1995). International relations get a lot less attention in this

matter. This relates to the academic relevance of this paper. Most of the research in international trade does not involve international relations, even though it is an important factor. This study will show that this subject deserves more involvement in the literature. On top of this, most studies only focus on a certain part of international relations, for example alliances or trading agreements. This paper will look into multiple of these parts at the same time to give a more extensive view on the relationship.

The main research question of the paper will be as follows: 'What is the effect of international relations / politics on the bilateral trade flows between countries?'. If we want to answer this question empirically, how do we exactly measure international relations? There are a lot of different ways of measuring this. Some of these ways will be discussed in the related literature section. In the end, three measures of international relations were chosen. These measures are reflected in the first three hypotheses of this paper. Also, we want to dive a bit deeper into the relationship by looking at different time periods and countries, which gives us the last two hypotheses.

- Having an alliance leads to more bilateral trade between the two countries.
- Increasing the number of intergovernmental organizations (IGOs) two countries share membership in, increases the bilateral trade flows between them.
- Diplomatic exchange between two countries leads to more bilateral trade between them.
- The relationship between international relations and bilateral trade is positively stronger for earlier periods.
- International relations relate stronger to bilateral trade for more developed countries than less developed countries.

The first three hypotheses speak for themselves. It seems like international relations and trade are positively related which means that the three measures are also expected to be positively related to bilateral trade flows. Next, we expect the relationship to be stronger during earlier periods in our sample. The reason for this is that it seems like international relations in general have been of less importance during the last few decades because of less conflicts and tensions. Our sample's last observed year is 2014, so the Russia-Ukraine war is

not included. Also, most alliances were formed right after the Second World War, so their effect is probably greater around that time. Lastly, we expect the relationship to be stronger for more developed countries. They engage relatively more in international politics than less developed countries, so these relations will probably have a greater effect on their trade. Finally, by either confirming or rejecting these hypotheses, we will try to answer the main research question of this paper.

Related Literature

There is quite some literature that examine the effect of international relations on international trade. However, since international relations and trade can be defined and measured in different ways, the literature is pretty diverse on this topic. In this paper, we measure international trade through bilateral trade flows. Because of this, most of the literature discussed below also measure the effect on trade in the same way. The most common way to measure the effect certain determinants have on bilateral trade flows, is with the help of the so-called *gravity model*. This model will be discussed below. After that, we will look at some literature that analyze the effect of international relations differently.

Gravity model

The gravity model has become one of the most important models in international trade. Thousands of papers and articles have used the model as the foundation of their research. The name *gravity* comes from Newton's famous law about gravity, since trade and gravity are affected by the same two determinants: proximity and size / mass (Kepaptsoglou et al., 2010). For international trade it is expected that the proximity, or distance between countries, negatively affects the trade between two countries. The reason for this is the higher amount of transportation costs required for longer distances (Shepherd, 2013). However, these costs have been declining in the last couple of decades as a consequence of technological development. As for the size of a country, this can be measured through the *Gross Domestic Product* (GDP), which is the 'total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period' (Fernando, 2023). The relationship between trade and size is expected to be positive, which means that two large

countries would trade more with each other than two small countries would (Shepherd, 2013). It should not come as a surprise that larger countries in general trade more than smaller countries do.

We now have the ingredients to construct the gravity model in a basic form. The following mathematical expression has been inspired by Shepherd (2013):

$$\text{Log } X_{ij} = \beta_0 + \beta_1 * \text{Log } GDP_i + \beta_2 * \text{Log } GDP_j + \beta_3 * \text{Log } distance_{ij} + \varepsilon_{ij} \quad (1)$$

Here, X_{ij} represents the exports from country i to country j . All the beta's (β) are the coefficients of the variables, except for β_0 , which is the constant. GDP_i and GDP_j represent the GDP's for country i and country j respectively, which are the countries' sizes. The $distance_{ij}$ indicates the geographical distance between the two countries and ε_{ij} is the error term. Notice also that the logs from the variables have been taken.

Looking at the equation, you can see that exports are determined by the GDP of both countries and the distance between them. Instead of exports, we could also substitute imports or bilateral trade flows for it. However, how does this model have any political implications? As said earlier, equation (1) is the most basic form of the model. If we want to know the effect international relations has on trade, we need to add the variables to the right-hand side of the equation that represent these relations (Kepaptsoglou et al., 2010). That way, we will know if these variables have a significant effect on our variable of interest on the left-hand side of the equation: bilateral trade flows. But what are variables that represent international relations? Below, potential variables and the literature on them will be discussed.

Intergovernmental organization membership

A way international relations can be represented is through intergovernmental organizations (IGOs). An IGO is 'an entity created by treaty, involving two or more nations, to work in good faith, on issues of common interest' (Harvard Law School, 2023). Most well-known IGOs are the United Nations (UN), World Trade Organization (WTO) and European Union (EU). The idea is that if two countries share membership in the same IGO, that this is a sign of positive relations. This is why it is expected that trade between these two countries would be high. One of the most cited papers on this subject is from Ingram et al. (2005). They find that if two

countries share membership in an IGO, trade between them is increased by \$27,834,000. On top of that, it is expected that trade gains would rise by about \$713,663,760 if a country joins an IGO. It should not be surprising that membership in trade focused IGOs, like the WTO, would increase the trade for the countries involved, since increasing trade is their main objective. Ingram et al. (2005) also found that IGOs that were established with social and cultural reasons had a strong positive effect on the bilateral trade flows of countries as well. This is an important result, since it shows that better social relations and economic benefits are positively related. Does the number of IGO memberships a country shares with another country also have a positive effect on trade? According to Oneal et al. (2003), it does: an increase in the number of IGO memberships from the 10th to the 90th percentile, increases bilateral trade flows by more than 14%. But not all papers find a strong significant positive relationship. Srivastava & Green (1986) find that shared membership only has a significant effect on certain product categories. They argue however that this small effect can be explained by the fact that IGOs at the time were composed of countries that were geographically close to each other. With the data being from 1977 and globalization having increased massively since then, we expect distance to matter significantly less nowadays. Lastly, there was some research that looked at certain IGOs in particular and their effect on world trade. For example, the WTO and its predecessor, the General Agreement on Tariffs and Trade (GATT), both had a significant positive effect on international trade. And this is not only the case for developed countries, also developing countries are profiting from their membership, which is something that has been doubted in older studies (Goldstein et al., 2007). Another study shows that being a member of the European Monetary Union (EMU), which are EU-members that have a common currency, leads to higher trade flows among the members. On top of this, being an EMU member has led to more trade openness with non-EMU members (Larch et al., 2018).

Preferential trading agreements

If countries sign trade agreements with each other, then this is most likely a sign of good relations. This is why we expect countries that have signed Preferential Trade Arrangements (PTAs) or Regional Trade Agreements (RTAs) with each other to also trade a lot. A PTA or RTA is defined as follows: 'a treaty, scheme, or contractual agreement that one or more

governments arrange or agree to rule their trade relationships and market access conditions' (Trade4msmes, 2023). They look pretty similar to IGOs, but the main difference is that PTAs and RTAs aren't organizations on its own. There are however exceptions like the EU, which is an IGO and an RTA. Other examples of PTAs are the North American Free Trade Agreement (NAFTA) and the Asia-Pacific Economic Cooperation (APEC). When looking at some studies, Mansfield and Bronson (1997) analyzed the effect that PTAs and alliances have on trade flows. For the PTAs, their results show that they had a significant effect on trade in the period 1960-1990. This was particularly large for trade between nonmajor powers: PTAs had a larger effect for these nations than alliances had. The authors determined that the following countries were considered major powers during that period: Great Britain, France, the Soviet Union, United States and China. However, it is important to note that this list is based on political-military strength and can be called subjective. Furthermore, the study found that PTAs and alliances together have an even higher positive effect on trade flows than one of them alone (Mansfield & Bronson, 1997). More on this in the next section about alliances. A more recent paper looked at the effect of 733 different PTAs on trade. They found a significant positive relationship but not only for PTAs where tariffs were involved: PTAs that focused on intellectual property rights and investments had strong effects as well (Dür et al., 2014). Looking at a specific continent, African countries have been profiting massively from RTAs in their region. Carrère (2004) found that RTAs, together with currency unions, have contributed massively to the increased trade flows between members of most African regional areas.

Alliances

Arguably the most well-known way countries can express their good relations, is through alliances. Most of these alliances were formed around the Second World War or soon after, so the question is if these alliances are still relevant today. Let us look at some literature then. In the earlier mentioned study from Mansfield & Bronson (1997) they found that PTAs and alliances together have a positive effect on the amount of trade between countries. They argue that this has to do with risk management from private investors and firms. These investors rather want to invest in a foreign country where there is less risk of future conflict with their home country, since a war will hurt them financially. More on the conflict-trade relationship later on. Also interesting is that for major powers, alliances have a larger effect

on trade flows than PTAs have (Mansfield & Bronson, 1997). Furthermore, it seems that the type of alliance and type of international system also matter for the effect on trade. Bilateral alliances, which are alliances between only two nations, seem to have a stronger effect on trade flows than alliances between multiple nations, multilateral alliances, do (Gowa & Mansfield, 1993). Looking at different systems, alliances have a larger effect on trade in a bipolar system than when the world is in a multipolar system (Gowa & Mansfield, 1993). Some explanation on the two systems: when there is bipolarity, there are two major powers competing for international control and other countries then choose to side with one of them (Aktunç, 2022). The most well-known period is the Cold War, where the United States and the Soviet Union were the two major powers. In a multipolarity system, there are more than two nations competing for control. This was the case in the century before the First World War with the Concert of Europe (1814-1914) (Aktunç, 2022). Finally, not only direct alliances but also indirect alliances matter for predicting trade flows. Research from Haim (2016) showed that countries trade more with each other if they are in the same alliance community. The number of alliances that countries share also has a significant impact on trade (Haim, 2016).

Diplomatic exchange

Another way international relations can be measured is through diplomatic exchange / representation. In most countries is the situation that another country is then represented through the existence of an embassy or consulate. These diplomatic missions are mostly a sign of mutual respect between the countries, which is why it represents international relations so well. Unfortunately, the literature on the relationship with international trade is rather scarce. Still, there are some studies that looked at this relationship: Rose (2007) finds that the first embassy in a country leads to an increase of approximately 120% in the exports with the other country. However, the author argues that reverse causality could play a role here. After the first embassy, every diplomatic mission still results in a higher number of bilateral exports, but this effect is heavily diminishing. Embassies also have a stronger impact than consulates have (Rose, 2007). Yakop and Van Bergeijk (2011) show that diplomatic representation only has a significant positive effect on trade for developing countries. This is especially strong for trade between two developing countries, but it is also significant for trade between a developed and developing country. Lastly, state visits by politicians also

seem to have a positive effect on trade. Even though these visits are not officially considered *diplomatic missions*, they are seen as 'the highest form of diplomatic contact between two countries' (Nitsch, 2007). These visits are relatively rare, but one visit is already related to an increase of approximately 9% in bilateral exports. Every visit after that still results in higher trade flows (Nitsch, 2007).

Democracies

There are also some studies that looked into the relationship between the similarity of country's institutions and trade. More specifically, they argue that democratic nations trade more with each other than nondemocratic nations do. Even though this relates more to politics, democracies tend to have better relations with each other due to their similar institution. That is why this relationship is also relevant for this paper. Morrow et al. (1998) estimated that bilateral trade flows increase by more than 133% if trade is between two democratic countries than if it is between two nondemocracies. In the earlier mentioned paper from Oneal et al. (2003), besides the fact that they analyzed the effect of an increase in the number of IGO's, they also looked at the effect that democracies have on trade. An increase in the *democracy score* of countries from the 10th to 90th percentile, which means that countries are considered relatively more democratic, results in an increase of approximately 2.6% in bilateral trade flows. It may not look like a huge increase, but it is statistically significant, which means that democracy really does have an impact.

Conflict

From all the relationships looked at so far, the one between conflict and trade is probably the one with the most literature on it. The well-known paper from Polachek (1980) shows that the relationship is significantly negative. However, most of the studies that analyze this relationship, analyze it in the opposite direction of our interest. They look at the impact trade has on conflict, which Polachek (1980) does as well. Fortunately for us, there were some papers that looked at the effect of conflict on trade. The results of Simmons (2005) show that territorial disputes are significantly costly for the countries involved because of a fall in bilateral trade. A territorial dispute is when two or more countries are in a disagreement over the control of a certain territory. Even if the dispute does not involve military action, it still

hurts these countries (Simmons, 2005). More generally looking at military disputes, a dispute between countries results in a fall of 19% in bilateral trade in the first year and a fall of 3% in the second year (Oneal et al., 2003). For disputes where there was at least one fatality the impact is even greater: a fall in bilateral trade of 33% in the first year and 26% in the second year (Oneal et al., 2003). Looking at conflict within a country, this also seems to matter for trade. Bayer and Rupert (2004) find that civil wars impact bilateral trade for that country in a negative way. However, this is not limited to only the country that is experiencing the internal conflict. Other countries are also significantly affected by the civil war, most of them negatively (Bayer & Rupert, 2004).

General political relations

This subsection will cover the literature that analyzed the relationship in a more broader way: the effect of general political relations on bilateral trade flows. Countries that have more similar interests and cooperate more in general are expected to have higher trade flows with each other. A paper from Pollins (1989) reflects this by showing theoretically and empirically that more cooperation and less hostility lead to a higher level of imports from the other country. The author argues that importers simply maximize their utility when making the decision from which country they import. Naturally, the price and quality of products are the main components, but maintaining a good relationship with people from 'friendly' countries also play an important role (Pollins, 1989). On top of that, trading with a 'friendly' country minimizes the risk of a conflict with the other country, which could have otherwise resulted in a trade disruption (Pollins, 1989). However, a study from Du et al. (2017) argues that the effect estimated by other papers is too big. They show with monthly data from China in the period 1990-2013 that a political shock only has a significant effect on China's exports in the first three months. After that, the effect diminishes (Du et al., 2017). We could however argue that China is a pretty special case. It is a country that has had a lot of political frictions with other countries in the last decades, because of the communist institution it has. Despite this, it is the country with the highest amount of export, as discussed earlier in the introduction. So, a lot of countries restore the trade ties with China soon after a political shock, since they are so depended on them when it comes to trade.

International relations in other ways

For the last part of this section, we will look at some studies that analyzed the relationship between international relations and trade flows in quite a unique way. They defined international relations in other ways than the already mentioned ones. You could see these as the *honorable mentions* of the related literature. One of these is the pretty recent study from Carter and Poast (2020) where they looked at what the effect is of border walls on trade since 1800. These are mostly getting build because of hostile relationships between the nations. They showed that border walls between neighbors indeed have a negative effect on trade. According to the authors, this result makes sense since this could either be the intended effect of the country that build the wall, or it is a price that the country is willing to pay for having the wall up (Carter & Poast, 2020). Another paper analyzed the effect of visa restrictions on bilateral trade flows (Neumayer, 2011). You could say that a country would have less visa restrictions with countries they are friendlier with. They find that if one country requires a visa for the other, then bilateral trade flows are reduced by 19%. If both countries require a visa for each other, trade is even reduced by 25% (Neumayer, 2011). The author however admitted that they could not eliminate the omitted variable bias completely, which makes these results less convincing. The last paper is actually a very famous one: Baier and Bergstrand (2007) investigate the effect that Free Trade Agreements (FTA) have on international trade. An FTA is bit similar to a PTA. They for the most part differ in how they tackle tariffs. FTA's eliminates tariffs for certain products completely, while PTA's only reduce tariffs in most cases. This is the reason why this paper is not part of the *Preferential trading agreements* section. As for their results, they find that an establishment of an FTA increases bilateral trade between countries by approximately 86% after already 15 years (Baier & Bergstrand, 2007). This is a huge positive effect.

All in all, international relations can be defined in a lot of different ways. Most of these are positive relations, and for this reason they are positively related with bilateral trade flows. The only ones negatively related with trade are conflict, border walls and visa restrictions. From all these examples the ones we will empirically test are: intergovernmental organization membership, alliances and diplomatic exchange. This way, we will determine what the overall relationship is between international relations and bilateral trade flows.

Data

If we want to perform an empirical analysis, we naturally need some data. The required data for this will be collected from the Correlates of War (COW) project. The COW was first established with the idea of gathering data about international wars and conflict, but they later expanded this with also collecting data regarding international relations and trade. Most of the datasets contain data from the early nineteenth century till now, which makes it ideal to analyze effects over a longer period of time. Exactly which datasets were used can be found in the appendix.

This subsection will discuss exactly which variables will be used in the research. If we want to examine what the effect is of international relations on trade, then trade will be the dependent variable. We will refer to this variable as *bilateral trade flows*. It is obtained by summing the exports from country i to country j and the exports from country j to country i . An observation will then consist of the bilateral trade between two countries in a certain year. The trade flows are in current US millions of dollars. International relations will be represented by three different variables: *alliances*, *diplomatic exchange* and the *number of IGOs*. These were also discussed in the related literature. For *alliances*, a dummy variable is created. This variable will take the value 1 if two countries had an alliance in a given year and 0 otherwise. To determine if there is an alliance between two countries, we look at four different classes an alliance can fall into: a defense pact, a neutrality pact, a non-aggression treaty or an entente agreement. If a dyad has signed at least one of these four pacts with each other, this is considered an alliance. The variable *diplomatic exchange* works in a pretty similar way, since it is also a dummy variable. It will take the value 1 if, within a dyad, at least one side is diplomatically represented on the other side and 0 otherwise. In a given year, if there was evidence of diplomatic exchange in the form of *chargé d'affaires*, counselors, ministers, ambassadors or interest sections, this will be considered as diplomatic representation. Observations that include this variable will only have data for every five years instead of every year. From 1950 on, this will mean that there will be data for the years 1950, 1955, 1960, 1965 and so on. The *number of IGOs* variable works somewhat different compared to the former two. A dummy variable would be impractical here, since in only 0.75% of all observations, a dyad does not share membership in an IGO. Instead, the variable will count

the number of IGOs where two countries share membership in a given year. The dataset contains membership information for 534 different IGOs.

The chosen period for the research will be from 1950 till the latest observed year in the dataset. The latest observed year differs per dataset, so in the methodology section it will be clarified what the exact period is for every analysis. We decided not to include data from before the wars, since a lot of data was missing and a good number of countries from that period do not exist anymore. Also, for many countries during the wars, the data was missing or inflated because of the conflicts. In the end, we decided the starting year to be 1950. This resulted in the dataset containing information on 188 different countries. Exactly which countries are included can be found in the appendix Table A2. Finally, if any of the variables above were missing for an observation, it got excluded from the sample.

Methodology

This section will cover the analyzation methods that will be used in the results section. It will start with an overview of the data that will be used in this paper. Some information on the variables used will be given to get a better understanding of the dataset.

After that, we will look into the five hypotheses. For this, multiple pseudo-Poisson regression models with multiple high-dimensional fixed effects will be performed (PPMLHDFE) (Correia et al., 2020). The long and complicated name might suggest that this method would be difficult to perform. However, the opposite is true. Correia et al. (2020) created a command called *ppmlhdfe*, which can estimate these models in a relatively fast and easy way. It consists of two parts: the Poisson pseudomaximum likelihood regression (PPML) and the high-dimensional fixed effects (HDFE). One of the reasons we are using the PPML is because it deals with large differences in value of the dependent variable (Correia et al., 2020). For example, in 2012, the bilateral trade between the US and Canada was \$586.205.000.000, while trade between Madagascar and Nauru was only \$1.254. These huge differences could bias the estimation if we do not take them into account. If this was the only reason for using PPML, performing log-linear regressions would also be suitable. However, performing these would

cause problems, since the dependent variable can also take the value zero in our dataset. Because you cannot take the logarithm of zero, we would then have to exclude these observations from our sample. These zeros are, however, crucial for our research. In our sample, the bilateral trade between the US and Cuba was completely zero until 1976, which was because of the terrible relationship between the countries during the Cold War. If we would exclude these observations, we would erase evidence of bad international relations being correlated with low trade values. The PPML can deal with these zero values, which makes it superior over the log-regressions (Correia et al., 2020). As for the other part of the estimation, the HDFE is also necessary. Since we are using a large panel dataset, we want to control for multiple sources of unobserved heterogeneity among the observations (Guimarães & Portugal, 2010). If we would hypothetically say that Spain had some internal financial issues in 2005, this could have caused their bilateral trade with all the other countries to drop in that year. By controlling for this by including country-time fixed effects, we prevent that events like this result in a bias of the estimation.

For testing the five hypotheses, the *bilateral trade flows* will be the dependent variable. The independent variable will differ per estimation. These variables will be: *alliances*, *number of IGOs* and *diplomatic exchange*. The variables that will be absorbed are the fixed effects. These will be two country-time fixed effects (one for country *i*, the other for country *j*) and country-pair fixed effects. The inclusion of these fixed effects will make sure we do not have to worry about reverse causality in our analysis. Lastly, the standard errors will be clustered at the country-pair level. We will then perform four different estimations. The first three will only include one of every independent variable. The last estimation will have all three independent variables combined in one model. All models will also include both country-pair and country-time fixed effects. The formulas of these four models will then look like this:

$$\text{Bilateral trade flows}_{ijt} = \beta_0 + \beta_1 * \text{Alliances}_{ijt} + \delta_{ij} + \delta_{it} + \delta_{jt} + \varepsilon_{ijt} \quad (2)$$

$$\text{Bilateral trade flows}_{ijt} = \beta_0 + \beta_1 * \text{Number of IGOs}_{ijt} + \delta_{ij} + \delta_{it} + \delta_{jt} + \varepsilon_{ijt} \quad (3)$$

$$\text{Bilateral trade flows}_{ijt} = \beta_0 + \beta_1 * \text{Diplomatic exchange}_{ijt} + \delta_{ij} + \delta_{it} + \delta_{jt} + \varepsilon_{ijt} \quad (4)$$

$$\text{Bilateral trade flows}_{ijt} = \beta_0 + \beta_1 * \text{Alliances}_{ijt} + \beta_2 * \text{Number of IGOs}_{ijt} + \beta_3 * \text{Diplomatic exchange}_{ijt} + \delta_{ij} + \delta_{it} + \delta_{jt} + \varepsilon_{ijt} \quad (5)$$

Where *Bilateral trade flows*_{ijt} are the total bilateral trade flows between country *i* and *j* at time *t*. The dummy variable *Alliances*_{ijt} reflects whether country *i* and *j* were in an alliance at time *t*. The variable *Number of IGOs*_{ijt} shows the number of intergovernmental organizations that country *i* and *j* share membership in at time *t*. The dummy *Diplomatic exchange*_{ijt} gives whether there was diplomatic representation between country *i* and *j* at time *t*. The beta's (β) are the coefficients of the variables, except for β_0 which is the constant. The formulas also consist of the fixed effects where δ_{ij} are the country-pair fixed effects and δ_{it} and δ_{jt} are the country-time fixed effects for country *i* and *j* respectively. Finally, ε_{ijt} is the error term.

In the results section, we will first estimate models 2, 3, 4 and 5 with the PPMLHDFE to get an overall view on the relationship between international relations and trade. Next, three regressions will be done with only Model 5 and each estimation will have a different sample period. This way we can see if there are differences in the interested effect between different time periods. The different sample periods will be: 1950-1970, 1970-1990 and 1990-2005. After that, models 2 through 5 will all be performed twice again. However, now the sample of one analysis will only include the 'least developed' countries, while the other will only include the 'most developed' countries. At first, the idea was to have one sample consist of developing countries and the other one of developed countries. But since multiple institutions and organizations measure development of a country in very different ways, it was decided to only include the countries where there was more overlap between the measurements: the least developed and the most developed. The choice of countries is based on the country classification from the UN in 2014, since this is our samples' last observed year. The countries that were considered 'developed economies' by the UN are the most developed countries in our research. The ones that were classified as 'least developed countries' are also the least developed countries in this paper (United Nations, 2014). Exactly which countries are included can be found in the appendix. This then gives us eight regressions to analyze if there is a difference between less developed and more developed countries when it comes to the effect international relations have on trade. As said earlier, the models will all have a different sample period, because of different data sets. Model 2's sample period will be from 1950 to

2012. For model 3, the period is from 1950 to 2014. And lastly, models 4 and 5 will have a sample period from 1950 to 2005.

Results

The results section will start with an overview that gives some information on the variables that are being used. This way, we will get a better understanding of the dataset. These descriptives of the sample will be given below in Table 1.

Table 1: Descriptives of the sample (overall)

	N	Percentage / Mean (Standard Deviation)	Minimum	Maximum
Bilateral trade flows _{ijt} (in millions of US dollars)	589,041	435.86 (5,902.44)	0	655,808.30
Alliances _{ijt}	560,401			
Dyad has no alliance	511,386	91.25%		
Dyad has alliance	49,015	8.75%		
Number of IGOs _{ijt}	589,037	27.73 (12.75)	0	106
Diplomatic exchange _{ijt}	98,893			
Dyad has no exchange	60,904	61.59%		
Dyad has exchange	37,989	38.41%		

Notes: This table shows the overall descriptives of the sample. Column 1 shows the number of observations (N) for every variable. Column 2 reports the mean for the continuous variables with the corresponding standard deviation in parentheses. For the dummy variables, Column 2 reports the percentages. Columns 3 and 4 show the minimum and maximum of the continuous variables respectively.

If we look at the results from the table above, we see that the average *bilateral trade flows* are \$435.86 million. There is also quite a huge gap between the minimum and maximum, with the trade between the US and China in 2014 being the highest in the sample. This huge gap, together with the relatively low mean, is why the PPML is necessary in our analysis. With the *alliances*, it can be seen that only 8.75% of all the dyads are in an alliance. This percentage is so low, because alliances across continents are pretty rare, especially for smaller countries. These alliances across continents mostly exist between Western countries. For the *number of IGOs*, the mean lies between 27 and 28. The dyad with the highest amount is the one between the Netherlands and France in 1998, who shared membership in 106 IGOs. The number of

dyads that had a *diplomatic exchange* is higher than the ones that had no exchange. The reason here is pretty similar to the *alliances* variable: especially between smaller countries that are located on different continents, we see significantly less diplomatic representation.

Next, we will perform four pseudo-Poisson regression models with multiple high-dimensional fixed effects as described in the methodology section. The results of these regressions are shown below in Table 2. The results from the same analysis where all regressions have the same sample can be found in the appendix in Table A1.

Table 2: Results of PPMLHDFE to analyze the effect of international relations on bilateral trade flows (Models 2, 3, 4 and 5)

	Bilateral trade (2)	Bilateral trade (3)	Bilateral trade (4)	Bilateral trade (5)
Alliances_{ijt}	0.567*** (0.094)			0.454*** (0.083)
Number of IGOs_{ijt}		0.018*** (0.004)		0.019*** (0.004)
Diplomatic exchange_{ijt}			0.436*** (0.081)	0.424*** (0.082)
Country-pair FE (δ_{ij})	Yes	Yes	Yes	Yes
Country-time FE (δ_{it}, δ_{jt})	Yes	Yes	Yes	Yes
Constant	9.379*** (0.037)	8.681*** (0.216)	8.887*** (0.076)	7.621*** (0.237)
Observations (N)	551,829	580,459	94,175	94,173

Notes: This table shows the results of four models where a PPMLHDFE is performed. All models have *bilateral trade flows* as the dependent variable. Model 2 has *alliances* as the independent variable, Model 3 *number of IGOs* and Model 4 *diplomatic exchange*. Model 5 has all these variables included together in one regression. All models also include country-pair fixed effects and two country-time fixed effects (one for country *i*, the other for country *j*). The sample periods for the regressions are as follows: Model 2 (1950-2012), Model 3 (1950-2014) and Models 4 & 5 (1950-2005). The numbers in regular font are the coefficients and the ones in parentheses are the standard error. The stars are based on the p-value of the coefficient, where *p < 0.10; **p < 0.05; ***p < 0.01.

Looking at the results from Table 2 will give us some insight on what the effect is of international relations on bilateral trade. However, interpreting the coefficients in a Poisson regression works somewhat different than in a linear regression. The following formula is required to be able to say something about the results:

$$\text{Change in percentage} = (e^{\text{Coefficient}} - 1) * 100 \quad (6)$$

So, we can now interpret the coefficients of the models with the use of this formula. Filling in the coefficient from *alliances* from Model 2, 0.567, gives a change in percentage of 76.30%. This means that a dyad that is engaged in an alliance has on average 76.30% higher bilateral trade flows than a dyad that does not have an alliance. Filling in the other *alliances* coefficient from Model 5, 0.454, gives 57.46% higher trade flows when in an alliance and holding the other variables constant. Both results are highly significant with the coefficients having a p-value of lower than 0.01. This means that we can conclude that having an alliance with another country is positively related to the bilateral trade flows with that country. This relationship also seems to be massive, with an increased bilateral trade of 57.46% to 76.30% in our sample.

Looking at the results from Model 3, we can see that the coefficient of *number of IGOs* is 0.018. Substituting this coefficient in Formula 6, gives a positive effect of 1.82%. Since the *number of IGOs* is a continuous variable, the interpretation of the coefficient goes like this: increasing the number of IGOs that a dyad shares membership in by one, increases the expected bilateral trade flows by 1.82% in this dyad. The coefficient in Model 5, which is 0.019, gives even higher expected bilateral trade flows when holding the other variables constant: 1.92%. Even though these effects seem rather small, they are actually bigger than you think. Remember that the expected trade already increases by almost 2% for every IGO a dyad share. Looking back at Table 1, the average number of IGOs that a dyad share is more than 28. Also, with a maximum of 106, the effect of sharing membership in IGOs can be massive on the amount trade. So, if a dyad shares membership in one more IGO, the expected bilateral trade of this dyad goes up by almost 2% in our analysis.

The results also show that the coefficients of *diplomatic exchange* are positive and very significant in both models. Filling in these coefficients in Formula 6 gives the following percentages: 54.65% for Model 4 and 52.81% for Model 5. Identical to *alliances*, *diplomatic exchange* is a dummy variable, which is why we can interpret these coefficients in a similar way. For Model 4 this means that a dyad that has diplomatic exchange, is expected to have 54.65% higher trade flows than if they had no diplomatic representation. For Model 5, the interpretation is the same, but then with 52.81% higher expected trade flows when holding the other variables constant. This means that if two countries have diplomatic exchange with each other, it is expected that their bilateral trade is at least more than 50% higher in our sample than if they did not have any diplomatic representation with each other.

In conclusion, it can be said that all our variables that represent international relations are significantly and positively related with bilateral trade flows. However, we cannot say that international relations have a positive effect on trade. This is because there still might be biases that we are unaware of that prevent us from concluding that this is a causal effect.

To analyze what the effect is of international relations on bilateral trade flows in different time periods, three PPMLHDFE regressions will be performed next. Here, every regression will have a different sample period. The periods are: 1950-1970, 1970-1990 and 1990-2005. The descriptives of these samples will be given in Table 3 and the results of the regressions can be found in Table 4.

Table 3: Descriptives of the samples (different time periods)

	1950 - 1970 Percentage / Mean (Standard Deviation)	1970 - 1990 Percentage / Mean (Standard Deviation)	1990 - 2005 Percentage / Mean (Standard Deviation)
Alliances_{ijt}			
Dyad has no alliance	91.04%	91.56%	91.50%
Dyad has alliance	8.96%	8.44%	8.50%
Number of IGOs_{ijt}	16.80 (8.87)	23.28 (10.54)	31.44 (11.69)
Diplomatic exchange_{ijt}			
Dyad has no exchange	59.44%	55.87%	67.27%
Dyad has exchange	40.56%	44.13%	32.73%

Notes: This table shows the descriptives of multiple samples that have different time periods. The columns show the mean for the continuous variables with the corresponding standard deviation in parentheses. For the dummy variables, the columns report the percentages. Column 1 shows the descriptives for the period 1950-1970, Column 2 for 1970-1990 and Column 3 for 1990-2005.

Table 4: Results of PPMLHDFE to analyze the effect of international relations on bilateral trade flows with different time periods (Model 5)

	Bilateral trade 1950 - 1970 (5)	Bilateral trade 1970 - 1990 (5)	Bilateral trade 1990 - 2005 (5)
Alliances_{ijt}	0.142 (0.091)	0.237*** (0.069)	0.212 (0.133)
Number of IGOs_{ijt}	0.025*** (0.008)	0.031*** (0.005)	0.005 (0.003)
Diplomatic exchange_{ijt}	0.248*** (0.057)	0.346*** (0.117)	0.165** (0.071)
Country-pair FE (δ_{ij})	Yes	Yes	Yes
Country-time FE (δ_{it}, δ_{jt})	Yes	Yes	Yes
Constant	4.657*** (0.276)	6.286*** (0.231)	9.050*** (0.233)
Observations (N)	17,164	38,359	46,273

Notes: This table shows the results of Model 5 where a PPMLHDFE is performed for three different time periods. All regressions have *bilateral trade flows* as the dependent variable and have *alliances*, *number of IGOs* and *diplomatic exchange* as the independent variables. All regressions also include country-pair fixed effects and two country-time fixed effects (one for country *i*, the other for country *j*). The time periods for the regressions are as follows: Column 2 (1950-1970), Column 3 (1970-1990) and Column 4 (1990-2005). The numbers in regular font are the coefficients and the ones in parentheses are the standard error. The stars are based on the p-value of the coefficient, where *p < 0.10; **p < 0.05; ***p < 0.01.

When looking at the results from Table 4, we can see that the coefficient of *alliances* is only significant in the period 1970-1990. Here, a dyad that is engaged in an alliance in this time period, has on average 26.74% higher trade flows than a dyad that is not engaged in such an alliance. The number of dyads that are in an alliance did not really differ across time periods, so this cannot be a reason why only the coefficient in 1970-1990 is significant. The reason has to be that alliances were more crucial during this period when it comes to trade. History confirms this: alliances played a crucial role during the second half of the Cold War. It is also interesting to note that the coefficient here is far lower than the ones from Table 2.

The coefficients of the *number of IGOs* that are highly significant are in the periods 1950-1970 and 1970-1990. The bilateral trade flows go up by 2.53% for every IGO a dyad shares membership in during the period 1950-1970. This percentage is even higher in the period 1970-1990: 3.15%. The coefficient in the period 1990-2005 is not significant. If we look at Table 3, we can see that the average number of IGOs that dyads share membership in increases every time period. This might be the reason why *number of IGOs* is not significant in the last period. Here, countries already share membership in so many IGOs that sharing in

one more would make a significantly less impact on the international relationship and thus on trade.

The variable *diplomatic exchange* is significant in all three time periods. However, it is only significant on a 5% level in the last period. Still, it is significant enough for us to interpret the results. The coefficient is the greatest in the period 1970-1990: a dyad that had diplomatic exchange is expected to have 41.34% higher trade flows than a dyad that does not have this exchange. For the periods 1950-1970 and 1990-2005 these percentages are 28.15% and 17.94% respectively. It seems that diplomatic exchange in general plays an important role when it comes to bilateral trade, no matter the time period. Still, during the Cold War the impact is again the strongest.

Overall, it seems that during the Cold War (1950-1990) international relations are the most positive and significantly related with bilateral trade flows. This implies that international relations and trade are heavily interrelated during a time where international politics play a crucial role. Also, the impact is the greatest during the second half of the Cold War (1970-1990). A reason for this can be that countries were partially still trading with 'the enemy' during the first half, but this gradually changed as the political rivalry kept going. After 1990, it seems that the relationship between international relations and trade diminishes significantly.

In our last analysis, we want to find out what the effect is of international relations on the bilateral trade flows for different countries. More specifically, we want to know if there is a difference between countries that are highly developed and countries that are relatively way less developed. This analysis will include models 2 through 5 again. Table 5 will show some descriptives of the samples used. Table 6 will then include the regressions for the least developed countries, while Table 7 will include those for the most developed countries.

Table 5: Descriptives of the sample (least developed vs. most developed countries)

	Least developed countries Percentage / Mean (Standard Deviation)	Most developed countries Percentage / Mean (Standard Deviation)
Alliances_{ijt}		
Dyad has no alliance	84.91%	76.27%
Dyad has alliance	15.09%	23.73%
Number of IGOs_{ijt}	35.17 (10.34)	54.95 (10.54)
Diplomatic exchange_{ijt}		
Dyad has no exchange	81.52%	20.81%
Dyad has exchange	18.48%	79.19%

Notes: This table shows the descriptives of different samples that have different countries included. The columns show the mean for the continuous variables with the corresponding standard deviation in parentheses. For the dummy variables, the columns report the percentages. Column 1 shows the descriptives for the least developed countries and Column 2 for the most developed countries.

Table 6: Results of PPMLHDFE to analyze the effect of international relations on bilateral trade flows for the least developed countries (Models 2, 3, 4 and 5)

	Bilateral trade (2)	Bilateral trade (3)	Bilateral trade (4)	Bilateral trade (5)
Alliances_{ijt}	-1.014 (0.645)			1.009* (0.604)
Number of IGOs_{ijt}		0.069* (0.039)		0.122** (0.054)
Diplomatic exchange_{ijt}			-0.249 (0.440)	-0.047 (0.459)
Country-pair FE (δ_{ij})	Yes	Yes	Yes	Yes
Country-time FE (δ_{it}, δ_{jt})	Yes	Yes	Yes	Yes
Constant	5.143*** (0.433)	1.528 (1.845)	3.707*** (0.349)	-2.308 (2.450)
Observations (N)	10,293	11,269	1,510	1,510

Notes: This table shows the results of four models where a PPMLHDFE is performed. This sample only includes all the countries that are considered “least developed”. All models have *bilateral trade flows* as the dependent variable. Model 2 has *alliances* as the independent variable, Model 3 *number of IGOs* and Model 4 *diplomatic exchange*. Model 5 has all these variables included together in one regression. All models also include country-pair fixed effects and two country-time fixed effects (one for country *i*, the other for country *j*). The sample periods for the regressions are as follows: Model 2 (1990-2012), Model 3 (1990-2014) and Models 4 & 5 (1990-2005). The numbers in regular font are the coefficients and the ones in parentheses are the standard error. The stars are based on the p-value of the coefficient, where * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table 7: Results of PPMLHDFE to analyze the effect of international relations on bilateral trade flows for the most developed countries (Models 2, 3, 4 and 5)

	Bilateral trade (2)	Bilateral trade (3)	Bilateral trade (4)	Bilateral trade (5)
Alliances_{ijt}	0.324*** (0.090)			0.295*** (0.084)
Number of IGOs_{ijt}		0.006* (0.004)		0.006* (0.004)
Diplomatic exchange_{ijt}			0.002 (0.098)	0.004 (0.099)
Country-pair FE (δ_{ij})	Yes	Yes	Yes	Yes
Country-time FE (δ_{it}, δ_{jt})	Yes	Yes	Yes	Yes
Constant	10.105*** (0.061)	9.883*** (0.290)	10.164*** (0.097)	9.482*** (0.302)
Observations (N)	13,844	15,100	2,284	2,284

Notes: This table shows the results of four models where a PPMLHDFE is performed. This sample only includes all the countries that are considered “most developed”. All models have *bilateral trade flows* as the dependent variable. Model 2 has *alliances* as the independent variable, Model 3 *number of IGOs* and Model 4 *diplomatic exchange*. Model 5 has all these variables included together in one regression. All models also include country-pair fixed effects and two country-time fixed effects (one for country *i*, the other for country *j*). The sample periods for the regressions are as follows: Model 2 (1990-2012), Model 3 (1990-2014) and Models 4 & 5 (1990-2005). The numbers in regular font are the coefficients and the ones in parentheses are the standard error. The stars are based on the p-value of the coefficient, where * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Let us start again with *alliances*. One of the two coefficients for the least developed countries is significant at only a 10%-level. This means that we cannot say too much about the result, but we also cannot ignore the massive outcome here. A dyad is expected to have bilateral trade flows that are 174.29% (!) higher when in an alliance when holding the other variables constant. The coefficients for the most developed countries are way lower but highly significant. For these countries, bilateral trade is expected to increase by 34.31% and 38.26% between each other if they are in an alliance. These percentages lie considerably lower than the ones from Table 2, where these were 57.46% and 76.30%. The reason for this might be that 23.73% of the most developed dyads had an alliance, while this was only 8.75% for all the dyads. This means that alliances among highly developed countries are less uncommon. Also, the most developed countries trade more in general.

As for the *number of IGOs*, the only interpretable coefficient is the one from Model 5 from the least developed countries. This result indicates that among these countries, a dyad that shares membership in more IGO is expected to have its bilateral trade rise by 12.98%. Considering that the mean is approximately 35 IGOs, it seems that the number of

intergovernmental organizations has a huge impact on trade for relatively less developed countries. For the most developed countries, the expected increase in trade is much lower and the results are also only significant on a 10%-level.

For the regressions that included *diplomatic exchange*, none of the coefficients of this variable turned out to be significant. This is unfortunate, since there is a huge difference in the number of dyads that had diplomatic exchange between the two type of countries, as can be seen in Table 5. This, together with significant results, could have given us a lot more insight on the relationship between diplomatic exchange and trade. Regardless, it is surprising to see that both coefficients are negative among the regressions for the least developed countries.

All in all, since there are so many insignificant results, we cannot get a strong overall conclusion on this part. This means that we cannot accept or reject the fifth hypothesis of this paper.

Conclusion

This study tried to empirically analyze what the relationship is between international relations and trade. This resulted in the main research question being: 'What is the effect of international relations / politics on the bilateral trade flows between countries?'. Looking into five hypotheses helped us in trying to answer this question.

To either confirm or reject the hypotheses, multiple pseudo-Poisson regression models with multiple high-dimensional fixed effects were performed. First, it was found that if two countries were in an alliance, they had significantly higher bilateral trade flows with each other than a dyad that had no alliance. To be exact, these trade flows are expected to be at least 57.46% higher. Secondly, we found that a dyad that shares membership in one more IGO is expected to have its bilateral trade increase by almost 2%. With the average number of IGOs being almost 28, the effect seems to be massive. Thirdly, the results show that a dyad that had diplomatic exchange had bilateral trade flows that were at least 50% higher than a dyad that had no diplomatic representation. Next, we looked if the impact of these variables would differ across different time periods. It was found that the relationship between international relations and trade was the greatest during the Cold War period, 1950-1990.

Especially during the second half of the Cold War, international relations is strongly positively related to trade flows. From 1990 on, the results are all insignificant or weak. Finally, we analyzed the impact of the variables for the least developed and most developed countries. Most of these results were insignificant, so we could not get any strong conclusions from this.

The outcomes of the results seem, for the most part, to be in line with our predictions. All three variables of interest are positively related to bilateral trade and are significant as well. This effect was the strongest during the second half of the Cold War. Overall, this means we can conclude that international relations / politics have a significant positive effect on the bilateral trade flows between countries, especially during the Cold War.

The strengths of this study lie for the most part within the large dataset that has been used. Some of the datasets used had more than 500,000 observations. This, together with the 188 countries included in the paper, makes the research very reliable. Also, the study included three different measures of international relations, which gave us a better view on the relationship. There are, however, some limitations. We could not confirm or reject our last hypothesis because of insignificant results. On top of this, the same analyzation method has been used throughout the whole study. For future research, it might be good to look into different analyzation methods and look at other variables that play a role in the relationship between international relations and trade. Finally, it seems like the Russia-Ukraine war has brought back some tension around the world and in international politics. In future research, it would be interesting to look if this war impacts the relationship strongly again, just like the Cold War did.

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Appendix

Results of analysis from Table 2 but with the same sample across regressions.

Table A1: Results of PPMLHDFE to analyze the effect of international relations on bilateral trade flows with the same sample (Models 2, 3, 4 and 5)

	Bilateral trade (2)	Bilateral trade (3)	Bilateral trade (4)	Bilateral trade (5)
Alliances_{ijt}	0.516*** (0.087)			0.454*** (0.083)
Number of IGOs_{ijt}		0.023*** (0.004)		0.019*** (0.004)
Diplomatic exchange_{ijt}			0.436*** (0.081)	0.424*** (0.082)
Country-pair FE (δ_{ij})	Yes	Yes	Yes	Yes
Country-time FE (δ_{it}, δ_{jt})	Yes	Yes	Yes	Yes
Constant	9.079*** (0.037)	8.009*** (0.245)	8.884*** (0.076)	7.621*** (0.237)
Observations (N)	94,173	94,173	94,173	94,173

Notes: This table shows the results of four models where a PPMLHDFE is performed. All models had *bilateral trade flows* as the dependent variable. Model 2 has *alliances* as the independent variable, Model 3 *number of IGOs* and Model 4 *diplomatic exchange*. Model 5 has all these variables included together in one regression. All models also include country-pair fixed effects and two country-time fixed effects (one for country A, the other for country B). The sample period for the regression is from 1950 till 2005. The numbers in regular font are the coefficients and the ones in parentheses are the standard error. The stars are based on the p-value of the coefficient, where *p < 0.10; **p < 0.05; ***p < 0.01.

Datasets used in the paper

Diplomatic Exchange (v2006.1). *Correlates of War*. <https://correlatesofwar.org/datasets/diplomatic-exchange/>

Formal Alliances (v4.1). *Correlates of War*. <https://correlatesofwar.org/data-sets/formal-alliances/>

Intergovernmental Organizations (v3). *Correlates of War*. <https://correlatesofwar.org/datasets/igos/>

Trade (v4.0). *Correlates of War*. <https://correlatesofwar.org/data-sets/bilateral-trade/>

List of countries included in the paper

Table A2: Countries included in the paper

Afghanistan	Ghana	Panama
Albania	Greece	Papua New Guinea
Algeria	Grenada	Paraguay
Angola	Guatemala	Peru
Antigua & Barbuda	Guinea	Philippines
Argentina	Guinea-Bissau	Poland
Armenia	Guyana	Portugal
Australia	Haiti	Qatar
Austria	Honduras	Romania
Azerbaijan	Hungary	Russia
Bahamas	Iceland	Rwanda
Bahrain	India	Sao Tome and Principe
Bangladesh	Indonesia	Saudi Arabia
Barbados	Iran	Senegal
Belarus	Iraq	Seychelles
Belgium	Ireland	Sierra Leone
Belize	Israel	Singapore
Benin	Italy	Slovakia
Bhutan	Ivory Coast	Slovenia
Bolivia	Jamaica	Solomon Islands
Bosnia and Herzegovina	Japan	Somalia
Botswana	Jordan	South Africa
Brazil	Kazakhstan	South Korea
Brunei	Kenya	South Sudan
Bulgaria	Kiribati	Spain
Burkina Faso	Kosovo	Sri Lanka
Burundi	Kuwait	St. Kitts and Nevis
Cambodia	Kyrgyzstan	St. Lucia
Cameroon	Laos	St. Vincent and Grenadines
Canada	Latvia	Sudan
Central African Republic	Lebanon	Suriname
Chad	Lesotho	Swaziland
Chile	Liberia	Sweden
China	Libya	Switzerland
Colombia	Lithuania	Syria
Comoros	Luxembourg	Taiwan
Congo	Madagascar	Tajikistan
Costa Rica	Malawi	Tanzania
Croatia	Malaysia	Thailand
Cuba	Maldives	Togo
Cyprus	Mali	Tonga

Czech Republic	Malta	Trinidad and Tobago
Czechoslovakia	Mauritania	Tunisia
DR of the Congo	Mauritius	Turkey
Denmark	Mexico	Turkmenistan
Djibouti	Moldova	Tuvalu
Dominica	Mongolia	Uganda
Dominican Republic	Montenegro	Ukraine
Ecuador	Morocco	United Arab Emirates
Egypt	Mozambique	United Kingdom
El Salvador	Myanmar	Unites States of America
Equatorial Guinea	Namibia	Uruguay
Eritrea	Nepal	Uzbekistan
Estonia	Netherlands	Vanuatu
Ethiopia	New Zealand	Venezuela
Fiji	Nicaragua	Vietnam
Finland	Niger	Yemen
France	Nigeria	Yemen Arab Republic
Gabon	North Korea	Yemen People's Republic
Gambia	North Macedonia	Yugoslavia
Georgia	Norway	Zambia
German Democratic Republic	Oman	Zimbabwe
Germany	Pakistan	

Notes: This table shows all the countries that were included in the paper in alphabetical order. Not all countries were included in every analysis, because of missing data.

List of countries considered 'most developed'

Table A3: Countries considered 'most developed' (1990-2014)

Australia	Germany	New Zealand
Austria	Greece	Norway
Belgium	Hungary	Poland
Bulgaria	Iceland	Portugal
Canada	Ireland	Romania
Croatia	Italy	Slovakia
Cyprus	Japan	Slovenia
Czech Republic	Latvia	Spain
Denmark	Lithuania	Sweden
Estonia	Luxembourg	Switzerland
Finland	Malta	United Kingdom
France	Netherlands	United States of America

Notes: This table shows all the countries included in the paper that are considered 'most developed' in alphabetical order. This list is based on the country classification from the United Nations in 2014, where these countries were labeled as 'developed economies'. Not all countries were included in every analysis, because of missing data.

List of countries considered ‘least developed’

Table A4: Countries considered ‘least developed’ (1990-2014)

Afghanistan	Gambia	Rwanda
Angola	Guinea	Sao Tome and Principe
Bangladesh	Guinea-Bissau	Senegal
Benin	Haiti	Sierra Leone
Bhutan	Kiribati	Solomon Islands
Burkina Faso	Laos	Somalia
Burundi	Lesotho	South Sudan
Cambodia	Liberia	Sudan
Central African Republic	Madagascar	Tanzania
Chad	Malawi	Togo
Comoros	Mali	Tuvalu
DR of the Congo	Mauritania	Uganda
Djibouti	Mozambique	Vanuatu
Equatorial Guinea	Myanmar	Yemen
Eritrea	Nepal	Zambia
Ethiopia	Niger	

Notes: This table shows all the countries included in the paper that are considered ‘least developed’ in alphabetical order. This list is based on the country classification from the United Nations in 2014, where these countries were labeled as ‘least developed countries’. Not all countries were included in every analysis, because of missing data.