Who benefits from the Russia sanctions? –
Trade diversion and destruction since 2014

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Content

List of abbreviations

AD/AS	Anti-dumping / Anti-subsidy measures
CFSP	Common Foreign and Security Policy (EU)
CSDP	Common Security and Defense Policy (EU)
E.O.	Executive Order
FE	Fixed Effects
FTA	Free Trade Agreement
EAEU	Eurasian Economic Union
IPR	intellectual property rights
MRT	Multilateral resistance term
PML	pseudo maximum likelihood
PPML	Poisson pseudo maximum likelihood
PTA	Preferential Trade Agreement
OFAC	Office of Foreign Assets Control (US Treasury)
OLS	ordinary least squares
RE	Random effects
TDI	Trade defense instrument
VAT	Value Added Tax
WTO	World Trade Organization

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Abstract

This paper hypothesizes that Western sanctions and Russian countersanctions in the aftermath of the crisis in Ukraine starting in 2013 exert a negative effect on aggregated trade flows between senders and target country. Moreover, the paper hypothesizes a general Russian trade diversion due to the Russian political and economic disintegration with the West and the resulting Russian reorientation toward Asia and particularly China. While such economic sanctions as well as other trade barriers serve as explanatory variables for bilateral trade in a high number of studies, the effect on third parties is often overlooked. Hence, the present paper ties in with prior literature on the effectiveness of sanctions as well as the trade effect of sanctions and focuses on a potential third-party effect. In line with vast parts of the literature on the trade destruction effect of sanctions, the direct trade effect of sanctions as well as the countersanctions was found to be negative. In contrast, evidence on trade diversion could not be observed by means of a gravity model approach with some results even indicating further trade destruction, i. e. a negative trade effect on bystanders. The main policy implication for the effectiveness of sanctions and thus the EU CSDP is that economic adjustment in the sense of trade diversion to other countries appears neither to bust sanctions nor serve as a viable method for evasion.

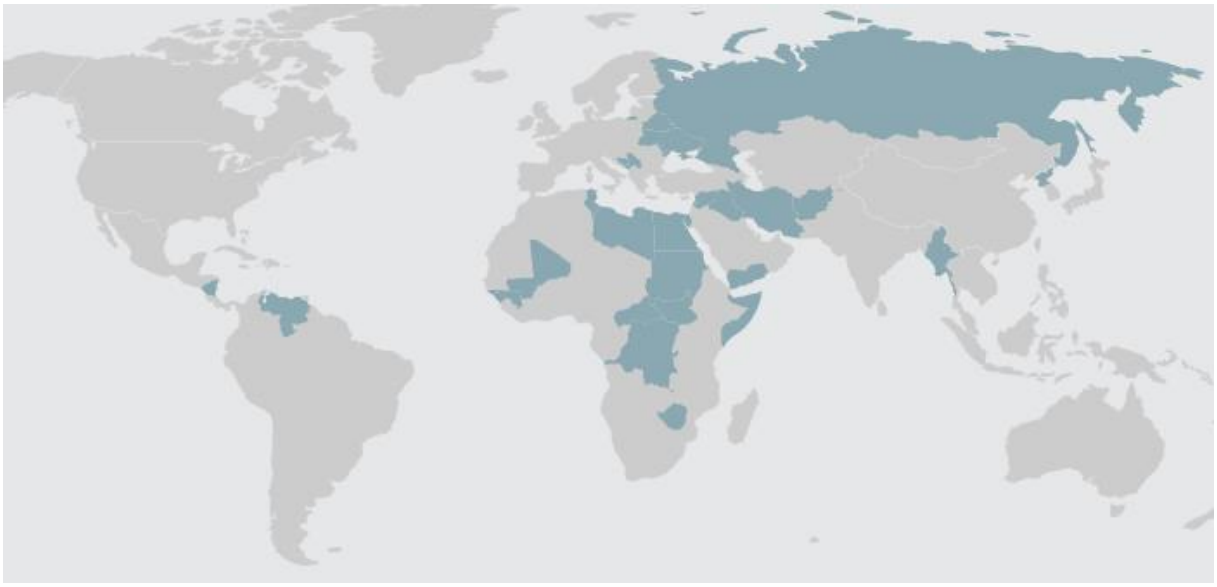
1. Introduction

This paper hypothesizes that Western sanctions and Russian countersanctions in the aftermath of the crisis in Ukraine since 2013 exert a negative effect on aggregated trade flows between senders and target. Moreover, the paper hypothesizes a general Russian trade diversion due to the Russian political and economic disintegration with the West and the resulting Russian reorientation toward Asia and particularly China. In addition to products that are directly affected by Western and Russian sanctions, the proposed theoretical relationship is guided by the argument that the worsening investment and trade climate exert a negative effect on aggregate trade volumes and thus further to Russian trade diversion toward China.

According to Hellquist (2016), in May 2015 countries that were targets of EU sanctions at the time were home to a third of the global population. Felbermayr *et al.* (2019) estimate that up to 15% of global trade is affected by economic sanctions or embargoes. In light of these striking numbers, may prove conducive to consider the EU's sanctions regime, the Common Security and Defence Policy (CSDP) and its impact in more general terms to provide a better understanding of the dynamics and effects of sanctions.

Overall, sanctions as a foreign policy tool have recently been enjoying increasingly great popularity among governments and international organizations, as shown in the following graph.

Figure 1: Countries where EU and/or UN sanctions apply



Source: Estonian Presidency of the Council of the EU (2017).

The annexation of Crimea by Russia has presented a more recent and salient example of sanctions imposed in response to an interstate dispute. Restrictions were mainly initiated by the US, Canada, Australia, Japan and the EU as well as some smaller allies in the political aftermath of the Ukrainian/Crimea crisis starting in 2013. These measures have given rise to questions surrounding their effectiveness and long-term implications, such as political and economic (dis-)integration or the re-orientation of Russia towards other partners. Moreover, the EU's collaboration and institutional interwovenness with the US and other allies plays a relevant role with regard to the global significance of its sanction regime. This is briefly discussed in section 3.1 and the alignment of other senders is described in the annex.

As a first step in working toward providing an answer to the research question it is necessary to consider a brief typology of sanctions as well as their assumed impact on their targets. Here, Felbermayr *et al.* (2019) distinguish sanctions by means of their *type, objective* and *effectiveness* as follows:

Table 1: Key dimensions of sanctions

Main dimension of sanctions	**Categories of the respective dimension**
Classification by type	trade, financial activity, arms, military assistance, travel, and other sanctions
Political Objective(s)	change policy, destabilize a regime, resolve territorial conflict, prevent war, end war, prevent the rise of terrorist groups, end human rights violations, restore democracy, and other objectives
Perceived effectiveness	(Eight categories) from failed sanctions to full acceptance (in sender's view)

Source: Own illustration according to Felbermayr *et al.* (2019).

The table above serves to illustrate the key dimensions of sanctions. Most importantly, the economic effect of sanctions can be used as an indicator of effective sanctions, which precisely shows the motivation behind and relevance of the present paper. The related literature on economic effects is reviewed in section 2.3. In previous papers, economic sanctions and other trade barriers often serve as explanatory variables for patterns of bilateral trade but the effect on third parties is often overlooked. The resulting research question thus aims to contribute

to the puzzle whether such trade diversion effects exist and thus mitigate or, as one could argue, help the target countries circumvent the impact and effectiveness of sanctions. The relevance of this contextual application of sanctions is particularly high as it studies the "strategic triangle" between Russia, China and the US/West (Williams, 2019).

Caruso (2005) further states that the direct negative effect on trade, unlike a number of other quantitative restrictions, comes along with rent-seeking on the part of certain actors which points to the potential influence that may be exerted by any interest groups involved. Hence, Caruso (2005) proposes viewing and evaluating sanctions according to their (domestic) *objectives,* the *actors* involved and thirdly the *object* of sanctions. Importantly, these objectives define the purpose as well as criteria of the success of sanctions. The following overview applies the scope of different objectives to the case at hand while other classifications of (economic) sanctions as well as literature on the interplay of the effectiveness and goals of sanctions are further discussed in section 2.2 and Description 1.

Table 2: Objectives of economic sanctions that explain senders' motivation

Objectives	**Explanation**	**Example/Application**
Primary	Change actions of target's government	Russian actions during the crisis in Ukraine
Secondary	Status, behavior and expectation to senders' governments	Senders confront Russia and signal their determination to achieve a policy change to the target, but to domestic groups as well
Tertiary	International ramifications	Senders send credible threats to future violations of sovereignty and against foreign interference

Source: Own illustration according to Caruso (2005).

In the framework of this paper, financial sanctions or restrictions are considered as part of the economic sanctions and thus not considered separately, although this could be a different approach if the focus was what kind of restrictive measures lead to an economic impact[1]. The

[1] Kirshner (1997) researches the micro-foundations of sanctions and draws attention to disaggregate effects on groups in the target country and different effects due to different types of sanctions. However, due to its "case study" nature the present study only considers general effects and the specific context of the sanction regimes related to the crisis in Ukraine.

involved actors are considered in 3.1 Political framework and actorswhile their *objects* are closely related to the triggered incentive structure of trade diversion which is presented in sect. 3.2.

Given that the results of previous studies, which are described in section 2, indicate that sectors of non-sanctioned products were also affected by the restrictive measures, this study hypothesizes a general effect on the aggregate trade volume between senders and the target. The magnitude of trade volume reduction is assumed to increase with the number of senders as the number of potential trade partners decreases (Popova and Rasoulinezhad, 2016). As a result of the theory and a worsening of the overall business climate, trade flows between senders and target and vice versa are hypothesized to cause trade destruction in both directions. In other words, the Western sanctions are hypothesized to cause damage for Russian imports from the senders as well as Russian exports to the senders. The equivalent mechanism holds for Russian sanctions (see below).

In addition to the hypothesis that the deterioration of relations with the West causes an era of risk and trade destruction, the second hypothesis holds that the lost Russian trade relations are at least partly diverted to other countries. In short, by pushing Russia's trade links out of the Western hemisphere, a theoretical maximum loss (i.e. a state in which Russia approaches autarky, thus experiencing the resulting welfare losses) would only occur if there were no opportunities to reorient the trading routes. Hence, the study explores the effect of these sanctions on third-party "bystanders" who are not directly involved in the conflict. It is argued that Russia particularly shifts its *economic* focus towards China and other Asian countries, thus resulting in an "Asianization" and "De-Europeanization" that characterize its trade dynamics (Popova and Rasoulinezhad, 2016). In addition to the geographic proximity between Russia and other Asian states, this reasoning may be substantiated by Russia's sanctions-induced *political* reorientation away from Europe, the Chinese alignment with Russia on this issue and the emergence of China as a major economic and political player on the world stage.

Hence, the proposed mechanism ties in with the literature on 'busted sanctions' which precisely refers to the fact that third-parties can help the target to alleviate the impact of sanctions, either by providing direct help or strengthening the economic ties with the target (Early, 2015). It derives its motivation from the question of how effects such as trade diversion play a role in determining the effectiveness of sanctions as well as affecting the nexus between EU policy actions and their outcomes, including arguably unintended ones. In sum, the

research question pertains to whether the sanctions on and by Russia destruct trade between senders and target and whether they encourage trade diversion toward China.

For this purpose, the study applies different specifications of the gravity model of trade to the underlying question. The ex-post effect of sanctions and the existence of trade diversion, Russian trade diversion in general as well as to China was estimated by using yearly, quarterly and monthly data and relying on both on ordinary least squares (OLS) and Poisson-Pseudo Maximum Likelihood estimators (PPML) with fixed and random effects. While the standard models include dummies for sanctions and countersanctions, respectively, additional models distinguish between the individual, entity and sectoral level of sanctions as well as the import and export effects of sanctions and countersanctions separately (Dreger *et al.*, 2016b). This is further elaborated in section 4.

Based on the state of the current literature as well as the theoretical and methodological groundwork, the results are discussed in section 5. In addition to political and economic implications for (the effectiveness of) sanctions, the relevance of the present paper can be derived from its repercussions for the Common European Defence and Security Policy (CSDP) as a part of the Common Foreign and Security Policy (CFSP) as well as EU law in general[2]. This relates to the fact that economic sanctions can also be viewed as *trade barriers with a legal nature*. As a result, the legal policy framework of the CSDP as well as the "legality" of sanctions on a global level are issues that need to be kept in mind throughout the present study. With respect to the latter, Russia, supported by China, makes use of the argument that *autonomous sanctions* that are not implemented through international organizations such as the UN are not compatible with International Law (Doraev, 2015). They infer this argument from an interpretation of the UN Charter which views the Security Council as the sole legal sender of international sanctions. In addition, it is argued that the principle of state sovereignty was neglected due to the extraterritorial application of a number of Western sanctions (Ilieva *et al.*, 2018). A third legal argument pertains to the WTO that prescribes that economic sanctions can only be imposed in case of a country's "essential security interests" under Article XXI GATT 1994 (Smeets, 2000)[3]. Moreover, the absence of a global enforcement mechanism both adds

[2] The CSDP is a part of the Common Foreign and Security Policy (CFSP) which is further regulated in Art. 21 to Art. 46 TEU. The CSDP partly follows its own rules and procedures which cannot be discussed in detail in this paper.

[3] Moreover, the prohibition on quantitative restrictions as well as the most-favored nation principle (Arts. XI and I) are argued to prohibit the use of the applied sanctions. Gruszczynski and Menkes (2017) argue that

complexity to this legal debate and further highlights the challenge of 'busted sanctions' as the senders have no or very limited legal authority if certain third countries or so called 'black knights' rally to the target's support. An evaluation of this area of International and EU law requires an understanding of the evasion mechanisms that sanctions trigger of which trade diversion is a key aspect.

Hence, it is necessary to factor in the side-effects of sanctions policy when making the respective decisions. This highlights the relevance of the present paper as it discusses the aspect of export and import substitution as a presumably unintended side-effect of the sanctions policy under the CSDP[4]. A major characteristic of EU sanctions to date is that they are targeted on specific goods, sectors or individuals. As a result, partial rather than complete trade or other sanctions have been imposed. In this context, the CSDP distinguishes three main types of sanctions on Russia, i. e. restricted access to Western financial markets for the energy, finance and defense sectors, secondly trade restrictions for energy equipment and oil exploration technology and thirdly trade restrictions for military and dual-use goods (Christie, 2015). Moreover, the scope of EU sanctions is territorial and personal, i. e. EU sanctions apply within the geographic jurisdiction of the EU and to any national of a member state. This also encompasses legal persons and thus EU companies and their subsidiaries in third countries, e. g. in Russia (EEAS, 2019). In addition, some sanctions also apply to Russian or Ukrainian entities and are *thus extraterritorial as well* which relates to the debate on the legality mentioned above. Further characteristics of EU sanctions include their non-punitive nature and their integration into a wider policy framework such as diplomatic efforts or the promotion of democracy, the rule of law, international law, peace and with the overarching aim of changing the behavior of the target. As in many other policy areas, member states are responsible for the implementation and enforcement of EU sanctions for which the Commission has provided guidance (EEAS, 2019).

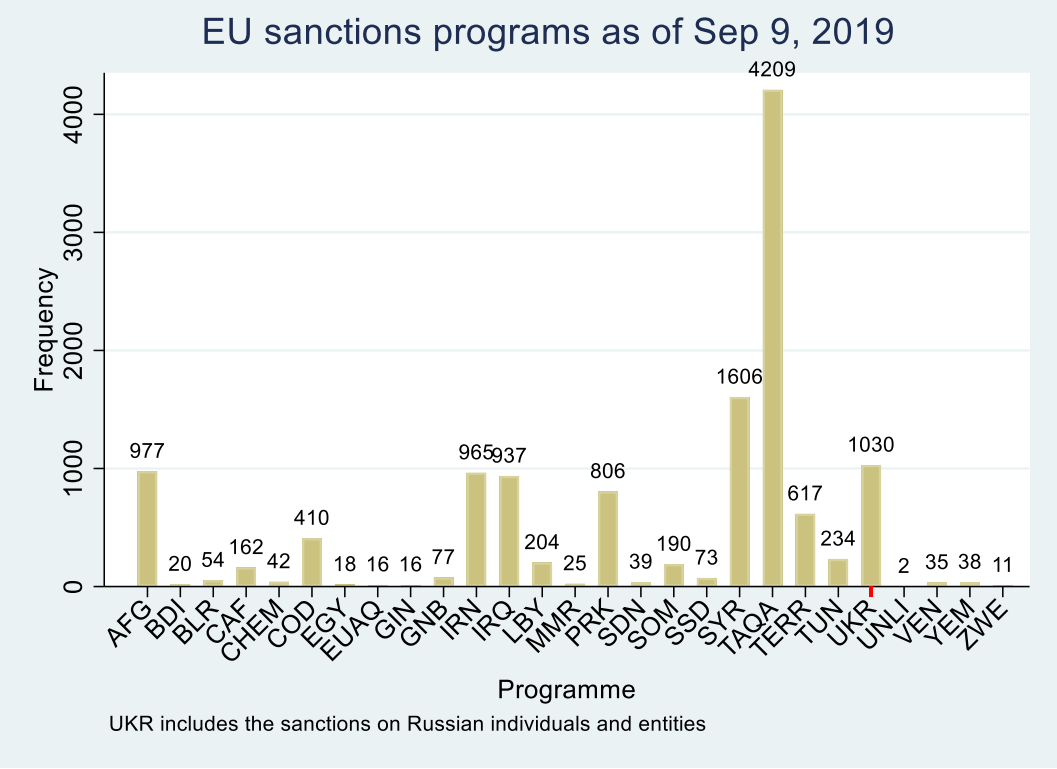
there are strong indications that the (EU) sanctions violate the latter two WTO articles but that the security exceptions seem to be justified, i. e. that the restrictions are compatible with WTO law. Similarly, Doraev (2015) argues that the actions of both the US and Russia have contributed to the legality and justification of economic sanctions through "International Customary Law".

[4] The EU can also impose restrictions under the Generalized Systems of Preferences, i. e. the withdrawal of trade preferences or as the withdrawal of development aid as well, e. g. the ACP-EU Partnership agreement Portela (2012). The focus of this paper is, however, on the sanctions on Russia which are imposed under the CSDP.

In general, direct trade restrictions on and by Russia are limited in scope and thus only constitute one part of the theoretical mechanism. Other direct restrictions and further indirect mechanisms of the sanction regime such as spill-over effects on other sectors, general uncertainty and associated effects that arguably lead to trade destruction and diversion are discussed in more detail in section 3.

The following histogram shows the different EU sanctions programs that are currently in place. Figure 27 in the annex further portray the high fraction of individual sanctions within these programs. Moreover, the scope of sanctions highly differs between the sanctioned countries. For example, sectoral financial EU restrictions are only in place for Ukraine, Syria and Russia (Gurvich and Prilepskiy, 2015). Although the general implications of this research paper are limited by its nature as a case study, the discussion of the trade effect of the sanctions on and from Russia also aims to draw some general conclusions for the effectiveness of multilateral and specifically EU sanctions which is further elaborated in section 2.2.

Figure 2: Number of sanctioned individuals and entities within sanction programs of the EU



Source: EEAS (2019).

2. Literature review

The following literature review is structured in three main aspects: First, a general introduction into the determinants of trade is presented. As the literature often considers *trade costs or trade barriers* as major determinants in general the following overview focuses on variables that shape trade cost and on the extent to which they do so. This further serves to relate the existing literature to the theoretical framework, the trade cost effects of sanctions as well as the variables selected for the statistical model. The second subsection considers political aims and effectiveness and thus the relevance of the present study, while the economic (trade) impact is the central research topic of this paper and is examined in section 2.3 (Portela, 2012).

2.1 Determinants of trade behavior

2.1.1 Economic Geography and economic determinants

The most intuitive variables in the context of the gravity model and determinants of trade are neither explicit economic nor political variables, but geographical. Besides the distance between two countries, economic geography literature generally comprises trade cost aspects such as "natural" borders, e. g. waters or mountains, common borders, landlocked countries or the area of a country. The main proxy of geographical variables are transportation costs, i. e. the more "distant" two countries the higher these costs are and thus the less they trade. Most studies confirm the negative impact of distance (Wang *et al.*, 2010; Anderson and van Wincoop, 2003). The size and the evolution of the distance effect are, however, more an issue of debate (Wang *et al.*, 2010). As part of a meta-analysis of more than 100 papers and almost 1500 distance effects, Disdier and Head (2008) find that the effect is indeed negative and -0.9 on average which is close to "inversely proportionate" as suggested by the theoretical gravity model. Brun *et al.* (2005) and Brouwer *et al.* (2008) state that the coefficients found in the literature is within a range of between -0.8 and -1.3 and Baltagi *et al.* (2014) quantify the range of coefficients, i. e. the elasticity of trade to distance, to between – 0.7 and - 1.5.

Besides distance as a theoretical proxy for transportation costs, Huang (2007) argues that geographical distance also functions as a proxy for cultural aspects or unfamiliarity as well. The author finds that "high uncertainty-aversion countries" are more cautious with respect to informational ambiguity and thus disproportionally trade less with more distant countries,

i. e. the effect of distance is higher the more risk-averse a country's culture is (Huang, 2007). Fratianni and Kang (2006) conclude that the effect of distance on trade is heterogenous in the sense that it is lower for OECD countries and particularly if both countries are OECD members. This supports the argument that distance is a more relevant trade barrier for developing countries. In addition, they find that religion matters in the sense that the distance coefficient is the highest if one country is shaped by Islam and its trading partner by Christianity. The elasticity estimates for a country pair with two of the same or none of the two religions are significantly lower, whereby the lowest elasticity values are estimated for Islamic country pairs or a pair where both are minority religions (Fratianni and Kang, 2006). These results illustrate the interaction of distance with other variables, such as cultural ones and the different mechanisms or proxies the geographical distance variable can represent. The findings also draw attention to the fact that trade and transportation costs are heterogenous across countries which can be the case for sanctions well.

The effect of distance on trade also depends on the respective definitions applied and how it is measured. The following also aims to provide examples showing the variety and often time difficult comparison of effect sizes in the literature. Wei (1996) defines regional distance as "one fourth the distance of a region's capital from the nearest capital of another region" (Head and Mayer, 2002, p. 4). Other options include considering distance as the pure distance between capitals, distance to the nearest border or more complex medium distance approaches. A series of gravity studies use weighted distance, e. g. by population or GDP[5]. Rauch (2016) proposes that distance should be measured as *"weighted harmonic means of pairwise distances of local economic activity",* in order to account for the uneven distribution of economic activity within a country. García-Pérez *et al.* (2016) use a more elaborate approach by developing a joint geographic and "economic distance" vector. The result is a scale of distance in a coordinate system with (other) aggregate trade barriers, a "hyperbolic space" (García-Pérez *et al.*, 2016). Moreover, the choice of the estimator matters. The effect of distance on trade or a border effect is often found to be larger with OLS or Gamma-PML than with a PPML estimator (Fally 2015). Baltagi *et al.* (2014) emphasize that OLS estimates of distance, in particular, are often biased. Hence, they argue that distance as well as effects of similar time-invariant economic geography variables require careful interpretation. Egger

[5] A population-weighted distance indicator is used in the paper at hand due to the reliance on the CEPII data set of bilateral covariates.

(2004) finds that the effect of distance using the Hausman and Taylor two-stage least square approach is twice as high (- 1.7) compared to a generalized least square estimation. This shows the diverse approaches in the International Trade literature and that the choice of the definition and the estimator matter.

With respect to time trends, most studies argue that geographical distance has generally become *less important* over time and relate this to better infrastructure, lower transportation costs due to factors independent from geographical distance as well as globalization trends in general. Borchert and Yotov (2017) estimate that the distance effect on trade flows of manufactured goods fell by 10% within two decades (between 1986 and 2006). In addition, they emphasize that this argument is more valid for industrialized than poorer countries. Similarly, Brun *et al.* (2005) contend that this decreasing role can be observed for richer countries only, which highlights the difficulties developing countries face in catching up in terms of trade and economic integration (Brun *et al.*, 2005).[6] Bergstrand et al. (2015) estimate that the relevance of national borders declined at 2.7% p. a. between 1990 and 2002 but that estimates on the *declining* effect of national borders are often biased upwards. Hence, they state that national borders are still a significant negative "geographical" determinant of trade.

In contrast, the meta-analysis by Disdier and Head (2008) emphasizes that the distance effect depends on the time frame of the respective study. They find that the overall importance of distance slightly decreased between 1870 and 1950, i. e. in an earlier phase of globalization, but *has not lost much of its significance* since then. Furthermore, García-Pérez *et al.* (2016) find that the importance of distance for trading partners' most relevant trade *networks* has actually been *increasing*. Moreover, they argue that trade has become more hierarchical[7] and heterogenous over time. The latter refers to strong regional differences (localism[8]) as well as a decreasing role of distance for high-income countries. In other words, especially small or poorer countries choose their most important trading partners from neighboring or other geographically close countries. Moore (2018) estimates the range of export losses due to the lack of sea access at between 27% and 41% over the period 2005 to 2014. Interestingly, the effect increased within this time period, which would also indicate an increasing role of

[6] This finding also sheds light on the advantage and need of model specifications that account for regional and economic specifics of independent variables.

[7] Hierarchy refers to the finding that bigger countries can establish global trade networks more easily than small economies and are thus at the top of the hierarchy.

[8] "Tendency to concentrate within natural trade communities", see García-Pérez *et al.* (2016, p. 8).

(economic) geography. Fally (2015) confirms that the distance coefficient is non-linear and finds a weaker effect for large trade flows, i. e. the bigger a country the less relevant distance becomes. In summary, there is mixed evidence as there are diverse findings that indicate diminishing, stable as well as increasing importance of distance and other geographical variables. However, the key element which these studies have in common is that larger and richer countries have more power to shape their trade relations and that this "penalty of distance" for small and developing countries is hard to escape (Bergstrand *et al.*, 2013; Egger, 2004; Fally, 2015; Redding and Venables, 2004). These findings could be applied to the Baltic countries or Finland, which heavily depend on trade with Russia and are thus more vulnerable to the sanctions on and by Russia. Moreover, it suggests that trade diversion is arguably easier for large countries such as Russia and emphasizes the interrelatedness of covariates in this overview. Within the contextual framework of the underlying paper, it is relevant to note that economic crises, a sharp drop of the price of oil or the rise of new commercial powers such as China can have significant effects on these variables and structures. In addition, infrastructure and the resulting issue of transportation costs are closely related to economic geography. Hummels (1999) contends that the respective coefficients vary for different products, which shows that transportation costs, and other variables as well, may be relevant for a certain range of products only. This implies that the potential effect of economic sanctions likely depends on the sectoral structure and kind of products that are traded between a country pair as well (Srivastava and Green, 1986)[9]. To conclude this subsection, economic geography is a major determinant and can thus restrict the economic and trade development potentials of certain regions (Redding and Venables, 2004).

Beyond variables that consider economic geography, the *economic "masses"* of a country or country pair play a key role in explaining trade flows. In economic terms, this primarily refers to variables such as GDP, GDP per capita as well as FDI flows. The size of the effect is again heterogeneous across countries[10]. It is generally assumed and has been found that smaller

[9] Another theoretical and methodological strand with respect to trade costs in economic geography literature are so called "iceberg trade costs" or "iceberg melting structures", where a fraction of a good is "lost" in transport with resulting implications in terms of the trade costs. This can be useful as the structure of a model is more straight-forward when trade costs are not required to be an explicit part of the equation but are rather implicitly described by the fraction that is "lost". An explicit framework for estimating these iceberg costs is e. g. provided by Irarrazabal *et al.* (2015).

[10] The concept of the „economic size" of a certain country can have a large overlap with the economic geography literature, which can render this distinction arbitrary to a certain extent. For example, GDP is often highly intertwined with the availability of resources, goods or suppliers. Although there are strong interactions

countries are more open to international trade, leading to decreasing coefficients as GDP increases (Santos Silva and Tenreyro, 2006)[11]. Wang *et al.* (2010) contends that *similarities* with respect to market size are positively related to bilateral trade flows. In addition, the estimation method again plays an important role. According to Santos Silva and Tenreyro (2006), OLS estimators yield higher estimates for GDP than do PML estimators. In general, the average coefficient centers around 1 (Yotov *et al.*, 2016). This approximate unitary "income" elasticity, i. e. the elasticity of a country's income or GDP to trade, suggests that a marginal increase in GDP leads to the same marginal increase in trade. Moreover, it highlights the strong significance of a country's "economic mass" to international trade and is therefore a major determinant supporting the theory and application of gravity models.

FDI flows similarly serve as a positive determinant of trade (Wang *et al.*, 2010). Strong business relations brought about through funding new manufacturing locations, business or research and development (R&D) projects further promote economic ties, contribute to a more integrated value chain and thus ultimately increase bilateral trade flows. FDI flows are not only an explanatory variable for trade but can be modelled with gravity models as well, thereby indicating the closely interrelated and similar theoretical mechanisms (see e.g. Brouwer *et al.* (2008; Gopinath and Echeverria), Gopinath and Echeverria (2004), Mitze *et al.* (2010)). Furthermore, Wang *et al.* (2010) find *domestic* R&D stock to be a positive factor as it positively contributes to the technologies that are available in a country, which is again followed by innovation and product differentiation. This higher specialization and global division of labor ultimately increases the benefits of while simultaneously increases the need for international trade (Wang *et al.*, 2010).

2.1.2 Regulatory determinants

The following "category" of trade determinants centers around the related regulatory or *economic-legal explanations*. In this regard, the key principles of *trade policies* are relevant. A defining characteristic of both trade and trade policy are non-tariff *barriers* (NTBs) as well as

and overlaps, the distinction is made due to different strands of the literature and the gravity concept, which explicitly distinguishes between economic geography variables, such as distance or direct access to a sea port, and "economic masses" such as GDP or population. (But even then, the distinction is not very rigorous, as variables such as population-weighted distance are used in the study at hand and in a number of gravity models).

[11] Heterogeneous effects across countries are in line with the argument that the variable "distance" has a different impact, depending on the size of the economy.

non-tariff *measures* (NTMs)[12]. Kox and Lejour (2005) argue that fixed entry costs due to international regulatory heterogeneity render access to service markets more difficult and thus decrease exports, a logic that is applicable to trade in goods as well. At the same time, harmonization of standards can lead to facilitated market access across different countries (Beghin and Bureau, 2001). Hence, the term non-tariff *measures* is more neutral with respect to the potential direction of the effect on trade. For instance, Kahouli *et al.* (2014) argue that stricter environmental regulation can positively influence trade, which would run counter to the term "barrier". UNCTAD (2012) provides an overview of different NTMs.

Figure 3: Classification of non-tariff measures

A	Sanitary and phytosanitary measures
B	Technical barriers to trade
C	Pre-shipment inspection and other formalities
D	Price control measures
E	Licences, quotas, prohibitions and other quantity control measures
F	Charges, taxes and other para-tariff measures
G	Finance measures
H	Anti-competitive measures
I	Trade-related investment measures
J	Distribution restrictions*
K	Restrictions on post-sales services*
L	Subsidies (excluding export subsidies)*
M	Government procurement restrictions*
N	Intellectual property*
O	Rules of origin*
P	Export-related measures*

Source: UNCTAD (2012, p. 72).

Overall, three distinct main categories of protectionist interventions may be identified: First, non-tariff barriers (NTBs) such as import controls, staid aid/subsidies, public procurement restrictions or other NTBS (capital controls, phytosanitary measures, technical barriers to trade (TBT). Secondly, trade defense instruments (TDIs) such as anti-dumping (AD) or anti-subsidy (AS) measures, safeguard measures, i.e. often implemented by tariffs or quotas. This also pertains to an adequate protection of national security matters such as in the previously

[12] Even though these terms are sometimes used interchangeably and definitions often overlap, it is important to emphasize that the term "barrier" implies a negative effect on trade, as regulations usually imply higher administrative or compliance efforts for firms that want to access certain markets. This also pertains to market-specific designs for the regulated products, i. e. *design costs*. Importantly, NTMs often aim to solve market failures such as information asymmetries or negative externalities and thus aim to improve welfare, even if it comes with a de facto trade restriction, cf. Yotov *et al.* (2016). Some NTMs such as regulatory standards can function as trade barriers, for example due to more difficult market access as a result of higher quality requirements.

mentioned WTO framework. Thirdly, and in line with the focus of this paper, trade *sanctions can consist of a combination of these measures* as well as more assertive policies such as complete export or import embargoes[13].

Another relevant NTM is regulatory transformation in general, which is a major issue, particularly in China, simultaneously entailing both economic liberalization and protectionist measures. Moreover, regulatory changes are often intertwined with economic initiatives, such as the "Belt and Road Initiative", that directly aim at a further integration of trade. Resulting value chains can also directly contribute to a trade effect (Raišienė *et al.*, 2019; Kohl, 2019). Similarly, membership in an economic union as well as preferentialism and free trade agreements (FTAs) constitute related determinants. Although a large part of the literature finds evidence in favor of the *trade creation* effect of economic or currency unions, the specific terms involved constitute a more relevant issue of debate (Baier and Bergstrand, 2007; Bergstrand *et al.*, 2015; Baier *et al.*, 2019; Kahouli and Maktouf, 2015). Rose and van Wincoop (2001) estimate that monetary unions *double* bilateral trade whereas de Nardis and Vicarelli (2003) argue that the Euro increased trade between EMU members only by 9 to 10 percent. Sousa (2012) finds that globalization led to stark decline of this effect since the 1970s. Low effect of FTAs could also be associated with the fact that distance already incorporates a certain share of this effect as members of an economic, customs or political union are usually geographically close (Srivastava and Green, 1986). This mechanism can be similarly applied to trade diversion and sanctions-busting as well if one assumes that primarily geographically close countries or neighbors of the target are involved. Pietrzak and Łapińska (2015) contend that the eastward EU enlargement positively impacted exports from the new to the "old" EU countries and vice versa. Bergstrand *et al.* (2015) find that the positive effect of economic integration agreements is halved if one accounts for changes of time-varying unobservable costs that render *inter*national trade more attractive, e. g. due to technological innovation.

These findings are opposed by studies which state that trade agreements do not necessarily positively influence trade and only if other conditions are met, e. g. if trade flows can be

[13] Within the contextual framework of this paper, phytosanitary measures and regulatory changes, Russian agricultural trade policies that restrict certain imports due to the African Swine fever, and which are therefore not part of the sanction regime, can be considered as an example of a NTB Brady (2019). These regulations clearly changed the legal and economic environment for exports and imports in a way that is arguably similar to import sanctions. However, they are limited to specific regulatory and technical issues and thus do not contribute to a similar negative "signaling game" and worsening investment climate, at least not to the extent as sanctions do in the proposed theoretical framework, cf. Beghin and Bureau (2001).

characterized by a hierarchy or if the agreement actually entails trade liberalization policies or a reduction of trade barriers that affect *both* partners (García-Pérez *et al.*, 2016). Interestingly, García-Pérez *et al.* (2016) argue that preferential trade agreements do not necessarily fit in well with *"natural" trade networks* and thus do not necessarily have a positive effect on trade.

With respect to trade diversion, Kahouli and Maktouf (2015) find that trade agreements in the Mediterranean area result in both trade creation and trade diversion from non-members to members. Carrere (2006) confirms the trade creation effect of most regional trade agreements (RTA). Moreover, the author finds evidence for trade diversion in the sense that exports to and imports from non-RTA members decrease. Yang and Martinez-Zarzoso (2014) find a *pure* trade creation effect of the ASEAN–China Free Trade Agreement (ACFTA). With respect to import and export diversion, they find *both* coefficients to be significant at the 10% level, which would even indicate positive feedback or spill-over effects of the FTA on non-member countries instead of a replacement of trade flows from non-members to members. This is an interesting finding as one can view sanctions as "negative trade agreements" and a corresponding trade effect of sanctions would reduce rather than increase Russian trade flows toward non-sanctioning countries (Frank, 2017). Hence, such a finding would contradict the proposed mechanism underlying this paper and trade destruction alone would prevail. In summary, evidence on the effect of FTAs on members is either found to be non-significant or positive and depends on the specific circumstances. For example, the effect is weaker for more distant pairs and with already existing agreements (Baier *et al.*, 2019). In contrast, there is mixed evidence regarding the effect on third-parties.

FTAs are usually linked with a corresponding reduction or abandonment of *tariff barriers* that can be considered as the counterpart of NTBs. More specifically, this strand of research deals with the impact of TDIs, safeguard measures, AD or AS measures, i.e. often applied by tariffs. Tariffs are further regulated under the WTO framework, which is why WTO membership, or, in panel data models, GATT membership, plays a role in defining tariffs and thus trade. Numerous gravity models estimate tariff-equivalent effects of other determinants of trade, which again shows the relevance of tariffs as a rather intuitive trade barrier (Dean *et al.*, 2005). Another tariff barrier can consist of *taxes* on traded goods (Egger, 2004). Keen and Syed (2006) emphasize that complex domestic tax structures need to be analyzed in order to make conclusions about tax effects. For instance, they do not find evidence for an effect of VATs on

trade. Corporate taxes in turn lead to an increase of exports in the short-run but decrease exports in the longer-term (Keen and Syed, 2006). Interestingly, Egger (2004) comes to the counterintuitive conclusion that higher taxes on traded goods in the exporting country positively influence trade of such products. This can be explained with a higher export pressure if prices in the domestic market are (relatively) high. Other studies incorporate regulatory variables into a single index or proxy variable[14]. For instance, "economic freedom" indexes can serve as overarching frameworks[15]. Egger (2004) uses the "Economic Freedom of the World" dataset which contains several of these variables in continuous, dichotomous or other scales. The Global Trade Alert (GTA) data base monitors trade and other policies as well as NTMs, NTBs that potentially affect international trade. It also distinguishes between almost 30 categories of NTMs and tariff-measures and thus provides a comprehensive categorization of the discussed variables and mechanisms that shape trade (Global Trade Alert, 2019).

The described regulatory determinants can be summarized by the mechanisms they trigger. The "*regulatory protection effect*" increases fixed market entry costs for foreign competitors and thus protects domestic suppliers. As a result, the supply price of imports and thus the respective products are more costly. In addition to these fixed costs, the general compliance costs for all competitors as well as the potential benefits of a regulation determine the "*supply shift effect*" that pertains to the change of supply due to all regulatory benefits and costs for firms. Thirdly, *demand is shifted* as well, e. g. when consumers consider products to be safer as a result of the regulatory change and adapt their consumption accordingly (Roberts, 1999; Beghin and Bureau, 2001). Legal and regulatory aspects such as a common legal system, common judicative approaches, a shared legal history and the like are also strongly interrelated with membership in certain organizations such as the WTO or EU and thus bridge the gap between these interrelated determinants. In summary, there is a wide consensus that trade policy and regulatory characteristics shape trade costs and volume, FDIs, integration of value chains and general welfare. However, the literature emphasizes that there are winners and losers (cf. Kinzius *et al.* (2019), Teti *et al.* (2017), Goldberg and Pavcnik (2016), Li and Beghin (2010), Ma and Lu (2011), Tahir and Khan (2014), Vaubourg (2016). Similarly, sanctions are expected to increase fixed market entry and compliance costs and potentially shift the

[14] As a downside of this approach, such indexes come along with several potential measurement issues of legal and regulatory variables.

[15] A dummy for the presence of a FTA is the standard example which is also applied in the paper at hand as sanctions can be considered as "a negative form of trade agreements", cf. Frank (2017).

demand, for instance if the Russian population boycotts Western products. This leads to the assumption that sanctions policy matters and that it can cause changes in trade costs as well.

2.1.3 Legal, political and socio-cultural determinants

In addition to economic and regulatory variables, the legal and political system and its characteristics constitute a relevant, even though at times rather indirect, determinant of trade. For instance, intellectual property rights (IPR) define a main characteristic in the legal structure of economic interactions as they reduce business uncertainties and thus the decision where trade flows are established. Awokuse and Yin (2010) find that *IPRs* in industrialized countries and China[16] *positively impact imports*, especially for those products that are knowledge-intensive and thus in a high need of protection. In line with this argument, Wilkinson (2012) finds that US exports are higher to destination markets with better IPR protection and enforcement. In contrast, Kazutaka (2012) argues that *IPR* can also constitute a *trade barrier* in the sense that diverging IPR regulations increase market entry and thus supply costs of certain products[17]. Egger (2004) finds that the viability of contracts or the *rule of law positively* influence trade relations. *Institutional quality* is another determinant of reliable trade relations. Álvarez *et al.* (2018) find that institutional conditions at the products' destination matter and have even increased in importance between 1986 and 2012. Moreover, higher *institutional distance* negatively affects bilateral trade. With respect to their sectoral analysis, they claim that the effect is even more important for agriculture or raw materials (Álvarez *et al.*, 2018). These findings would apply to the hypothesized Russian trade diversion presented in this paper to a high extent as the Russian countersanctions restrict agricultural imports and raw materials further constitute a key Russian trade good.

Within the group of political determinants, Srivastava and Green (1986) find a negative effect of the exporter's *political instability*, while the effect of an importer's political instability is not significant. Interestingly, the effect of instability on fuel exports is also not significant. According to these results, it could be argued that sanctions-induced political instability plays a minor role in the context of the Russia sanctions as energy is a major Russian export good (Crozet and Hinz, 2016). This would not support the proposed theoretical mechanism which

[16] This potentially pertains to other developing countries, too, but they are not subject to research.
[17] In the author's paper the result refers to pharmaceuticals.

hypothesizes a general trade destruction and diversion effect. Another major political factor which is often used in combination with economic policy tools, such as tariffs, are trade wars. Trade wars are not to be confused with economic sanctions, although both "policies" can sometimes overlap and have common characteristics. Although trade wars are not an issue of this research, they shape trade and the global repercussions are stronger the more the global or bilateral supply/value chain is impaired by a specific trade war (Klevak *et al.*, 2019).

With respect to socio-cultural and (economic) history, *common colonial ties* have been a major area of study. Due to political ties and established business relations, most studies that consider this variable find a positive relationship on trade. Srivastava and Green (1986) confirm the positive effect of cultural similarity on trade, but also find that this effect varies for different product categories, e. g. with higher coefficients for manufactured goods and food. Other common historical or cultural characteristics include language or religion. In short, *common country characteristics* can stand for historically developed trade routes or trigger psychological mechanisms such as perceived lower market risks due to better mutual understanding, i. e. lower *communication costs*. With respect to other mechanisms of cultural variables*, information costs* describe the fact that firms tend to trade in countries where they have a better understanding of the underlying cultural circumstances. *Search costs* refer to reliability, competitiveness and business practices in foreign markets, which are again related to regional cultural characteristics (Linders *et al.*, 2005; Felbermayr and Toubal, 2010). Overall, common country characteristics are found to be trade facilitating variables. Such common country characteristics are also part of one of the chosen data sets, the CEPII data set on bilateral covariates, and are thus included in the present gravity approach.

Most of the aforementioned variables contribute to certain general developments that shape trade, one of which is globalization. However, these developments are sometimes complex trends and trade can be considered both a result and a cause of globalization which is why this paragraph has more focused on the underlying, interrelated variables. It is also crucial to acknowledge the fact that these determinants can vary considerably according to the chosen regional specifics. For instance, Borchert and Yotov (2017) find that the effect of globalization on trade is u-shaped in the sense that middle-income countries benefit the most in terms of both trade and economic wealth. García-Pérez *et al.* (2016) analyze historic World Trade Atlases between 1870 and 2013 and find a "hyperbolic" geometry of trade which illustrates

the complex nature of trade structures and networks. Overall, the three developments of globalization, hierarchization, and localization provide a framework for the International Trade System (García-Pérez *et al.*, 2016; Borchert and Yotov, 2017).

In the context of the paper at hand, it is important to bear these trade determinants in mind as they also have repercussions on the context and relative importance of sanctions. Moreover, these variables need to be controlled for in the estimate, either by including them explicitly in the model or, as is the case with most country specific or time-invariant variables, implicitly by the application of fixed effects (Allison, 2009). In summary, the covariates can be grouped into geographic, economic, political, legal and cultural determinants of trade (Srivastava and Green, 1986). (see Table 9 for a summary).

2.2 Effectiveness of sanctions

2.2.1 Definitions and background

An additional and equally relevant part of the literature review deals with the effectiveness of sanctions. More specifically, the primary purpose of sanctions, types of sanctions, as well as the extent to which a country is meant to be affected (scope) are reviewed. First, the characteristics of sanctions are highlighted in order to lay a theoretic groundwork for the review and evaluation of sanctions. Galtung (1967, p. 379) defines sanctions as

"actions initiated by one or more international actors (the "senders") against one or more others (the "receivers") with either or both of two purposes: to punish the receivers by depriving them of some value and/or to make the receivers comply with certain norms the senders deem important."

Galtung thus follows an approach that defines sanctions by their *purpose.* Other definitions emphasize the intended *coercive nature* of economic sanctions, which involves imposing costs on the target as well as acceptance of losses by the senders (Bapat *et al.*, 2013; Eland, 2018). Alternative approaches define sanctions by their *tools,* as they constitute one among many sub-policies of foreign policy such as the CSDP and thus contribute to a more comprehensive strategy (Eland, 2018). Hence, the present paper makes use of the latter practice of characterizing economic sanctions by their *economic instruments*, i. e. by considering the means rather than ends. Such an approach is also suited for the present purpose as the policy objective is largely political or military and the economic damage is commonly perceived as a

mean to this end. The advantages include a clear distinction between means and ends, a circumvention of a more complex and rather country-specific "policy goal" definition and, lastly, enables a facilitated comparison between these sanction strategies (Baldwin and Pape, 1998). Table 17 and Description 1 in the annex further present different definitions and categories of the effectiveness of economic sanctions. The following table integrates the various characteristics and "items" of sanctions into the paper at hand. This overview also shows that the present paper only touches upon a limited share of issues with respect to sanctions and their impact (marked red).

Table 3: Categories and (sub-)issues of economic sanctions and their effectiveness

Aims	**Targets**	**Type/ Tools**	**Scope**	**Duration**	**Implement.**	**Consequences**	**Evasion**
Policy changes	Whole gov't/ country	Diplomatic	(Extra-) Territorial: 1) Domestic entities	Limited	State authorities	1) Intended -> according to aims	Stockpile supplies
Destabilization	Pol. or econ. elite	Military, arms embargo	2) Foreign entities	Renewal required	Private sector contribution	2) Unintended: Rally round the flag, strengthening a certain fraction in the conflict	Creating safe havens
Disruption of a military action	NGOs	Individual (travel bans, asset freezes)	3) Global	Unlimited	Review: Required, recommended or not necessary?	Corruption, Humanitarian and human rights violations	Substitute products
Lower target's military potential	Firms / (Non-state) entities	Export/import bans; Key econ. sectors: Prohibition to conclude certain contracts	Temporal: 1) For new contracts only	Short-term or long-run aims?	Enforcement: Inspection and seizure possibilities	Disrupting economic supply chain and reducing long-term leverage on target; Lack of energy security	Import same products from other "origin"

Signal norms	Conflict parties, Terrorists	Restricted access to financial markets	2) For existing contracts as well		Cooperation of third parties	Trade diversion	Trade diversion
	Regime supporters				Adjustments if necessary?	Negative spill-overs on bystanders	-> Busted sanctions?

Sources: Hufbauer and Oegg (2003), Peksen (2019), Galtung (1967), Mensah and Economy (2019), Wolcott (1997).

2.2.2 Determinants of effective sanctions

Sanctions can be viewed as a tier on the "diplomatic escalation ladder" and can thus be evaluated accordingly. The use of this foreign policy tool indicates that a conflict has surpassed a purely diplomatic stage while a military conflict is still perceived as too risky or linked to high risks that the parties are not willing to take (Hufbauer, 2007). Christie (2015) argues in favor of the effectiveness of this foreign policy tool as they signal unity, responsibility, make a strong commitment to conflict resolution and, lastly, bolster the credibility of the senders. Moreover, the author explains that Russia was forced to activate part of its foreign exchange reserves while the economic damage for the senders is "affordable", meaning the sanctions constitute a cost-effective tool of foreign policy. Schneider and Weber (2018) propose to evaluate Western sanctions on Russia under the premise that arguably "larger parts of Ukraine would now be under the control of the thugs and Mafiosi (…) on the Crimea and in Donetsk and Lugansk oblasts" without the fierce reaction of sanctioning countries. Hence, Schneider and Weber (2018) argue that the sanctions on Russia did or do not lead to a revision of the Crimea annexation, but that Russia or local authorities *possibly* refrain from applying the same referendum or annexation process in eastern Ukraine. This can be viewed as a result of the signal the sanctions send as well as the economic damage they arguably cause. In addition, they compare this case to the sanctions on Iran where a further escalation has been avoided. Similarly, Moret *et al.* (2016) argue that this deterrent role or positive externality of sanctions may not impact current decisions in the target country as their leaders may fear "to lose face", but may possibly influence future situations, which would render sanctions effective.

Another important argument in favor of the effectiveness is the destabilization effect on the target's government. Marinov (2005) presents evidence on this effect considers it a necessary condition of successful coercion. Secondly, the chance of reaching a compromise in exchange for the lifting of sanctions make incumbents more willing to bargain with senders and to consider a (partial) policy change. With respect to concerns about a resulting rally-round-the-flag effect, parts of the literature argue that Putin cannot keep his promise to improve the economic situation (Seitz and Zazzaro, 2019). As a result, his bond with the population disappears in the long run, which would render a regime or policy change more likely. This potential outcome again incentivizes good behavior or diplomatic efforts towards the senders. Hence, this strand of the literature considers a rally-around-the-flag, if at all, only as a short-term effect but expects negative repercussions for the Kremlin on a longer horizon (Frye, 2019; Bunce, 2017)[18].

Beyond the theoretic arguments that side with either sanction-advocates or opponents of this tool, the key question in the literature is *why and under what circumstances* they constitute an effective tool of foreign policy. Hence, findings that argue that sanctions are *conditionally effective* are discussed in the following. Hufbauer (2007) describes three central theoretical components that are incorporated in many of the following studies. *Size* refers to a higher likelihood of success if the sender is bigger than the target, (trade) *exposure* refers to higher effectiveness if the senders' economic leverage on the target is more significant and *cooperation* refers to the expectation that multilateral sanctions are more effective (Hufbauer, 2007; Kirshner, 1997). Within the scope of a SWOT analysis on the EU sanctions policy toward Russia, Dolidze (2015) identifies the s*ectoral nature of the tightened sanctions as strength*, although she adds that even stronger sanctions would add credibility and show more support to countries such as Moldovia, Georgia or Armenia. Hence, she considers the depreciation of the Ruble, capital flight and lower investments as success, but only if the sanctions ultimately lead to a change in policy. The author therefore urges sanctioning countries to combine restrictive measures with support of Russian civil society and democratic structures, i. e. a "better balance between soft and hard-power tools". A *weakness*, unsurprisingly, consists of the *lack of solidarity* within and outside the EU toward Russia.

[18] Examples of shrinking public support in Russian history include the aftermath of the First World War, the collapse of the Soviet Union or the return to more autocratic regime after a period of "liberal democracy" under Yeltsin Dreyer and Popescu (2014a).

Although the CSDP requires decisions on this issue by unanimity, critical voices from e. g. the Visegrad countries or Serbian cooperation with Russia as well as general cooperation in energy issues serve to partly counter the effectiveness of sanctions. An *opportunity* of the sanctions lies in strengthening an independent European Defense and Security Policy or deepening the transatlantic *defense cooperation* as well as a reorientation towards "more reliable" markets than Russia. *Energy dependency* is identified as the respective *threat*. This further highlights the relevance of Russian trade diversion or (reducing) the energy dependency on Russia.

Overall, the relative power of the sender in relation to the target plays an important role. Political instability and economic weakness of the target are thus shown to be positive determinants with respect to the effectiveness of sanctions in Hufbauer *et al.* (1990), Lam (1990), van Bergeijk and van Marrewijk (1995) as well as in Jing *et al.* (2003). Closely linked to these results are the positive effects of higher sanctions costs for the target (Dashti-Gibson *et al.*, 1997; Chan and Drury, 2000; Hufbauer *et al.*, 1990; Kaempfer and Lowenberg, 2007; Dehejia and Wood, 1992; Bapat *et al.*, 2013). Lam (1990) shows that the costs to the sender represent a negative factor. Similarly, Jing *et al.* (2003) argue that *economic health and political stability of the target* render the effectiveness of sanctions more difficult. Hufbauer (2007) distinguishes between the target's economic conditions of *distress, significant problems* or a *strong and stable* economy, which function in conjunction with sanctions as the determinants of success. This is important for the case at hand in so far as the depreciation of the Ruble and the oil price drop have major negative repercussions on the Russian economy.

Hufbauer *et al.* (1990) find a success ratio for sanctions that lies between 20 and 52 percent, *depending on the policy goal*. On average, they find that one in three sanctions regimes achieves the desired policy change or political outcome if one does not control for military interventions that happen at the same time. Moreover, the success rate is lower if the policy goals are *overambitious*, e. g. where a *major* policy change is desired. Similarly, Dashti-Gibson *et al.* (1997) conclude that more ambitious sanctions are less likely to be successful. Smeets (2000) argues that *conflicting goals* of economic sanctions and the WTO framework (in short the goals of trade liberalization versus measures aimed at restricting trade for political reasons) can impede sanctions, as trade liberalization increases the availability of alternative trading partners and thus leaves room for evasion methods, including trade diversion. Jing *et al.* (2003) argue that the effectiveness is higher if the relations between sender and target

prior to the imposition of sanctions were *better,* which is line with Hufbauer *et al.* (1997), Lam (1990) and Bonetti (1998). Bapat *et al.* (2013) and van Bergeijk and van Marrewijk (1995) find similar relationships, i. e. a higher trade dependence of a target or better trade relations in general render sanctions more effective. This hints at the potential mechanism that the *change in international or trade relations* plays a role. As the EU is Russia's major trading partner, this is an important finding for the present research question.

Moreover, Jing *et al.* (2003) find the counterintuitive result that success is *less* likely the larger the *size of a sender is relative to the target*. They draw attention to the potential mechanism that other countries are more keen to help the target if they perceive the sender as "bullying the underdog". Tsebelis (1990) develops a game-theoretic model of economic sanctions and finds a slightly higher success rate (33 out of 83 cases). He relates the limited success of economic sanctions to the fact that sender countries fail to choose an adequate *design of sanctions* due to incomplete information. He also argues that the "size" of the sanction has no impact on the equilibrium of strategies. Kaempfer and Lowenberg (2007) state that *incomplete information* explains why sanctions are imposed in the first place. They relate this to the game-theoretic assumption that sanctions are imposed only if the *expected* gain for the senders and targets are higher than their costs. Hence, the "counterproof" is that with complete information one would not observe any sanctions as the target would adapt its policy preventively. With incomplete information, higher levels of commitment of the senders increase the expected costs for the target and thus lead to more effective sanctions. In short, the *perception* of the sanctions in the target country matters (Ang and Peksen, 2007).

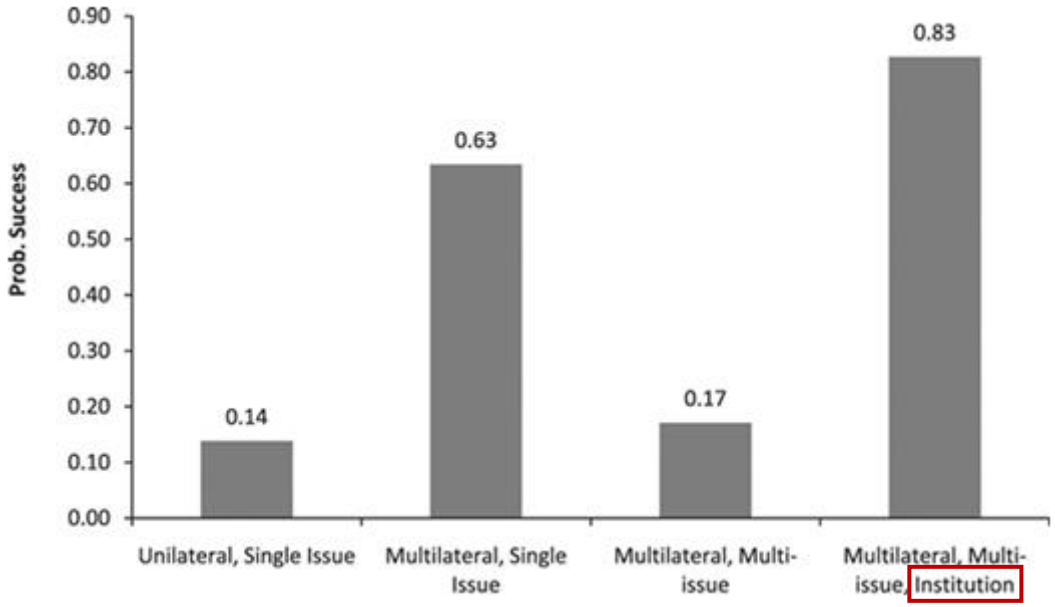
Another key factor for success (or the lack thereof) includes the selection of an adequate *type and design* (Felbermayr *et al.*, 2019). Jeong and Peksen (2019) conclude that targeted individual sanctions fail more often than "traditional" sanctions with economic restrictions. Hufbauer *et al.* (1990), Dashti-Gibson *et al.* (1997) and Chan and Drury (2000) find that financial sanctions are more likely to achieve their policy goals than trade sanctions. Bapat *et al.* (2013) distinguish *threat and imposition stage* and conclude that financial sanctions do make a difference in the desired policy output if they are implemented. However, the authors also note that the threat stage itself can explain a relevant fraction of the effectiveness. One could argue that a general worsening of diplomatic relations or the initial stages on the diplomatic escalation ladder may already suffice to achieve one's policy goals. Moreover,

economic sanctions are intended to hurt more in the long-run which relates to van Bergeijk and van Marrewijk (1995) who discuss a potential "*learning process*" on the part of a sanction's target. They distinguish between anticipated sanctions that constitute an effective *threat*, others that take time to work, and a third group of sanctions that never work. They contrast this learning process, which ultimately serves to make targets comply with *economic adjustment* processes. If economic adjustment is prevailing, sanctions are less likely to be effective and vice versa. In short, the two alternatives of political compliance and learning processes versus economic adjustment as well as the underlying structure of the sanctions determine their effectiveness. Some findings show that sanctions are less effective if they are in place longer (Hufbauer *et al.*, 1990; Bolks and Al-Sowayel, 2000). This is evidently dependent on the extent to which economic adjustment, i. a. trade diversion, is possible and is therefore the core interest of the paper at hand. Hence, the analysis of economic sanctions is more meaningful after a certain period and with additional models that control for the evolution of the effect, as is applied in the paper at hand (Dreyer and Popescu, 2014a).

Kaempfer and Lowenberg (2007) argue that those sanctions are effective that have differential effects on opponents and supporters of the current regime. This follows the logic that inherent conflict-generating tendencies exert more pressure on the regime not to lose support. This again is related to the regime type and intuitively explains the findings that sanctions are more effective if the target is a democratic country (Bolks and Al-Sowayel, 2000; Nooruddin, 2002). On the contrary, Jeong and Peksen (2019) do not find that democracy is a significant predictor but agree that the domestic institutional characteristics of the target matter. They contend that the *number of veto players* are *positive determinants* as more veto players exacerbate policies that do *not* comply with the senders' requirements. Bapat *et al.* (2013) even argue that the effectiveness is higher for *non-democratic targets* whereas the democratic nature of the *sender* is a *positive* factor. Kaempfer and Lowenberg (1999) argue that *multilateral sanctions* are more powerful in terms of the economic damage they cause due to fewer possibilities for evasion or trade diversion. In contrast, they are less effective in terms of a desired behavioral change if multilateral coalitions fail to cooperate, if the target manages to manipulate the sender coalition or if the sanctions undermine the political coordination of opposition groups in the target countries, e. g. by unintentionally supporting rally round-the-flag tendencies. In fact, a number of studies do claim that *multilateral sanctions are less effective than unilateral ones* or that cooperation is at least overvalued by policy makers (van

Bergeijk and van Marrewijk, 1995; Lopez and Cortright, 1995; Drezner, 2000; Miers and Morgan, 2002; Heine-Ellison, 2001). Bapat *et al.* (2013) discern these effects and find that multilateral sanctions are more successful than unilateral ones if they refer to a *single issue* only and are bargained through an *international institution*. The underlying mechanism suggests that it is more difficult to break the coalition in such cases (Abbott and Snidal, 1998; Keohane and Martin, 1995; Bapat and Morgan, 2009). Bapat *et al.* (2013) further note that it is indeed in line with previous research *in the event* one controls for these two variables. The authors estimate the following predicted probabilities for success:

Figure 4: Predicted success of sanctions according to the number of stakeholders and issues



Source: Bapat *et al.* (2013).

As already noted, sanctions can be undermined by potential evasion methods. These are again dependent on the extent of *third-party assistance* to the target, which is shown to be a negative determinant by Hufbauer *et al.* (1990), Bonetti (1998) and Chan and Drury (2000). With respect to the sanctions on Russia, "assistance" in a narrow sense could only be observed in terms of "not joining the sanctions", as even the members of the EAEU refrain from joining the *counter*sanctions. Overall, Kirshner (1997) emphasizes that the mechanisms itself also depend on the underlying design and aims of sanctions:

Table 4: Characteristics and advantages of sanctions by type

Type of sanction	Characteristics and (dis-)advantages with respect to effectiveness
Aid	Good for signaling, "positive" sanctions
Asset freezes	Public signal, arguably no market reaction, legally complex
Finance	Can be informal and prevent market circumvention to a high extent
Money	Fast implementation, can be secret but effect may fade over time
Trade	Slower implementation, market incentives for evasion (see section 3.2) and hard to revert if sanctions are lifted

Source: Kirshner (1997, p. 41).

2.2.3 Ineffective or counterproductive sanctions

One central of the literature that alludes to the ineffectiveness of sanctions are so-called black knights, i. e. countries that intervene on behalf of a target country. Cilizoglu and Bapat (2018) argue that targets try to render sanctions ineffective by credibly demonstrating that they are "sanctions-proofed". In the resulting economic and political uncertainty, the authors find that countries with a low credit rating and high interdependence with the senders' markets are more likely to be targeted. A failure to assess these criteria can lead to an inapt sanction design and thus ineffective sanctions. Overall, the effectiveness of sanctions is to a great degree dependent on powerful third parties and allies. Early (2015) relates this to the fact that targets are either provided with foreign aid from their supporters or that "sanctions-busting trade" renders sanctions ineffective. Close allies of senders contribute to the latter, in particular, which means they are "often the worst enemies of these sanctions" (Early, 2015). Hence, legal and illegal trade diversion is a major explanation why sanctions are not effective. That is why the present paper researches trade diversion effects of the sanctions on Russia.

Early and Peksen (2018) further argue that at least parts of this trade diversion is likely to move to the black market. They find strong evidence that sanctions lead to an increase of such "informal economies" by disrupting the normal incentive structure of market participants. Hence, sanctions can change the economic incentive structure and weaken senders' and targets' control mechanisms over certain parts of the economy[19]. Furthermore, Jeong and

[19] As such developments are also not included in official trade flows, they constitute one of the major challenges to the validity and accurateness of the methodology and results of the paper at hand.

Peksen (2019) argue that literature that argues in favor of sanctions partially suffers from a sender-biased interpretation, the use of static data, an insufficient consideration of non-state actors and, further, that the effect needs to be integrated in the whole policy framework, i. e. it is at times not portrayed in isolation from other developments (Jeong and Peksen, 2019).

With respect to the primary goal of Western sanctions, a change of Russia's policy or at a minimum its interventionist policy in Ukraine, Wang (2015) refers to unsuccessful coercion or the non-existent Russian policy reaction to this foreign policy or the CSDP. Schneider and Weber (2018) argue that the sanctions could be considered unsuccessful if one takes the implementation of the Minsk agreement as benchmark. Moreover, a possible reason for the lack of effectiveness can be traced back to the limited scope. The authors compare Russia with the more successful case of Iran, where the international payment system SWIFT was used to exert pressure and further hint to possible lobbying efforts by Western business organizations.

Sanctions themselves as well as the effect of sanctions are also debated issues between theories of the state as well as diplomatic interaction theories. Wilhelmsen and Gjerde (2018) discuss the non-static characteristics of foreign policy and diplomatic interaction between Russia and Norway and find that realist-mode communication and behavior increasingly dominate the discourse and assert that the Ukraine crisis and the imposition of the respective sanctions function as a game-changing incident in Russian-Western relations. They conclude that the "diplomatic management mode" is used less frequently and intensively when sanctions are in place, even though diplomacy would be required even more. This finding of a negative diplomatic spiral and upward escalation exacerbates peaceful and cooperative solution strategies, including the ease of sanctions. This result is indicative of the longevity and path-dependency of sanctions, resulting in high costs for both sides which is associated with a lower probability of success, i. e. rather ineffective sanctions.

Besides results on effective and non-effective sanctions or the conditions thereof, Yurgens (2014) draws attention to the *counterproductive consequences* and the fact that sanctions tend to stabilize rather than eliminate support for President Putin's regime. Public opinion thus plays a role and can impede the sanctions' aims. Findings on this "rally round the flag effect" and its longevity center around Putin's rise in popularity (Kazun, 2016; Connolly, 2016). This mechanism of "counterbalancing a domestic lack of success with external strength" is caused by the perception that Western hostility or pure punishment is the primary goal of the

sanctions. Moreover, the fact that (parts of) Russian *society* perceive themselves as targets renders that element more responsive to respective propaganda (Dolidze, 2015). Seitz and Zazzaro (2019) argue that the rally-around-the-flag effect is stronger if the population is geographically closer to the outside threat. Grauvogel and Soest (2013) contend that non-democratic regimes in particular tend to incorporate outside threats and sanctions in their legitimation strategies. In addition, sanctions that hit the entire population, such as economic sanctions, are more likely to create rally-round-the-flag and other reverse effects. Similar to Grauvogel's argumentation, Heine-Ellison (2001) reasons that targeted sanctions regimes are more effective and humane than regimes that include trade embargoes. She argues that these trade embargoes have unintended consequences and operate by imposing human suffering, and therefore emphasizes the need for effective monitoring schemes. This again is in line with Allen and Lektzian (2013) who argue that the public health system can be affected in a way that is comparable to the impact of military conflicts. Hence, humanitarian consequences need to be accounted for in the sanctions design and are a major obstacle to "effective" sanctions. Jeong and Peksen (2019) add that sanctions can induce other negative externalities such as an increase of authoritarianism, state repression or poor governance. Another unintended outcome is that financial restrictions pressure a target to develop alternative payment systems which could render the global financial system more fractured and vulnerable to terrorist attacks (Dolidze, 2015). A summary on most of the aforementioned factors can be found in Kaempfer and Lowenberg (2007).

In summary, the question whether sanctions are an effective foreign policy tool remains an important debate in International Relations. Effectiveness ultimately also depends on the relative harm done on the sender or non-targeted countries or entities, i. e. the ratio between the success or achieved policy change and the costs of sanctions. These costs do not only pertain to political and economic variables, but to social ones as well. Moreover, effectiveness largely depends on the definition and aims of different kinds of sanctions. For instance, a related aspect is whether economic damage can be considered as success of sanctions or rather as means to an end, which would ultimately be the criterium for success. In short, the question whether economic sanctions hurt the target country does not necessarily give an answer to whether they are effective or not (Dreyer and Popescu 2014). The argument for decreased leverage on Russia even claims the contrary in the sense that trade destruction

would damage the senders as their long-term economic leverage on the target decreases. This again depends on trade diversion as the core research question of the present paper.

2.3 Economic and trade effect of sanctions

Having considered determinants of trade and the conditions under which sanctions can be effective, the following reviews the literature on the economic effects of sanctions. Moreover, the section functions as interface of both strands of the literature and relates them to the core research topic and, in so doing, provides a groundwork for the theoretical framework. It thereby ties in with previous studies on the trade creation, destruction and diversion effects of economic sanctions. Overall, literature on trade destruction and creation effects is much more advanced than are studies focusing on trade diversion, which also pertains to the respective application to the crisis in Ukraine.

2.3.1 General findings

Caruso (2003) applies the gravity model and finds that *comprehensive* unilateral US economic sanctions between 1960 and 2000 negatively affect bilateral trade whereas more moderate sanctions do not. With respect to trade diversion, comprehensive sanctions still have a negative impact, i. e. there are negative feedback effects or pure trade destruction. By contrast, more moderate forms increase the targets' trade with the G7 (US excluded), thereby providing evidence for positive trade diversion in support of the "busted-sanctions" argument. Torbat (2005) similarly reasons that US sanctions on Iran cause economic damage on the target. The respective trade sanctions primarily led to a drop of trade with capital and non-oil goods, whereas Iran could sell oil to other buyers. This indicates that trade diversion is dependent on the underlying market structure and products. Goods such as oil or other energy products are less likely to be affected due their rather "fungible" nature in the sense that the origin is hardly traceable and they are easily "saleable" on the global market, and not only as a consequence of energy dependency issues. Torbat (2005) also finds financial sanctions to be more effective than trade restrictions and estimates the economic damage at about 1.1% of Iranian GDP. However, the author notes that political success has been much less clear and emphasizes the advantages of tailoring sanctions, i. e. imposing restrictions on certain key sectors such as finance or specific individuals such as the clergy class in Iran.

Yahia and Saleh (2008) study the links between oil price volatility, employment and UN economic sanctions on Libya in 1992. They find negative repercussions on non-Libyan workers in the sense that they left the country and Libya thus suffered from a long-term loss of highly qualified labor. Hence, economic sanctions in combination with fluctuating oil prices imply economic instability, economic disintegration and further isolation of the respective country, which renders them a potentially effective tool in foreign policy.

Felbermayr *et al.* (2019) also draw attention to whether sanctions are bilateral or directional. They further conclude that the effect varies between country pairs and the direction involved, even if they are part of the same sanction regime[20]. Applied to the paper at hand, this would result in different findings for country pairs of different EU member states vis-á-vis with Russia, even though they are in the same sanction regime under the CSDP. As this paper also provides a suitable framework for the present research, their findings are summarized as follows:

Table 5: Economic effects according to the direction of trade flows

Categorial distinction	Effectiveness (negative significant result)
Bilateral or directional	**Bilateral** (Ex. AND Im.) Sanctions are effective **Directional**: Ex. Sanctions are effective Imp. Sanctions only are not effective
Complete vs. partial	Complete bilateral: Effective Partial bilateral: Not effective *All* export sanctions are effective

Source: Felbermayr *et al.* (2019).

Interestingly, their gravity model as applied to Iran sanctions further shows that releasing the trade sanctions would result in *relatively* lower expenditures for *Chinese* goods. Hence, sanctions change the relative composition of trade flows as well which is precisely in line with the proposed theory of trade diversion to China as well as the study of Popova and Rasoulinezhad (2016).

Slavov (2007) studies the effect of UN trade sanctions on neighboring countries and finds that land neighbors are often 'innocent bystanders'. The author draws attention to potential principle-agent-problems in public law enforcement in the international context, i. e.

[20] Complete sanctions refer to all sectors while partial sanctions concentrate on specific goods or services.

sanctions hit – or benefit – third parties. Frank (2017) finds evidence for the trade destructing nature of sanctions but could not confirm the expected trade diversion effect. By contrast, Popova and Rasoulinezhad (2016) study the sanctions on Iran and hypothesize a trade effect from "De-Europeanization" and "Asianization" that highly coincides with the theoretical framework for the present study. The authors confirm their hypotheses and estimate that the trade destruction effect between Europe and Iran amounts to 47% on average, while the trade diversion effect of the sanctions toward Asia is 85% on average.

2.3.2 Effect on Russia

Mokin *et al.* (2019) argue that the Russian financial and energy sectors are the main victims of the targeted sectoral Western sanctions. Moreover, the increase in demand for foreign currencies and the strong relationship between the energy sector and political elites cause economic instability while the Russian capacities to counteract are limited. Harrell *et al.* (2017) contribute that the sectoral sanctions have the strongest impact on the Russian economy, while asset freezes and sanctions on individuals are less important, but still show a significant impact. In regard to quantitative effects, Havlik (2014) estimates that sanctions-induced damage to Russia amounts to 1% of GDP growth, further resulting in a GDP loss of 20bn, 30bn and up to 50bn for the years 2014, 2015 and 2016, respectively. Fritz *et al.* (2017) estimate that sanctions and countersanctions cost Russia 8 – 10% of its GDP.

A series of studies deals with the effect of sanctions on Russia in combination with the oil price drop that occurred at the same time. Bimbetova *et al.* (2019) argue that both developments led to a depreciation of the Ruble as well as capital flight, which in turn caused economic hardship. They further state that the most significant effect consists of a decreasing FDI value and more long-term challenges to the competitiveness of the oil and gas sectors. With respect to the latter, they note that Russia has reoriented its energy investment in projects and markets toward China, India or the Asia-Pacific region and wants to reduce its dependency on energy sales to Europe. This finding supports the present paper's framework.

Most measured effects in the literature claim that the impact of sanctions is lower in comparison to the oil price shock (Bond *et al.*, 2015; Tuzova and Qayum, 2016; Dreger *et al.*, 2016b; Vlček and Jirušek, 2019b; Yahia and Saleh, 2008). For instance, Dabrowski (2015) confirms that sanctions contribute to this economic downturn, along with the conflict in

Ukraine itself and lower oil prices. However, he emphasizes the structural challenges in the Russian economy which include institutional ones such as poor governance or the relapse to dirigisme as well as an already unfriendly business and investment climate prior to the sanctions. In contrast to other studies, he also notes the advantages of a lower Ruble value, i. e. a higher possible export performance. Tuzova and Qayum (2016) find that both the oil price and sanctions negatively affect Russian GDP, the exchange rate as well as trade. Gurvich and Prilepskiy (2015) estimate the aggregate negative effect of the oil price drop between 2014 and 2017 on GDP at 8.8%, while the respective effect of sanctions is -2.4%. Ahn and Ludema (2017) find that the financial stability of sanctioned firms is lower than those not targeted. This approach has the advantage of clearly separating the effect of sanctions and oil price as well as the exchange rate. Moreover, the authors estimate that oil price fluctuations explain 80% or more of the decrease in import demand and the drop in Russian GDP. They thus classify the effect of sanctions as "second-order" effect that contributes to this already harsh depression and consider the negative spill-over effect on the EU (i. e. trade destruction due to sanctions and countersanctions) as relatively small, ranging from -0.02% for Portugal and -2.73% for Lithuania between 2013 and 2015. Interestingly, the estimated numbers are similar to Fritz *et al.* (2017).

In contrast, Vymyatnina (2016) contends that effect the financial sanctions on *the credit market* is more relevant than the lower oil price. The author asserts that these restrictions have changed the structure of the credit market in the sense of a higher share of short-term and indirect forms of borrowing, thereby jeopardizing the sustainability of the loan structure and increasing credit market risks for market participants. In the medium or long-run this also leads to a reduction of GDP. Dreyer and Popescu (2014a) confirm that the lower availability of capital due to sanctions leads to higher interest rates and thus lower economic performance. Gurvich and Prilepskiy (2015) estimate that the financial restrictions negatively affect capital flows of their direct targets as well as other non-targeted firms. The cumulative *negative* impact between 2014 and 2017 on gross capital *in*flow is estimated to amount to approx. 280bn $US. However, this effect is significantly *reduced by* a lower gross capital *out*flow as well as adaption policies of Russian entities, i. e. a geographical shift of their financial sources. These tendencies reduce the net outflow effect to -160 – 170bn $US, which again indicates that *economic adjustment* to the sanctions is possible to a significant degree. In addition, the whole economy is affected by lower FDI and limited borrowing options. Reid (2019) tests the

effect of American and EU sanctions on Russia between 2014 and 2019 on a variety of macroeconomic indicators and finds that only Russian imports have been negatively affected. Hence, the author argues that sanctions are ineffective as they only improve the Russian trade balance and lead to an increase of Putin's popularity.

The impact on the credit market is closely linked with the one on the *exchange rate and its volatility*[21]. Dreger *et al.* (2016b) as well as Wang *et al.* (2019) find that sanctions positively affect the target's exchange rate's volatility and thereby contribute to additional economic risks. However, Dreger *et al.* (2016a) contend that the effect of sanctions is of minor short-term importance for the Kremlin. This shows a fundamental challenge and trade-off as the economic effect takes time "to phase in" while political resolution is likely to become even more difficult over time (Thorhallsson and Gunnarsson, 2017).

Another dependent variable that can reveal information about the effect of sanctions are *stock market* returns. Hoffmann and Neuenkirch (2017) present evidence on negative stock market returns in Russia and Ukraine as a result of conflict and sanctions related news. In a similar study, Ankudinov *et al.* (2017) conclude that the volatility of Russian indices in all sectors increases after the imposition of sanctions, which again would be comparable to the proposed mechanism of the present paper, i. e. that most sectors are affected by the worsening business environment to an extent that the aggregate trade volume is affected. However, this effect could be (partly) caused by the oil price as well as higher geopolitical risks.

Shida (2019) does not find evidence in favor of the hypothesized regionally diverging effects of Western sanctions. On the contrary, the financial restrictions affect firms equally, including those close to the Asia-Pacific region. It could be inferred that a change of business relations, no matter where in Russia, strengthens the hypothesis of an expected general trade diversion effect independent from where the corporate headquarter is. Using survey data, the author surprisingly finds that only half of the entrepreneurial respondents believed that the economic sanctions had a negative effect, which would not support the argument of a uniform effect of the sanctions across Russia. Nikulina and Kruk (2016) argue that European export restrictions on oil equipment lead to the two strategies of simply copying the needed products and that

[21] The exchange rate plays an important role due to its effects on demand, supply and thus trade. For instance, a (sudden) drop of the exchange rate causes a price increase of certain import products, in addition to the effect of the sanctions, and thus affects the domestic interplay between supply and demand.

certain products are likely to be imported via third countries such as Kazakhstan. Secondly, the Western financial restrictions lead to a diversion of loans to domestic and Asian sources. Hence, they support the argument of trade diversion and that sanctions are likely to be busted. However, they also emphasize the accompanying risks, i. e. lower product quality and higher interest rates and emphasize that it is unlikely that these "policies" completely substitute Western products. Klinova and Sidorova (2016) similarly argue that Russia failed to modernize its economy in times of high hydrocarbon prices and that the economy is thus less resistant to "exogenous" measures. They further confirm the negative economic impact and add the aspect of increased military spending due to the stronger perceived "NATO threat".

With respect to the *price effects* of sanctions, Wengle (2016) reasons that the sanctions in combination with the lower Ruble value lead to higher prices as well as to decreased household incomes, with both factors contributing to a lower demand for certain agri-food products. Depending on the sub-sector, she further finds evidence for boosted domestic production and asserts that the sanctions, presumably as a part of the Russian "food security strategy", have helped domestic pork and poultry producers whereas import diversion prevailed for beef or dairy products. In a similar study, Hinz and Monastyrenko (2016) confirm higher consumer prices in Russia in the short-run while regions with an above-average import dependence on sanctioning countries experienced a higher rise in prices for the respective products. One year after the imposition of countermeasures, trade diversion as well as increased domestic production alleviated the impact, but did not fully offset it. Hence, the Russian countersanctions induced trade destruction, increased domestic production as well as trade diversion. These effects are also greatly dependent on future expectations. According to Fritz *et al.* (2017), the Kremlin bet that the sanctions would be lifted soon and did not expect long-term impacts of this Western foreign policy. In line with the argument of uncertainty, Bond *et al.* (2015) find that the sanctions' impact is concentrated on short-term losses.

2.3.3 Effect on senders

The effect of the sanctions and countersanctions is relevant topic for the senders as well. Smeets (2018) argues that sanctions imply high costs for the sender countries and the sanctions have not achieved a resolution of the conflict in Ukraine. Moreover, he argues that trade diversion is a "likely" consequence of sanctions and the economic damage on the target

is thus unclear while senders "shoot themselves in the foot". Christen *et al.* (2016) and Fritz *et al.* (2017) contend that the macroeconomic effect of sanctions in interaction with the oil price drop and exchange rate developments leads to an estimated employment effect *within the EU* of between 500 000 and 870 000 job losses or 400 000 from sanctions alone (Christen 2016). The respective loss in total value added is 0.2% in 2015. Trade diversion from the EU to other markets is not included but only marginally reduces this effect (Fritz *et al.*, 2017). As a result of differences in economic and trade integration with Russia, one may expect regionally diverse effects with a rather low burden for the Iberian countries and far-reaching consequences for the Baltic countries (Ahn and Ludema, 2017). Giumelli (2017) studies the *redistributive impact* of the Russia sanctions and finds that exports to Russia decreased for all EU members differing from country to country. Nevertheless, certain sectors in a few sender countries have been benefitting from the sanctions. More specifically, the sectors "*commodities and transactions not classified elsewhere"* increased by 5% after the imposition of sanctions. Similarly, chemical exports from Lithuania or Malta "skyrocketed". While the actual mechanisms behind these trends remains unclear, these numbers could hint at *busted sanctions*[22], widely differing implementation of sanctions within the EU or a combination thereof. This argument of "innocent bystanders or profiteers" can be extended to parties that either support or threaten the effectiveness of sanctions. As a further conclusion, different vulnerability levels, particularly between the US or EU, do play a role in reverse sanction effects.

Havlik (2014) argues that the damage to EU countries is comparatively small, ranging between -0.1 and 0.4% of GDP, assuming a 10% decrease of exports. However, 0.4% for the major sender bloc, the EU, would constitute a considerable number. In addition, the Russian import ban is estimated to cost up to 2.7% of GDP for Lithuania, although the value for most countries value lies below 0.1% of direct damage due to Russian sanctions. The author further argues that there are five EU key industries whose trade to Russia exceeds a share of 3%, namely textiles, pharmaceuticals, electrical as well as machinery and transport equipment, with the latter industries at least partly directly affected by the sanctions. Fritz *et al.* (2017) quantify the *aggregate* damage of the reciprocal sanctions at 40bn Euro (2014) and 50bn (2015) and

[22] At least for those products with export restrictions, while the actual product categories remain partly unclear as indicated by the term "not specified elsewhere".

about a half percent of EU GDP. The average EU export destruction effect to Russia is estimated at 11% and sanctions can explain 40% of the observed export loss (Fritz *et al.*, 2017).

Although vast parts of the literature present findings on the negative and trade diversion impact on senders as well, one can also think of some positive effects. Năsulea *et al.* (2015a) argues that the capital outflow from Russia directly benefits European banks as their liquidity increases. In addition, the author mentions that lower energy prices, partly induced by the sanctions as well, could benefit European importers. Hence, energy issues constitute another relevant economic impact of the sanctions. In contrast, Peters (2017) hypothesizes higher gasoline prices for European consumers but did not find evidence in favor of this argument.

2.3.4 Trade diversion effects

Up to this point, the studies described mostly conclude that sanctions are effective in the sense that they impede trade and cause economic damage in the target state, while only a part of the articles focuses on or at least accounts for *trade diversion effects*. Connolly (2018a) researches the repercussions of the Western sanctions on the political economy of Russia and argues that the reorientation toward Asia has already begun. Priede and Pereira (2015) analyze Russian-EU trade and argue that risks which are closely related to the sanctions, such as geopolitical risks, energy security issues and trade restrictions, induce EU firms to change their export structure away from Russia toward countries such as Saudi Arabia, South Korea, India, China or Brazil. This risk diversification comes along with trade diversion.

A further indication of the (need for) trade diversion and regionally different impacts is that the EU adapted its strategy of export promotion schemes with a focus on alternative destination markets. At the same time, the cancellation of export guarantees for the Russian market aims to strengthen the sanctions, but also increases the export diversion pressure (Fritz *et al.*, 2017). Moreover, Boulanger *et al.* (2016) emphasize that the EU tried to stabilize and strengthen the European agricultural market[23]. The respective measures hint at potential trade creation within the EU or bloc of sender countries, which theoretically functions as a counterpart of the trade destruction hypothesis. The gravity models thus include the variable

[23] Instruments such as emergency measures and market interventions within the common agricultural policy (CAP), support for farmers and reallocation of food to alternative markets through the negotiation of trade agreements, paying storage costs, processing food and the like have been implemented for this purpose. Fritz *et al.* (2017) provide an overview on trade developments including potential trade diversion.

"*senders*" to control for and estimate whether such trade creation has taken place[24]. Korgun (2019) studies Russian trade with South Korea as a "Western-oriented country" that did not impose sanctions on Russia. The author notes that some firms such as Hyundai took advantage of the sanctions as they tried to expand their market share at the expense of firms from sanctioning countries. However, other firms chose to postpone investment decisions due to the lower Russian purchasing power, inflation and a higher economic uncertainty. Overall, this still hints at *relatively* improved economic ties, at least from the Russian perspective but supports both trade diversion and feedback effects.

There is little empirical evidence relating to the circumvention of sanctions not involving trade diversion. However, descriptive data of implausibly high export increases of the Baltic countries to Belarus, central and eastern European countries to Macedonia as well as increases of these countries' respective trade flows to Russia indicate that such sanctions-busting has taken place to a certain extent. In addition, after the tightening of Russian import controls the respective trade flows experienced a drop (Fritz *et al.*, 2017). With respect to agricultural products, European and US exports of banned products only recovered in 2016 after a sharp decline in 2014 and 2015. The Eurasian Economic Union (EAEU) has been providing an alternative destination market to European farmers. Some products have experienced quite significant increases of up to 97% of EU and 466% of US exports to the EAEU (Fritz *et al.*, 2017). On the one hand, one could argue that these numbers are implausible and indicate an initial suspicion of an illegal circumvention of sanctions under Russian law rather than legal trade diversion, particularly if one considers the comparatively stable development of non-EAEU US trade (including non-Russian). On the other hand, pre-sanction period US exports to the EAEU were already quite low.

Moreover, there are small countries which can potentially benefit the most in *not* taking part in the sanction regime. An example would be the Faroe Islands which was able to increase fish exports to Russia whose export structure is similar to the Icelandic one which did take part in the sanctions and suffered export losses in their fish industry (Thorhallsson and Gunnarsson, 2017; Troianovski, 2015). With respect to the Russian sanctions, countries in Latin America or

[24] With respect to the theory of the gravity model, barriers to "extra-community" trade increase the multilateral resistance term or bilateral resistance terms between a sender and target and thus simultaneously decrease the bilateral resistance term between two sender countries. In short, the theory works very similar to the research of the effect of trade agreements as both render trade within a certain country bloc *relatively more attractive.*

Asia have quickly started making inroads into the Russian market and have replaced agri-food products (Dolidze, 2015). Russia seemed determined to enforce sanctions, particularly toward Belarus, as the country suddenly produced “seafood made in Belarus” (Dolidze, 2015).

Crozet and Hinz (2016) similarly argue that the effect of sanctions exceeds the direct targets in the sense that non-targeted firms are affected as well. First, the estimate of the “global lost trade” amounts to 4.7bn $US per month, with 1.8bn $US being borne by the senders of the sanctions on Russia. More importantly for the present paper and its theoretical foundation is the fact that 91% of this lost trade relates to products which are *not* directly targeted by the sanctions. Secondly, the authors find evidence for trade diversion on both the country and (French) firm-level and again for embargoed and non-embargoed products as well. Nevertheless, they emphasize that these effects are very small in comparison to trade destruction and that they are far from being able to offset the lost trade.

Trade effects also depend on three main aspects, first the extensive (number of firms) and intensive (trade per firm) margin of trade, secondly the underlying mechanisms and lastly the possibilities for trade diversion (Magee, 2008). Generally, Fernandes *et al.* (2018) show that variation in trade can be explained about half/half due to extensive and intensive margin, respectively. The implication for the framework of this paper lies in the underlying question of whether firms sell less (intensive) or retreat completely (extensive) from the respective market as a result of the sanctions. Hence, the export structure of the senders to Russia and vice versa plays a role. An economy characterized by particularly small firms with small trade shares likely reduces its exports to Russia more as the risk and administrative effort of exporting firms is too high. Big firms that consider Russia an important market likely try to keep their market access. This firm level evidence on the effect of sanctions is shown by Haidar (2017) in the case of the sanctions on Iran. The two most relevant findings are that bigger firms can divert their trade more easily, which shows the connection to the extensive and intensive margin of trade, and that trade diversion of Western countries is more focused on the EU and US whereas Iran diverts trade more towards India and China. Crozet and Hinz (2016) find that both ex- and intensive margins of trade are affected, particularly in the embargoed agricultural sector, but in non-embargoed as well. The latter provides an empirical result in line with the hypothesized overall trade impact of sanctions in the paper at hand, with a decrease of 15% and 21% of the extensive and intensive margins, respectively.

Overall, the literature and evidence of a potential trade diversion effect of the sanctioning and target countries is limited. The EU managed to divert agricultural exports to Africa and China, while Russia exports more to the EAEU. This paper contributes to the literature by looking at the extent to which the imposed sanctions cause the EU to become *relatively* less important for Russia's trade. It thus contributes to the discussion of carefully weighing the advantages and disadvantages of sanctions (Giumelli and Ivan, 2013).

3. Theoretical framework

The theoretical framework focuses on a short background and general micro foundation of why economic sanctions are hypothesized to destruct and divert trade. More specifically, one could identify three key questions that center around the proposed framework. First, one may wonder *why a general trade effect* is hypothesized, i.e. that more sectors than the ones directly targeted are affected. Secondly, one could ask why precisely *economic sanctions* are primarily hypothesized to affect trade. One could otherwise argue that even smart or targeted individual sanctions cause this effect as well or already sufficiently cause economic pressure on the target. As a third puzzle, the question *why trade diversion to Asia, especially to China*, may be expected further requires an explanation. These underlying mechanisms are contextualized around the sanctions imposed on and by the Russian Federation.

3.1 Political framework and actors

3.1.1 Russia-Western relations or "De-Europeanization"

First, the political framework may be regarded within the context of what Klinova and Sidorova (2016) consider as "the story of the Cold War (…) being repeated, but this time under the more complex conditions of globalization". As a starting point, it proves helpful to briefly consider the sanction regime(s) as well as their main characteristics. Two Western sanctioning parties play a major role in this context. First, the United States are historically actively involved in sanctioning Russia's behavior. Secondly, the EU, at Russia's doorstep and major trade partner, can arguably exert significant leverage on Russia (Hufbauer *et al.*, 1997). Despite the traditionally strong cooperation of these two senders, particularly in security policy and the NATO framework, the EU sanctions, the CSDP in general and the relations with Russia have disentangled themselves to a certain extent from the American position. Hence, the political/

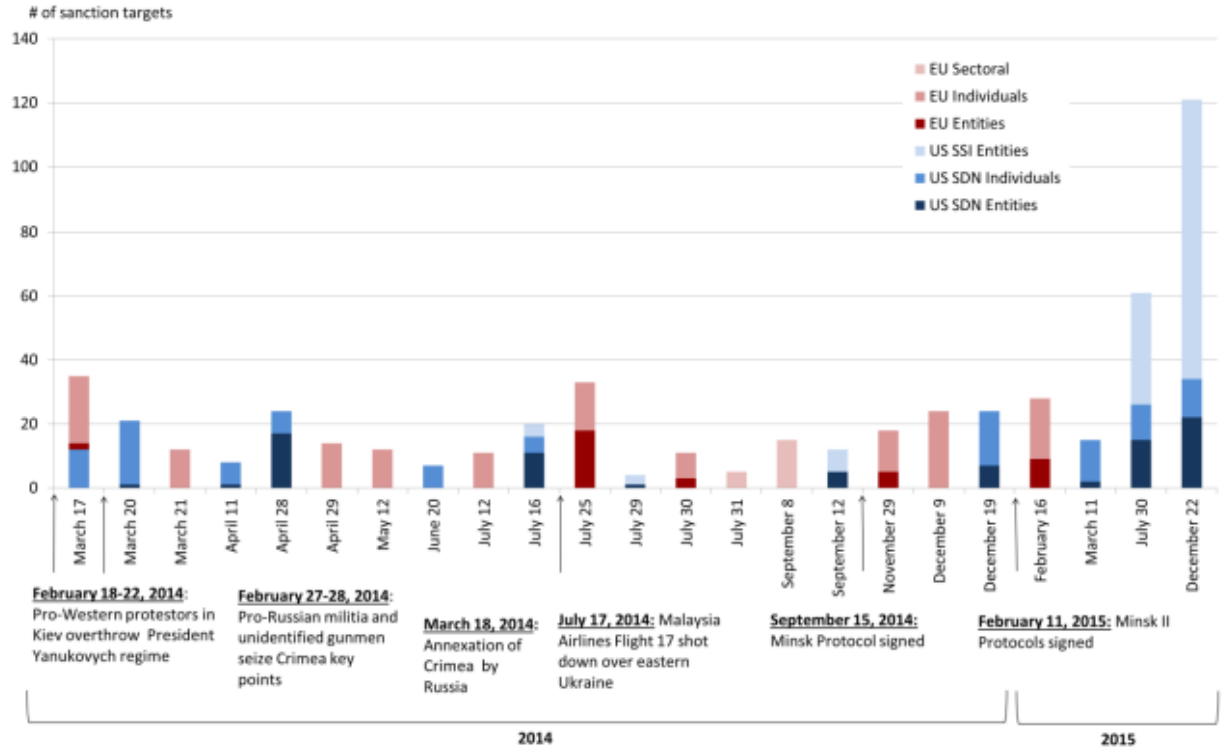
economic measures undertaken by the EU can be considered more moderate in comparison to those of the US, not least due to higher Russian-European economic interdependence. Interestingly, the EU, its member states and the US have remained the most active senders globally of economic sanctions during recent years. Trade affected by EU sanctions even exceeds the scope of those imposed by the US (Felbermayr *et al.*, 2019, p. 15).

Most scholarly literature respectively considers and distinguishes between three and six waves of Western sanctions (Crozet and Hinz, 2016). With respect to the three major EU steps, the first wave started in March 2014 when asset freezes and travel bans were imposed on Russian individuals. Secondly, the EU sanctions were expanded on *Crimean* economic activities between March and June (Fritz *et al.*, 2017). In a third stage, the scope and measures of EU and other countries' sanctions were extended after the airplane crash in Eastern Ukraine in July 2014. These measures go beyond Russian and Ukrainian individuals and affect private entities, capital markets, the energy sector and the defense industry and are further considered economic sanctions in the present case (Dolidze, 2015). The restrictive measures also apply to European firms that trade with or buy certain goods from Russia (Crozet and Hinz, 2016; Council, 2014d). In contrast to US sanctions, existing contracts were exempted. In 2015, the EU sanctions were linked to the fulfillment of the Minsk agreements and continue to be in place to the present days as the agreement has not been complied with fully[25].

In contrast, the US and Canada imposed stricter sanctions on Russian entities as early as March 2014 after the Crimean referendum, which are classified as economic sanctions in this research paper (POTUS, 2014; Canadian Government, 2014). Japan, the only Asian sanctioning country, stopped investment, business and space cooperation projects that same month as well and followed with stricter measures in September 2014. Australia broadly followed the Canadian and US approach in June 2014. The following overview by Ahn and Ludema (2017) illustrates these waves of sanctions with a timeline of individual, sectoral and sanctions on entities by the two most relevant senders, the EU and the US.

[25] The extension takes place every six months following an assessment of the compliance process with the Minsk agreement Dreyer and Popescu (2014a, 2014b).

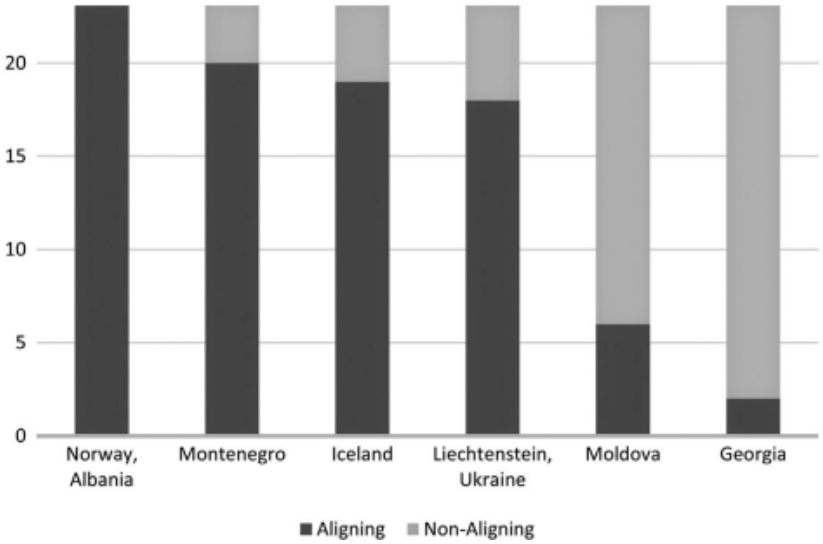
Figure 5: Timeline of new EU and US sanctions on individual, entity and sectoral level



Source: Ahn and Ludema (2017).

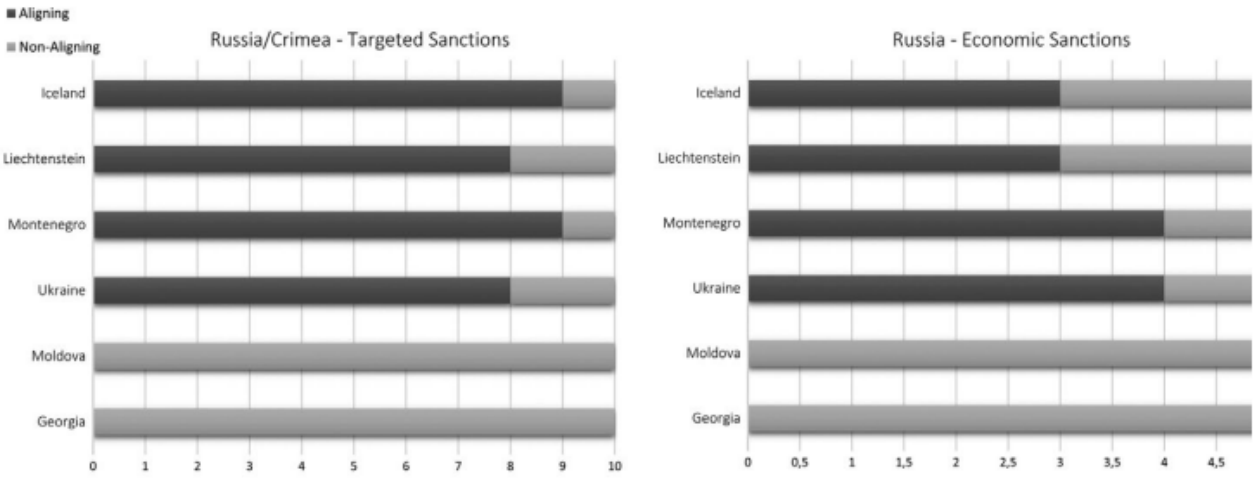
In general, the EU emphasized that it "expects third (…) countries to refrain from (…) exploiting new trading opportunities" (Dolidze, 2015; Council, 2015). This is already a strong indication that the EU was indeed aware of potential evasion methods such as trade diversion which further leads to the question which countries supported the EU viewpoint and sanctions and which were unable or unwilling to do so. Moreover, it elucidates that "selective" support of the EU by third parties might pose challenges for the CSDP, foreign policy in general and the sanctions on Russia specifically. Other sanctioning countries are Ukraine, Norway, Albania, Montenegro, Iceland and Liechtenstein. The following tables by Hellquist (2016) give an indication which countries aligned with the EU and to what extent they did so. For instance, Moldova and Georgia did join some declarations, but refrained from imposing own economic sanctions. Switzerland passed laws that aim to prevent a circumvention of existing sanctions without imposing own additional restrictions. A more detailed distinction of EU and other sanctioning countries' decisions can be found in the Alignment of other sanctioning countries with EU CSDP and Table 17.

Figure 6: Alignment of certain European countries with EU declarations on Russia



Source: Hellquist (2016, p. 1010).

Figure 7: Alignment of certain European countries with EU sanctions on Russia



Source: Hellquist (2016, p. 1011).

The Russian sanctions on the EU, US, Canada, Australia and Norway were imposed in August 2014 on certain agricultural products. Albania, Iceland, Liechtenstein and Montenegro were only added to the import ban in August 2015, one year later than the original imposition of countersanctions (Thorhallsson and Gunnarsson, 2017). These reciprocal sanctions are also a special case due to the extraordinary importance of the target which exceeds former or other sanction regimes, e. g. on North Korea and Iran. For instance, Russia is the 12th largest economy of the world, a major nuclear power and, arguably most notable for various

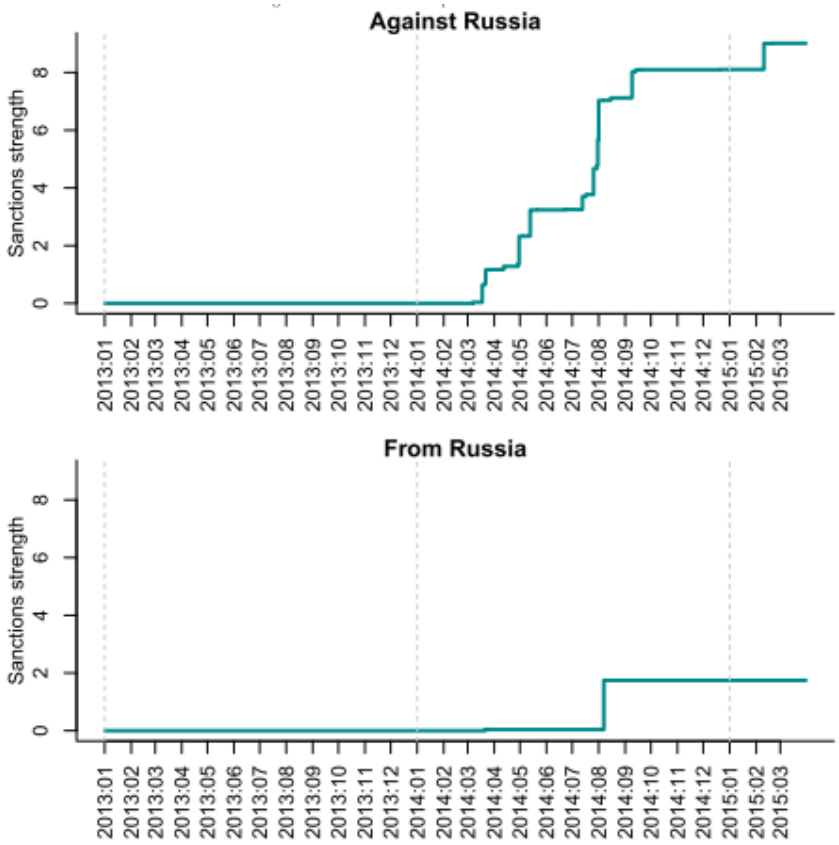
European countries, an important energy supplier (World Bank, 2019). Moreover, both the specific economic and political circumstances are unique. Russia is a more open and larger economy than other targets which presumably facilitates trade diversion. Furthermore, Russia plays an important role in some key sectors of the global economy as a supplier of energy, raw material or weaponry. Not only are these sectors directly targeted by the sanctions, the Kremlin also has a strong voice in these sectors or even directly administers the respective businesses. More specifically, as the economic power of these sectors largely coincides with the political oversight it is fair to assume that the Kremlin does not only have an incentive, but additionally the power to influence at least parts of the respective trade flows (Dabrowski, 2015). While this indicates that the sanctions are indeed targeted on the Russian government's direct income, this fact adds value and plausibility to the proposed trade diversion effect (Connolly, 2018b, 50ff.). For example, Connolly (2018b) shows that Russian arms exports have gone up considerably since the imposition of sanctions and that this sector therefore does not seem to suffer much from the restrictions. In conclusion, a large trade share must have either been diverted or was not affected in the first place. Although the level of Russian arms trade with the West was already low in the pre-sanctions period, it clearly shows that trade networks and channels to alternative destinations already exist (Connolly, 2016). In contrast, other Russian sectors face a more complex situation as they rely more on trade with the senders and it is unlikely that they can create new trade networks at a fast pace, i. e. to fully compensate the lost trade with trade diversion. In short, the core aspect of this framework asserts that the *political reorientation* toward other cooperating partners, particularly in Asia and China, *leads to increased economic cooperation and trade diversion*.

With respect to the design and intensity, Hufbauer (2007) distinguishes yet again between three categories of economic sanctions, namely diplomatic sanctions, restrictive measures on individual persons and companies (travel bans, asset freezes) and thirdly sectoral sanctions, i. a. trade restrictions. Hufbauer and Oegg (2003) classify the intensity of sanctions as limited, moderate, or extensive. Dreger *et al.* (2016b) follow a similar approach, weight the intensity of economic sanctions from 1 to 3 and find the following cumulative "sanctions strength".

In summary, the overall framework follows the argument that political actors, among others, define the legal and economic conditions of trade. In other words, this framework considers

the role of regulation. In the European context, this "regulation" concerns the respective legislation on sanctions and thus the relevance and implications of the CSDP.

Figure 8: Strength of sanctions according to Dreger et al. (2016b, p. 28)



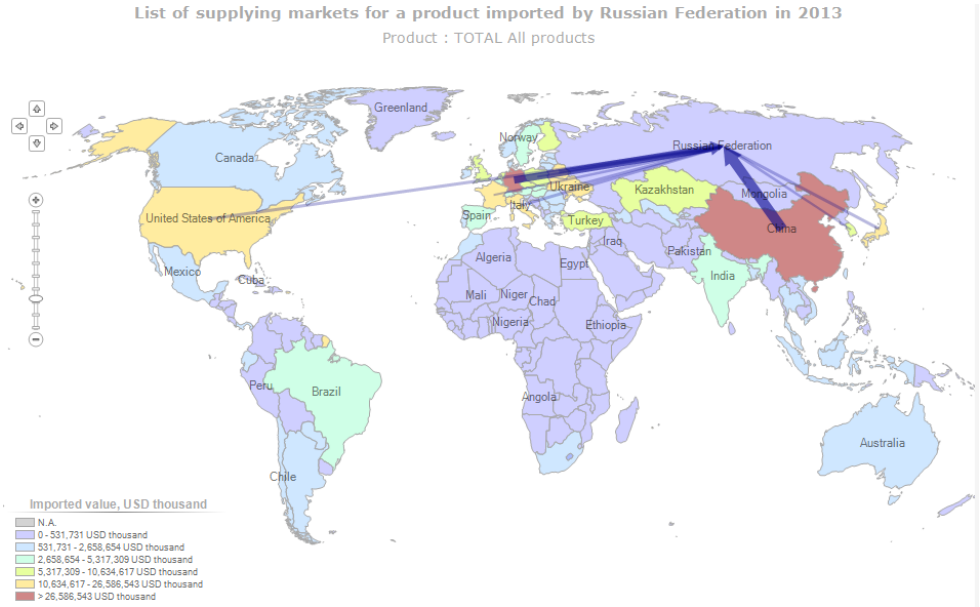
3.1.2 Russia's relation with China or "Asianization"

The previous section primarily dealt with the political groundwork for a general trade destruction effect and thus "De-Europeanization" of Russian trade relations. In addition to economic sanctions that 'push' the senders and Russia further apart, the framework also needs to touch upon factors that explain a convergence of the Sino-Russian relations. These include, except for the basic variables included in the gravity model (e.g. GDP and distance), a top-down policy-driven convergence of the Chinese and Russian policy, particularly in the areas of security, financial, energy as well as economic policy or economic integration of value chains. The following considerations thus constitute the counterpart of De-Europeanization by discussing determinants of increasing political cooperation and, as a result, economic interaction with Asian countries and China in particular. Hence, this so-called "Asianization"

by Popova and Rasoulinezhad (2016) precisely aims to refer to the question why primarily trade diversion to China is hypothesized, rather than of e. g. Africa or South-America.

Overall, the Chinese economy follows the megatrends of an upwardly mobile but ageing society, urbanization, digitization with respective demand increases of energy and other goods and thus generally provides steadily increasing business opportunities (Klein and Westphal, 2016). These trends are also reflected in the thirteenth five-year-plan which serves as an overarching framework for economic policy and further contains strategies that aim to foster internationalization and trade, a further opening of domestic markets, increasing domestic manufacturing capacities ("Made in China 2025") and, not least, the Belt and Road Initiative (Kohl, 2019). Most of these developments clearly present opportunities for Russian entities to offset some of their lost trade with the sanctioning parties. In addition, Russia and China share policy approaches and principles and are already important trading partners as 10% of Russian exports and 22% of Russian imports in 2016 came from China (Henderson and Mitrova, 2016). Hence, the trade networks are already established to a certain extent which makes access and trade diversion to China easier than to other countries such as many in Latin America or Africa. To put it differently, it is easier to increase the intensive margin of trade than establishing trade relations from scratch, i. e. to increase the extensive margin of trade with other countries (Fernandes *et al.*, 2018). The following graph shows the most important Russian trading partners in 2013 where EU countries but China as well clearly stand out.

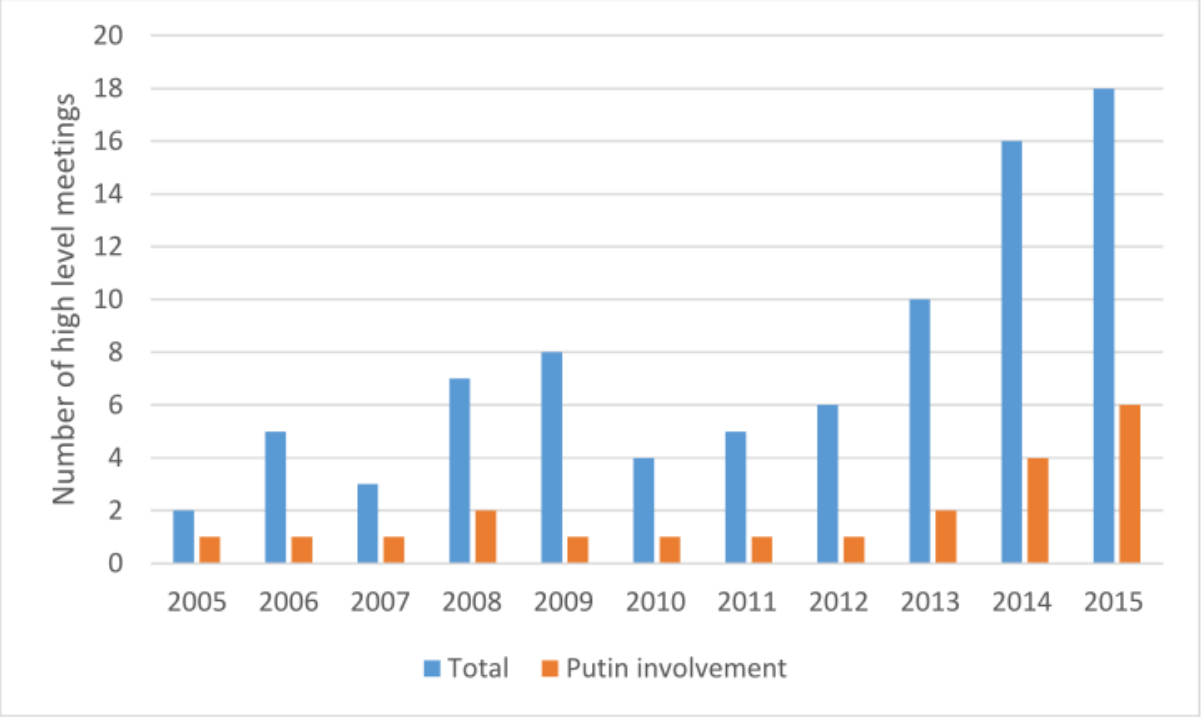
Figure 9: Relative importance of Russian trading partners in 2013



Source: (ITC, 2019).

In addition, the increasing cooperation and major improvements of their historically complex relations since 2014 constitute the main argument of why trade diversion to China is hypothesized. This framework argues that at least parts thereof can be traced back to the pressure on Russia for political reorientation and the at least neutral Chinese viewpoint or rather "cautious support" for Russia regarding the Western reaction to the conflict in Ukraine (Korolev, 2016b). As argued earlier, a neutral position of China and other Asian countries would already suffice to improve their relations on a *relative* viewpoint. Although China's foreign policy can be characterized by the principles of sovereignty and non-interference, the Ukraine conflict shows that China leaves room for interpretation. More specifically, it is not Russian involvement, but rather "Western interference in the domestic politics of Ukraine" that is condemned by China. The Chinese "alignment" with Russia this issue began in May 2014 with a joint statement opposing the Western sanctions (Wishnick, 2017). As an indicator of increasing cooperation, Henderson and Mitrova (2016) find that high-level meetings experienced a substantial rise after the deterioration of Western-Russia relations.

Figure 10: High-level meetings of Russian and Chinese Officials



Source: Henderson and Mitrova (2016, p. 17).

The major policy areas where improved Chinese-Russian coordination can be identified are security, energy, financial and economic cooperation and large parts of the literature argue that the sanctions accelerated and deepened Sino-Russian cooperation (Connolly, 2018b). A more detailed account on this partnership and interstate cooperation may be found in Description 3. These descriptions and arguments can be applied to other Asian countries, albeit to a lesser extent. Still, as the main argument refers to China, only Sino-Russian relations were considered, as the inclusion of more countries would exceed the scope of the present paper.

3.2 Economic framework and variables

3.2.1 Direct and indirect trade destruction

Within the present framework, it is central to bear in mind that sanctions work in combination with the collapse in commodity prices and lower Russian purchasing power due to lower Ruble value as the main reasons why trade flows dropped, including with China (Christie, 2015). The following table summarizes the most relevant direct economic mechanisms of sanctions[26].

Table 6: Objects of economic sanctions that directly aim to restrict trade

Object	Explanation	Mechanism/Goal	Application/Example
Boycott	Import restriction on one or more goods	-Lower demand for products from target -Lower target's foreign exchanges Damage to certain sector	Russian countersanctions: Import ban on certain agricultural products
Embargo	Export restriction (partial or complete)	-Lower supply for target, higher consumer prices -Restricted access to technologies	EU sanctions: No more energy equipment exports, e. g. products that are needed

[26] As mentioned earlier, defining economic sanctions is still an issue of debate. A different possible distinction and operationalization would be to distinguish financial and economic sanctions as is done in numerous studies. However, this distinction would come along with challenges regarding this definition and is furthermore less useful in the present case due to consideration of aggregated trade flows as dependent variables. Due to the combined use of these sanction tools and temporal overlap it would be challenging to keep the effect of different sanctions types apart. As a result, and similar to another common practice in the International Trade literature, financial measures are included in the theory and models of economic sanctions in the present case. However, (future) studies with other dependent variables such as FDI, loans and the like could benefit from distinct considerations.

		-Damage to certain sector or whole value chain	for deep-sea oil exploration
Financial measures	International payment system	1) Prevent sanctions-busting through triangular trade 2) Disruption of trade finance	US sanctions: No new issuance of debts that last longer than 30 days for certain indiv. & entities
	Suspension of lending and investment activities	1) Increase net capital outflow/Decrease net capital inflow → Pressure on econ. Development 2) Disruption of trade finance	Canadian sanctions: Certain Russian entities are no longer entitled to receive loans with a life of more than 30 or 90 days
	Asset freezes	Hindering certain groups from pursuing business	Effectively all senders impose asset freezes, but with different scope (individuals/ entities)

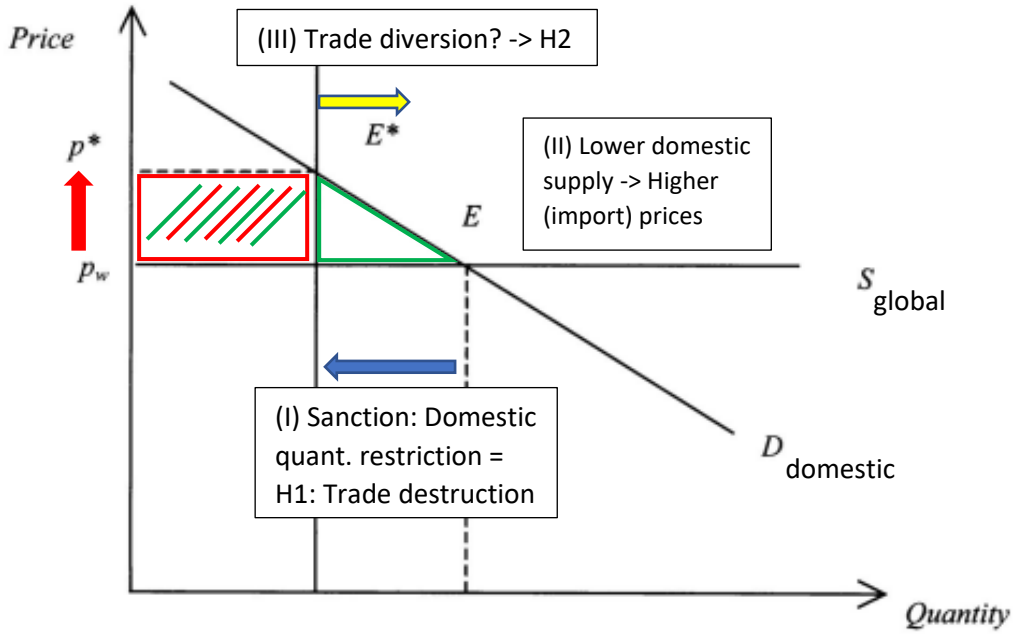
Source: Own illustration according to Caruso (2005) and Crozet and Hinz (2016). See Table 17, Table 18 and respective sources for more details.

Sanctions, as any other of the described trade barriers in section 2 above, shift the equilibrium of prices and volumes. The following graph shows the hypothetical market equilibrium *E* in absence of trade barriers. Trade impairments such as sanctions then restrict the quantity of available products and thus result in higher consumer prices which pertains to the new equilibrium *E**. Some studies that consider consumer prices as a dependent variable and thereby study precisely the direct effect of sanctions on certain product prices were included in section 2.3 above. One assumption of this framework by Caruso (2005) is that countries are price takers, i. e. that their market power is not strong enough to influence the global market prices. While this assumption could be challenged especially on some sectoral levels[27], for example the oil or gas markets, it is a rather realistic assumption in the case of aggregated trade values. This is reflected by the horizontal supply curve *S* that indicates that sanctions do

[27] See for example Felbermayr *et al.* (2019, p. 37): " [Other] Oil producing countries also tend to lose from undoing the sanctions as the additional supply of Iranian *[here: Russian]* oil drives down the world price of oil."

not affect the global supply. In short, (Russian) consumers bear the brunt of higher prices due to the quantitative restrictions whereas the target's domestic producers benefit from higher prices. With respect to this theoretical relationship, it is important to note that the Western sanctions target government-affiliated consumers and sectors such as the energy or financial sector. The Russian import ban on agri-food products arguably results in higher consumer prices as well, but this time with direct effects on the citizens. Overall, this described trade destruction effect can then be partly offset by trade diversion from other origins. Higher prices in Russia renders exports to Russia for bystanders to be even more interesting and suggest that they can get higher prices from Russian consumers than elsewhere. This theory can also be applied to empirical findings of inferior borrowing conditions for Russian entities.

Figure 11: Domestic impact of sanctions/trade barriers in the target's market



Source: Caruso (2005).

A higher number of senders – or stronger sanctions – theoretically lead to a greater change of equilibrium prices and volumes. The red rectangle indicates the rents for *domestic* suppliers in the case of *import restrictions*. For instance, Russian farmers benefit from the Russian sanctions if they can increase the prices[28]. Interestingly, such domestic rents cannot evolve if there simply are no domestic producers of certain products. This would be another

[28] See different empirical findings whether this is indeed the case. The involvement of state-owned companies renders the whole framework, particularly price effects, evidently more complex than is explained here.

explanation of the Western sanctions design since Russia's production capacity of certain products such as specific drilling parts or pumps is very limited (Zubacheva, 2016). Hence, this (full) rent is either captured by third-country exporters to Russia in the case of (complete) trade diversion. Alternatively, the economic damage is even higher and would add lost welfare to the green triangle, i. e. the target's welfare destruction due to the trade barrier, in this case sanctions. This lost welfare could be translated into the economic effectiveness of sanctions if welfare destruction was the respective criterium. In short, sanctions destruct trade through their characteristic economic tools which mainly leads to higher prices for consumers. The resulting welfare loss highlights the relevance and mechanism through which sanctions are intended to cause economic damage by trade destruction.

This model shows the basic dynamics. However, the elasticity of substitution, in this case sanctions, to trade further indicates the effect size of a certain trade barrier and the steepness of the supply and demand would change accordingly (Caruso, 2005). This base model can be further expanded and adapted to different situations and assumptions. For instance, it depends on the specific design of the sanctions, i. e. which entities or goods are sanctioned and to what extent. In other words, the potential disruptive nature of sanctions on the whole value chain matters. Hence, if the target's value chain is more integrated with the sender and on a global level, evidently the sender's leverage is higher. Furthermore, the role of multiple players, i. e. senders, targets and third parties with sometimes opposing interests and diverging enforcement approaches determine the effectiveness and whether sanctions are potentially subject to being busted (Early, 2015). Moreover, interest groups, the level of trade dependency of the target, the extent of specialization in an economy or rigidity of the production curve as well as economies of scale further play an important role in this regard (Kirshner, 1997). The negative effect and the effectiveness of sanctions further depend on the production possibility curve of the target country, i. e. in how far Russia can adapt its production. On the one hand, it is rather unlikely that Russia can quickly build new production capabilities for highly specialized products. On the other hand, and as shown above, the self-induced shortage of agricultural products partly led domestic producers to catch up with international competitiveness. Gray (1986) develops certain categories of "competitive and non-competitive" products according to which domestic production can replace a part of the import reduction. Related to this, the response strategy of the target matters (if there is one). This includes price interventions, support for consumers or producers and, importantly, trade

diversion. As explained in section 4, the gravity model of trade is not sensitive to most of these issues but these considerations explain the theoretical motivations of the present paper.

More *indirect mechanisms* that cause trade effects particularly aim to answer the puzzle why a general trade effect is expected. One of these argumentation aspects refers to the underlying assumption that the targeted sectors are critical in the Russian economy and the effect thus *spills over* to other sectors. For instance, economic costs such as lower investments in Russia, especially in the central energy sector, lead to this spill-over effect that would create a measurable trade impact on the aggregated level. Similarly, the financial restrictions do not only affect finance, but any other sector that is dependent on financial instruments as well[29]. In other words, one could also claim that the aim of this research is to find out whether the trade effect of sanctions is measurable *beyond* the products which are targeted. For instance, the (European) export restrictions are focused on equipment for the quite significant energy sector which is again very dependent on the supply chain from Western countries[30].

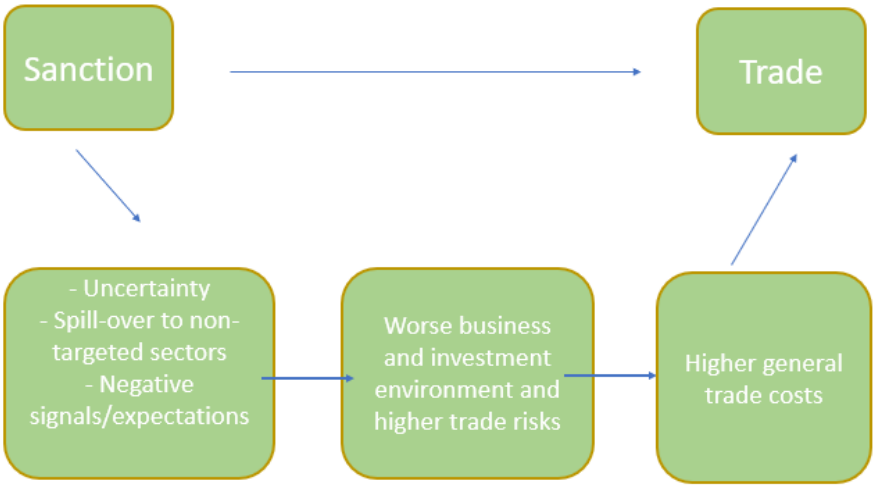
Apart from the measures themselves, sanctions also send strong political and economic *signals* to Russia and its elite. This includes intended signals such as the unity of Western countries through coordinated action, responsibility and credibility through targeting strategic economic sectors and causing economic damage, particularly for government-affiliated corporations and individuals. Moreover, the sanctions also signal the willingness to resolve the situation by *taking own economic and trade losses* (Christie, 2015). In addition to this, the argument in favor of a general trade effect is that sanctions-induced risks and economic disadvantages contribute to a *general worsened business environment* for all market participants within the respective countries. Firms may likely be worried about increasing administrative effort due to the need of export licenses or stronger monitoring, whether they can still trust their business partners, and their reputation if they continue their economic ties with the target country even though they might not be directly targeted (Klinova and Sidorova, 2019). In addition, the potential introduction of even stronger sanctions or potential expansions to other sectors may function as a threat to business relations.

[29] This should be viewed as an addition to direct impacts of the financial restrictions, e. g. if firms are not allowed to issue loans on the European markets.

[30] This is not only the case for Russian imports, but Russian exports as well, although the specific ex- and import products may differ as Russian exports focus on i. a. nuclear energy and pipelines whereas imports consist particularly of pipe or turbine equipment, cf. MIT (2019).

These future *expectations* are closely related to the sent signals. As a result, the respective *uncertainty* caused by sanctions can lead to "anticipatory trade [destruction and] diversion" (Connolly, 2016; Magee, 2008). In short, sanctions induce a worse business climate, uncertainty, lost trust and thereby determine the *indirect* economic impact in the sense that not the measures themselves, but the associated economic conditions for and firms' perception of trade deteriorate. As noted earlier, this intuition can be backed by the fact that trade did not only decrease for embargoed products, but other sectors and products and overall trade as well (Fritz *et al.*, 2017; Crozet and Hinz, 2016; Dreger *et al.*, 2016b; Kholodilin and Netšunajev, 2019). Hence, the respective theoretical question is whether these political signals, expectations and uncertainty are taken as a motivation to redirect economic relations towards Asia and further whether trade in general has been substituted by Asian countries. In short, every relative worsening of bilateral investment relations between sender and targets improves the relative conditions for trade between target or sender with third countries.

Figure 12: Indirect mechanisms of economic sanctions



3.2.2 Trade diversion

Viner (1950) first introduced the concept of trade diversion in the context of a customs union. As noted earlier, the theory and methodological measurement of trade diversion can be linked with the rich literature on FTAs, customs unions and the like if one considers sanctions as "a negative trade agreement" (Frank, 2017). With respect to trade diversion, additional characteristics of bilateral trade play a role which are closely related to the findings in the literature review. For example, as the Russian economy is heavily reliant on big state-affiliated

firms the distance effect would be lower than for an economy which is mainly characterized by SMEs[31]. Hence, the Russian economy faces arguably lower barriers for trade diversion than other countries (Popova and Rasoulinezhad, 2016). Moreover, open, but generally "larger" economies can adapt their trade flows more easily as they are less concentrated on only a small number of trading partners. On the other hand, this is only partly true in the Russian case as trade flows are fairly concentrated on both geographical and product level.

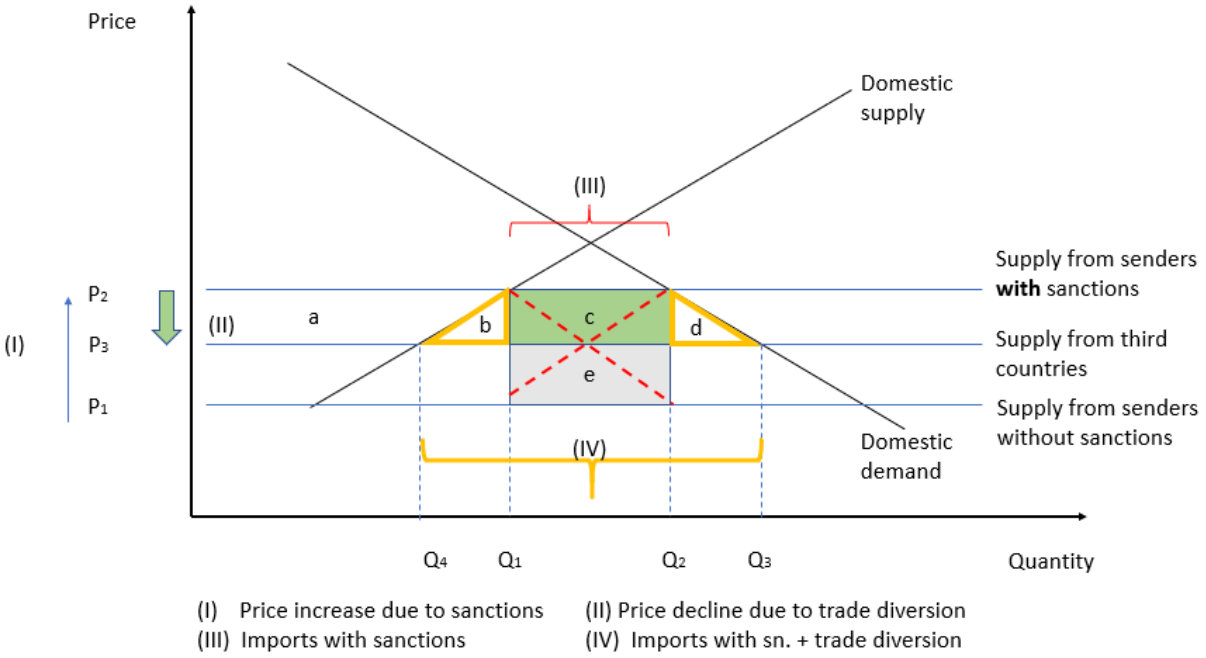
Trade diversion on the product level again depends on the type of products. For instance, uniform goods such as commodities are replaceable more easily (Kirshner, 1997). Trade diversion can also be considered from the individual or firm perspective. If one market participant drops out due to sanctions, another, for example from a non-sanctioning country or a domestic one, has an incentive to replace him until the market equilibrium is reached again. The counterpart on a state level would for instance be a higher influence for the third-party or "sanctions-buster" in the target country. An overview by Kirshner (1997) who summarizes issues that relate to the effect of sanctions can be found in Figure 23. The assumed *time horizon* of trade diversion is evidently another key aspect as re-routing trade takes time, particularly for special energy equipment or seasonal agricultural products (Fritz *et al.*, 2017). Hence, elasticities can be generally assumed to be higher in the long-run. As noted above, the ex- and intensive margins of trade further define the trade structure and thus the possibilities for trade diversion accordingly.

A positive correlation of sales in different export markets or network effects of trade further indicate that an additional trade barrier in the target country negatively affects trade with another market. In other words, if a firm's exports to a target are positively correlated to a firm's export to a non-involved or sender country, sanctions simply lead to trade destruction. For instance, strong economies of scale that render a lower production quantity of a certain good unprofitable lead to lower exports to third markets as well. In contrast, if this correlation is negative the substitution of exports from one market to another would be easier. For example, if the production capacity is limited and the sanctions-induced lower demand of the target do not lead to lower global prices, i. e. if the target is a price taker, a firm can re-orient

[31] If trade diversion to more distant destinations is necessary, the negative impact is borne above average by SMEs as their relative transportation costs rise even more. In contrast, state-sponsored or large companies have a higher market power on transportation costs or can simply afford them while SMEs cannot, cf. Huang (2007).

its trade toward other destination markets (Magee, 2008). The following graph shows the aggregated theoretical trade diversion if one considers sanctions as a form of negative trade agreement or additional "tariff". In comparison to the graph above, the supply from senders with and without sanctions, from third countries and the domestic supply curve are added.

Figure 13: Economic incentives for trade diversion in the target state



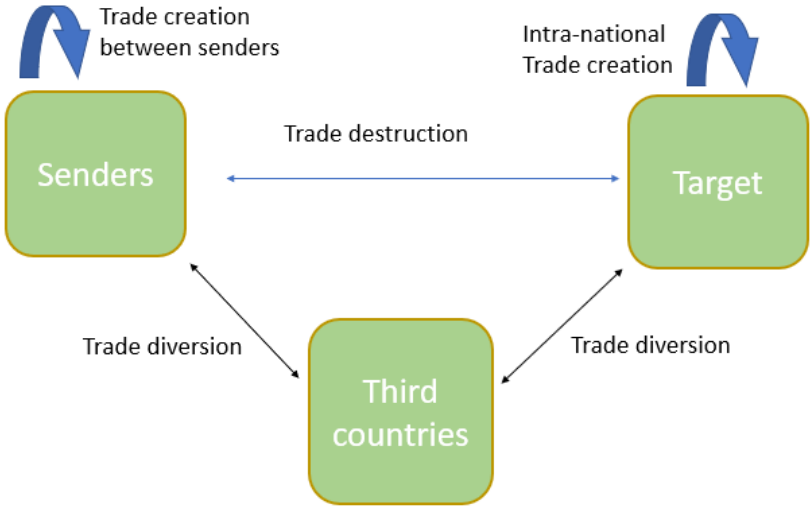
Source: Own illustration according to Magee (2008), Viner (1950) and Galtung (1967).

According to this logic and the described mechanisms above, the sanctions regime between sender and target leaves exporters with a disadvantage in comparison to exporters from third countries[32]. As depicted above, the sanctions are in simplified terms assumed to increase prices for aggregated trade flows (I). Secondly, those imports from *non-sanctioning* countries that were more expensive prior to the sanctions are now *cheaper* than imports from the senders *with* the sanctions in place (II)[33]. Hence, domestic demand rises from Q_2 *to* Q_3 and the consumer surplus from this trade diversion is *a + b + c + d*. Domestic producers, however, lose producer surplus *a* from trade diversion but are still better off than without the sanctions. Overall, the traded quantity due to trade diversion increases from $Q_2 - Q_1$ *to* $Q_3 - Q_4$ but is

[32] In this simplified model, it does not matter whether the exporter is from a sender or target state as the sanctions are bidirectional, i. e. the mechanism is symmetric.
[33] This could refer to all imports or just certain products. The underlying assumption is that products from third countries which are cheaper or have the same prices as products from the sender countries would have been supplied before anyhow. The motivation of this graph is to show the incentives for trade diversion and the resulting trade volumes.

still lower than without the sanctions in place. In other words, the negative quantitative effect of sanctions is to a certain extent offset by trade diversion which directly ties into the research question (Caruso, 2003; van Bergeijk and van Marrewijk, 1995). The difference to tariff models is that in *c* and *e* no government revenue can be lost as there simply is none[34]. Hence, the net surplus of trade diversion increases by *(a + b + c + d) – a*. As *c* and *e* cannot lost as tariff revenue or the like, this model strongly highlights the positive net benefits of trade diversion in the case of sanctions and thus indicates the motivation of a target to divert trade flows. Moreover, if the sanctions are bidirectional the same mechanism holds for the senders (even though the effect sizes are likely much smaller the greater the sender bloc is in relation to the target).

Figure 14: Expected trade creation, destruction and diversion



3.2.3 Elasticities

The size of the effect depends on elasticities, i. a. the (price) elasticity of substitution, demand, supply as well as the elasticity of trade to these different determinants. In short, elasticities make judgements about the proportional changes of (dependent) variables to a marginal change of another (independent) variable[35]. Anderson and van Wincoop (2003) conclude that the elasticity of trade in the literature lies between the range of five and ten, depending on the model and assumptions. Furthermore, there are different methods of estimating the

[34] This does *not* include and refer to the existence of government-affiliated firms.
[35] Hence, the elasticity of substitution in the present context simply describes whether (traded) products are *substituted* by other products or the same products from other countries. Due to the use of aggregated data (all goods) one can only estimate a change in aggregated bilateral trade flows. The elasticity of trade to sanctions describes in how far trade is destructed if sanctions are in place.

elasticity of trade. Simonovska and Waugh (2014) find lower values (between ca. 2.8 and 4.5) for trade elasticity of disaggregated data than earlier studies. This *lower* elasticity of trade would imply higher welfare gains of trade which would symmetrically result in a higher welfare destruction due to trade destruction as well as a higher pressure to trade diversion. Moreover, Imbs and Mejean (2015) argue that trade elasticities are generally lower for aggregate data than for the sectoral level which would imply even higher welfare losses. The same authors estimate country-specific elasticity values and find lower export and import price elasticities for developed countries such as Austria, the UK, France, Japan, but China and India as well, and higher values for small open economies (Imbs and Mejean, 2010, 2017).

The time frame and aggregation regarding the sectoral, product or the goods and services level do play a role in the calculation of the elasticity of trade as well (cf. Bernard et al. (2003) or Fratianni and Kang (2006)). This is also related to the economic structure of a country/region: For instance, more price variation within a country often implies higher variation in production levels which leads to lower trade elasticities. This means that a price change does not affect trade to a high extent as domestic production can react more flexibly and produce more/less for a domestic market (Simonovska and Waugh, 2014).

The elasticity literature is related to the present paper insofar as the effect of sanctions also depends on this elasticity of trade and that if, for instance, domestic production can react more flexibly to price changes, the effect of higher trade costs or in this case sanctions can be alleviated. The findings further emphasize the importance of the research question. This is reflected in the results, as coefficients of logarithmized (continuous) variables can be interpreted as exactly this elasticity of substitution and as "semi-elasticities"[36] in the case of variables in levels (Yang and Martinez-Zarzoso, 2014). With respect to this issue, one needs to bear in mind that some goods may even be perfect substitutes whereas others are hardly replaceable[37]. As a result, models in this paper do not include country-specific estimation coefficients, but it is important to bear in mind that the hypothesized effects are likely to differ

[36] Semi-elasticities describe to a percentage change of dependent variables after an *absolute, e. g. a unity increase,* instead of proportional change in the independent variable.

[37] For instance, consider products in the by the Russian countersanctions particularly hit European agricultural sector. Apples may be highly substitutable by other fruit which is much less the case for certain crops such as wheat. Hence, when considering aggregate trade data, these discussions are related to average elasticities, i. e. across all goods. An adequate average elasticity is, however, hard to obtain.

between countries and thus, regarding the generalizability of this paper, between sanction regimes as well (e. g. EU sanctions on Iran or North-Korea).

3.3 Hypotheses

In summary, this theory hypothesizes a positive sign of Russia – China trade in response to the sanctions, and the following hypotheses can be derived from the previous findings:

(I) *The economic sanctions on and by Russia lead to trade destruction between senders and target*

(II) *The reciprocal economic sanctions lead to a reorientation of Russia's trade towards China*

Both direct and indirect mechanisms or trade barriers contribute to the hypothesized trade destruction and diversion. If the first hypothesis can be confirmed, it is likely that exporters search for new markets and importers buy – at least certain products – from other countries which entails implications for other non-involved or "neutral" countries such as China and many other Asian countries. "Pure" trade diversion would mean that the trade destruction effect of sanctions (var. "sanctions") is completely offset by the higher trade flows to non-involved countries ("bystanders") or trade creation within the block of sanctioning countries ("senders") and the spurred intra-national trade within the target country (Carrere, 2006).

The "senders" variable constitutes the counterpart to a potential increase of Russia's domestic production due to the sanctions. The resulting importance for EU (Governance) could be derived by the sub-question whether common decision making within the EU CSDP and with other allies in general leads to more integration in other areas such as trade. However, as this study does not include intranational trade data, an explicit hypothesis could not be measured symmetrically. Overall, the approach is comparable to the measurement of RTAs with the gravity model, but with trade destruction instead of creation and trade diversion from target to bystanders instead of from "bystander" to RTA member as it would be in the RTA case.

Figure 15: Dummy variables and expected sign of coefficients

Dummy variable	**Expected outcome**
Sanction	Trade destruction effect (negative sign)
Countersanction	Trade destruction effect (negative sign)

Bystander(sanction)	Trade diversion effect (positive sign)
Bystander(countersanction)	Trade diversion effect (positive sign)
Senders	Trade diversion effect to bloc of senders (positive sign)

4. Method

4.1 The Gravity Model of Trade - Concept and Theory

The following section discusses the gravity model and its application to the sanctions following the crisis in Ukraine and focuses on its framework, the associated data and variables and the specified model structures. The respective assumptions are considered where they apply. The gravity model's intuition is rather straightforward, as it follows Newton's model of gravitation where the gravitational force is proportional to the product of masses and inversely proportional to the square of distance. According to this, trade, e. g. exports from country j to i, as explanandum is positively determined by the fundamental independent variables of the economic sizes and inversely related to their squared geographic distance (Yotov *et al.*, 2016).

$$trade = (GDP_j * GDP_i)/(distance^2) \qquad \text{(I)}$$

As Feenstra (2002) states, the basic version of the gravity model thus claims that trade is determined by the product of GDPs, thereby hypothesizing that countries with a higher GDP, but also countries that are more even in terms of their economic size, trade more. Due to the multiplicative nature of the gravity model, the logarithm is usually used in OLS applications which translates into the following log-linear "baseline" model:

$$\ln(X_{ij,t}) = \beta_0 + \beta_1 \ln(Y_{i,t}) + \beta_2 \ln(\mathrm{Y_{j,t}}) + \beta_3 \ln(distance_{ij}) + \varepsilon_{ij,t} \qquad \text{(II)}$$

Where *X* is the dependent variable of interest, i. e. bilateral imports or exports, Y_i is the GDP of country *i*, Y_j the trading partner's GDP and ε the error term, each at time t within a panel structure. The theory assumes a monopolistic competition model with identical homothetic preferences and constant elasticity of substitution (CES). This means that the reaction to relative price changes, e. g. caused by increased trade costs through economic sanctions, is equivalent on both local and temporal levels. Moreover, standard theoretical assumptions for the estimation of gravity models include that all goods are differentiated by place of origin, that trade costs are borne by the exporter but passed on to the importer, market clearance and that trade barriers or costs are symmetric and that domestic trade costs equal zero.

However, one of the most relevant theoretic, and methodological, strengths of gravity models is that they can be derived from different theories that explain international trade, e. g. theories that are based on increasing returns to scale, Armington demands or endowment and technological differences, Heckscher-Ohlin or Linder models of trade while constant-elasticity of substitution (CES) models[38] are the standard assumption (Santos Silva and Tenreyro, 2006). Hence, different theoretic assumptions play only a minor for the estimation of gravity models. Still, this rather simple model needs to be theoretically extended to control for other variables that determine trade.

The "traditional" gravity model was extended by Anderson and van Wincoop (2003). The "AvW" model has since served as a standard model and shaped the terminology for succeeding studies and gravity models. More specifically, the AvW model demonstrates the necessity to consider and control for outward and inward multilateral resistances (MR). Anderson and van Wincoop (2003) derive this trade resistance factor that describes the "average trade barriers faced by an exporter and an importer" from three components. These consist of the bilateral trade barrier *between* regions as well as the respective trading partners' resistance to trade with all regions. The outward MR term is exporter-specific and describes the export barriers, in other words the 'quality' of the access to foreign markets. The inward MR is the importer-specific equivalent and considers the availability of foreign goods. In other words, a country is more likely to trade with a certain partner the more 'resistant' it is to trade with all *other* countries (Anderson and van Wincoop, 2003). Hence, this higher *multi*lateral resistance thus theoretically raises *bilateral* trade[39]. In contrast, higher bilateral resistance or barriers lead to a reduction of trade flows (Christen *et al.*, 2016). Not considering these effects would lead to an omitted variable bias (Anderson and van Wincoop, 2003). One solution that is shown by the authors as well as by Feenstra (2002) is the use of exporter and importer fixed effects which are shown to be consistent measures for in- and outward MR (see following subsection). In summary, MRs are structural and theory-consistent *aggregates* of bilateral trade cost terms or general equilibrium trade costs indexes. Translated to the context at hand,

[38] The theoretic significance of this constant elasticity model implies a *constant percentage change* of elasticity coefficients, i. e. the effect of sanctions is assumed to be equal for the complete span of values and not only within certain restricted domains. In this context, the elasticity of substitution refers to the substitution of goods from a country *i* to another country *j* Yotov *et al.* (2016).

[39] The reasoning behind this is that "the constant vector of real products must still be distributed" (Anderson and van Wincoop 2003, p. 9). Hence, higher trade costs lead to lower supply costs as the produced products (constant output, at least on a short-term consideration) need to be sold at equilibrium market prices.

this refers to the fact that sanctions increase the bilateral resistance between Russia and the senders and thus, relatively, decrease the multilateral resistance. As a result, Russian trade with non-sanctioning countries is relatively cheaper than before the imposition of sanctions which is exactly why *trade diversion* is hypothesized. In short, economic disintegration with one (bloc of) trading partner(s) leads to a relatively higher economic integration with the other (bloc of) trading partner(s) (Yotov *et al.*, 2016). With the assumption of uniform GDP coefficients of Y_i and Y_j , $\alpha_1 = \alpha_2 = 1$, the stochastic AvW-model in its multiplicative form and without additional control variables yields as follows[40] (Bergstrand *et al.*, 2013):

$$E\left(T_{ij}\middle|Y_i, Y_j, D_{ij}, d_i, d_j\right) = \alpha_0 Y_i Y_j D_{ij}^{\alpha_3} \varepsilon^{\theta_i d_i + \theta_j d_j} \qquad \text{(III)}$$

where $d_i \; and \; d_j$ denote exporter and importer dummies and $\theta_i \; and \; \theta_j$ are their respective coefficients. As a result, the error term ε and unobserved heterogeneity depend on exporter- and importer-specific variation in the (panel) data. Hence, the difference to the traditional model (II) is the addition and control of these multilateral resistance terms. In order to indicate a panel data structure, one would need to index each coefficient and variable with an additional *t* (Yang and Martinez-Zarzoso, 2014). This stochastic form also hints at the intuitive differences between Newton's physical law and the economic theory as it holds on average only and thus brings along an error term with certain assumptions needed. The respective methodological challenges are illustrated as follows (Santos Silva and Tenreyro, 2006).

4.2 The Gravity Model of Trade – Estimation Approaches in Practice

Generally, these challenges vary along two dimensions – the error term and the degree of model structure. The latter concerns the number and potential interaction of included variables (Fally, 2015). With respect to both challenges in the context of trade data, 'cost including freight' (c.i.f.). prices in one country, e. g. an importer, differ from 'free on board' (f.o.b.) prices in another country, e. g. where a good is produced (equals the "net" of c.i.f. prices or zero cost of transport). Hence, price levels are not the same across countries and

[40] Theoretically assumed unit-income-elasticity model, i. e. a change in the economic masses (GDP) (=elasticity) explains a change in trade flows or another dependent variable to the same extent (10% lower combined GDP would explain a 10% lower trade flow, ceteris paribus).

exogenous variables such as sanctions change these levels in one country not to the same extent as they affect the ones in another country.

Feenstra (2002) discusses three solutions to control for different price levels which lays the groundwork for a high number of gravity studies. One possibility entails the use of price index data with the drawback that certain transaction costs and risks are usually not reflected in the index data. In addition, they often use an arbitrary base period which again differ across countries. A second solution is the implicit estimation of these price indexes according to Anderson and van Wincoop (2001) and Feenstra (2002)[41]. The third possibility to control for unobserved price indexes and different market sizes, which is also applied in the paper at hand, is the use of importer and exporter fixed effects. One advantage is that effects can be estimated directly within the regression equation as there is no need to estimate the price indexes in a preceding step. This computational much simpler approach faces the disadvantage of arguably less efficient estimates in comparison to the *explicit* use or estimation of MRs as would be the case in the previous solutions. However, Feenstra (2002) argues that the advantage of explicit estimations is rather small in most applications and negligible in comparison to the benefits of the simpler estimation procedure (see also Fally (2015), Egger (2004), Baltagi *et al.* (2014)). The following equation describes the applied gravity model[42]:

$$X_{ij,t} = \exp\big[\alpha_0 + \beta_1 Y_{i,t} + \beta_2 Y_{j,t} + \beta_3 D_{ij} + \beta_4 CV + \beta_5 Senders + \beta_6 Sanction + \beta_7 Countersanction + \beta_8 Bystander(sanction) + \beta_7 Bystander(countersn.) + \mu_i + \pi_j + \chi_{ij} + \omega_t\big] + \varepsilon_{ij,t} \qquad \text{(IV)}$$

[41] These unobserved "indexes of multilateral resistances" depend on the assumed symmetric transportation costs and can be estimated according to the specific assumptions on border effects and would thus require a custom solution which is not a focus or within the scope of this paper.

[42] Yotov *et al.* (2016, p. 105) emphasize that the following misspecifications need to be avoided. First, the "gold medal mistake" is to omit MRTs or remoteness indexes as is described above and in Baier and Bergstrand (2007); Baldwin and Taglioni (2006). Secondly, the silver medal mistake would consist in averaging reciprocal trade flows. Hence, e. g. France as importer and China are considered as one country pair and China and France as exporter are assumed to be another country pair in order to be theoretically consistent and distinguish the direction of trade flows. The bronze medal mistake would be to inappropriately incorporate the deflation of trade flows. As the main source, UN Comtrade reports data in nominal (current) USD which shows the relevance of this consideration. However, this challenge is already taken care of by the solution to the "gold medal" mistake, i. e. to account for MRTs and include country fixed effects in the equation.

CV are additional time-invariant[43] and time-varying control variables with evidently separate coefficients but are not listed for reasons of simplicity (see Figure 24). Senders, sanction and bystander are dummy variables that indicate whether a trade flow is between two sender countries, directly hit by the sanctions or if only one country is affected by the sanctions, respectively. μ_i is the importer dummy or importer fixed effect that captures observed and unobserved importer-specific effects or inward MR. π_j is the counterpart for the exporting country and outward MRT while the country-pair fixed effect χ_{ij} captures all time-invariant unobserved *bilateral* determinants of trade. Moreover, the latter absorbs most of the correlation between the variables of interest and the error term ε_{ijt}. In other words, it controls for the endogeneity of sanctions. ω_t denotes the time fixed-effects and thus controls for time-varying developments that affect trade flows[44]. Importantly, the PPML estimation allows for the estimation without the logarithmized version of the dependent whereas the logarithm is taken for the OLS models. Another major advantage of the PPML approach is that neither homoskedasticity nor normality of the included variables need to be assumed (Santos Silva and Tenreyro, 2010).

4.3 Estimation techniques

4.3.1 Potential approaches

Overall, the OLS approach has been applied in several gravity models (Santos Silva and Tenreyro, 2006; Baltagi *et al.*, 2014). With respect to OLS estimation, the independence of the error term and covariates is assumed, otherwise the consistency of the OLS estimator would be violated. However, Santos Silva and Tenreyro (2006) find evidence for heteroskedasticity in log-linear models and that the error term and covariates are not statistically independent. Hence, the variances vary between different country pairs and heteroskedasticity may generally be considered a main challenge of trade data. As a result of these inconsistent elasticity estimates with OLS and heteroskedasticity of trade data, they recommend the PPML approach. Nevertheless, the present paper applies OLS estimation as "robustness" check for the estimates of the PPML estimator which is used as the standard approach.

[43] Time-invariant variables will drop out of the equation/regression as there is no within-group variation. In other words, the effect of variables that do not change cannot be measured.

[44] It should be noted that this only constitutes a second-best strategy in comparison to importer-time and exporter-time fixed effects which cannot be applied in the paper at hand due the limited number of dummy variables that can be generated with Stata/IC.

A general measurement issue of gravity models is that by assumption, and due to the theoretic derivation from Newton's law of gravity, trade flows can never be zero. However, this is often the case in practical applications as in the present one, particularly for monthly data. If the OLS estimator is applied, potential solutions include just to drop the observations with zero trade flows as in the paper at hand, add an arbitrary number to the trade flows (usually 1) or to use a Tobit estimator (Yotov *et al.*, 2016). With respect to Tobit models, Gómez-Herrera (2013) argues that they lack theoretical foundation in relation to trade data.

Non-linear least square (NLS) estimators as an alternative to OLS would face similar problems as they cannot account for heteroskedasticity. NLS would give more weight to extreme values/noisier observations with the ultimate result of an inefficient estimator (Baier *et al.*, 2019). This could be solved with a *weighted estimator* which would require information on the distribution of the error term. A potential solution could be to apply a multiplicative model but with a cumbersome or questionable identification of the first-round estimator (Santos Silva and Tenreyro, 2006). Such a weighting approach could be similarly performed with the gamma-PML estimator. However, a drawback is that bigger countries usually record a better quality of trade data. Hence, it could result in more weight for observations with bigger measurement errors. The imposition of constraints on the multilateral resistance alleviates the problem of undesirable properties of the Gamma-PML and OLS estimators. Overall, Baier and Bergstrand (2007) emphasize the need to account for endogeneity and argue that a panel data approach performs better than an instrumental variable or control function techniques.

4.3.2 Poisson-Pseudo-Maximum-Likelihood Estimation

In contrast, a pseudo maximum likelihood estimator (PML) gives the same weight to all observations. Hence, observations with a larger variance are weighted less than with a NLS estimator and observations that have a higher measurement error are weighted less than with the Gamma-PML estimator[45] (Santos Silva and Tenreyro, 2011). Importantly, the data does not need to be Poisson distributed[46] but the coefficients are derived by the same first-order

[45] Hence, those observations that are likely to be less informative about the curvature of the conditional $E[y_i|x]$, i. e. the maximum likelihood estimate, are weighted less which results in more efficient estimates. The conditional variance of y_i then equals its conditional mean as in the Poisson distribution.

[46] Poisson distributions are usually assumed when working with count data. The authors show that a correct specification of the conditional mean of the data $E[y_i|x] = \exp(y_i x)$ is a consistent estimator that is based on a PPML function, even in case of variance misspecifications.

conditions (FOC) as with the ML estimator and a Poisson distribution (Fally, 2015). This leads to a straightforward and easy-to-implement approach which is further robust to misspecifications. In comparison to potential alternatives, the PPML estimator has several advantages such as strong robustness properties and is thus considered an adequate estimator under the AvW model (Baltagi *et al.*, 2014).

Certain applications and research questions require a more "structural" approach, e. g. the *explicit* estimation of importer and exporter fixed effects (Anderson and van Wincoop, 2003). If this is not of explicit interest as is the case in the paper at hand, the *estimated MRTs* with their respective theoretically derived conditions of AvW approach can be replaced by their *"observed" counterparts*, i. e. if a PPML FE approach is applied. In other words, if PPML is combined with an exporter fixed effect, e. g. by the inclusion of exporter dummies, the *estimated production*, i. e. exports, equals the *observed production* value (GDP if all sectors are considered). The same holds for *importer* fixed effects, i. e. a country's *expenditure*.

This is an important finding as it allows the researcher to directly use PPML in combination with importer and exporter FEs and "skip" the explicit estimation of respective fitted values (Fally, 2015). Furthermore, it is also a theoretical advantage over estimators such as OLS or Gamma-PML as importer and exporter effects are biased "downward for large countries and upward for small countries" in case of the latter two estimators (Fally, 2015, p. 81)[47]. The PPML estimator with FEs automatically satisfies these constraints and is thus easier to implement, without resulting in a lower quality of the results. Moreover, PPML puts relatively more weight on large trade flows than OLS or Gamma-PML and deals with observations where the ML estimator does not exist, i. e. in case of zero trade flows (Fally, 2015). Santos Silva and Tenreyro (2010) therefore recommend applying a "simple PML" such as the PPML estimator.

4.3.3 Fixed effects estimation

The term "fixed effects" illustrates that certain model parameters are "fixed" or held constant, i. e. they are non-random quantities. The purpose is to control for unobserved heterogeneity while the *underlying assumption* is that there is a *correlation between the individual*

[47] The problem can, however, be alleviated by the replacement of the market size or GDP with other country characteristics such as GDP per capita. In summary, more restrictions on the multilateral resistance terms and thus a more "structural approach" are needed if OLS or gamma-PML with simple fixed effects is applied which would no longer be compatible with the framework given by Anderson and van Wincoop (2003).

observational unit and the *independent variables* of a model. Fixed effects (FE) thus control for characteristics that are specific to certain observation units such as country pairs (Baltagi *et al.*, 2014). Hence, FEs capture confounding variables and the respective macroeconomic effects which allows in principle to separate the sanctions-induced effect from unobserved developments such as the oil price and exchange rate developments (Christen *et al.*, 2016). Hence, FEs with panel data structures can control for the effects that are specific to a certain observation unit, i. e. unobserved heterogeneity (Gómez-Herrera, 2013). The disadvantage is that time-invariant and constant variables are dropped from the regression due to collinearity. In other words, the lack of *within-group variation*, i. e. certain characteristics of the observation unit that do not change, in exporter and importer-specific variables such as bilateral distance makes the measurement of time-invariant variables unfeasible (Prehn *et al.*, 2016). However, the present research focuses on the time-varying variable sanctions.

Generally, fixed effects are constructed by simply including dummies for the specific fixed effect, e. g. importer dummies for every importer[48]. The structure of FEs is quite flexible as it is possible to include main effects only such as time, importer and exporter FEs or to apply exporter-time, importer-time and country-pair-time FEs. Exporter- or importer-time FEs allow the MRT to vary over time, which is of theoretical importance as these MRTs also vary due to increased trade costs as explained by Anderson and van Wincoop (2003). This is likely even more so in "disrupting events" such as the Crimea crisis and thus relevant to the underlying topic. Although the theoretical and methodological country-time fixed effects cannot be included due to the very high number of variables needed in that case, the inclusion of variables such as free trade agreements, bilateral distance or common country characteristics alleviates this problem considerably, at least in those models where these covariates are not omitted due to collinearity (due to time-invariance) (Allison, 2009) [49]. As Baltagi *et al.* (2014) note, much of the potential endogeneity of these pair-specific time-invariant or even pair-time specific effects is caused by the included control variables in Figure 24. Baltagi et al. (2014)

[48] There are different ways to do this in Stata, an intuitive approach is just to explicitly include these dummies in the code, e. g. "*ppml limports (…) importer_* exporter_* (…)*" denoting all exporter and importer dummies. Implicit inclusion with, for instance OLS, usually looks like "*xtreg limports (….) sanctions, fe (robust)*" where *fe* denotes the fixed effect of the panel identifier or unit of observation, i. e. a country pair fixed effect as country pairs and the respective period define the panel data structure. The bilateral variable of interest must be time-varying, see UNCTAD (2012, p. 108).

[49] The Stata version Stata/IC only allows for a certain number of variables which would be exceeded by the country-pair dummies, even for the reduced data set [(Importer + Exporter)*Time variables].

sum up the characteristics of panel data models which include fixed effects and conclude that standard gravity covariates can explain up to 98% of the variation of trade data[50].

4.3.4 Random effects estimation

Random effects are an alternative approach which allows time-invariant variables to vary and does not omit them from the regression (Mesters and Koopman, 2014). Hence, the use of REs allows for the estimation of time-invariant variables such as distance, area or common legal history. The main difference to FEs is that, rather than just being able to measure the *within effects* as is the case with fixed effects, random effects can measure the *between effects* as well (Bell and Jones, 2015). This means that the *within* group variation, e. g. the variation of a certain variable's characteristic over time that is zero for time-invariant variables, is "extended" by a measurement of the variation *between different units of this variable*. By assuming that this variation between different units is random instead of fixed, the effect can be measured (Verbeke *et al.*, 2010). Moreover, *the variation across observation units* of a certain variable, e. g. country pairs, is *assumed to be uncorrelated with other independent or* dependent variables. For example, it allows for the estimation of random exporter-importer interactions if one assumes that these country-pair effects are random (Baltagi *et al.*, 2014). Overall, some studies argue and show that a random intercept PPML model is the best available model, also in order to *measure* the effect of time, exporter and importer-invariant variables (Bell and Jones, 2015; Yang and Martinez-Zarzoso, 2014; Prehn *et al.*, 2016). A Hausman-test can test whether the FE or RE specification is more efficient.

A drawback of random effects in comparison to fixed effects is the assumption of zero correlation of *unobserved bilateral time-invariant random variables* with the variables of interest. According to Baier and Bergstrand (2007), these variables are better controlled for with FEs. Moreover, the PPML fixed effects model has been most commonly applied as preferred estimation method in the literature of International Trade and it suffices to *control*

[50] This argument in favor of fixed effects can also pose a drawback. Depending on the research question, fixed effects can "wipe out" all the variation of interest of other variables of interest, cf. Baltagi *et al.* (2014).
In the Stata application, the command "ppml" is used, checked by the "xtpoisson" command which equally applies a pseudo-ML estimator as well as on OLS estimation with "xtreg". For reasons, background information and differences to i. a. the xtpoisson command see Santos Silva and Tenreyro (2011). In general, this command shares many limitations of the "glm" command. It drops regressors that "may cause the non-existence of the (pseudo) maximum likelihood estimates". As the research interest lies in the effect of sanctions, dropped variables such as control variables can be justified, although this rarely happens in the paper at hand.

for (unobserved) bilateral and time-specific effects rather than *measuring* them explicitly through REs (Schunck, 2013). In short, the PPML FE model controls for observed and unobserved time, country and country-specific effects and is applied as the standard approach while the respective PPML RE and OLS RE models are used as robustness checks. An overview of similar model specifications may be found in the Stata do file appendant to this paper.

4.4 Data

The included variables in the panel data vary across the exporter and importer-specific and time dimensions (*i,j,t).* Hence, *country-pair* observations repeated *over time* define the panel data structure as well as its dyadic nature (Baltagi *et al.*, 2014). The dependent variable of all models is constructed from bilateral import data from the database UN COMTRADE which reports data on a monthly and annual level [51] (Yotov *et al.*, 2016). Moreover, the OLS models use a logarithmized value whereas PPML can deal with the original value. However, as there are several gaps in the monthly data for Chinese trade, the data is mirrored and the resulting dependent variable is thus the bilateral exports[52]. As both Russian and Chinese trade data have several gaps before 2013, this is not possible for the period before 2013. Hence, models that are based on monthly and quarterly data include the time frame 2013 – 2017, whereas the annual data covers 2009 – 2017[53]. For this reason, the quarterly trade data is constructed from the monthly trade flows. The included countries were chosen according to their trade relations with Russia (see Table 19: Included countries)[54]. Bell and Jones (2015) emphasize that

[51] Import data is used as the preferred standard in trade literature even if the dependent variable of interest are exports – this technique is often referred as *mirroring*. The underlying assumption is that custom authorities monitor imports more precisely than exports. One potential caveat is that some countries may have weak monitoring capabilities and thus the data could be quite imprecise. The latter may apply, if at all, only to a few countries in the used dataset.

[52] In short, mirror statistics simply declare imports as exports. For example, Russian imports from China are declared as Chinese exports to Russia. This simplification renders the panel more balanced as missing values for a certain country do not stem from its own systematically unreported data but only trade flows that are not reported by its trading partners which is much less systemic.

[53] The estimation evidently needs to start with pre-sanction years. Otherwise the dummies have an "artificial break point" and are interpreted incorrectly (Carrere (2006)).

[54] There are approx. 33 countries included with each then 32 trading partners over 10 years or 5*12 months. Panel data) gravity models that include a similar number of countries can i. a. be found in Yang and Martinez-Zarzoso (2014). The data is in a *long format* which means that each row entails a country pair-year, -quarter or -month combination which Hence, each country pair at a certain point of time is in two rows (exporter/importer).

the effective sample size is much smaller as the same observation units are included in different combinations. In addition, robust or clustered standard errors are applied as they allow for intragroup correlation. Applied to the present context this means that observations of the panel identifier, country pairs at different points of time, do not need to be independent *within* their groups and likely are not independent from each other. In contrast, the standard errors are assumed to be independent *between* groups, i. e. there is no systematic correlation of the SE of country pair A with the SE of country pair B (Santos Silva and Tenreyro, 2010).

As UN Comtrade data is reported in current US dollars, GDP data from the World Development Indicators (World Bank) are chosen to be in the same format. The CEPII data set of bilateral covariates includes standard trade cost determinants for gravity models. Hence, the control variables include contiguity/common border, a common language, common colonizer, a common colonial history, a common legal history a regional trade agreement or if one of the countries is landlocked (Head and Mayer, 2014). In addition, WTO membership and accession dates are retrieved from the WTO website.

4.5 Trade volume and tariff-equivalent effects

Tariff-equivalent effects aim to find values for tariffs that would have the same effect on trade. Similarly, trade volume effects aim to answer the question how much trade is lost or created as a result of a certain policy, in this case the sanctions on Russia and the countersanctions. The coefficients of the elasticity of trade with respect to sanctions can then be applied to find the following tariff and volume effects in percentage terms (Yotov *et al.*, 2016, 17ff.).

$$TradeVol.Effect = (e^{\beta_{sanction}} - 1) * 100 \qquad \text{(V)}$$

$$TariffEqu.Effect = (e^{\beta_{sanction}/\beta_{tariff}} - 1) * 100 \qquad \text{(VI)}$$

As the models of the present paper do not include tariffs, the respective coefficient needs to be taken from other sources. This coefficient can, however, be interpreted as the negative

trade elasticity of substitution $\beta_{tariff} = -\sigma$ which of a range of estimates, quite roughly around $\sigma = 5$, exist in the literature (Feenstra, 2002; Yotov *et al.*, 2016). It follows that

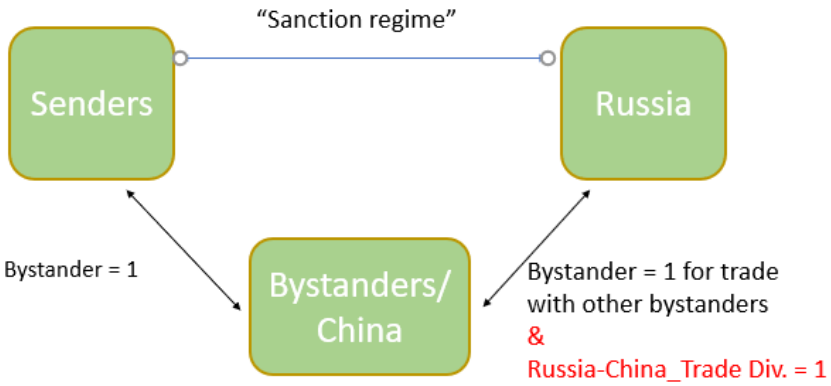
$$TariffEqu.Effect = (e^{\beta_{sanction}/-\sigma} - 1) * 100 \quad \text{(VII)}$$

However, computing such a tariff equivalent is linked to considerable uncertainty, also with respect to the different economic mechanisms at work. Hence, Beghin and Bureau (2001) and Simonovska and Waugh (2014) emphasize that the computation of a trade volume effect is more appropriate and that one should carefully interpret tariff equivalent values, particularly with respect to potential welfare implications.

4.6 Models

In general, the models assume the exogeneity of sanctions[55]. The argument against exogeneity would state that e. g. the US are much less reluctant to impose sanctions on Russia due to their low bilateral trade flows with Russia. However, this is even less likely for EU countries with their closer trade relations. Hence, it is assumed that there was no anticipation effect of sanctions which is particularly relevant for the monthly analysis (Carrere, 2006)[56]. As a starting point, models with "regime dummies" only, i. e. if a trade flow is hit by either sanctions or countersanctions and the respective bystander country pairs are tested as illustrated below.

Figure 16: Baseline model



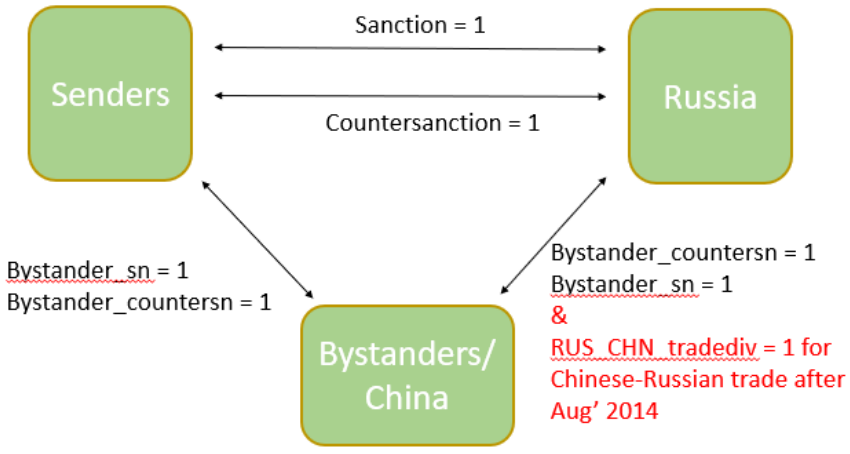
[55] In contrast to the study of FTAs, potential endogeneity can at least be considered less severe as the respective theoretical mechanism of endogeneity would indicate that *countries with low bilateral trade flows are more likely to impose sanctions on the respective trading partner*. However, a potential correlation cannot be denied if one considers e. g. the intensity of US sanctions and the low relative economic importance of Russia for the US.

[56] Related to this, it is assumed that the time-invariant variables are uncorrelated with the time-variant error term. Hence, if they are exogenous, they are uncorrelated with the time-invariant error. If they are partly exogenous, it follows a correlation with the time-invariant error component Baltagi *et al.* (2014, p. 39).

Due to the temporal variation with respect to the imposition of the reciprocal sanctions, their effects can be measured separately. It is important to mention though that the coded dummies only differ in a temporal perspective as the countersanctions were imposed later for some and not at all in certain cases. For instance, Japan was not included in the Russian countersanctions. A "simple" approach is conducted by Crozet and Hinz (2016) who fully rely on fixed effects models and thus only use monthly bilateral data from UN Comtrade between 2012 and 2015[57]. Similar models are applied in the present paper with the different sanction indicators and the fixed or random effects only. Furthermore, the control variables are added to these models. In principle, the same models are applied with quarterly data as quarterly sums of monthly trade data. Finally, annual data from 2009 to 2017 is used.

Moreover, other models test for trade diversion from senders to bystanders as well as from the target to bystanders, specified by the "bystander_sn" dummy that is equal to one if the *country pair* either consists of a sender and bystander *or* the target and a bystander. "Bystander_countersn" is the respective dummy for the trade diversion effect due to the countersanctions. The double-ended arrows indicate that the models include e. g. exports from Spain to China as well as exports from China to Spain, *i. e. in both directions*. To explicitly test for Russian trade diversion, as well as import and export diversion in separate models, dummies that indicate Russian trade with China while sanctions are in place are added. Hence, Sino-Russian trade is no longer incorporated in *bystander_sn and bystander_countersn*.

Figure 17: Models that distinguish between the effect of sanctions and countersanctions



[57] They further exclude certain sectors where trade happens infrequently and then in large numbers (e. g. nuclear reactors or other energy equipment).

It could be further argued that the sanctions only developed their full potential effect after a certain "phasing-in" period and the effect of sanctions can also be expected to vary over time (Cilizoglu and Bapat, 2018). To account for this potential "evolution", some estimations provide yearly coefficients for the main variables of interest and monthly, quarterly and annual data levels. In addition, further models distinguish between the respective export and import effects as well as the effect of different type of sanctions according to whether they apply for individuals, entities or sectors, following the approach of Dreger *et al.* (2016b). As a result, more countries such as New Zealand which only imposed travel bans were included.

However, these results should be interpreted with caution due to the short time between the imposition of different sanction types. All models are applied with and without a separate consideration of Russian-Chinese trade. A more detailed description of the applied models as well as methodological approaches from a few similar studies can be found in the Stata do file appendant to this paper (Crozet and Hinz, 2016; Dreger *et al.*, 2016b; Felbermayr *et al.*, 2019; Popova and Rasoulinezhad, 2016). The coefficients are tested on their statistical significance with standard approaches of their respective estimators such as t-tests.

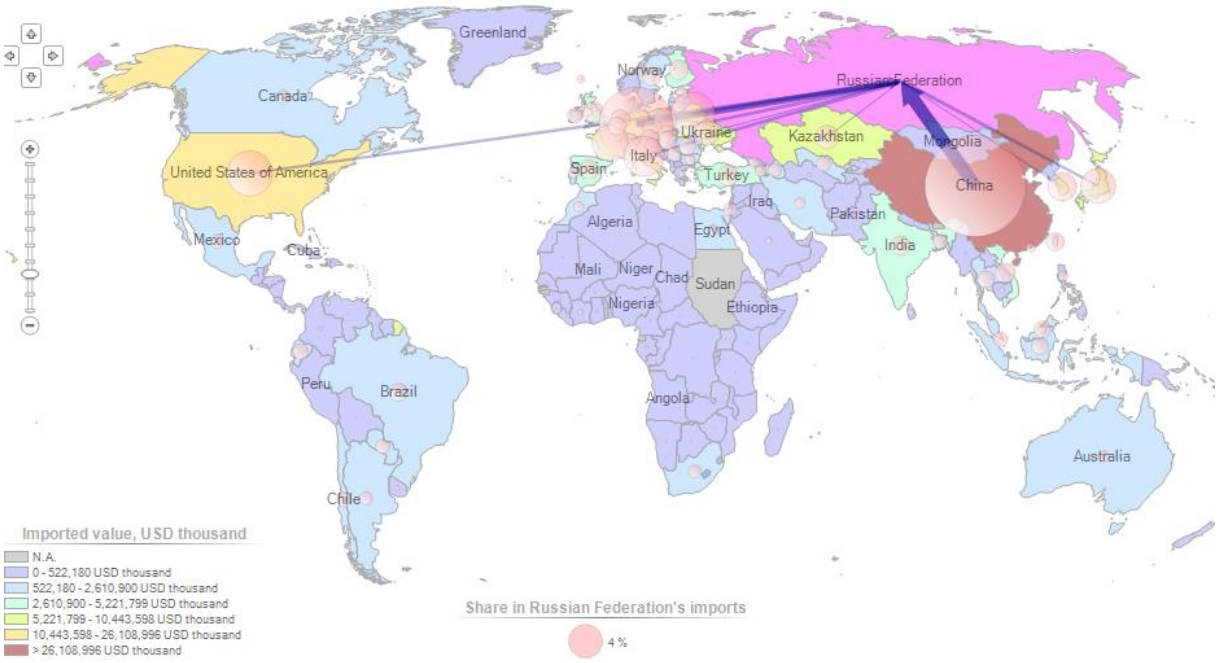
5. Discussion of Results

5.1 Descriptive statistics

As the EU was and still is the most important market for Russian firms, with 42% of Russian exports in 2013, the pressure of trade restricting sanctions can be considered as quite high. In contrast, Russia is far from being economically insignificant for the EU, but "only" its fourth largest trading partner with roughly 8% of overall trade flows in 2013. In general, the average trade relations with the EU deteriorated by 20% annually from 2013 to 2016 and then stabilized (Christen *et al.*, 2016). Moreover, it is difficult to identify a pattern according to which certain sender and EU countries experienced the relatively highest economic damage, but countries that rely more on trade with Russia are evidently more hurt (Giumelli, 2017). These numbers illustrate trade reductions on a descriptive level and underline the motivation of the present paper whereas the actual impact of sanctions remains unclear. The following graph illustrates the Russian import structure with recent data (ITC, 2019). The respective graphs for exports may be found in Figure 29 and Figure 28.

Still, the source countries of Russian imports have significantly changed. In 2012, sanctioning countries exported about twice as much as to Russia than other countries (Dong and Li, 2018). In the meantime, non-sanctioning countries have caught up or even superseded trade from sanctioning countries since 2016 (Fritz *et al.*, 2017). A harsh decline of European exports can be observed between 2013 and 2014, i. e. *before* the sanctions were introduced. This indicates once more that the Russian economic slowdown and lower GDP is largely driven by the oil price, the depreciation of the Ruble, capital outflow and budgetary pressure which all come along with less expenses for trade, even without the sanctions in place (Hinz and Monastyrenko, 2016).

Figure 18: Structure of Russian imports in 2018



Source: ITC (2019).

The following graphs on page 74 highlight that overall trade had sharply declined before the situation has been stabilizing since 2016 with the sanctions still in place. Prima facie, since 2016 especially trade with China has experienced the strongest increase.

Zooming into the sectoral level and direct effect of the Russian countersanctions, developments regarding agri-food trade are shortly described as an example of significant trade, but still with an asymmetric relevance of trade for the bloc of senders and Russia. Europe is Russia's main source of foreign agricultural products. Moreover, Russia is the

second-most important market – outside the EU - for European farmers which is in stark contrast to other sectors where the importance of Russia is rather low (Christen *et al.*, 2016).

Figure 19: Russian trade with sanctioning countries and non-sanctioning countries

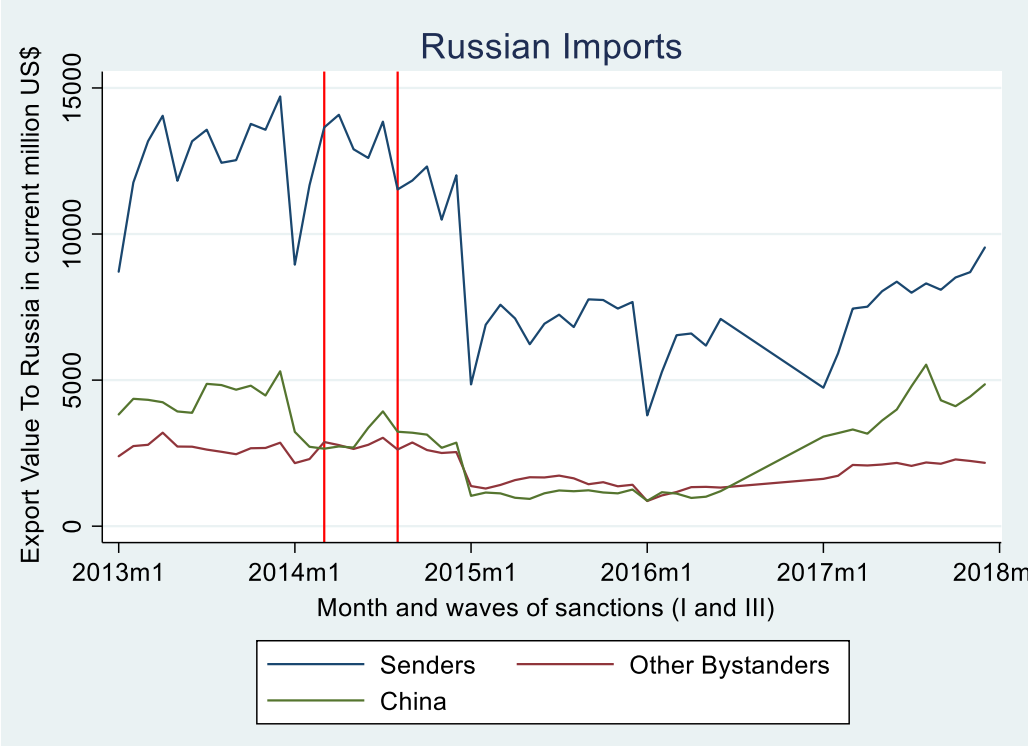
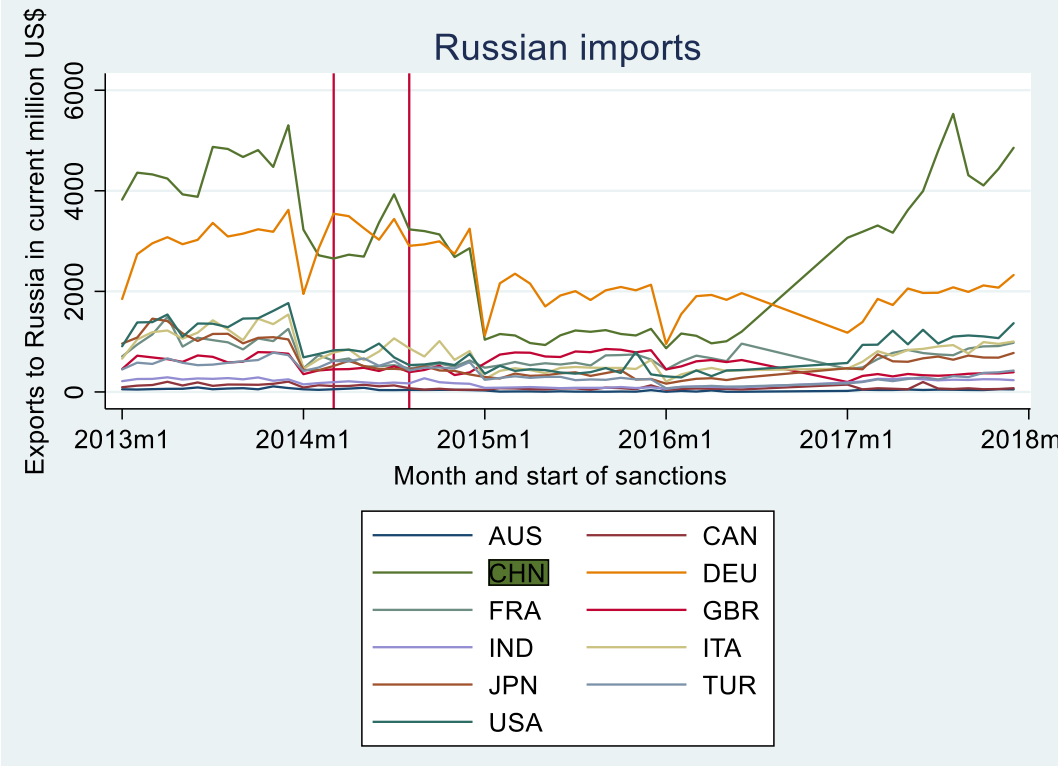


Figure 20: Russian imports from major trading partners



However, the overall trade share of agriculture of EU exports to Russia still only accounted for about 10% of overall exports in 2013 and further declined since then. Moreover, Russia's agricultural trade is characterized by a large negative balance of trade before the sanctions were imposed: In 2013, imports were almost three times as high as the exports which is also a result of the comparatively more expensive import products and not necessarily the pure volume of trade (Fedoseeva and Herrmann, 2016).

Hence, the Russian countersanctions arguably aim to reduce this negative trade balance and foster domestic production which would result in trade diversion from international to intra-national trade flows, although international trade data would incorporate this development as trade destruction (Boulanger *et al.*, 2016). Interestingly, although the countersanctions aim at all senders, the effect e. g. on the US is very limited in comparison to the EU (only about 4% of Russian agri-food imports stem from the US in 2013, but 35% come from the EU). About half of the European agricultural products are covered by the countersanctions (Fritz *et al.*, 2017). Fedoseeva and Herrmann (2016) find that the export losses to Russia are also caused by earlier Russian import restrictions such as restrictions on milk and meat in 2013. This exemplarily shows that exports already fell prior to the sanctions. However, the author also argues that *uncertainty* due to sanctions plays a major role for export losses as is argued in the present paper. Overall, these findings exemplarily show that trade relations with sanctioning countries is more important for Russia than vice versa. In addition, there are significant sectoral differences.

5.2 Results of the gravity models

The results of the applied gravity models uniformly reject the null hypothesis of no trade destruction effect. Hence, these results are in line with most of the literature and conform with the trade destructing nature of sanctions of hypothesis (I). This section will further outline whether the null hypothesis, that the EU sanctions on Russia in the aftermath of the crisis in Ukraine did not cause a change of Russia's trade reorientation towards China, can be rejected. Overall, evidence on a potential trade diversion effect is limited or even suggests further trade destruction.

Table 7: General trade destruction and diversion effects

	(1) Regime only	(2) All countries	(3) Russian Im/Ex D.	(4) Russian Trade D.	(5) Export/Import Div. to China	(6) Trade D. to China
lgdp_quarterly_exporter	0.59***	0.58***	0.56***	0.55***	0.56***	0.56***
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
lgdp_quarterly_importer	1.17***	1.16***	1.06***	1.11***	1.06***	1.08***
	(0.17)	(0.17)	(0.14)	(0.14)	(0.14)	(0.14)
ldist	-0.99***	-1.09***	-1.14***	-1.58***	-1.14***	-2.01***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.17)
sanction_regime	-0.34***					
	(0.04)					
sanction		-0.24**	-0.20**	-0.20**	-0.20**	-0.20**
		(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
countersanction		-0.12	-0.15*	-0.15*	-0.15*	-0.15*
		(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
bystander	0.01					
	(0.02)					
bystander_sn		-0.04	-0.03	-0.03	-0.03	-0.03
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
bystander_countersn		0.07**	0.08**	0.08**	0.08**	0.08**
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
senders	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
imp_Russia_rest			-0.39***		-0.39**	
			(0.04)		(0.14)	
exp_Russia_rest			-0.12		-0.12	
			(0.12)		(0.12)	
trade_Russia_rest				-0.28***		-0.19*
				(0.07)		(0.09)
RUS_CHN_importdiv					-0.39***	
					(0.03)	
RUS_CHN_tradediv					(0.03)	-0.38***
N	24220	24220	24220	24220	24220	24220
R^2	0.988	0.989	0.989	0.989	0.989	0.989

p-value in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Note: All portrayed models use the PPML estimator with importer, exporter, country-pair and time (monthly) fixed effects. Due to collinearity of the dummies, import and export or trade diversion in general are estimated in separate models.

The models of monthly data in table 7 show that the sanctions regime, i. e. trade flows that are hit by the sanctions or countersanctions negatively affect trade. In Model (1), only "regime variables" are included and thus all trade flows that are targeted by the sanctions, countersanctions or both are incorporated in this effect. Model (1) to (5) underline the negative effect on trade of both sanctions and countersanctions. The dependent variable in all models is the export value in current million $US[58].

The results with respect to trade diversion are mixed. The table above indicates that the effect of sanctions on trade between a target or sender of the countersanction, i. e. Russia, and a third-party is positive significant. Hence, this result is in line with the proposed mechanism of Hypothesis (II) and would thus indicate that the Russian sanctions lead to trade diversion for all affected countries (bystander of countersanction in Models 2-6). Model (3) and (4) then single out the effect of Russian trade diversion. The models suggest that trade in general between Russia and the rest of the included countries as well as Russian imports from those countries are negatively affected. Hence, this would suggest that sanctions destruct *trade networks* as well. However, Russian exports to bystanders do not seem to be affected. Model (5) and (6) then specify Russian trade with China as separate dummies. Interestingly, all dummies show negative significant results. This suggests that, quite contrarily to the proposed theory, Russian trade with China is negatively affected and that the null hypothesis of no trade effect can be rejected, but in a negative direction. However, the interpretation of the effect of Russian exports to China is limited due to gaps in the reported Chinese import data.

Applying formula (V) from above, the trade destruction effect of sanctions can be estimated as $TradeVol.Effect = (e^{-0.2} - 1) * 100 = -18.13\%$ following that $\beta_{sanction} = -0.2$ in Model (3) to (6). The imposition of sanctions would thus lead to an average reduction of the export volumes in both directions of about 18%. Interestingly, Felbermayr *et al.* (2019) find that trade sanctions reduce international trade flows by about 14% *on average* which would support the plausibility of the estimated effects. Christen *et al.* (2016) estimate the European export losses to Russia to about 11% and find thus a lower value. A tariff equivalent effect could be estimated accordingly to about $TariffEE = \left(e^{-\frac{0.2}{-5}} - 1\right) * 100 = 4.1\%$. Moreover,

[58] The rescaling in millions does neither change the coefficients nor p-values but allows a much faster estimation with ppml. For instance, the required iterations of Model (1) are reduced from 47 to 17 iterations.

model (6) suggests that Russia reduces its imports from China to $(e^{-0.39} - 1) * 100 = -32\%$. Interestingly, this coefficient is even higher than the direct effect of sanctions alone.

Overall, the quarterly analysis finds similar coefficients. The only quite substantial difference is that the coefficient of sanctions is even higher, but the effect of countersanctions is not significant any more (see Table 14). This hints again to the difficult distinction of both effects with the underlying approach. With respect to the models that distinguish different type of sanctions, only the effect of sectoral economic sanctions is significant which also conforms with previous findings that consider "limited" sanctions ineffective, but more moderate or extensive forms effective (see Table 12) (Dreger *et al.*, 2016b; Christie, 2016). Moreover, models that distinguish between import and export effects of the reciprocal sanctions, respectively, find that both sanction and countersanction reduce Russian exports to the senders. The effect on Russian imports from senders is significant in some, but not in all models while the countersanction does not affect senders' exports to Russia. Interestingly, these findings differ from direct trade restrictions that are both primarily intended to *reduce Russian imports* of certain products from the senders. This would support the argument that the sanctions' effect exceeds or differs from the embargoed goods itself (see Table 13).

The following models zoom in on the evolution of trade destruction and potential trade diversion over time. As many articles note, the effect of sanctions as well as effects that determine trade flows often take a certain time to phase in (see e. g. Carrere (2006)). In this context, this may be especially be expected for trade diversion which also coincides with the expectation of high-ranking Kremlin officials. For instance, Dimitri Medvedev noted that "for certain groups of products it will take several years [to divert trade]" and former Finance Minister Alexei Kudrin contributed that "sanctions (…) are going to have an impact over one, or two years" meaning that the effect can be compensated with other trading partners or domestic production after this time frame (Dolidze, 2015; Russia Beyond, 2015). As the standard option, only the PPML FE models with monthly data are shown[59].

[59] Further models of quarterly and annual data, also with OLS and RE, can be found in the annex as well as with the help of the Stata do files appendant to this paper.

Table 8: Evolution of Russian trade diversion with monthly trade data

	(1) Trade Div.	(2) Exp./Imp. separately	(3) Trade Div. to China	(4) Exp./Imp. to China
lgdp_quarterly_exporter	0.53***	0.54***	0.54***	0.54***
	(0.07)	(0.07)	(0.07)	(0.07)
lgdp_quarterly_importer	1.09***	1.05***	1.07***	1.05***
	(0.14)	(0.14)	(0.14)	(0.14)
ldist	-0.30***	-1.17***	-1.37***	-1.03***
	(0.01)	(0.01)	(0.00)	(0.03)
sanction	-0.21**	-0.21**	-0.21**	-0.21**
	(0.07)	(0.07)	(0.07)	(0.07)
countersanction	-0.15*	-0.15*	-0.15*	-0.16*
	(0.07)	(0.07)	(0.07)	(0.07)
bystander_sn	-0.03	-0.03	-0.03	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)
bystander_countersn	0.08**	0.08**	0.08**	0.08**
	(0.02)	(0.02)	(0.02)	(0.02)
senders	-0.01	-0.01	-0.01	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)
trade_Russia_rest_2014	-0.16*		-0.05	
	(0.07)		(0.05)	
trade_Russia_rest_2015	-0.57*		-0.23*	
	(0.25)		(0.09)	
trade_Russia_rest_2016	-0.43**		-0.37**	
	(0.14)		(0.12)	
trade_Russia_rest_2017	-0.06		-0.11	
	(0.11)		(0.16)	
exp_Russia_rest_2014		-0.05		-0.05
		(0.03)		(0.03)
exp_Russia_rest_2015		-0.10		-0.10
		(0.07)		(0.07)
exp_Russia_rest_2016		-0.23		-0.26
		(0.16)		(0.14)
exp_Russia_rest_2017		-0.10		-0.08
		(0.18)		(0.20)
imp_Russia_rest_2014		-0.22***		-0.02
		(0.06)		(0.12)
imp_Russia_rest_2015		-0.99***		-0.68***
		(0.10)		(0.06)
imp_Russia_rest_2016		-1.08***		-1.11***
		(0.06)		(0.22)
imp_Russia_rest_2017		0.05		-0.17

		(0.08)		(0.24)
RUS_CHN_tradediv_2014			-0.28***	
			(0.03)	
RUS_CHN_tradediv_2015			-1.09***	
			(0.03)	
RUS_CHN_tradediv_2016			-0.44	
			(0.23)	
RUS_CHN_tradediv_2017			-0.02	
			(0.08)	
RUS_CHN_exportdiv_2017				0.10***
				(0.01)
RUS_CHN_importdiv_2014				-0.28***
				(0.03)
RUS_CHN_importdiv_2015				-1.09***
				(0.03)
RUS_CHN_importdiv_2016				-1.07***
				(0.03)
RUS_CHN_importdiv_2017				0.10**
				(0.04)
N	24220	24220	24220	24220
R^2	0.989	0.989	0.989	0.989

p-value in parentheses: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Note: All portrayed models use the PPML estimator with importer, exporter, country-pair and time (monthly) fixed effects. Model (8)-(10): Bystander does not include Russian trade diversion as there are separate effects for Russian trade diversion in general and Russian trade diversion toward China. Similarly, Russian trade diversion toward the rest of the world, or the included countries in the data set, does not capture the effect of trade with China as this is considered separately (Model (9) and (10)).

The result show once more that the null hypothesis of no trade destruction effect can be rejected. Hence, the results are substantively the same as above. In addition, this table shows that the average effects from above differ significantly for different years. The coefficients for Russian import as well as trade diversion in general are negative significant for 2015 and 2016 only whereas the effect of 2014 and 2017 is insignificant. This is in line with the argument that sanctions take some time to work. With respect to Russian trade diversion to China, the coefficients from 2014 to 2016 are almost only negative significant as well. In contrast, this trend is reversed for 2017 where the coefficients for Russian export and import diversion even turn to positive significant which would support Hypothesis (II). Overall, quarterly and annual results do not substantively deviate from these results. However, especially the annual results

show different and partly very high coefficients which indicates the limitations of the underlying models and especially with annual data (see below).

In summary, sanctions destruct trade flows where they are intended to work, senders seem to manage to divert trade to a small extent or at least are not further hurt by feedback effects and, thirdly, the target suffers from strong network effects that destruct trade not only toward the senders, but bystanders as well. Russian exports seem to be much less affected than its imports. Finally, the effect tends to abate over time with even positive trade diversion values between Russia and China in 2017. In comparison to the descriptive data above, it can be concluded that the at times high coefficients are possible but very likely still incorporate the effect of some other macroeconomic developments that cause trade destruction. For instance, the coefficient of Russian imports from China in 2016, -1.07, would imply that trade is reduced by almost two thirds due to the sanctions. Hence, the bulk of the overall trade destruction during in 2016 would be caused by the sanctions. However, the validity of such high results is limited due to some methodological issues which are discussed in the following.

5.3 Measurement issues and methodological limitations

Most importantly, the main limitation of the present study is that the use of country pair-, importer- or exporter-*time* FE would be an ideal estimation strategy in order to avoid the previously mentioned methodological caveats. However, this approach would require too many dummy variables for the available Stata version and is thus not feasible within the scope of the present paper[60]. Exporter- or importer-*time* fixed effects would allow the MRT to vary over time, which is of theoretical importance as these MRTs vary due to increased trade costs (Baltagi *et al.*, 2014; Baier and Bergstrand, 2007). In other words, although FE and RE models control for time-invariant exporter, importer and country pair effects as well as for time-varying effects they cannot fully capture the interaction between time-varying and time-invariant effects. In short, the present paper controls for the MRTs as importer, exporter,

[60] More specifically, Bell and Jones (2015, p. 139) explain that "time-invariant processes can have effects on time-varying variables, which are lost in the FE model (…) any time-varying covariate can have such time-invariant 'between' effects, which can be different from time- varying effects of the same variable, and these processes cannot be assessed in an FE model." In short, time-invariant variables can have time-varying effects as well.

country pair FEs are included but partly not for their variation over time, even though time FEs are included as separate dummies. Bell and Jones (2015) further discuss drawbacks of the FE or RE approach and contend that by *controlling for* instead of being able *to include* relevant variables, fixed effects models often lack context and can be overly simplistic.

In addition to the FE or RE approach, a one year-lag variable, i. e. "lag12", "lag4" and "lag1" for the respective aggregation level, or First-Difference models could control for seasonal effects and the trend in the panel data, meaning that a change is measured in terms of the difference to the same quarter in the previous year. However, the inclusion of a lag variable in combination with the applied fixed effects is an issue of debate and would perform better with a generalized method of moments (GMM) estimator (Lin, 2007). Furthermore, the consistency of FEs could be affected by the inclusion of lagged dependent variables and vice versa (Proença *et al.*, 2015)[61]. For a discussion of FE and RE models, see Bell and Jones (2015).

In addition, the span of results on the distance and GDP effects that were identified in section 2.1 above also provide an opportunity to check the plausibility of new models. In this regard, the distance effect in most models lies between – 0.7 and - 1.5 which was found to be a realistic span of results by Baltagi *et al.* (2014). However, some specifications also show coefficients of -0.3 or around -2 which illustrates the sensitivity of these coefficients to different model specifications in the present paper. With respect the theory as well as prior empirical findings, the GDP coefficients should be around 1 (Yotov *et al.*, 2016). While this is the case for most models and GDP of the importer, the coefficients of the exporter's GDP are significantly lower with values between 0.53 and 0.87. This exemplarily shows the uncertainty around the coefficients and leaves room for future improvements of the underlying models.

Next to these general methodological challenges, there are specific reasons for non-significant or mixed results with respect to trade diversion. The underlying theory argues that there is a "general" trade diversion effect on both the import and export of goods. As a result, the variables *sanction* and *countersanction* are effectively quite similarly coded (Bergstrand *et al.*, 2015). Moreover, the trade diversion dummy between Russia and China only pertains to one specific country pair while the importer and exporter as well as country pair FE already

[61] See more on this "Nickell's bias" in dynamic panel data models in Lin (2007). Potential solution strategies include instrumental variables (IV) or generalized methods of moments (GMM) approaches that differ from the standard gravity approach which is followed in this paper.

account for variation between country pairs. This means that there is a considerable risk that one of these variables could incorporate the effects of the other variable and vice versa. Hence, it cannot be fully excluded that the effect of variables of interest is captured by other independent variables or vice versa. Similarly, Egger (2004) discusses the challenge of unobserved bilateral effects and shows that particularly distance and country size are major sources of correlation between independent variables and random unobserved variables. However, this methodological caveat is alleviated by including more countries in the trade diversion variables, such as in *trade_Russia_rest* that indicates Russian trade with sender countries. The downside of this arguably more efficient estimate is the less specific result in view of the research question. Hence, the research design and coding of dummies pose challenges, particularly with respect to more specific dummies that check for trade diversion.

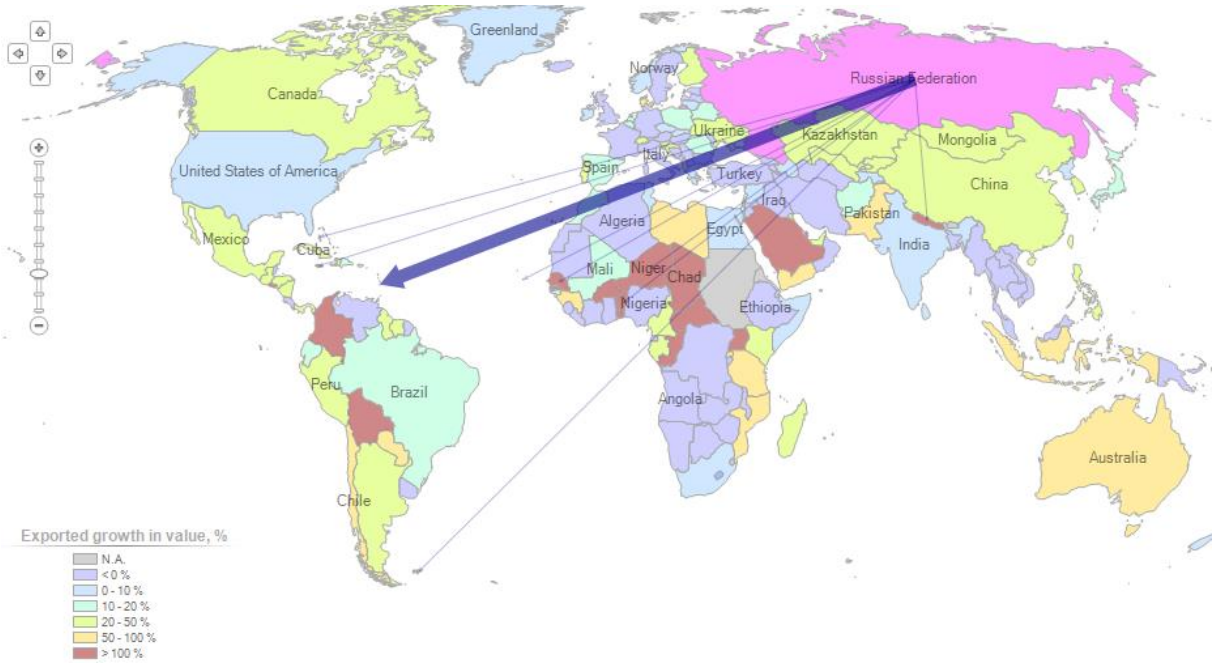
Heterogeneity, i. e. the fact that the observation units such as country pairs differ in their characteristics, is a key issue with trade data. Hence, the assumption of independence of covariates and residuals is not fulfilled. For instance, stronger integration within the EAEU such as the expansion of free movements of people, goods, services and capital could cause unobserved heterogeneity and biased results in the applied models. This is less an issue of trade diversion with China which also makes trade diversion to China a better indicator of whether and how sanctions-induced increased political cooperation can lay the groundwork for enhanced economic ties and trade. Still, Santos Silva and Tenreyro (2010) argue that a PPML approach is the best way to control for unobserved heterogeneity.

The endogeneity in case of sanctions is another challenge if one assumes that primarily countries that have economically “nothing to lose” would impose sanctions. FE mitigate this endogeneity challenge (55) (Baier and Bergstrand, 2007). With respect to potential alternative approaches, Baier and Bergstrand (2007) contend that first-differencing is more efficient if one assumes that the unobserved heterogeneity in trade flows is correlated over time which is often the case with trade data. Moreover, first-differences often yield estimates closer to unity which is more consistent with the theory of gravity models and it can further consider the “phasing-in” of trade agreements -or in this case sanctions – in a more efficient way. However, both estimators share some mathematical fundamentals and the FE approach is usually used in the context of standard gravity models (Egger, 2004).

Santos Silva and Tenreyro (2006) further discuss the heteroskedasticity of the error term in gravity and log-linear OLS models which leads to biased estimates of the elasticity[62]. They argue that the non-linear transformation of the dependent variable changes the properties of the error term in a nontrivial way which results in a correlation of the error term with the regressors. Hence, the PPML approach can solve this issue, but the "robustness checks" through the OLS application can be biased. In this paper as well, diverging results of models that only differ with respect to the applied estimator, i. e. OLS or PPML, stress this challenge.

A further methodological limitation is the potential *selection bias* of trading partners as it was only possible to include about 35 Table 19. These include the most important Russian trading partners and countries of interest. However, at times particularly small countries are involved in sanctions-busting or seek their chance to improve business relations with Russia which can be underlined with data on Russian trade growth over the years 2014 and 2018 in Figure 30.

Figure 21: Russian export growth from 2015 to 2016



[62] The heteroskedasticity of the error term can be shortly explained as follows: When the expected value $E[y_i|x]$, where y is the dependent variable and x an independent random variable, approaches zero (which in this case implies low or almost non-existed *predicted* trade flows), the probability of y_i being positive must also approach zero (Santos Silva and Tenreyro (2006)). The resulting conditional variance is thus very low. In contrast, if this expected value is not close to its lower bound (-> zero), larger deviations from its conditional mean and thus greater dispersion can be observed. This again leads to a higher variance of the error term, "clashes" with the first observation and results exactly in the definition of heteroskedasticity as the variances then vary with different models, variables and effects. Bergstrand *et al.* (2015) propose a PQML estimation procedure that explicitly deals with Jensen's inequality which precisely states that the linear transformation of the expected value $\mathrm{E}(\ln \mathrm{y})$ is not equal to ln(E(y)).

Source: ITC (2019). Note: Overall Russian trade has been stabilizing since 2016 which is why a considerable share of countries show positive growth rates. Except for China and EAEU countries, particularly small states and countries in Latin America or Africa were able to benefit from the Russian economic rebound, albeit on a low trade level. Most of these countries are, however, not included in the gravity data set.

In addition, it is plausible to assume that lost trade is not diverted to one or a few countries only. In contrast, trade diversion likely happens at different levels and toward different destinations. These small changes, however, are unlikely to lead to a rejection of the respective null hypothesis of no effect (Frank, 2017). In addition, the time period covered for the monthly and quarterly analysis is not ideal. As monthly Chinese and Russian trade data are characterized by several gaps before 2015 and 2013, respectively, the panel only begins in January 2013 with the "mirrored" data. The mirrored trade flows are again limited by the assumption that free-on-board prices are the same as cost including freight prices. As a result, it is unclear who bears the transport risks which results in a certain bias (Keen and Syed, 2006). Similarly, the annual trade data covers 2009 – 2017 but at the cost of more aggregate estimates. The challenge that the economic sanctions were introduced at different points of time, but mostly in *mid*-2014, is an equally valid point of criticism[63]. In sum, this sample selection bias thus constitutes a major limitation. However, different temporal aggregation levels are applied with no substantive differences with respect to the findings.

Furthermore, the data do not cover *intra*-national trade flows and thus cannot observe trade diversion towards domestic markets. A similar challenge in this context of busted sanctions are trade flows that are not captured by the data. This concerns undoubtedly illegal "trade diversion" or circumvention of sanctions via the re-export, re-declaration of goods or simply smuggling. Moreover, it is possible that certain non-sanctioning countries exported *sanctioned* goods to Russia and at the same time re-route their exports of *non-sanctioned* goods toward alternative destinations (Early, 2015). Considering the higher expected prices for certain products on the Russian market, there are indeed economic incentives to do so (see above). This can evidently not be observed with the use of aggregated data. The lack of trade in services data in the paper at hand can be considered as another drawback. Hence, the gravity model could underestimate the overall effect of sanctions as trade in services is

[63] The measurement of the general effect of sanctions thus includes annual data from 2015, or 2016 regarding the countersanctions to some countries, to 2017.

more volatile (Kox and Lejour, 2005). Moreover, service providers or users can arguably divert their trade flows more easily as many services do not require presence at the local market.

Importantly, the conflict in Ukraine, lower oil prices as well as the depreciation of the Ruble began to exert pressure on the Russian economy in 2013 already (Vymyatnina, 2016). These factors likely contribute to cyclical trends in the whole economy. Even though the gravity model predicts trade flows according to GDP and thus controls for the "direct" effect of the economic recession, indirect effects such as on the labor market or lower state expenditures are more difficult to catch, especially in the context of the Russian economic and financial crisis. Similarly, the direct effect of the considerably lower exchange rate is controlled for as the GDP and trade data are reported in current US$. However, it should be noted that the use of data in a "current" format cannot *directly* control for inflation which certainly constitutes a methodological limitation, especially with respect to the Russian Ruble in the chosen time frame[64]. Such fundamental economic changes render an identification of the "pure" effect of sanctions difficult as they likely interact (Wang *et al.*, 2019; Kholodilin and Netšunajev, 2019). In addition, effects that function on different temporal aggregated levels such as short-term exchange rate volatility or variations of a country's GDP throughout one year could also influence trade flows but are evidently not measured with yearly or quarterly and to a lesser extent monthly data as well[65]. Such feedback effects of changing structures as well as the effect on the multilateral trade balance can result in a change of the respective Russian MRTs and, to a lesser extent, in sanctioning countries (Crozet and Hinz, 2016; Baltagi *et al.*, 2014, p. 14). Again, the application of fixed or random effects alleviates the measurement challenge of such country and time specific developments (Dieleman and Templin, 2014; Allison, 2009). Hence, the panel's time frame is not ideal due to the aforementioned events as well as due to the short time period without sanctions in place.

[64] The underlying assumption is then that the value of a good is constant in terms of its value in USD. However, "second-order effects" of inflation on the general economic activity and performance of an economy cannot be accounted for by the chosen approach as it would require a much more advanced methodological approach as well as a different research question that aims to research the effect of inflation on trade Wang *et al.* (2019).
[65] Other "smaller" confounding events are for example a Russian import ban of pork and pigs in early 2014 due to the outbreak of the African Swine Fever in the EU which does not constitute an economic sanction but is in effect quite similar, at least with respect to the underlying restriction and *direct* impact. In addition, other sanctions unrelated to the crisis in Ukraine are not explicitly covered by the models, e. g. Russian sanctions on Moldova (Vlček and Jirušek, 2019b). Similarly, potential Russian trade diversion or "Asianization", for example to India, South Korea, Vietnam or Japan, started prior to the sanctions as well (Connolly, 2018b).

Overall, the gravity model of trade performs well in regard to the general variables that determine trade, but its adequacy with respect to predicting trade flows between a certain country pair is a much bigger point of debate, e. g. due to its limited ability to capture network effects (García-Pérez *et al.*, 2016). Dueñas and Fagiolo (2013) find that the gravity model cannot explain higher order statistics such as *triadic* effects very well even if it correctly captures dyadic structures. For instance, a dyadic FE such as a country-pair FE may correctly explain bilateral trade flows but does not perform well in measuring the effect of this bilateral trade flow on third parties. This is, however, the present purpose of the paper at hand. A similar limitation of the gravity model is that certain bilateral or country-specific variables can simply not be quantified. This mainly pertains to the amount of country-specific, complex trade restrictions that cannot be incorporated within the scope of the paper at hand. For instance, such applications include more complex cultural and historical relations or hostilities (Srivastava and Green, 1986). Hence, the hypothesis that Russia diverts its trade to China may likely not be perfectly measurable with a gravity model and a country pair dummy. Overall, only partial-equilibrium *average* effects are measured, i. e. the effect of the respective covariates on trade across all country pairs. However, the effect could differ for different senders, also due to diverse pre-conflict trade ties (Giumelli, 2017; Crozet and Hinz, 2016).

5.4 Substantial explanations of lack of evidence

Potential substantial explanations of why the hypothesis of Russian trade diversion cannot be confirmed are illustrated as follows. Economic integration and thus political interdependence may be much more sustainable if a certain trend continues over a few years and conclusions about the longer-term implications can be drawn more easily (Disdier and Fontagné, 2010)[66]. However, the present study only considers data for a time frame *with sanctions in place* of about three and a half year in addition to one and half year pre-sanction period for monthly data. Due to the structure of Russian exports and imports it can be assumed that the reorientation can only advance slowly. For instance, this pertains to energy trade and related projects where a certain infrastructure or planning processes are necessary. Moreover, even if this European trade diversion away from Russian energy toward other senders' energy supply such as US LNG still was about to happen, which of there are some indications, it would

[66] The advantage of sanctions regarding the measurement is that e. g. NTBs only change or adapt gradually, whereas sanctions are usually put in place within a short period of time or as a reaction to an external event.

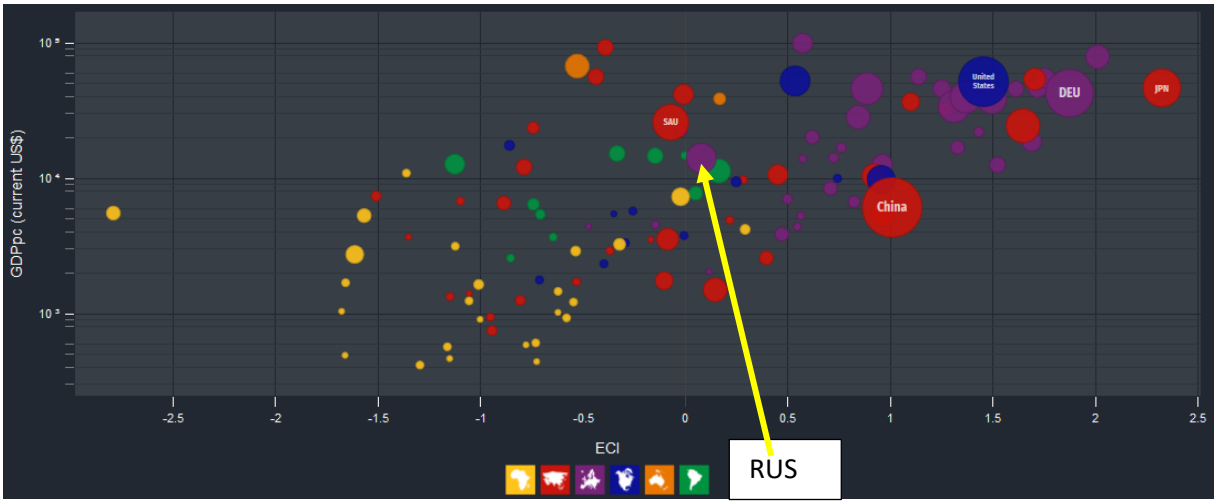
likely still take more than three and a half years (Tuzova and Qayum, 2016). The same logic can be applied to other sectors to a greater or lesser extent and emphasizes that trade diversion is generally a complex issue for firms. The lack of evidence for trade diversion can thus be a result of the *path-dependency of business relations*. A change of business partners may thus only be justified if the business environment continues to be difficult over a certain period of time (Felbermayr *et al.*, 2019). Overall, this "phasing in effect" can be supported by the previously shown results that the negative effects decline after three years and further seem to be replaced by positive Russian trade diversion to China in 2017. It is also in line with the weaker effect of sanctions after three years as shown in Table 15 and the descriptive statistics that show a considerable increase of Russian imports from China since mid-2016.

A weakness of the proposed theoretical mechanism could consist of the argument of *uncertainty*. It can be argued as well that the conflict itself, targeted individual sanctions and travel bans already lead to an uncertain business environment which is why the additional effect of the imposition of economic sanctions can be considerably weaker (Kirshner, 1997). Hence, the definitions and respective model specifications of the included economic sanctions are an issue of debate. Moreover, one can argue that the dirigisme in the Russian economy plays a strong role and that the Kremlin is capable to change Russia's trade flows more "from above" (Connolly, 2018a). In contrast, one would expect in this case a greater ability for trade diversion as well which does not seem to be the case. As a conclusion, this raises questions whether the public and private sector in Russia are indeed as intertwined as is often perceived or how far the government's economic and political steering capacities reach.

Mixed evidence further hints to the high integration of the global value chain in the sense that specific products or supply chains cannot simply be replaced by their counterparts from other origins or destinations, especially if these goods are highly specialized. This is further related to the *limited capacity of firms* to divert their trade to new markets. Hence, the underlying business structure of the countries within the sanction regime does play a role. As noted above, big firms with good relations to the government would be expected to have higher capacities which would favor the trade diversion capabilities. However, some studies and analysts note that Russian firms need to invest a lot of their capabilities in the relations to the Kremlin as they are dependent on its benevolence (Skalamera, 2018; Tuzova and Qayum, 2016). In addition, it is argued that precisely the big and thus key firms in the Russian economy

are poorly managed. This again is related to the high energy and commodity prices prior to their decline around 2013 and the low pressure on their short-term competitiveness at that time (Bimbetova *et al.*, 2019). As a result, Russian firms missed their potential to modernize and diversify risk their structure, partly also because they did not expect the worsening business climate and threatened trade networks with their partners in the sender countries. In sum, even if the political and economic *intention* or pressure of decreasing the trade dependence on the sender countries and to develop closer ties with China is existent, it does not necessarily mean that the economy's or firms' *capacities* suffice to do so. Moreover, the lacking capacities of trade diversion can also be explained by a relatively lower diversification of the Russian economy. This is shown by the relatively low economic complexity score in the following graph, especially in comparison to other European countries (purple).

Figure 22: Economic complexity versus GDP per capita (2018)



Source: MIT (2019).

This argument also relates to the simple theoretic model in section 3 above where the incentive of trade diversion from a welfare and country perspective is illustrated. Despite the general beneficial impact of trade diversion, *domestic* producers do not necessarily benefit from Russian trade diversion. This could indicate that the respective (state-affiliated) firms or even the Kremlin put a higher value on direct revenue from their domestic production than considering the overall trade (and welfare) destruction for their country and citizens (Gilligan, 2016; Ferrara, 2017). Findings in the literature on rally-round-the-flag effects are certainly not unhelpful for President Putin in this regard (Kazun, 2016). The arguably lower incentives for trade diversion of producers than for consumers can be supplemented by the fact that at least

some market participants are not pressured to search for new customer or suppliers. In other words, for some parts of the economy there are simply *no incentives* to diversify their trade networks, also because some considerations of the theoretical mechanism simply do not apply to them (Hinz and Monastyrenko, 2016). Examples include again energy firms in CEE countries or Germany or big firms such as the aluminum producer Rusal[67] (Bieri, 2015). From the European perspective, certain economic dependencies continue to exist and cannot simply be 'removed' which is also shown by the continuation of pipeline projects such as North Stream II. Hence, firms with a high market power in foreign markets are unlikely to give up their position, even within sender countries (Antonopoulos, 2017). Whether there is need to divert trade also depends on whether sanctions are expected to be lifted soon or not. In this regard, Dolidze (2015) argues that Russia's situation in 2014 can be characterized with low public debts and solid financial reserves, despite the economic breakdown. The Russian government in 2014 'bet' that the "storm will be over soon", did not expect the unity among EU members within the CSDP on this issue and thus a much shorter period of inflicted economic damage (Frye, 2019). This (mis-)calculation can be regarded as a potential reason why the state and firms did not prepare trade diversion options to an extent they would have done otherwise.

Another argument that can explain the absence of a positive trade diversion effect is the lack of cooperation from third countries with Russia. Most importantly, the members of the EAEU are Russian neighbors within a customs union and thus in a strong theoretical position to render the Western sanctions less effective. However, they abstained from 'casting their lot with Russia'. First, the four other EAEU members have not officially aligned with Russia's viewpoint regarding Ukraine and the Western sanctions (Blakkisrud and Rowe, 2017). Secondly, the Russian countersanctions were not joined by other countries. Thirdly, the Kremlin announced that it would strongly enforce the countersanctions even against its closest allies such as Belarus (Drăgoi, 2018). This exemplarily shows the isolation that Russia experiences vis-à-vis the West and the position of its neighbors that try to stay neutral, also in order not to be targeted by sanctions as well.

[67] This is an anecdotal but illustrative example that the type of sanctions matters. The EU sanctions effectively allowed a business as usual of the owner's (Oleg Deripaska) involvement in this company with locations in i. a. Ireland. In contrast, the US sanctions went much further in this instance in a way that Deripaska had to sell his majority share. This can ultimately affect and disrupt (intra-industry) trade if new suppliers which shows the significance of oligarchs in Russia as well as the relation to the present paper.

A similar argument pertains to the still very relevant differences between Russia and China that are, despite their converging relations. Although China had aligned to a high extent with Russia with respect to Western sanctions, the country was or still is not prepared to take own losses in exchange for support of its northern neighbor (Korolev, 2016a). Hence, the 'big four' Chinese banks were complying with Western sanctions in fear of mainly US sanctions, despite the official condemnation of sanctions (Kohl, 2019). Henderson and Mitrova (2016) contend that after a few years of increased cooperation and promises, a certain disappointment found its way into the Kremlin, e. g. with respect to technology cooperation. China simply did not possess some of the needed products, e. g. for deep-sea oil exploration that were embargoed by Western nations (Cox, 2016).

This 'disappointment' is strengthened by conflicting interest in Central Asia where Russia simultaneously cooperates with China but also cooperates with states that have difficult relations to Beijing. In addition, Beijing views Russia as the "old" and China as the "new" Great Power which is also reflected by the stronger Chinese and weaker Russian bargaining position, not least as a result of the sanctions (Lanteigne, 2018). Nikulina and Kruk (2016) argue that provided loans for common projects or other terms of trade are often particularly advantageous for the Chinese side while Russian companies still accept these terms due to the increased pressure on their competitiveness and need for foreign capital. For instance, they note that the interest rates for Russian entities from Asian banks are up to 15 times higher than the ones of comparable Western loans. Similarly, Henderson and Mitrova (2016, p. 16) argue that Russian bankers perceived the terms of the Chinese Development Bank (*CDB*) and *ExIm Bank* "as "highway robbery" and added that it is often "easier to evade sanctions and get money in the EU". This illustrates that illegal sanctions-busting is likely in the present case and that a considerable amount of (illegal) 'trade diversion' is likely not incorporated in the UN Comtrade data. In sum, China considers Russia as a "useful, but not essential neighbor" and takes advantage of the strengthened bargaining position (Klein and Westphal, 2016). This would imply that trade diversion due to weakened bargaining positions would not render sanctions (much) less effective as the target is forced to complete deals that it would not have concluded otherwise. Hence, the weaker competitive position due to a lower number of potential trading partners decreases "the quality" of trade which arguably renders *evasion less* and the *sanctions more effective*.

This lack of cooperation is closely related with the *increasing risks* on the Russian market. As the simple model in section 3 above shows, sanctions increase prices by inflicting economic risks on the target's economy. However, risk-adverse producers or consumers might rate this risk even higher and thus consider the "risk premium" as too low (Reid, 2019). In other words, the price that they receive in Russia does not justify the additional risks that come along with the sanctions. Hence, they are not expanding their capacities for the Russian market or even consider leaving the market. Moreover, potential foreign investors can perceive the sanctions and the resulting loss of reputation for Russia as a reputational risk for their own entities as well (Kirshner, 1997). In combination with the strong role of the government or dirigisme in the Russian economy, the increasing (perceived) risks, also due to the trade destruction effect, deter potential investors or sellers even further. As a result, more investors refrain from improving or continuing business relations with Russia which can result in a negative feedback loop. The risk structure is again related to the following aspect of network effects of trade.

The negative significant results on third-parties also hint to *network or feedback effects*[68] that hit the global value chain which could be considered as a counterpart to positive trade effects of trade agreements on non-members (Yang and Martinez-Zarzoso, 2014). International trade networks also emphasize the significance of globalization and integrated value chains. For instance, a Russian firm that is dependent on European supplies can thus export less to China. A further economic mechanism behind trade networks suggests that the producers' revenue in the target economy declines due to the sanctions as exporting opportunities and thus a country's income decrease. In addition, consumers bear the brunt of the sanctions' cost and can thus spend less on (foreign) goods (Hinz and Monastyrenko, 2016). Korgun (2019) emphasizes that this lower Russian purchasing power in combination with higher economic uncertainty and the resulting psychological perceptions of trade with Russia further intensify the negative effect on trade *with third parties*. Trade destruction can have further implications on the cost structure of a country's trade policy. For instance, this includes increasing transportation costs in case of lower average utilization of trade routes in combination with

[68] Network effects of International Trade in the framework of this paper simply refer to the fact if a certain firm does not continue to trade with a Russian partner, i. e. the extensive margin of trade declines, another firm, e. g. a supplier, follows and leaves the market as well. A similar mechanism pertains to the intensive margin of trade if firms reduce the trade volume with Russia. Similarly to the mechanism that trade agreement stimulate trade with non-members of the RTA as well, sanctions as "negative trade agreement" imply trade destruction with 'non-members' of the sanctioning regime as well, cf. Kirshner (1997); Frank (2017).

economies of scale (Huang, 2007). Moreover, new trading partners can have different income structures and thus different demand behavior and, as the major aspect in the context of this paper, changing political dependencies can also lead to a reduction of trade flows if the terms of trade are less favorable for the target. In sum, network effects can run counter or offset the described incentives for trade diversion in section 3.2 above (Felbermayr *et al.*, 2019). Such networks or 'network communities' are also at the core of the research question, i. e. whether sanctions cause a shift of Russian commerce relations toward China or other countries (García-Pérez *et al.*, 2016). In other words, do *intra*-community Eurasian trade networks lose significance in favor of a Central-Asian trade community? Or do sanctions generally negatively affect the *inter*-community trade network between the senders, Russia and further countries (Kohl, 2019; Yurgens, 2014; Dueñas and Fagiolo, 2013)? The findings favor the latter argument.

Another factor is potential trade diversion from senders to other senders or simply trade creation between senders. No result was found that would suggest that the sanctions on Russia as a common adversary lead to increased economic (trade) integration between sender countries. This further supports the argument that sanctions are not a zero-sum-game but rather inflict damage on the whole supply chain (Cadot and Gourdon, 2015). Additionally, it can be argued that this conforms with findings in section 2.2 above that sanctions are more effective if the senders' economic size is relatively bigger in comparison to the targets one (Brzoska, 2013; Tsebelis, 1990; Wolcott, 1997). However, the non-significant results are likely also a cause of the much bigger aggregated sender economies in comparison to Russia.

In sum, the lack of conclusive evidence for positive trade diversion and additionally the network effects on trade with third parties show the relevance to consider the full supply chain when evaluating the effectiveness and economic impact of sanctions. In regard to the literature, the findings conform with Fritz *et al.* (2017), Frank (2017) but are not in line with i. a. Popova and Rasoulinezhad (2016). Vakulchuk (2018) emphasizes that FDI in Russia from other Asian countries than China is still negligible and that the turn to Asia would be easier *without* the sanctions. Moreover, Europe is still the most important destination of Russian exports and origin of imports which emphasizes the limited possibilities to trade diversion.

Overall, non-significant results indicate that there are other (unobserved) structural effects, that there simply is no general trade diversion or that the data is not specified enough (sample

selection bias). Importantly and as argued earlier, it is crucial to critically evaluate the coefficients in view of the plunge of the exchange rate and oil price which of the indirect effects on the economy cannot be fully captured by the underlying gravity models.

5.5 Implications

The implications of the results are not only relevant for academic purposes but for the EU sanctions policy and decision making within the CFSP/CSDP as well. First, some of the arguments depicted in section 2 above emphasize the negative effects of trade destruction for the senders as well. This pertains to the direct costs of the sanctions as they inflict considerable trade and thus welfare losses. Trade destruction potentially leads to political or societal conflicts which can be particularly challenging for countries with Russian minorities such as Estonia or Latvia and countries with historically close ties to Russia (Bieri, 2015). Hence, potential challenges with respect to intra-national tensions and the unanimity within the EU CSDP arise (Giumelli, 2017). The inflicted and confirmed economic damage in combination with diverse economic relations with Russia pose challenges for decision-making within the EU and its member states. Although the sanctions have been criticized from time to time by a number of actors such as the Hungarian prime minister, different opinions have not caused a change of the (EU) sanctions policy (Stoop, 2016). This present paper supplements the policy considerations by drawing attention to the negative effect on third-parties.

Secondly and more relevant in the present context is the concern that reducing trade ultimately also leads to a lower economic and political leverage over the target in the long-run (Wallensteen, 1968). This argument claims that, by cutting ties with the target, the support for pro-Western groups becomes less prevalent and impairs their domestic position even further (Burkhardt, 2017). This also shows the trade-off between targeted (individual) sanctions or low economic pressure and higher economic pressure. High economic pressure, supported by the present findings, can arguably lead to adverse effects in the population of the target country such as a rally-round-the-flag effect or humanitarian consequences (Dolidze, 2015; Ferrara, 2017). However, one can reasonably assume that this effect does not hold forever and that the inflicted trade effect and absence of trade diversion, at least within two or three years, increases the political pressure on the Kremlin and thus the effectiveness

of the sanctions (Harrell *et al.*, 2017; Kolstø, 2016). Furthermore, the non-significant results of trade diversion relativize the concern of decreasing leverage in so far as the ties are not easily replaced by other countries and thus the relative economic leverage is not as strongly reduced as with trade diversion. Moreover, the negative effect on Russian trade with bystanders, or trade network effects, indicate that the relative leverage is to a great extent unaffected. The implication for the EU and other senders' sanctions policy is that trade diversion does not seem to be a challenge for the political bargaining position vis-à-vis Russia (Frankel *et al.*, 1997). In contrast, the positive result for 2017 indicates that Russia recently manages more successfully to divert trade and reorient its economic ties with China. Hence, the situation needs to be closely monitored and the more long-term implications could conform with the proposed theoretical framework of the present paper.

Thirdly, the negative effects on trade with third parties show that the 'innocent bystander' argument is quite relevant in the present and future use of sanctions under the CSDP. As the sanctions negatively affect Russian trade with non-involved countries that are not targeted, this raises questions about the CSDP and its effect on third parties (Doraev, 2015). Besides economic and ethical questions especially if the sanctions hit poor countries and their populations, the findings lead to potential principal-agent problems of EU law and its enforcement (Slavov, 2007). This can also be seen in the light of the rise of the EU as 'a global regulatory power' and the extraterritorial application of (EU) law which of the sanctions have given rise to a recent example (Gurvich and Prilepskiy, 2015; Ilieva *et al.*, 2018). The findings stress the practical relevance as the extraterritorial application as part of the CSDP affects trade relations that are not directly related to the EU (Scott, 2014). From the viewpoint of effectiveness, one could also argue that sanctions are *less* effective if they inflict damage on non-targeted groups. Hence, the costs increase in case of networks and feedback effects which decreases the *relative* utility and effectiveness of EU sanctions. As a result, costs for bystanders need to be considered when both evaluating the impact and of sanctions and making further decisions within the CSDP (Portela, 2012).

Fourth, the findings also show that the effect changes over time and indicate that trade diversion is likely more a long-term phenomenon (Felbermayr *et al.*, 2019). As an implication, the significance of monitoring with respect to the effects on third-parties and economic adjustment policies in the target state is high. Although this seems to happen occasionally, the

review process regarding the sanctions has focused on the primary goal, i. e. a change of policy in the sense that the Minsk agreement is implemented (EEAS, 2019; Toal, 2017). While the political compliance goal is still the ultimate indicator whether the sanctions are effective or not, the effect on third parties and the economic adjustment component need to attract the attention of policy makers even more, especially due to the temporal evolution of such effects (Năsulea *et al.*, 2015b).

It should also be noted that, despite the ongoing conflict in Ukraine and the sanctions in place, cooperation with Russia is needed in several policy areas such as energy or with Syria. The trade destructing effect of sanctions and the policy itself are likely to lower the pressure of cooperation in other policy fields which bears long-term risks for the target as well as senders. The economic, structural and institutional cooperation do not only suffer from the sanctions itself but additionally from the trade destructing implications (Romanova, 2016). In other words, the Kantian peace argument can be applied to the present contextual framework: Trade destruction, contrarily to trade liberalization and economic integration, increases the likelihood of conflicts or lowers the willingness for cooperation (Gartzke and Westerwinter, 2016). Romanova (2016, p. 790) contends that sanctions "freed the EU and Russia from any obligation to search for acceptable solutions at a policy-specific level" in regard to Ukraine. This may be strengthened by trade destruction but would even be intensified with trade diversion. In short, the economic isolation through trade destruction in addition to the political isolation from the West decreases the willingness as well as need to cooperate in certain (global) policy areas (Dorussen and Ward, 2010).

In summary, the findings generally support the effectiveness of EU and the other senders' sanctions. Trade diversion does not seem to be a viable short-term instrument to evade and bust sanctions, at least through legal trade channels. However, the reversal of this trend in 2017 requires attention, further research and, if necessary, adjustment policies for domestic producers or third parties. The latter also pertains to a possible increasing cooperation with other Asian countries that suffer from the sanctions even though they are not targeted by the CSDP (Hellquist, 2016).

5.6 Future research

The present paper only provides answers to a limited range of issues within the framework of economic sanctions that are summarized in Table 3. Nonetheless, some areas of future research can be identified as a result of the present findings in combination with the described current state of research. Based on the third-party effects, it is further relevant to research the *global* trade and economic impact of sanctions and their effect *on trade networks* (Dorussen and Ward, 2010). Due to the present findings and the apparent integration of value chains and globalization, it becomes clear that even trade *among uninvolved* country pairs could be affected as well. The relevance can also be derived by the principal-agent problem mentioned above. As illustrated, EU law is applicable to directly targeted entities in i. a. Russia which again has de-facto implications for other firms and individuals, not only in Russia (Gruszczynski and Menkes, 2017). The impact thereof is passed on to the whole supply chain which raises questions about whether the inflicted damage is justifiable. This is not only an economic or political question but pertains to the theoretical discourse about the legality of sanctions and the implications of EU law in general and leaves room for future research (Gilligan, 2016).

As the CSDP and sanctions policy specifically constitute policy areas where European cooperation and integration is quite advanced, the aspect of *enforcement* in the context of busted sanctions is a key research issue. This is even more so in the absence of trade diversion as it *could* indicate that products are re-exported to and from other countries or that informal economies grow considerably (Ang and Peksen, 2007). Other quantitative or qualitative research approaches promise to be more effective in this regard as such trade flows are not officially reported. Moreover, the resulting depicted principal-agent problems of EU law constitute an area where more research is needed from the viewpoint of enforcement of EU law. More specifically, principal-agent considerations in the context of extraterritorial application of EU law and the effect on third-parties thus pose a key element of further research (Scott, 2014).

The absence of trade diversion, at least until 2016, shows the political potential of cooperation within the CSDP, but also with other senders that aligned with this particular issue of the CSDP such as Norway, Iceland or Albania (Hellquist, 2016). In short, the *dynamics of multilateral alignment* with the EU's (autonomous) sanctions need to be further researched as well. This also relates to previous research and the theoretical considerations in 2.2 Effectiveness of

sanctionsthat expect multilateral sanctions to be more successful whereas other studies do not (Heine-Ellison, 2001; Drezner, 2000; Miers and Morgan, 2002).

Moreover, *domestic "trade diversion"* or the replacement of foreign with domestic goods is not incorporated in this paper. However, as shown in 3.3 Hypotheses, the domestic producers' competitiveness can generally be expected to increase with sanctions, at least on the domestic market. This provides another area of future research, even though some studies estimate sectoral effects but mostly on the directly affected Russian agricultural market (Boulanger *et al.*, 2016; Christen *et al.*, 2016). Studies that focus on non-targeted sectors can further significantly broaden the picture to which extent "smart" or "targeted" sanctions are possible or whether the effect can generally be expected to spill-over to other branches of the economy.

Moreover, future research could consider the *trade diversion of some specific EU countries* such as the Baltic countries and the resulting implications for the EU and decision making within the CSDP. Trade diversion *away* from Russia could also lead to *lower* potential for conflicts within these countries as well as on the EU level. To this purpose, country pair specific effects could be researched, for instance with more dummies that measure the interaction of sanctions with other unilateral or bilateral characteristics, e. g. in case of a recession or regarding the level of economic openness. Potential underlying questions are when and under which circumstances sanctions lead to trade diversion and thus why they are effective or not (Jeong and Peksen, 2019). Such interaction effects require more advanced research designs and would have exceeded the scope of this paper.

Similarly, case studies about a potential *increased cooperation between countries that are targeted* by the same or different senders could provide a relevant aspect of assessment, e. g. Russia with Iran or North Korea (Korgun, 2019). In addition, there is plenty of room for future research regarding the *dynamics within the EAEU*. Despite their integration regarding some economic issues such as customs, the EAEU countries sit on the fence of both sides and have mainly tried to stay out of the conflict. Hence, their role as potential sanctions busters could be further analyzed in detail (Frye *et al.*, 2017; Bond *et al.*, 2015). Further case studies of bilateral political and economic relations of Russia with its allies or neighboring countries could alleviate problem that certain international trade flows are not reported, particularly in times of crises (Early, 2015). For instance, studying the senders' trade diversion to certain

border regions in Asian countries, Ukraine or Belarus could indicate potential sanctions busting as the additional trade to these countries regions is likely to be re-exported to Russia or vice versa[69].

The use of trade volumes in monetary value could be replaced by e. g. measures of the *intensity of trade*, i. e. the relative importance of trading partners. An advantage of this approach could i. a. be that different trade effects of sanctions on small economies or their bigger counterparts could be researched more detailed (Srivastava and Green, 1986). *Other explanatory variables that are based on sanctions* could be used as well. For instance, the use of media coverage of the sanctions as independent variable or mediator is a wide-spread approach in the research of financial markets and could be potentially applied to the case at hand and in combination with sectoral or firm-level approaches (Dreger *et al.*, 2016b). This would give more weight to the psychological effects and perceived complications that sanctions trigger for the bilateral trade and business environment.

Other dependent variables such as FDI or capital flows that are not measured in the present study promise relevant insights for the mechanisms that sanctions trigger[70]. Moreover, future qualitative studies can research those variables that cannot be measured in economic terms such as cultural exchange, societal and specific political relations (Felbermayr and Toubal, 2010). This effect is arguably more relevant for sectoral economic sanctions than for smart sanctions only as the "whole population/country" and not some individuals only are hit.

The mixed results can be assumed to depend on the overall structure of Russian trade itself as well. For instance, trade of certain goods with a rather high volatility can lead to these diverging results, such as (parts for) nuclear power plants that depend on current projects or in sectors where domestic production can only catch up slowly (Fedoseeva and Herrmann, 2016). Aggregate trade flows are not ideal for a differentiated assessment of trade diversion as elasticities of demand, supply and further trade differ to a great extent across different product categories. This constitutes a limitation that can easily be addressed by following studies. Hence, future research can *focus on certain sectors or products* as well as distinguish

[69] Research on the circumvention and non-compliance of sanctions could also be conducted by using explicit data on re-import or re-exports that can be downloaded from UN Comtrade.

[70] Such data were not available freely available for the paper at hand. For instance, bilateral FDI time series data is freely available in Eurostat, but only for European countries and their partners. This does not suffice for the paper at hand as e. g. data between Russia and China and other data of non-European countries would be needed.

between directly targeted products and ones that are affected without being sanctioned (Haidar, 2017). Crozet and Hinz (2016) research the changing extensive and intensive margins of trade for French firms, an approach that could be expanded to several more sectors or countries and with updated data. For instance, more qualitative study designs of trade diversion of seafood firms in Iceland, Norway or in other countries that depend heavily on exports to Russia can help to understand the trade effect of sanctions. Sectoral studies have the additional advantage of a better distinction between the effect of sanctions and countersanctions.

Hence, sectoral studies of trade diversion promise to give more detailed insights to the mechanisms and implications of trade diversion or increased domestic production. For instance, as energy was also identified as one of the key cooperation aspects that have improved between China and Russia, future research could apply the central mechanism of this paper with a focus on energy. Other prominent sectors include manufacturing or transportation where increased policy cooperation with China can already be observed (Fan *et al.*, 2016). With respect to methodological improvements of the present paper, there are drawbacks that can be (partly) dealt with easily if the needed resources are available. Apart from the lack of sectoral data, this especially pertains to the inclusion of exporter-time and importer-time fixed effects as well as the use of intranational trade or production data.

6. Conclusion

The general conclusion that can be drawn from the present study is that the sanctions in the aftermath of the crisis in Ukraine are in fact found to destruct trade flows of goods. In addition to the direct negative effect on targets and senders, trade flows between Russia and other countries are negatively affected, while the senders do not seem to suffer from additional trade losses with third parties. On the contrary, trade between sanctioning countries and bystanders even increases. Overall, the argument of Russian trade diversion cannot be supported, at least for the period of 2 to 3 years after the introduction of the reciprocal sanctions. Network and feedback effects appear to dominate the global, and in this case Russian, trade architecture (Dorussen and Ward, 2010). However, with respect to the temporal evolution of Russian trade diversion, the effect generally vanishes for 2017

coefficients or is even replaced by positive Russian trade diversion to China. Importantly, the results need to be viewed within the context of the general economic depression, low oil price and lower exchange rate of the Ruble as well as the limitations of the applied gravity models.

The findings of effective sanctions in the sense that they inflict economic damage on the target's economy illustrate the relevance for the study of European Governance as well as policy making within the CSDP. However, this assessment depends on the assumption that this economic damage may incentivize a behavioral or policy change of a target or merely even that it pressures the target to refrain from future aggressions. The underlying reason is that between the two broad policy alternatives – economic adjustment or political compliance with the sanctions – economic adjustment by trade diversion does not lend itself as an easy-to-implement alternative (Masters, 2019). This renders political cooperation a more viable approach. On the other hand, if the target is willing to incur the economic damage and is keen on continuing the sanctioned policy at high costs, sanctions destruct trade and imply costs for the senders and the target's population without contributing to resolving a specific problem.

This is ultimately the condition on which the policy implications depend. If trade restricting measures do not lead to 'rally-round-the-flag' effects or as long the target's government is in principle open to a bargaining solution, sanctions seem to constitute a viable foreign policy tool of the CSDP as well as other senders' strategies (Seitz and Zazzaro, 2019). According to the findings of the present paper, the alternative to this political compliance solution, economic adjustment, appears to be a more long-term solution, as the reorientation toward other economic partners is not possible in the short-run. To put it differently, trade diversion is no short-term caveat to the effectiveness of sanctions, at least in this specific context. This implies that a periodic monitoring of sanctions is necessary, not least with respect to the negative effect on third party bystanders.

The specific policy of the CSDP, the sanctions on Russia, were successful in economic terms but have not yet achieved their self-set goal of Russia implementing the Minsk agreements. Moreover, Russia is a special case in the sense that it has come to harbor a rather open economy and is more powerful economically than most other sanctioned countries or organizations. Hence, one can generalize the results to a certain extent if one argues that if Russia is not able to divert trade, it presumably is rather unlikely that other sanctioned and

economically weaker countries are capable of reorienting their trade flows (Hofer, 2017). This is an important finding for the future of the CSDP, the use of sanctions as well as trade restricting measures in general.

In addition to the underlying case of sanctions, the present paper researches Russia's increasing political and economic cooperation with China (Connolly, 2016). Although Russia seems to pursue its interest with the intention of economic adjustment and further hopes to improve its bargaining position vis-à-vis Western and non-Western parties, the country's elite is apparently willing to take high risks and losses in the short-run (Connolly, 2018b, 196ff.). Whether this strategy pays out in the end is rather questionable but a matter of the future as well as future research. Still, the quite striking trade improvements in 2017 both in terms of descriptive data and the results of the quantitative analysis highlight that closer economic ties in combination with the already observed convergence on a political level between China and Russia constitute a severe challenge for the Western-led system of International organizations, and ultimately liberal democracy as well.

Hence, closer cooperation is likely to cause further feedback effects, potential Sino-Russian alignments and alliances with respect to further policy areas and is thus set to intensify the effects caused by the "alienation" between Russia and the "West" (Romanova, 2016; Antonopoulos, 2017). The significance of this potential geopolitical shift exceeds the challenge to the effectiveness of sanctions while they contribute to a further divergence between Russia and the West and at the same time are merely an elucidating expression of the challenges that confront Western foreign policy. Hence, the present study confirms the effectiveness of sanctions in general but also highlights the difficulties of accurately targeting decision-makers in the target state. The wider implications for the EU CSDP, Western and non-Western actors include the perception of and perspectives on democratic systems, rule of law, global governance and the global geopolitical order. Still, potential unintended effects of the CSDP and the interrelatedness of policies must be acknowledged, and this paper aimed to contribute to this important issue.

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Annex

Table 9: Most important determinants of trade

Effect on trade	**Variable**	**Exemplary studies**
Positive or trade creation effects	Country size / GDP	Gopinath and Echeverria (2004), Bartelme (2015), Wang *et al.* (2010)
	Dom. R&D expenditure	Wang *et al.* (2010)
	Rule of law	Egger (2004)
	Institutional Quality	Álvarez *et al.* (2018)
	Common country character.	Linders *et al.* (2005), Felbermayr and Toubal (2010)
Negative or trade destruction effects	Geographical distance	Rauch (2016), Fouquin and Hugot (2016),
	Borders	Anderson and van Wincoop (2003), Magerman *et al.* (2016)
	Landlocked country	Moore (2018)
	NTBs, TDIs	Arita *et al.* (2015), Roberts (1999), Kinzius *et al.* (2019)
	Political Instability	Srivastava and Green (1986)
	Institutional distance	Álvarez *et al.* (2018)
	Trade wars/Tariffs	Klevak *et al.* (2019), Lindé and Pescatori (2019)
	Design, Information & Search costs (cultural det.)	Felbermayr and Toubal (2010), Linders *et al.* (2005), Guiso *et al.* (2009),
Mixed evidence/depending on circumstances	NTMs	Dean *et al.* (2005), Cadot and Gourdon (2015), Itakura (2019), Gaglio (2017)
	Free or preferential trade agreements	Baier *et al.* (2019), Bergstrand *et al.* (2015), García-Pérez *et al.* (2016), Carrere (2006)
	Property rights protection	Kazutaka (2012), Wilkinson (2012), Awokuse and Yin (2010)
	Labor Market	Pflüger *et al.* (2013)

Note: Trade diversion is not explicitly listed in the table as it can be a result of both trade destructing and creating variables.

Description 1: Characteristics of sanctions and their effectiveness

The respective **aims** or purpose of the imposition of sanctions are closely linked to the definitions. Portela (2012) distinguishes *personal measures* that aim at personal discomfort of the political elite and *selective measures* that reduce the state's capabilities to implement certain policies. Brzoska (2013) emphasizes the difference between the aim of the sanction regime, e. g. economic damage and the political aim, e. g. a policy change. Hufbauer *et al.* (1990) identify five policy objectives, namely "modest and major policy changes, destabilization, disruption of a minor military adventures and impairing the military potential of a target". Other commonly used categorizations consider three sets of goals that consist of the signal of dissatisfaction to a target, to constrain future actions and coerce a government to change its policy source (Bapat *et al.*, 2013)[71]. In short, a distinction between political efficacy and economic effectiveness is crucial. The **targets** can consist of (parts of) a government elite or regime supporters, NGOs, terrorists, key persons in the economy such as oligarchs or supporters of certain activities in general. This again pertains to the **type** of sanctions which can be individual, diplomatic, general or consist of trade restrictions and limitations for core economic sectors as is the case with the Russia sanctions. The **scope** can differ with respect to the territorial and temporal application as well as the applicable exemptions. With respect to the temporal application, it is important to consider whether only new business contracts after a certain implementation date or already existing trade relations are affected. For example, the EU sanctions in July 2014 were only applicable for contracts concluded after the decision date, whereas the US also included contracts that were concluded before the imposition (Fritz *et al.*, 2017). The volatility of these sanctions is another determinant if one considers the "sustainability" of sanctions: A signal or effect may be much weaker if its **durability** is considered as doubtable. The effectiveness is thus also dependent on the prospects or criteria of lifting the sanctions, e. g. whether they are automatically renewed or time-limited. For instance, Canadian or US sanctions on Russia are unlimited while EU sanctions need to be extended every (Ahn and Ludema, 2017). Sanctions can also be preventive which renders the measurement of effectiveness difficult[72]. The **implementation** of sanctions is an equally important aspect. This includes review procedures, reporting requirements, the contribution of the private sector and the respective

[71] With respect to the latter, one can again distinguish specific policy targets, e. g. regime change, a change of behavior, constrain access to resources or even just pure punishment or stigmatization of the target. Domestic considerations can also lead to "symbolic sanctions", thereby showing the electorate, domestic interests or allies to side with the respective group and thereby defend certain norms. Pursuant to this logic, domestic interests in general are likely to play a role in at least some sanction regimes, although it is unlikely that they are specified as such. Moreover, the goals can be rather intangible which pertains for example to a general destabilizing effect.

[72] The study of "Non-events" as a desired outcome would not be not possible with quantitative data and a research design such as the one in the paper at hand. For remarks on a potential counterfactual analysis see Fritz *et al.* (2017). The measurement of the effectiveness of sanctions can be challenging, particularly if they interact with other measures or policy tools such as diplomacy, military conflicts or other implementation and enforcement measures emphasize the importance of a clear distinction.

strength of enforcement processes. Another central aspect regarding the effectiveness is the potential evasion of sanction. Literature on potential unintended or counterproductive **consequences** such as a "rally round the flag effect" includes the mechanism that forces in domestic politics unite if a country needs to respond to an outside threat or a policy that is perceived as such. This further relates to the possibility of **evading** sanctions, of which trade diversion is one, but by far not the only strategy (e. g. stockpile supplies, other safe havens (e.g. cooperating governments), or substitute products depending on the elasticity of substitution).

Apart from these considerations on sanctions in general, the following focuses on the definition of economic sanctions, as this form of sanctions pertains to the main research puzzle in the present project. Pape (1997) argues that there are three main strategies of using international economic pressure, namely trade wars, economic warfare and *economic* sanctions[73]. He further states that although these strategies can overlap, they are mainly defined by their political purpose. The purpose of the *strategy "economic sanctions"* is thereby to reduce the target's country overall welfare by *reducing international trade and thus exerting political pressure in order to reach a certain policy change* (Pape, 1997; Baldwin and Pape, 1998). This definition already highly coincides with the proposed theoretical mechanism of trade destruction. However, effectiveness should be ultimately measured by means of whether the actual policy objective could be achieved or not. Hence, the economic effect only gives an indication whether sanctions are effective in the sense that they destruct trade and thus increase pressure on the (Russian) government, but not in how far this pressure is linked with a policy change. Trade diversion, in contrast, would give an indication that the effectiveness is at least partly limited through the replacement of trade flows and could further result in a decrease of medium to long-term political leverage.

Other definitions emphasize the intended *coercive nature* of economic sanctions by imposing costs on the target as well as accepting own losses (Bapat *et al.*, 2013; Eland, 2018). Smeets (2000) considers economic sanctions as "all direct trade-restricting policies between sovereign nations, and often include financial or investment restrictions". Dreger *et al.* (2016b) use cumulative composite sanctions indices and weight the sanctions on Russia between 1 for individual sanctions, 2 for those on entities and 3 for sectoral economic sanctions which is applied in the present paper as well (see *Table 12*).

[73] Trade wars are defined as "a state threatens to inflict economic harm or actually inflicts it in order to persuade the target state to agree to terms of trade more favorable to the coercing state". Economic warfare can be characterized with the aim "to weaken an adversary's aggregate economic potential [and] its military capabilities, either in a peacetime arms race or in an ongoing war", cf. Pape (1997, p. 97); Conybeare (1987). Economic warfare, e. g. naval blockades, thus aims to persuade the target that "its reduced military strength" is not sufficient to achieve the policy goals it pursues or pursued. Hence, measurement usually considers the "change in military production". Both concepts are not within the scope of this paper but need to be distinguished from economic sanctions, even though they might (partially) overlap in certain cases.

It needs to be emphasized that the present paper does not distinguish financial and economic sanctions. In contrast, the financial measures are considered to constitute a part of the economic sanctions. However, such a distinction would be possible and useful in other contextual frameworks[74].

Economic sanctions are also intended to hurt more in the long-run. Hence, the analysis of economic sanctions is more meaningful after a certain period as in the paper at hand (Dreyer and Popescu, 2014a). Giumelli and Ivan (2013) propose to use the role, purpose, impact, costs and the utility of the sanctions as proxies for the effectiveness of sanctions. Pape (1997) emphasizes the need of a "standard of success" and proposes the three criteria of a high extent of concession of the target toward the senders' demands, that the economic sanctions were introduced prior to the policy change as well as that there are no other explanations of a policy change. It still depends on the case whether these criteria are applicable. For example, in case of a military intervention it is hard to assess whether the economic sanctions facilitated the intervention or whether the military intervention would have been successful anyway. In contrary, military interventions show that economic sanctions *alone* were apparently not sufficient to achieve a policy change. The timing of a concession can be used as an indicator whether a policy change is a response to economic sanctions or e. g. a military threat. In short, alternative explanations and confounding events are crucial to consider in the framework of the effectiveness of economic sanctions (Baldwin and Pape, 1998)[75]. Another common practice to identify economic sanctions is to characterize them by their *economic instruments*, i. e. to consider the means rather than ends. Such an approach is also suited for the research project at hand, as the policy objective is vastly political or military and the economic damage is commonly perceived as a mean to this end. The advantages include a clear distinction between means and ends, a circumvention of a more complex "policy goal" definition that likely differs to a higher extent between sanctioning countries than the actual instruments and lastly enables a facilitated comparison between these sanction strategies (Baldwin and Pape, 1998). In summary, economic sanctions in the paper at hand follow a definition that is oriented on the economic tools or instruments of the Russia sanctions. As a

[74] Nevertheless, the actual distinction of different sanctions is not trivial as they sometimes significantly differ in scope and depth. This also holds for a distinction between financial and economic sanctions. For instance, the line between severe financial sanctions and economic sanctions can be thin as trade finance can be significantly limited. Moreover, particularly the Russian economy is characterized by a high extent of oligarchs who dominate the Russian economy. If these oligarchs are sanctioned, it can have severe repercussions on their firms and thus the whole Russian economy.
An anecdotal but illustrative example of the complex interrelatedness of diverse sanctions in the (prolonged) context of the Crimea crisis would be the case of the aluminum producer Rusal. The holding was formerly controlled by the Russian oligarch Oleg Deripaska whose financial activities were targeted by US sanctions which then led to a complex interplay between the US and EU, the two main senders of sanctions after the Crimea crisis, as one of Rusal's manufacturing bases is in Ireland as well. This shows the importance of Russian oligarchs but also the potential of sanctions on non-targets, not only in the global and European aluminum or metal production OFAC (2016, 2018).

[75] This source consists of different opinions explained by authors, i. e. the reference only documents the source, but does not distinguish between Baldwin and Pape's opinion.

result, the distinction between the major measures is rather straightforward and diplomatic measures such as the exclusion from the G8 or the cancellation of conferences *as well as* individual sanctions, particularly travel bans, are not considered as economic sanctions. In contrast, export and import bans, instruments such as the prohibition to conclude contracts or restricting access to financial markets as well as the cancellation of investment projects (e. g. Japan) constitute economic instruments. However, the categorization of asset freezes is more challenging. Although individual sanctions are not primarily considered as economic sanctions, they can constitute an effective instrument for sectoral sanctions in the Russian economy due to the overarching role of oligarchs, particularly in the targeted financial and energy sectors as key parts of the Russian economy[76]. For instance, asset freezes are considered as economic sanctions only if they are imposed on key players and thus expected to have an economic effect that exceeds the individual consequences.

However, the existence of other definitions should be acknowledged as well. Hufbauer *et al.* (1990) define the two dimensions of policy result and sanctions contributions and develop a four-step scale to measure both indexes from "no outcome/zero contribution" to "successful/significant contribution". In the context of the sanctions on Russia, Schneider and Weber (2018) distinguish targeted sanctions against individuals, trade restrictions and financial sanctions. Of the latter two, vast parts of the literature further distinguish three different *types of economic sanctions,* i. e. restrictions on the access to Western financial markets, export restrictions for oil and energy exploration equipment and thirdly export restrictions on arms and dual-use goods (Bimbetova *et al.*, 2019).

[76] A further distinction of financial and economic sanctions could be useful and is applied in some parts of the literature. This is, however, not within the scope of the study at hand. Moreover, the distinction would be even more challenging in the present case as these restrictions on the financial sectors temporally coincide with the sectoral sanctions on the energy and arms sector. A research question and design that goes beyond this "case study" can, however, account for the difference.

Figure 23: Effects of different types of sanctions on the core groups affected

	Direct Effect When	Core Groups Affected	
		Most	Least
Aid	-- Aid is a large % of government expenditures -- Government has limited taxation capability	-- Externally dedignated recipients -- Government clients	-- Most others
Assets	-- Leaders hold wealth abroad	-- Actors holding wealth abroad -- International business	-- Most others
Finance	-- Finance is a large % of government expenditures -- Foreign lending is a large % of total	-- Financial community -- Seasonal producers	-- Insular sectors
Money	-- Government has large demand for foreign exchange -- Government is sensitive to perception of its management skills	-- Consumers -- Urban middle class -- Trading sectors	-- Subsistence agriculture -- Non-trading sectors
Trade/ Export	-- Tariffs important source of state revenue	-- Consumers -- Port cities	-- Import-competing producers
Trade/ Import	-- Substantial state trading -- Trade is an important source of foreign exchange	-- Exporters -- Port cities	--Insular sectors

Source: Kirshner (1997, p. 49).

Table 10: Overview on potential estimation models and respective advantages

	Advantages	**Drawbacks**
OLS RE	Ability to measure "higher-level" processes (between effects can be measured)	OLS: Heterogeneity bias and issue of zero trade flows
OLS FE	FE: No heterogeneity bias	"Lost information" -> No time-invariant (or exporter-, importer-invariant) variables can be considered Only within effects can be est.
PPML RE	Estimation of exporter/importer-invariant vars. possible	Possible heterogeneity bias Main criticism of REs: correlation between covariates and residuals
Random *intercept*	Can be considered a Bayesian FE-model; Large sample assumption: Role of prior vanishes (asymptotically Normal) ->	Only holds for large samples and a large scale of the

PPML approach	estimator is robust to its choice -> Laplace approximation (Replacement of mean with mode) = ML estimator of FE model	(endogenous, independent) variable
PPML FE	- Standard procedure in literature - PPML deals with heteroskedasticity, model misspecification and zero trade flows - Adding up theoretical constraints: PPML FE estimator automatically accounts for these constraints - Coefficients are derived by the same FOC as with the ML estimator and a Poisson distribution, although the dependent variable does not need to be Poisson distributed (Fally, 2015)	No measurement of time-invariant variables

Source: Bell and Jones (2015), Prehn *et al.* (2016), Fally (2015).

Figure 24: Control Variables

variable name	storage type	display format	value label	variable label
intra_eu	float	%9.0g		
fta_wto	byte	%8.0g		1=RTA (Source: WTO, 2015)
gatt_d	byte	%8.0g		1=Destination is GATT/WTO member
gatt_o	byte	%8.0g		1=Origin is GATT/WTO member
nonein	float	%9.0g		none of the country pair are members of the WTO
onein	float	%9.0g		one of the country pair is member of the WTO
bothin	float	%9.0g		both countries are members of the WTO
comlang_off	byte	%8.0g		1=Common official or primary language
comlang_ethno	byte	%8.0g		1=Language is spoken by at least 9% of the population
comcol	byte	%8.0g		1=Common colonizer post 1945
comcur	byte	%8.0g		1=Common currency
comrelig	float	%9.0g		1=Common religion
comleg_pretrans	byte	%9.0g		1=Common legal origins before transition
comleg_posttr~s	byte	%9.0g		1=Common legal origins after transition

.

Table 11: Overview and categorization of estimated models

Aim of estimation	Included fixed and random effects	Other included variables/ characteristics
General trade destruction and div.	Country pair and month FE/RE	
	+ importer & exp. FE/RE	
	+ importer & exp. FE/RE	+ control variables*
Evolution of trade destruction and diversion	Country pair FE/RE;	"sanction, bystander, sender" as *yearly* dummies (2014: Aug to Dec) -> difference to same model with yearly data: Yearly data cannot capture that sanctions were introduced in August only
	+ importer & exp. FE/RE	
	+ importer & exp. FE/RE	+ control variables*
Russian trade diversion	Country pair and month FE/RE	Dummy for Russian trade with non-sanctioning countries (models with export/imp. sep. as well as with trade in general)
	+ importer & exp. FE/RE	
	+ importer & exp. FE/RE	+ control variables*
Russian trade with China	Country pair and month FE/RE	Dummy for Russian trade with non-sanctioning countries and *with China separately*
	+ importer & exp. FE/RE	
	+ importer & exp. FE/RE	+ control variables*
Evolution of Russian trade diversion	Country pair and month FE/RE + importer & exp. FE/RE	Dummies indicating trade diversion for each year (yearly dummies)

All models are estimated with each an OLS and PPML estimation. Each model contains the variables sanction, countersanction, bystander_sn, bystander_countersn, senders and control variables (see below), (log of) quarterly GDP and population-weighted distance from CEPII (Head and Mayer, 2014).

Trade destruction of different type of sanctions	Country pair and month FE/RE + importer & exp. FE/RE + control variables*	Three dummies for the sanctions type "Individual", "Entity" and "Sectoral"
Overall effect	Country pair and month FE/RE + importer & exp. FE/RE + control variables*	"sanction regime" and bystander dummies only
Export and import effect of sanctions	Country pair and month FE/RE + importer & exp. FE/RE + control variables*	Dummy variables "sanct_imp", sanct_exp, countersn_imp, countersn_exp The effects refer to trade flows on the respective target, i. e. sanct_imp to the effect on Russian imports

Table 12: Models that distinguish different type of sanctions

	(1)	(2)	(3)	(4)	(5)
	All	Russian Trade Div.	Exp./Imp. separately	Trade Div. to China	Exp./Imp. to China
	b/se	b/se	b/se	b/se	b/se
lgdp_quarterly_exporter	0.59***	0.54***	0.55***	0.55***	0.55***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
lgdp_quarterly_importer	1.17***	1.09***	1.05***	1.05***	1.07***
	(0.17)	(0.14)	(0.14)	(0.14)	(0.14)
ldist	-1.08***	-0.93***	-1.38***	-1.75***	-1.55***
	(0.00)	(0.01)	(0.01)	(0.11)	(0.00)
senders	-0.00	-0.01	-0.01	-0.01	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
sanct_ind_only	0.05	0.05	0.05	0.05	0.05
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
sanct_entity	-0.11	-0.11	-0.11	-0.11	-0.11
	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)
sanct_sectoral	-0.32***	-0.33***	-0.33***	-0.33***	-0.33***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
bystander_sn	-0.04	-0.03	-0.03	-0.03	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
bystander_countersn	0.07**	0.08***	0.08***	0.08***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
trade_Russia_rest_2014		-0.15*			-0.04
		(0.07)			(0.05)
trade_Russia_rest_2015		-0.56*			-0.22*
		(0.25)			(0.09)
trade_Russia_rest_2016		-0.43**			-0.37**
		(0.14)			(0.12)
trade_Russia_rest_2017		-0.05			-0.10
		(0.11)			(0.16)
exp_Russia_rest_2014			-0.05	-0.05	
			(0.03)	(0.03)	
exp_Russia_rest_2015			-0.09	-0.09	
			(0.07)	(0.07)	
exp_Russia_rest_2016			-0.24	-0.26	
			(0.15)	(0.14)	
exp_Russia_rest_2017			-0.08	-0.07	
			(0.19)	(0.20)	

imp_Russia_rest_2014			-0.02	-0.02	
			(0.12)	(0.12)	
imp_Russia_rest_2015			-0.68***	-0.68***	
			(0.06)	(0.06)	
imp_Russia_rest_2016			-1.30***	-1.11***	
			(0.24)	(0.22)	
imp_Russia_rest_2017			-0.14	-0.17	
			(0.24)	(0.25)	
RUS_CHN_tradediv_2014			-0.26*		-0.28***
			(0.12)		(0.03)
RUS_CHN_tradediv_2015			-0.41***		-1.08***
			(0.05)		(0.03)
RUS_CHN_tradediv_2016			0.28		-0.43
			(0.24)		(0.23)
RUS_CHN_tradediv_2017			0.23		-0.02
			(0.24)		(0.08)
RUS_CHN_exportdiv_2016				-0.10***	
				(0.01)	
RUS_CHN_importdiv_2014				-0.28***	
				(0.03)	
RUS_CHN_importdiv_2015				-1.09***	
				(0.03)	
RUS_CHN_importdiv_2016				-1.06***	
				(0.04)	
RUS_CHN_importdiv_2017				0.10**	
				(0.04)	
N	24220	24220	24220	24220	24220
R^2	0.989	0.989	0.989	0.989	0.989

Table 13: Export and import effect of (counter)sanctions with monthly data

	(1)	(2)	(3)	(4)	(5)
	All countries	Russian trade div.	Russian Exp/Import Div.	Russian Trade Div. to China	Russian Exp/Import Div. to China
	b/se	b/se	b/se	b/se	b/se
lgdp_quarterly_exporter	0.61***	0.57***	0.59***	0.58***	0.59***
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
lgdp_quarterly_importer	0.91***	0.87***	0.84***	0.85***	0.84***
	(0.13)	(0.11)	(0.10)	(0.11)	(0.10)
ldist	-1.43***	-1.71***	-1.24***	-0.93***	-1.52***
	(0.00)	(0.06)	(0.00)	(0.02)	(0.04)
sanct_imp	-0.32	-0.30	-0.30	-0.30	-0.30
	(0.18)	(0.17)	(0.17)	(0.17)	(0.17)
sanct_exp	-0.20*	-0.17**	-0.17**	-0.17**	-0.17**
	(0.08)	(0.06)	(0.06)	(0.06)	(0.06)
countersn_imp	-0.22**	-0.24***	-0.24***	-0.24***	-0.24***
	(0.08)	(0.07)	(0.07)	(0.07)	(0.07)
countersn_exp	0.03	0.01	0.01	0.01	0.01
	(0.18)	(0.16)	(0.16)	(0.16)	(0.16)
bystander_sn	-0.04	-0.03	-0.03	-0.03	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
bystander_countersn	0.06**	0.08**	0.08**	0.08**	0.08**
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
senders	-0.02	-0.02	-0.02	-0.02	-0.02
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
trade_Russia_rest		-0.29***		-0.18	
		(0.08)		(0.09)	
imp_Russia_rest			-0.41***		-0.42**
			(0.04)		(0.14)
exp_Russia_rest			-0.10		-0.10
			(0.12)		(0.12)
RUS_CHN_tradediv				-0.41***	
				(0.03)	
RUS_CHN_importdiv					-0.41***
					(0.03)
N	26575	26575	26575	26575	26575
R^2	0.989	0.989	0.989	0.989	0.989

Table 14: Trade destruction and diversion with quarterly data

	(1) Regime only	(2) All countries	(3) Russian Imp/Exp Div.	(4) Russian Trade Div.	(5) Export/Import Div. to China	(6) Trade Div. to China
lgdp_quarterly_exporter	0.64***	0.65***	0.63***	0.61***	0.62***	0.62***
	(0.09)	(0.09)	(0.08)	(0.08)	(0.08)	(0.08)
lgdp_quarterly_importer	1.10***	1.10***	1.01***	1.05***	1.01***	1.03***
	(0.15)	(0.15)	(0.13)	(0.13)	(0.13)	(0.13)
ldist	-1.17***	-1.84***	-0.62***	-1.68***	-1.32***	-1.16***
	(0.01)	(0.12)	(0.01)	(0.01)	(0.01)	(0.01)
sanction_regime	-0.36***					
	(0.04)					
sanction		-0.37***	-0.31***	-0.31***	-0.31***	-0.31***
		(0.08)	(0.06)	(0.06)	(0.06)	(0.06)
countersanction		0.03	-0.03	-0.03	-0.03	-0.03
		(0.08)	(0.06)	(0.06)	(0.06)	(0.06)
bystander	0.00					
	(0.02)					
bystander_sn		-0.04	-0.03	-0.03	-0.03	-0.03
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
bystander_countersn		0.08**	0.09***	0.09***	0.09***	0.09***
		(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
senders	-0.01	0.01	0.01	0.01	0.01	0.01
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
imp_Russia_rest			-0.36***		-0.40**	
			(0.04)		(0.13)	
exp_Russia_rest			-0.10		-0.10	
			(0.12)		(0.12)	
trade_Russia_rest				-0.25***		-0.17
				(0.07)		(0.09)
RUS_CHN_importdiv					-0.35***	
					(0.03)	
RUS_CHN_tradediv						-0.35***
						(0.03)
N	8100	8100	8100	8100	8100	8100
R^2	0.992	0.992	0.992	0.992	0.992	0.992

Table 15: Evolution of effects with quarterly data

	(1)	(2)	(3)	(4)
	Trade Div.	Exp./Imp. separately	Trade Div. to China	Exp./Imp. to China
lgdp_quarterly_exporter	0.60***	0.60***	0.60***	0.60***
	(0.08)	(0.08)	(0.08)	(0.08)
lgdp_quarterly_importer	1.04***	1.01***	1.03***	1.01***
	(0.13)	(0.13)	(0.13)	(0.13)
ldist	-0.79***	-1.51***	-1.33***	-1.45***
	(0.01)	(0.00)	(0.00)	(0.01)
senders	0.01	0.01	0.01	0.01
	(0.02)	(0.02)	(0.02)	(0.02)
sanction	-0.31***	-0.32***	-0.31***	-0.32***
	(0.06)	(0.06)	(0.06)	(0.06)
countersanction	-0.03	-0.03	-0.03	-0.03
	(0.06)	(0.06)	(0.06)	(0.06)
bystander_sn	-0.03	-0.03	-0.03	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)
bystander_countersn	0.09***	0.09**	0.09***	0.09**
	(0.03)	(0.03)	(0.03)	(0.03)
trade_Russia_rest_2014	-0.15		-0.02	
	(0.08)		(0.05)	
trade_Russia_rest_2015	-0.53*		-0.21*	
	(0.25)		(0.09)	
trade_Russia_rest_2016	-0.40**		-0.35**	
	(0.14)		(0.12)	
trade_Russia_rest_2017	-0.01		-0.07	
	(0.11)		(0.15)	
exp_Russia_rest_2014		-0.04		-0.04
		(0.03)		(0.03)
exp_Russia_rest_2015		-0.08		-0.08
		(0.06)		(0.06)
exp_Russia_rest_2016		-0.22		-0.23
		(0.14)		(0.14)
exp_Russia_rest_2017		-0.04		-0.03
		(0.19)		(0.20)
imp_Russia_rest_2014		0.05		0.05
		(0.13)		(0.13)
imp_Russia_rest_2015		-0.67***		-0.67***
		(0.06)		(0.06)
imp_Russia_rest_2016		-1.28***		-1.11***

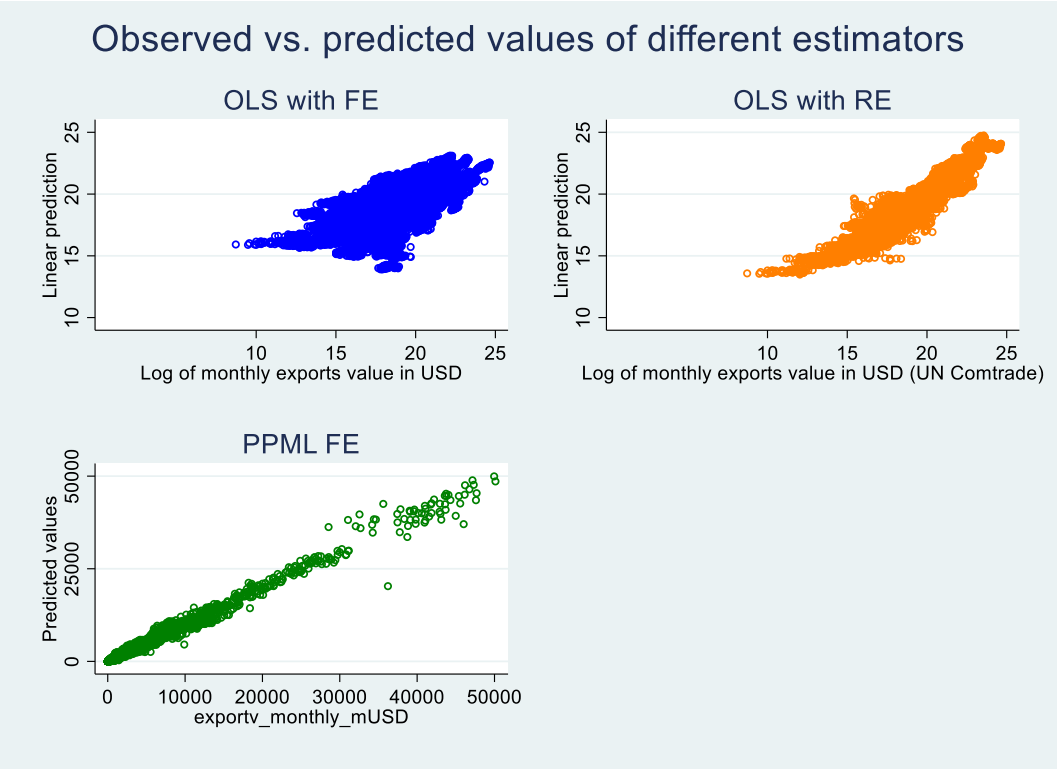
		(0.23)		(0.21)
imp_Russia_rest_2017		-0.12		-0.14
		(0.23)		(0.24)
RUS_CHN_tradediv_2014		-0.36**	-0.31***	
		(0.13)	(0.03)	
RUS_CHN_tradediv_2015		-0.37***	-1.04***	
		(0.06)	(0.03)	
RUS_CHN_tradediv_2016		0.31	-0.39	
		(0.23)	(0.23)	
RUS_CHN_tradediv_2017		0.26	0.04	
		(0.23)	(0.07)	
RUS_CHN_exportdiv_2017				0.12***
				(0.01)
RUS_CHN_importdiv_2014				-0.31***
				(0.03)
RUS_CHN_importdiv_2015				-1.04***
				(0.03)
RUS_CHN_importdiv_2016				-1.01***
				(0.03)
RUS_CHN_importdiv_2017				0.15***
				(0.03)
N	8100	8100	8100	8100
R^2	0.993	0.993	0.993	0.993

Table 16: Different estimators with monthly data

	OLS with FE	PPML with FE1*	PPML with FE	OLS with RE	PPML with RE*
lgdp_quarterly_exporter	0.67***	0.71***	0.71***	0.63***	0.62***
	(0.12)	(0.09)	(0.09)	(0.12)	(0.12)
lgdp_quarterly_importer	1.09***	1.04***	1.04***	1.03***	0.91***
	(0.14)	(0.13)	(0.13)	(0.13)	(0.16)
ldist			-1.36***	-1.29***	-2.58
			(0.01)	(0.10)	(37.10)
sanction	-0.17	-0.19**	-0.19**	-0.16*	-0.21**
	(0.09)	(0.07)	(0.07)	(0.08)	(0.07)
countersanction	-0.14	-0.15*	-0.15*	-0.16*	-0.16*
	(0.09)	(0.07)	(0.07)	(0.08)	(0.07)
bystander_sn	-0.03	-0.04	-0.04	-0.03	-0.04
	(0.03)	(0.02)	(0.02)	(0.03)	(0.02)
bystander_countersn	0.09**	0.08***	0.08***	0.09**	0.08***
	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
senders	0.09	-0.00	-0.00	0.08	-0.02
	(0.05)	(0.02)	(0.02)	(0.05)	(0.03)
trade_Russia_rest	-0.12	-0.17	-0.17	-0.13	-0.19*
	(0.14)	(0.09)	(0.09)	(0.14)	(0.09)
RUS_CHN_tradediv	-0.49***	-0.39***	-0.39***	-0.36**	-0.21
	(0.05)	(0.03)	(0.03)	(0.14)	(0.18)
N	26575	26575	26575	26575	26575
R^2	0.153		0.989		

*estimated with command xtpoisson instead of ppml

Figure 25: Performance of predictions of three different possibilities of estimation



Note: The scatter plots relate to the table above to column 1, 3 and 4. The command *xtpoisson* cannot be used for predictions (Santos Silva and Tenreyro, 2010).

Description 2: Alignment of other sanctioning countries with EU CSDP

In mid-March 2014, the declaration of the EU High Representative on Foreign Affairs on the imposition of sanctions on Russian individuals as a reaction to the Russian annexation of Crimea was joined by Iceland, Montenegro, Albania, Norway and Ukraine (Thorhallsson and Gunnarsson, 2017; Hellquist, 2016). Liechtenstein, North Macedonia, Ukraine and Georgia aligned with this round of EU sanctions as well (Dolidze, 2015).

Canada already decided to impose “targeted economic sanctions” in mid-March 2014 and thus widely followed the US strategy of tighter sanctions right after the referendum on the Crimea peninsula. However, these economic sanctions were gradually expanded to further individuals, entities and sectors in the following months.

Australia also started to impose sanctions after the annexation but started with travel bans and financial sanctions on some individuals which were expanded in May 2014. Economic sanctions in the sense of sectoral and trade restrictions, particularly the finance, infrastructure and energy sector, started to be effective in June 2014 and were again expanded in early September, but with a focus on

Ukrainian entities. In the context of the paper at hand, Krivushin (2018) adds that Australia's relationship with Russia is increasingly characterized by tensions that arise due to Moscow's closer cooperation with Beijing, the resulting support for Chinese activities in the Western Pacific and a greater competition of both countries in the Chinese and Indian energy markets.

The Australian neighbor, New Zealand, started to impose sanctions in March 2014 as well, but these travel bans were admittedly "largely symbolic" (Hoadley, 2019). Brady (2019) gives an overview on New Zealand's foreign policy. Despite heavy criticism on Russia's aggression in Ukraine and its involvement in Syria, New Zealand abstained from imposing stronger sanctions, also due its policy to mainly refrain from autonomous and to follow UN sanctions (Headley 2019). In contrast, Crozet and Hinz (2016) include New Zealand in their list of sanctioning countries as they research "smart *and* economic sanctions". It should be noted that the bilateral trade can be characterized with a focus of agricultural exports from New Zealand to Russia and New Zealand would thus constitute a potential profiteer of the Russian retaliatory measures and thus Russian trade diversion. However, such trade diversion could not be observed as Russia restricted or threatened to limit agricultural imports from New Zealand more than once, officially due to health risks and arguably also due to diplomatic challenges (Headley 2019). However, the travel bans only do not suffice to be considered as economic sanctions.

In March 2014, Japan suspended talks on military, investment and outer space cooperation as a response to the annexation of Crimea and followed with individual travel bans in April. These travel bans were expanded and introduced next to asset freezes in the framework of the foreign exchange and trade act (FERA) in early August (MOFA, 2014). Sectoral economic sanctions on the finance sector and export restrictions, particularly of military and dual-use goods, were finally introduced in late September. The latter can be compared to e. g. the EU sanctions. However, Japan is already coded as sanctioning country since 2014 as the cancellation of investment and business projects can be considered as economic sanctions and is thus hypothesized to worsen the general investment and trade climate.

Iceland, as a member of the European Economic Area and arguably under pressure from the US and EU, followed these sanctions in the sense that it adopted and implemented the design of the EU sanctions, both in March and end of July (Thorhallsson and Gunnarsson, 2017). However, the issue was more contentious than in most European countries and the government considered to withdraw the sanctions, e. g. in early 2015 when the government decided to continuing to implement the (EU) sanctions, but not to sign the following respective declarations on the Russian involvement in Ukraine any more (Thorhallsson and Gunnarsson, 2017). Iceland is an interesting case in the context of the sanctions on Russia as it is a small open economy which is often characterized with a heavy

dependence on international trade. Moreover, Iceland directly suffered to a high extent from the Russian countersanctions as *seafood exports to Russia* account for 7 to 8% of the total Icelandic exports. The *share* of Icelandic food exports to Russia as a percentage of GDP almost accounts 1% in 2013, whereas the comparative US value is negligible (about 0.01%) (Reykjavik Economics 2016). This also highlights the tremendous *relative* differences of the potential impact of sanctions and particularly the Russian countersanctions. Furthermore, the risks of smaller sanctioning countries to impose sanctions are considerably higher than those of bigger countries that can divert trade more easily, particularly if they are more open and dependent on the targeted trading partner (Brady, 2019). Russia imposed countersanctions on Iceland in August 2015.

Norway is another such relatively small country with strong economic ties to Russia and besides Albania the only country which always aligned with the EU policy on Russia. The most relevant note in this regard is that Russian countersanctions hit Norway already in August 2014 and Albania was included in the Russian sanction regime one year later in August 2015.

Montenegro joined the EU sanctions regime in March 2014 as well. In contrast to Norway or Iceland, the trade share with Russia is very low as it only amounts to 0.4% of imports and 0.1% of exports from Montenegro (Vlček and Jirušek, 2019a). However, Russian investors play a major role in tourism and industry as almost one third of the Montenegro's companies had Russian owners in 2013 (Vlček and Jirušek, 2019b).

Switzerland can be considered as a border case within the sanction regime. Some parts of the literature do consider Switzerland as part of the "Western front" and refer to Swiss legislation from November 2014 (Thorhallsson and Gunnarsson, 2017; Klinova and Sidorova, 2016). Others, however, emphasize that Switzerland only implemented legislation that prevents circumvention of the Western sanctions while not imposing own sanctions itself and thus maintaining its neutrality principle in foreign policy (see e. g. Crozet and Hinz (2016)).

Although Moldova and Georgia did not impose *economic sanctions on Russia*, Georgia implemented an investment ban on Crimea while Moldova went along with the EU with respect to targeted sanctions on Ukrainian individuals (Hellquist, 2016). Hence, they are included in this consideration of sanction policies toward Russia as well as in vast parts of the literature but are not coded as economic sanctioning countries in the gravity models. It is also important to mention that other potential aligning countries such as Serbia, North Macedonia, Turkey, Azerbaijan, Armenia as well as Bosnia and Herzegovina did not align at all with the EU's sanction policy on Russia (Hellquist, 2016, p. 1012). This shows the "selective" support of EU foreign policy in general and the Russia sanctions specifically. The

following tables give a short overview on the respective legislation as well as different domestic categories of sanctions.

Description 3: Increased Sino-Russian cooperation in the fields of security, energy, finance and economy

In a broad sense, issues regarding security policy also pertain to global governance views. Both countries share the viewpoint that certain international institutions are too Western-dominated. For this purpose, they increasingly coordinate their international strategies and cooperate within International Organizations such as the UN, G20, the Conference on Interaction and Confidence Building Measures in Asia (CICA) or the Shanghai Cooperation Organization (SCO) (FMPCR, 2014). For example, Meick (2017) argues that Russian-Chinese policy coordination in the UNSC has increased since the Western sanctions. Related to these global governance issues are shared views on information policy: In contrast to the Western approach of free information, the Chinese as well as Russian governments are interested in being able to determine which flows of information are "allowable" and which are not. This so-called "Information sovereignty" is another example of how both states perceive their international relations. A bilateral "cyber peace agreement" was signed in May 2015 – next to 31 other agreements in several policy areas - and puts an emphasis on mutual non-aggression as well as "cyber sovereignty" which could be interpreted as a challenge to sanctions by the US Treasury or the general US approach (Cox, 2016; *Russia's Turn to the East*, 2018). For instance, both seek to 'democratize' the governance of cyberspace which relates to "multilateral governance by state actors rather than multi-stakeholders (the US preference) who could also be non-state actors" (Wishnick, 2017). Their self-perceived role on the global stage is also reflected by strong self-confidence and "pragmatic political cooperation" such as within the Six-party talks on North Korea (Headley, 2019). The similarities in their normative perception of the global governance structure can be anecdotally illustrated with the foreign policy principle of so-called "Peaceful Coexistence", which was originally applied by the Soviet Union and was or still is applied by China as well (Odgaard, 2012). In short, both countries share certain interests, put an emphasis on their sovereignty and feel connected in their rejection of Western interference within their natural areas of influence (Itoh and Kuchins, 2016; Rozman, 2018). The "personal friendship" of the presidents Putin and Xi certainly positively contribute to increased interstate cooperation (Henderson and Mitrova, 2016).

Furthermore, the creation of strong institutional foundations reflects an increased level of military cooperation. Korolev (2018) argues that the *military partnership* has been highly institutionalized since 2014 and is thus on "the verge of an [formal] alliance". Despite the absence of a formal alliance, three major steps undertaken by both states illustrate that the partnership needs to be taken seriously. First,

Meick (2017) contends that the increasing complex nature and expanded geographic reach of joint exercises as well as the expansion of the cooperation to strategically important defense instruments such as missile defense systems render both states more capable of acting in cooperation. Examples include the Joint Sea 2014, 2015, 2016 maneuvers, border defense cooperation or coordination of their defense postures, aerospace exercises and outer space cooperation projects[77]. Secondly, military-technical cooperation has deepened significantly. To this purpose, joint research and development projects as well as *joint production* or *industrial partnerships* in key defense sectors have been established. Thirdly and in line with Henderson and Mitrova (2016), high-official meetings at the military level have increased their frequency as well, which also suggests that both parties consider the partnership to be increasingly important (Schwartz, 2019; Meick, 2017).

A second and similarly important field of increasing cooperation is energy policy. A first cause for the significance of this policy area is that energy is increasingly used as leverage over other players in the regions which is sometimes referred to as "securitization of energy policy". A second key argument pertains to the sanctions' focus on energy equipment. In this regard, the European focus on energy dependence *on Russia is reciprocal in nature*, i. e. Russian dependency on energy sales to Europe. Although this dependency constitutes a more long-term political risk for the Kremlin than vice versa, it still increases leverage of the buyers on the seller as well. Hence, it is argued that the economic sanctions assert and strengthen the more immediately perceived need to diversify risk and thus trade structures. The respective new market opportunities can be particularly found in Asia and China with its fast-pace economic development and related increasing energy demand. Hence, the closer political ties not only opened a chance to initiate several new energy projects, but the higher pressure on Russia to access new markets comes along with a weaker bargaining position and further renders cooperation with Russia for Asian countries more interesting. Moreover, China is one of three major drivers of the overall investment trends in the energy sector (IEA, 2019). Among others, the "Memorandum on China-Russia Natural Gas Cooperation Project at the East Line" and the "Sino-Russian East gas purchase and sales contracts" two key policy documents have determined a closer cooperation, particularly in the gas market. Current respective projects include the East gas pipeline, the gas pipelines "Caspian Sea-China", "Altai" and "Power of Sibiria" or the oil pipeline "Atasu-Alashankou" (Bimbetova *et al.*, 2019). Putin also proposed a closer energy integration or "Energy Super Ring" with China and other neighboring countries of far-east Russian (Zubacheva, 2016). However, these projects are at different progress stages and aspects pertaining to practical implementation remain partly unclear.

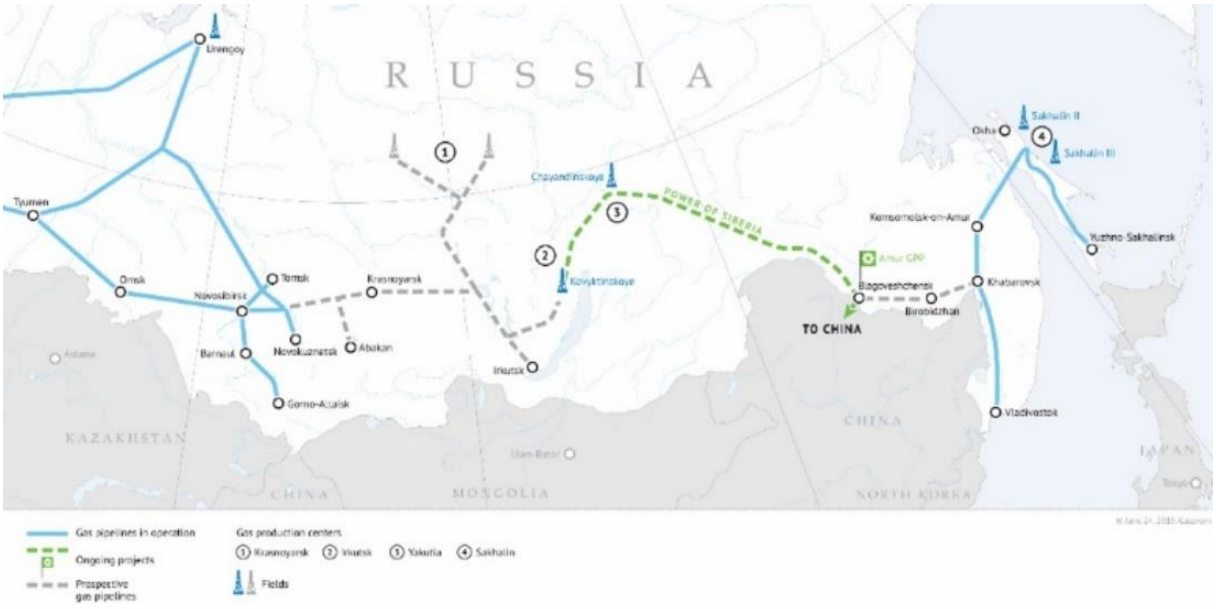
[77] It should be noted that the joint military operations already started in the early 2000s. However, they significantly intensified in pace and scope since 2014 Meick (2017).

Next to pipeline projects that also follow the simple logic that Russia is a major energy supplier and demand in China and Asia is steadily increasing, bilateral talks have led to the initiation of considerable Chinese financial support and cooperation within energy firms or consortia. These conversations started as early as in May 2014 and continued in 2015, e. g. with considerations about a joint development of oil fields by Rosneft and Sinopec (Chinese) (Skalamera, 2018). Moreover, Chinese companies acquired several shares of Russian energy companies, e. g. Sinopec and CEFC China Energy participated on an equity basis of 10% of the Russian Sibur and Rosneft 14% in 2017, respectively. The Bank of China granted the largest loan to Gazprom in the history of the firm (note: Gazprom is not a direct target of sanctions) in 2014. In 2015, Rosneft received 15bn $US and in 2016, Novatek`s Yamal LNG received support. This clearly shows the increased Chinese support of the Russian energy sector, even though with delays and likely "at a price". The more unfavorable conditions of Chinese banks, however, could be taken as an indication that Western sanctions impacted Russian entities and pressured them to turn to China. Country-specific Chinese energy finance shows that Russia is the biggest destination of these financial flows, mainly supported by the ExIm and China Development Bank[78].

In 2014, imports of equipment used in oil and gas production such as drilling and tunneling equipment, and pumps from Western countries fell by around 50%. In contrast, imports of similar products from China increased by 8% (ITC, 2019). This descriptive data already hints at trade diversion, at least regarding directly sanctions-targeted energy products (Henderson and Mitrova, 2016). Skalamera (2018) emphasizes that domestic movers in Russia played a major role in the "energy turn to the East". In a case study of Gazprom's re-orientation toward Asia, they contend that Russia's "Eurasianists" were able to influence the public discourse and preferences due to the Western actions that were perceived as "attempt to isolate it economically and geopolitically". Hence, such domestic norm entrepreneurs managed to change the perception of Russia's national interest which also hints at the more complex interplay of domestic players that determine policy decisions.

[78] A "trend" is difficult to observe as these investments are often one time, but very big investments. However, country-specific data of Chinese foreign energy investment and its sub-sectors can be retrieved at a database by Boston University, see Gallagher (2017).

Figure 26: Ongoing pipeline projects



Source: Gazprom (2019).

A third policy area in which the Sino-Russian relations have improved considerably, and which is arguably the most important one in the present context, concerns economic and financial cooperation and opportunities in China. With respect to *investment and finance issues* China and Russia agreed upon a currency swap agreement worth 150 billion yuan (Klein and Westphal, 2016). This could be considered a potential evasion of the financial part of Western sanctions and indicates that China was willing to support the troubled Ruble value. Although the Big Four Chinese Banks have made efforts to comply with the Western sanctions, Henderson and Mitrova (2016) argue that the "political" banks did increase their cooperation with Russia, more specifically the China Development Bank, the ExIm Bank of China as well as the so-called Silk Road fund. In addition, the "New Development Bank" was founded by the BRICS states in 2014. Further examples are the inter-bank cooperation of the Shanghai Cooperation Organization as well as the Asian Infrastructure Investment Bank, even though the latter was joined by Western states as well. All these examples can be viewed as a supplement or – as others may argue, long-term replacement - of the "Western-led" World Bank Group or IMF with China, and to a lesser extent Russia, in leading or "pushing" positions (Lanteigne, 2018). The desired reduction of dependence on Western financial payment systems and reliance on the dollar as global key currency equally contribute to the pressure of the sanctions to build a non-Western finance infrastructure. The use of alternative systems of "trade finance" is evidently a particularly important factor while trade destruction decreases the need to use the Western system even further. Hence, such feedback processes are triggered by the sanctions.

For instance, successful energy payments were concluded without the use of the US dollar. In addition to this 'petro-yuan', China even made it possible to test payments with the Ruble in some cities at the border to Russia. These aspects clearly illustrate the geopolitical shift from Russia toward Asia and thus connects the intensified Sino-Russian cooperation to the paper at hand. Moreover, they are in line with the previously mentioned geopolitical and security policy considerations such as promoting a global (economic) governance that favors emerging economies.

In addition to the depicted financial cooperation, cooperation also advanced in certain *other economic sectors* and thereby support the argument of a general trade diversion effect. Wang (2015) emphasizes that already in October 2014 Russia and China signed almost 40 cooperation agreements concerning various policy areas including trade and technology issues. In 2015, both parties reached an agreement to avoid competition in Central Asia and to combine Silk Road with EAEU projects. In short, they agreed upon economic *policy coordination* and it could be considered as a strategy of collaboration in those policy areas where common interests exist and getting out of each other's way where a consensus would be more difficult to reach.

In 2016, China proposed to invest in 12 key Russian industries (Henderson and Mitrova, 2016). A strategy with major economic potentials for both states as well as the whole Central-Asian region evidently constitutes the *One Belt, One Road Initiative* (B&R). This issue cannot be further discussed in detail due to its far-reaching implications and the inclusion of several other partners. However, it should be noted that Russia is indeed a key partner and that the Silk Road similarly contributes to challenges regarding this geopolitical triangle of "the West", Russia and China, but with different underlying mechanisms. Increased bilateral cooperation also overlaps with certain B&R policies or functions through this initiative, e. g. if projects are financed through the Silk Road Fund. The following graph gives an overview on some important Chinese projects in Russia. Kohl (2019) (Kohl, 2019)finds that better market access and improved infrastructure asymmetrically change the supply chain in favor of China, Russia and Southeast Asian countries, i. e. they benefit to a higher extent than other participating countries. With respect to infrastructure, Chinese investments e. g. contribute to the "Moscow-Kazan" high-speed railway (Wang, 2015).

However, the picture of Sino-Russian partnership should not be portrayed as a unidimensional improvement in all aspects of their relations. From Russia's "junior partner" perspective, the question remains whether China is a cooperative partner, ally or in which aspects a counter-weight to the Chinese dominance is needed. In short, both states are rather "pragmatic" and it would probably be exaggerated to consider them as allies. However, due to their pragmatism and strategic partnership in some areas both states are keen to take advantage of opportunities and stand up against "Western

interference" of which the economic sanctions on Russia can be considered to be a contributing factor (Cox, 2016). Overall, this strategic partnership or "marriage of convenience" is also driven by their relations to the US, at least in some key policy areas such as cybersecurity or military issues. Some analysts derive the emergence of this coalition of "anti-liberals" by the window of opportunity that allowed the Kremlin to use these power vacua that can be tracked back to the inactivity of the US and Western nations (Blakkisrud and Rowe, 2017). In the context of the paper at hand, Korolev (2018) also argues that one driving factor of this partnership is the Western reaction to the conflict in Ukraine which would support the underlying argument of political and further economic reorientation toward China. Henderson and Mitrova (2016) consider the imposition of Western sanctions as a turning point not only in Russia-Western, but in Chinese-Russian relations as well. Lanteigne (2018) portrays the "Crimea-effect" as the turning point in Sino-Russian relations which is also reflected by the Russian optimism after a series of contracts had been concluded with China in May 2014. With these developments in mind, the geopolitical redistribution of power and the importance of deepened economic and political Sino-Russian cooperation supports the main argument that Russia's political reorientation towards China results in deepened economic cooperation as well (i.e. integration of value chains and thus trade flows between Russia and China).

In contrast, this increasing cooperation in some issues stand in opposition to other issues where conflicts between China and Russia can be observed. A similar strategy can be observed by China and other Asian neighbors as "China's rise has resulted in a similar combination of engagement and precautionary moves by neighboring states". In addition, one needs to distinguish the actual change of relations from 2014 onwards with a more long-term trends such as toward greater financial coordination, opposition to the dominance of the U.S. dollar and most importantly, a significant drop of Russian economic ties in general due to much lower oil price and lower Ruble value. According to some analysts and studies, Russia already used to "bandwagon(…) with China against the United States, while covertly balancing against China's rising power through energy and military relations with its opponents in Southeast and Northeast Asia" before the Western sanctions (Kim and Blank, 2013).

With respect to the "causality" of the proposed mechanism and developments, one could certainly argue that the political Russian reorientation toward China would have happened anyway. Given the overall rise of Chinese power and the evident absence of a counterfactual situation, this certainly constitutes a valid point of critique to the present paper. Moreover, the hypothesized trade diversion due to sanctions versus trade diversion *to China* are arguably two different developments. In other words, it is quite clear that sanctions push Russia economically away from Europe, but where to? The latter question does not completely overlap with the former assessment. However, the underlying framework does not argue that Western sanctions are the only 'factors', but at least a contributory

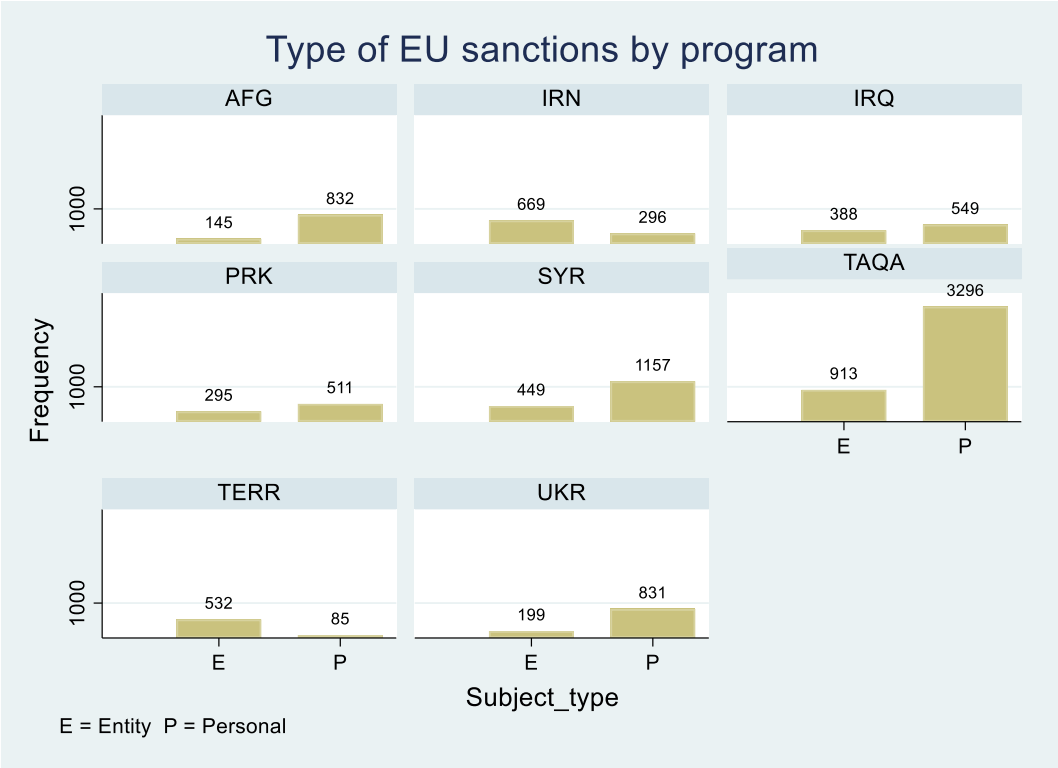
one. In addition, the applied gravity models control for other economic and political pull factors that were identified in the theoretic and methodological literature. Again, one could argue that these variables, e. g. GDP or a potential FTA, already incorporate a certain fraction of the potential trade diversion effect that would be related to the proposed mechanism. However, this aspect of criticism would rather result in estimates that are biased downward and contribute to a conservative estimation result.

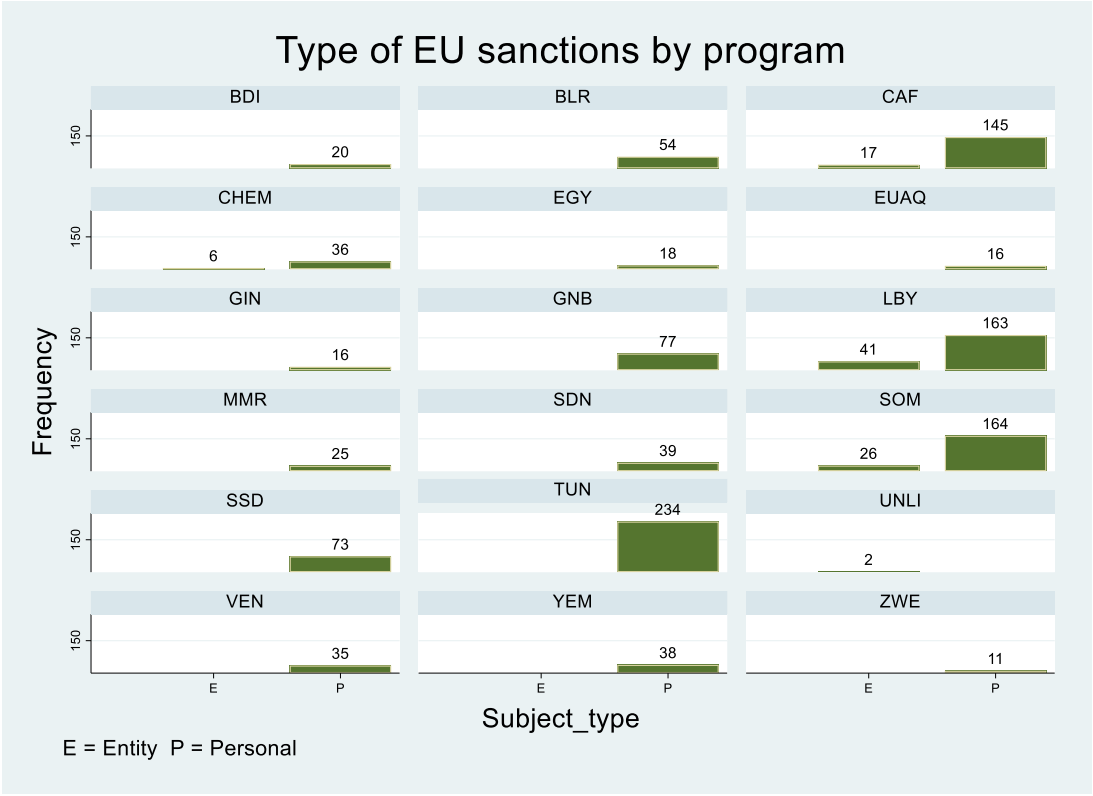
Description 4: Categorization of economic sanctions

Economic sanctions in the context of this theoretical framework are sanctions that aim to, have the objective or accept the risk to impact the Russian economy by *economic instruments* such as trade or financial restrictions. While it is rather simple to define this in some cases, i. a. where certain Russian economic entities are within the scope of the sanctions or in cases in which domestic actors are restricted to trade or conduct business with Russian entities, some cases are more difficult to discern. For example, Executive Order 13662 of the former US president Barack Obama aims to restrict the economic freedom of certain members of the Russian elite. While this alone would not suffice to be classified as economic sanction, the executive order further explains the reasoning behind this. Instruments that *by their design* restrict operations "in such *sectors* of the Russian Federation economy (…) such as financial services, energy, metals and mining, engineering, and defense and related materiel" (E.O. 13662 (i)) are thus classified as economic sanctions. Hence, the sectoral character of these sanctions aims to impact the core of the Russian economy as these are also the most critical Russian sectors and the sanctioned oligarchs "have a hold" on most these sectors. This finding also hints to the fact that it can be at times difficult to keep the "tools" and "goals" apart, that is if the tool is defined or derived by its goal. In the present context, this is because the sanctions to Russian individuals usually also apply to their entities which highlights the potential economic impact of the underlying policy, particularly if asset freezes are involved. It needs to be emphasized that travel bans only do not qualify as a potential economic impact in the theoretical framework as far as the firms are free to operate in business as usual. Moreover, some sanction legislation does not necessarily restrict Russian entities from operating within the sender's jurisdiction, but rather restrict domestic firms in trade or business activities with Russia. This, intuitively, can be considered as economic sanction as well. For example, the US Office of Foreign Assets Control (OFAC) distinguishes the three sanction categories "blocking sanctions against individuals and entities", "Sectoral sanctions against entities operating in the Russian economy" and an investment, ex- and import ban to or from Crimea. As the third category is limited on Crimea only, but not the rest of the Russian economy, it is not considered as an economic sanction *on Russia* in this context. The second category is considered as economic

sanction in this paper due to structure of the Russian economy, whereas the first category also includes sanctions that are imposed on the *political* elite, which are not hypothesized to impact the trade relations, and is thus not included in the scope of economic sanctions. As the sectoral, economic US sanctions were imposed in mid-March, the sanctions "start" in April or the second quarter in the models, depending on the data level. The same logic is applied to the other sanctioning countries.

Figure 27: Type of EU sanctions by program





Source: EEAS (2019).

Table 17: Overview of main characteristics of sanctions on Russia and Russian Countersanctions

Country / Political entity	Time frame of sanctions	Scope of sanctions/Legislation	Russian countersanctions	Type*	Source
EU-28	Since March 2014	Decision 2014/145/CFSP; Reg. 2014/208 and 2014/269; Travel bans and asset freezes mainly for individuals	Yes, August 2014	1	Council (2014c; Council), Council (2014e), Council (2014d), Council (2014a)
	Since July 2014	Regulation 2014/833: Mainly trade restrictions for certain items; Council Decision 2014/512/CFSP: Restricted access to EU capital markets and on dual-use, arms and energy products		3	
USA	Since March 2014	E.O. 13662; restricted access to loans and energy related products & services *for Russian entities*	Yes, August 2014	2	OFAC (2016), OFAC (2018)
	Since May 2014	Additional export restrictions on dual-use goods		3	
	Since Aug 2017	CAATSA; Exceeds scope of previous US and EU sanctions, also targeting *Russian-European* energy projects		3	

Canada	Since March 2014	Special Economic Measures Act 2014 (SOR/2014-58): Prohibition of trade or financial transactions with specified individuals; Sectoral sanctions on financial transactions (no loans with a lifespan longer than 30 or 90 days, depending on the entity) Export restrictions on specific goods (focus on energy equipment) (scope: Canadians and within Canada; Russian individuals and entities)	Yes, August 2014	3	Canadian Government (2019)
Australia	Since June 2014	Autonomous Sanctions Act and Regulations 2011, amended by "Designated Persons and Entities and Declared Persons – Ukraine List 2014": Asset freezes and travel bans for political and military elite; Trade and financial restrictions for military, infrastructure, financial and energy organizations	Yes, August 2014	2	DFAT (2017)
	Jan 2015	Autonomous Sanctions (Russia, Crimea and Sevastopol) Specification 2015		3	
New Zealand	Since March 2014	Mainly travel bans	no	1	Hoadley (2019), Headley (2019)
Japan	Since March 2014	Stop of bilateral talks or actions on certain *investment*, military and outer space cooperation projects (March); Travel bans (April)	no	3	MOFA (2014)
	Since April 2014	Travel bans		1	
	Since Aug/ Sept 2014	Foreign Exchange and Trade Act: Asset freezes for individuals and two entities Import restrictions from Crimea Export restrictions on military and dual-use products Restrictions on transactions for Russian banks and financial sector (exceptions possible with authorization)		3	
Norway	Since March/ *July* 2014	Followed the EU's sanction policy	Yes, August 201**4**	1 *3*	Wilhelmsen and Gjerde (2018)
Iceland	Since March/ *July* 2014	Followed the EU's sanction policy	Yes, August 201**5**	1 *3*	Reykjavik Economics 2017; (Thorhallsson and Gunnars

					son, 2017)
Albania	Since March/ *July* 2014	Followed the EU's sanction policy	Yes, August 201**5**	1 *3*	Hellquist (2016)
Montenegro	Since March/ *July* 2014	(Mainly) followed the EU's sanction policy	Yes, August 201**5**	1 *3*	
Liechtenstein	Since March/ *July* 2014	(Mainly) followed the EU's sanction policy and additional anti-circumvention measures of foreign sanctions	Yes, August 201**5**	1 *3*	
Ukraine	Since September 2015	Sanctions targeting individuals all over Europe as well as predominantly Russian legal entities in the finance, aviation, IT and military-industry sectors	Yes, Jan 2016	2	Toal (2017)
	Since October 2016	Presidential Decree No. 467/2016 confirms National Sec. & Defense Council's decision; Extension and expansion of sanctions in the sectors above as well as new sanctions with a focus on capital outflows, investment and "transit of resources and goods"		3	
Switzerland		Legislation that prevents illegal circumvention of EU and other countries' sanctions on Russia	no	-	Crozet and Hinz (2016)
Russia	Since March 2014	Travel bans for US and Canadian citizens	N. a.	1	Dreger *et al.* (2016b), Fritz *et al.* (2017), The Russian Government (2015)
	Since Aug 7, 2014	-Executive Order On Special Economic Measures to Protect the Russian Federation's Security -Resolution 778 of the Government of the Russian Federation 7 August 2014 -Import ban on agri-food goods since Aug 7, 2014 on USA, CAN, AUS, EU, NOR;		3	
	Since Aug 2015	Extension and expansion since Aug 14, 2015 on Albania, MNE, ISL, LIE On Ukraine since Jan 2016		3	

Note: The sanction dummies in the empirical models are coded as "1" in the following month or quarter if the sanctions were introduced only in the second half of a month/quarter (e. g. the decision on EU sanctions was made on July 29 and thus August is the first month and the third quarter 2014 the first one coded as "1"); See also table below; * Type of sanctions similarly to the weighting by Dreger *et al.* (2016b): 1 = individual target, 2 = entity, 3 = sectoral.

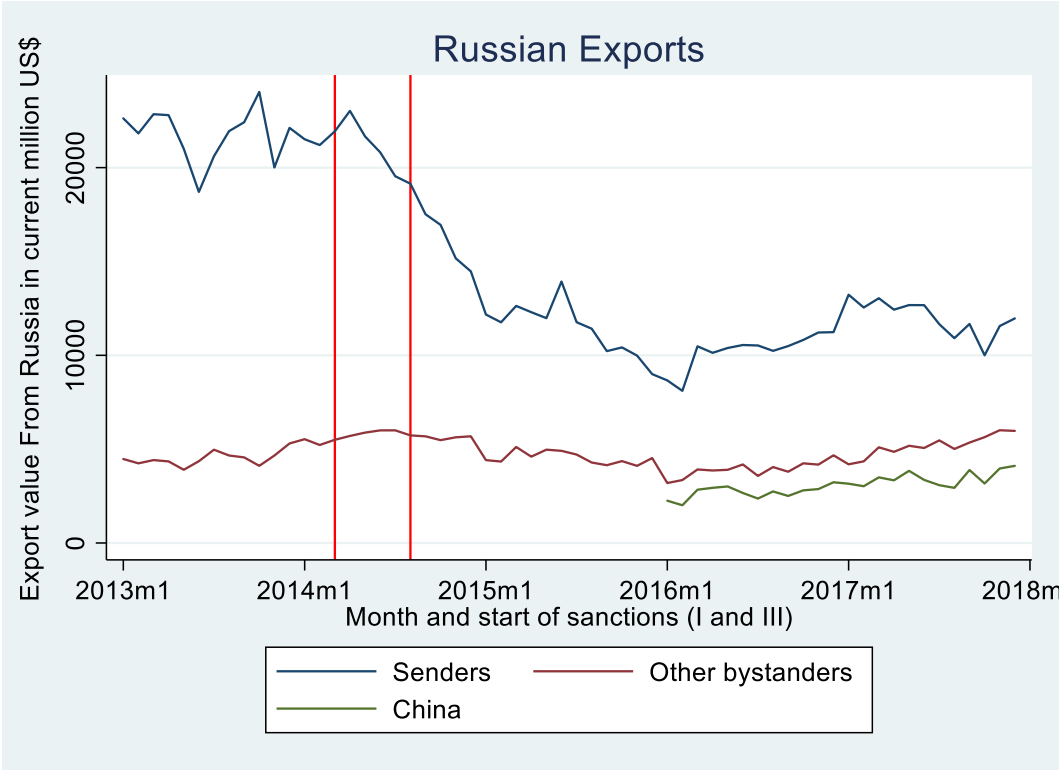
Table 18: Domestic definitions or characterizations of sanctions

Country	Definition/Categories	Economic sanction in models & Start
EU-28	1) Diplomatic measures	no
	2) Restrictive measures such as asset freezes and visa bans	no
	3) Restrictions for Crimea and Sevastopol	no
	4) Measures targeting sectoral cooperation and exchanges with Russia	Yes (August 2014)
	5) Measures concerning economic cooperation	Yes (August 2014)
USA	1) Blocking sanctions against individuals and entities	no
	2) Sectoral sanctions against entities operating in sectors of the Russian economy	Yes (April 2014)
	3) Investment ban on *Crimea*	no
Canada	Canadian sanctions of the Special Economic Measures Act are "Targeted Economic Sanctions" by definition; Includes asset freezes, financial prohibitions and trade restrictions	Yes (April 2014)
Australia	Restrictions on: - the export or supply of certain goods	Yes (July 2014)
	- the import, purchase or transport of certain goods	Yes (July 2014)
	- certain commercial activities	Yes (July 2014)
	- the provision of certain services	Yes (July 2014)
	- assets to designated persons or entities	No (July 2014)
	- dealing with the assets of designated persons or entities	No (March 2014)
	- travel bans on designated persons	No (March 2014)
New Zealand	Travel bans	No (March 2014)
Japan	Travel bans	No (April 2014)
	Sanctions under Foreign Exchange and Trade Act: Asset freezes for individuals and two entities Import restrictions from *Crimea*	No (August 2014)
	Export restrictions on military and dual-use products Restrictions for Russian banks and financial sector	Yes (October 2014)
Iceland	See EU (mostly aligning with EU)	Yes (August 2014)
Norway	See EU (completely aligning with EU)	Yes (August 2014)
Albania	See EU (completely aligning with EU)	Yes (August 2014)
Montenegro	See EU (mostly aligning with EU)	Yes (August 2014)
Moldova	*Did not join sectoral (EU) sanctions*	*No*
Georgia	*Did not join sectoral (EU) sanctions*	*No*
Liechtenstein	See EU (mostly aligning with EU) + introduction of anti-circumvention measures	Yes (August 2014)
Ukraine	Ukrainian sanctions law, 12 categories: 1-4) asset freezes, restrictions on capital flight and transit of goods and trade	Yes

	5-8) annulment of licenses, exclusion from procurements and suspension of fin. Obligations	
	9-12) restrictions on loans, cash withdrawal and termination of different sorts of agreements	No
	2015: "Personal economic sanctions" against specific Russian legal entities in the finance, IT, aviation and military-industrial sectors	Yes (October 2015)
	2016: Prohibitions on privatization, capital increase, foreign investments, use of payment systems, transit of goods and transportation	Yes
Switzerland	Legislation that prevents illegal circumvention of EU and other countries' sanctions on Russia	No
Russia	Import ban on agri-food goods Extended country list in August 2015 On Ukraine: Since 2016 Extended under Presidential executive orders No. 320 of June 24, 2015, No. 305 of June 29, 2016, No. 293 of June 30, 2017 and No. 420 of June 12, 2018.	Yes (August 2014 for EU, US, AUS, CAN, NOR; Aug 2015 for LIE, Albania, MNE, ISL; Jan 2016 for Ukraine)

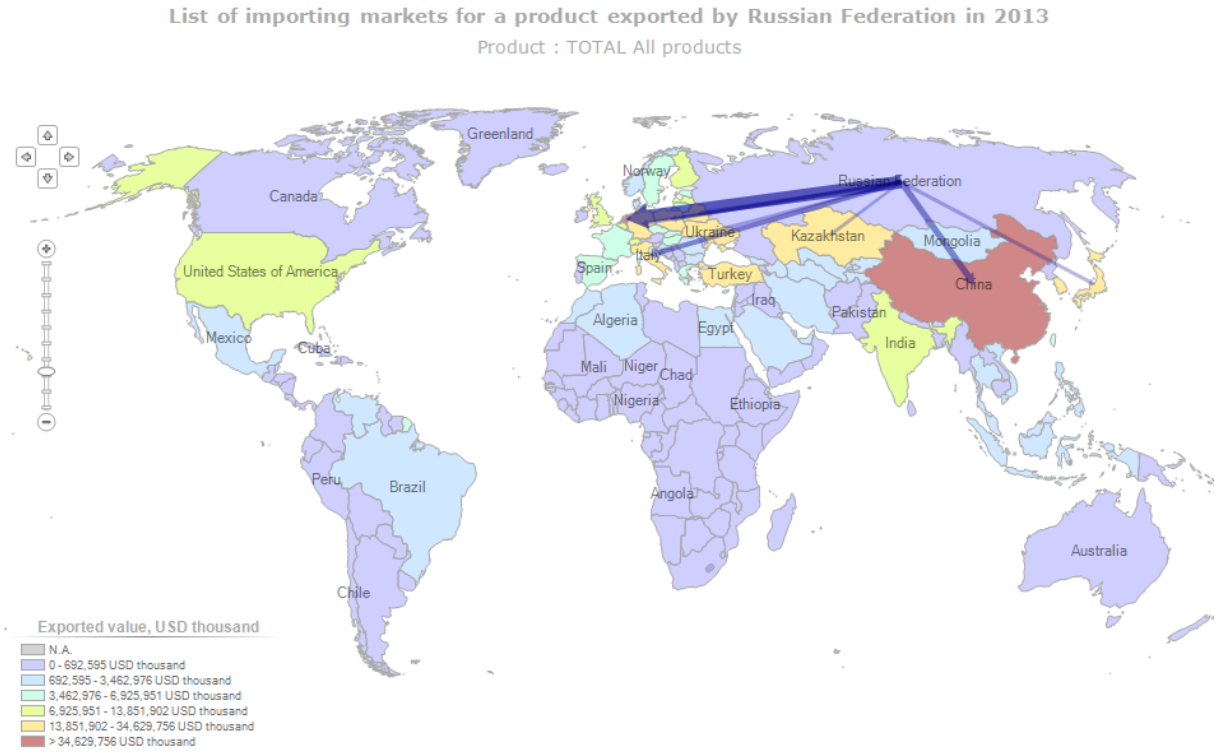
Sources: See table above.

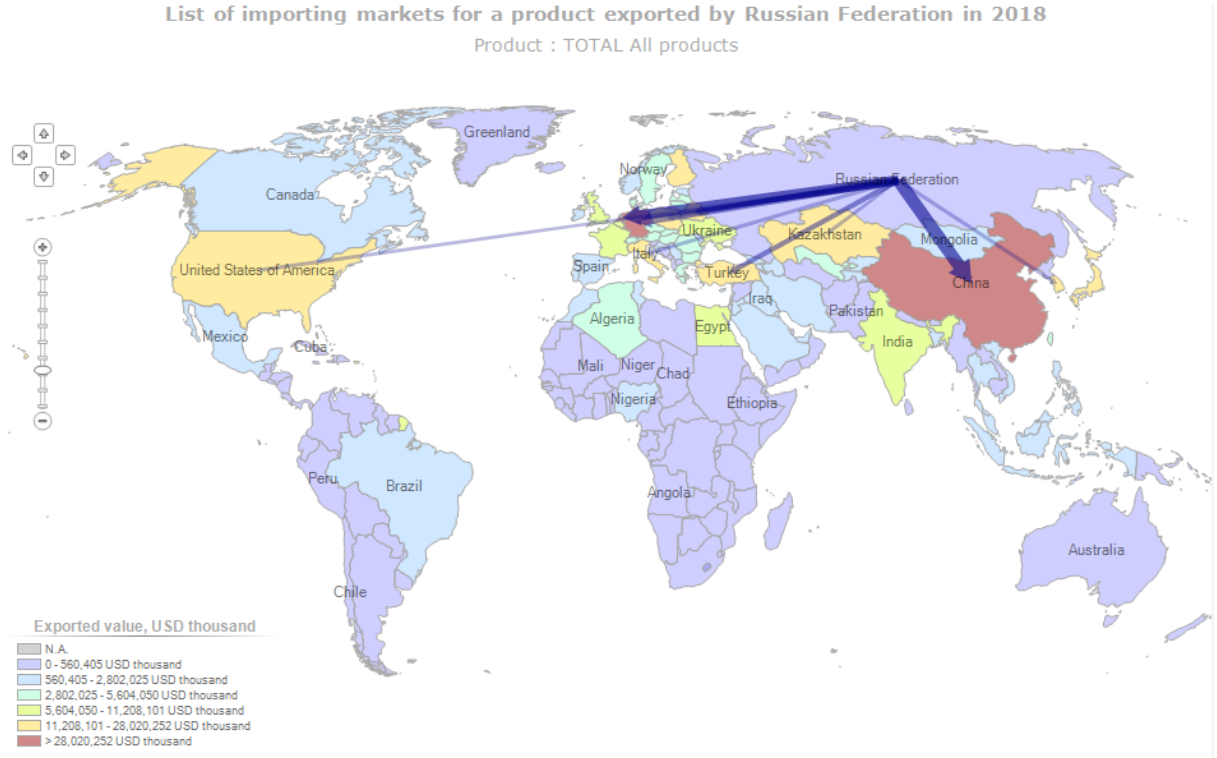
Figure 28: Russian exports to senders, bystanders and China



Source: UN Comtrade. Note: Chinese monthly data is not reported to Comtrade before 2016.

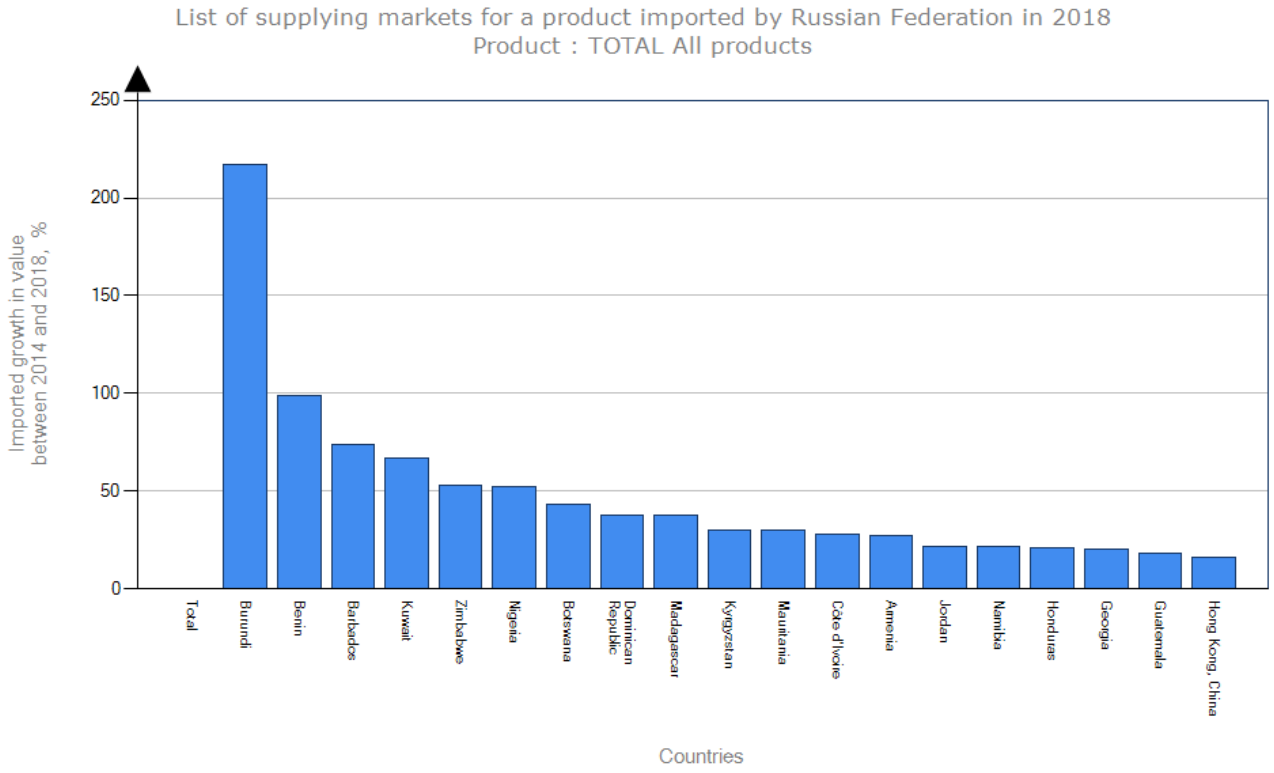
Figure 29: Russian export structure in 2013 and 2018





Source: ITC (2019).

Figure 30: Russian import growth between 2014 and 2018



Source: ITC (2019).

Table 19: Included countries

Sanctioning countries		**Bystanders**	
USA	Italy	South Korea	India
Japan	Australia	Kazakhstan	China
France	Canada	Belarus	Turkey
UK	Poland	Mongolia	Indonesia
Norway	Japan	Serbia	Brazil
Latvia	Sweden	Vietnam	
Germany	Spain		
Finland	Ukraine		
Estonia	Austria	Russia	
Romania	Netherlands		
Czech Republic			