Upgrading of Exports: Does the Integration into Trade Agreements Pave the Way to Product Upgrading?

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Upgrading of Exports: Does the Integration into Trade Agreements Pave the Way to Product Upgrading?

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Abstract

This paper investigates whether trade agreements help middle income countries to upgrade their product portfolio exported to high income countries.Combining product level trade flows from the CEPII-Baci database with information on product complexity from the Atlas of Economic Complexity and the DESTA database on trade agreements, this question is studied for a set of 135 countries between 2001 and 2013 based on a gravity framework. In this context, the development of the extensive and intensive margins for high complex products is considered as proxy for product upgrading. By exploiting the cross sectional dimension of the panel, this study finds that middle income countries export a wider product scope of complex goods if their trade relation is covered by an agreement including trade provisions related to competition, services and investments, compared to country pairs without an equivalent framework. Still, the consideration of the time dimension leads to ambiguous effect of these provisions. While positive estimation results for the intensive margin of complex goods are in line with related papers, negative effects on the extensive margin of complex goods are at odds with expectations of the mechanism between agreements and trade.

JEL classification: F14, F15, F53.

Keywords: Empirical Studies of Trade, Economic Complexity, Trade Integration.

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1 Introduction

The past decades marked a fundamental change in industrial organization. Labeled by Baldwin (2011) as the great unbundling, today's production is no longer organized at one production site but spread across national borders along global value chains. This development is particularly relevant for middle income countries as the specialization at specific production stages allows them to integrate into the world economy without the necessity to establish the entire value chain of a good. Importantly, this integration offers the chance for middle income countries to establish themselves as suppliers in value chains of more complex products and to enter higher value added production stages through product upgrading (Taglioni and Winkler, 2016; WorldBank et al., 2017). In view of the fact that the average complexity of exports of countries proved to be a good predictor for future economic growth and is closely correlated with domestic per capita income, product upgrading can be perceived as an important step towards growing prosperity of economies (Hausmann et al., 2007).

In this context, the crucial question emerges which factors favor the integration of middle income countries in value chains of complex goods. Even though there are discrepancies regarding the magnitude of their individual impact, it is commonly acknowledged that both trade agreements and trade institutions promote trade among their member countries (Baier and Bergstrand, 2007, 2009; Felbermayr and Kohler, 2006; Dutt et al., 2013; Anderson and Yotov, 2016). Thereby, trade agreements are found to not only enhance exports of already traded products but are also found to promote trade of new goods (Hillberry and McDaniel, 2002; Kehoe and Ruhl, 2013; Baier et al., 2014). While the majority of studies in this field considers trade agreements as a black box, recent studies devote more attention to the investigation of the impact of particular contract clauses in agreements, so called trade provisions, on trade among signatories. Accordingly, it has been shown that deeper trade agreements enhance trade among signatories, fosters the integration in production networks and that trade provisions related to competition, services and investments favor the integration of countries in global value chains (Mattoo et al., 2017; Orefice and Rocha, 2014; Dhingra et al., 2018).

Against this background, the present chapter aims at investigating to what extent trade agreements help middle income countries to foster their integration in value chains of complex products and to upgrade their export product basket. Thereby, particular attention is

paid to the role of additional provisions of trade agreements and their potential to further enhance exports of complex products. As trade of high complex products is traditionally dominated by high income countries, the main focus of the analysis lies on trade relations between middle and high income countries. To investigate this question empirically, product upgrading is measured as the extensive and intensive margin of high complex products defined according to the Atlas of economic complexity and analyzed in conjunction with data on trade agreements and provisions from the DESTA database. Given the availability for the underlying data, the link between agreements, provisions and trade margins of complex goods is studied for 135 countries between 2001 and 2013.

Considering the cross sectional dimension of provisions related to competition, services and investments, results indicate that middle income countries export a wider product scope of complex goods to high income countries when their trade relation is covered by a trade agreement with additional provisions on competition, services and investments compared to country pairs whose trade is not covered by an equivalent agreement. However, with respect to the time dimension of the panel, the effect of trade provisions related to competition, services and investment turns out to be ambiguous. On the one hand, positive estimation results for the intensive margin of complex goods are in line with related papers, while, on the other hand, negative effects on the extensive margin of complex goods are at odds with expectations of the mechanism between agreements and trade. In this context, the consideration of phasing-in effects shows that the ambiguous effect of provisions related to competition, service and investments is also persistent in the long run over a time horizon of 5 years.

The remainder of the chapter is structured as follows. Section 2 provides a brief overview about the relevant literature related to the topic. While section 3 outlines the theoretical background of this paper, section 4 demonstrates how the theoretical fundaments are implemented empirically. After the presentation of data in section 5, results are presented in section 6. Finally, section7 concludes.

2 Literature Review

The research question of this chapter relates to essentially two different streams of empirical literature. First, the chapter is based on insights gained through the evaluation of the nature of exported goods and the resulting economic performance of countries. Generally, richer countries export a wider set of goods (Hummels and Klenow, 2005). Regarding the economic development of countries, it has been shown that the economic performance of countries is not entirely determined by country specific fundamentals like capital, labor, natural resources and the institutional quality of countries but also by the type of goods these countries export (Hausmann et al., 2007). Accordingly, the product set exported by countries is determined by both the endowment of capabilities of a country and technological requirements of goods (Hausmann and Hidalgo, 2011; Hidalgo and Hausmann, 2009). In this context, the economic complexity of exports has been identified to serve as predictor for future economic growth. A high discrepancy between a country's actual income and its expected income calculated based on its export complexity is accompanied by faster growth for economies like China or India (Hausmann et al., 2007). Even within countries, empirical studies on China showed that locations with a production structure geared towards more complex products experienced higher economic growth (Jarreau and Poncet, 2012; Poncet and de Waldemar, 2013). However, countries with general high levels of economic complexity were found to have lower levels of income inequality regardless the national education, the aggregated income level or institutional quality (Hartmann et al., 2017).

The second stream of literature considers the impact of trade agreements, currency unions and trade institutions like the GATT or WTO on trade. In this context, it has been shown that GATT/WTO membership encourages trade and thus works predominantly through the extensive margin of trade (Felbermayr and Kohler, 2006; Dutt et al., 2013). Moreover, even though currency unions were shown to generally increase trade among members by 100%, large currency unions like the European Monetary Union did not significantly lead to more trade thus prohibiting to derive a pure positive effect of economic integration (Larch et al., 2019).

With respect to trade agreements, empirical studies widely confirmed the positive impact from signing a free trade agreement and increasing trade volumes of signatories. On the country level, it has been shown that agreements even double trade among members

within a period of 10 years after its signing (Baier and Bergstrand, 2007, 2009; Anderson and Yotov, 2016). Related to this finding, both the extensive and intensive margins of trade were proven to be positively linked to the existence of trade agreements (see e.g. Hillberry and McDaniel (2002) and Kehoe and Ruhl (2013) for an investigation of the effect of NAFTA and Baier et al. (2014) for a broader country setting). Considering the heterogenous effect of trade agreements, it has been shown that effects of free trade agreements for individual countries differ within the same agreement by country pairs and that effects are different for exporters and importers within pairs Baier et al. (2019). In this context, both empirical and theoretical contributions highlight that especially lower income economies seek to reduce trade policy uncertainty e.g. arising from protectionist events or frequent small-magnitude changes in trade policy, by signing trade agreements (Limão and Maggi, 2015; Handley and Limao, 2015). Accordingly, the expansion of Portuguese exports to other member countries of the European Community (EC) is attributed to a limitation of uncertainty about future trade policies of EC members after Portugal's accession to the EC in 1986 (Handley and Limao, 2015). Moreover, by exploiting the heterogeneity of individual firms, more granular studies identified diverse effects of trade agreements based on firm size and types of products. While there exist both theoretical and empirical contributions showing that trade agreements benefit mostly large firms, there is also evidence that small firms gain from trade agreements through the extensive margin when operating on a market with differentiated goods (Osgood et al., 2017; Baccini et al., 2017; Chaney, 2008; Spilker et al., 2018).

Besides studying the general impact of trade agreements, various empirical studies increasingly focus on the role of trade provisions for bilateral trade. As stressed by Dür et al. (2014), even though the depth of concluded trade agreements increased particularly since the 1990ies, the number of studies focusing on determinants or the impact of design differences of agreements is still comparably low. Generally, it has been shown that agreements, which can hardly be broken, motivate countries to undertake relation specific investments thus fostering trade among country pairs (Yarbrough and Yarbrough, 2014; Hicks and Kim, 2012). In this context, deeper trade agreements, measured as the number of legally codified provisions, boost trade by up to 44% relative to shallow agreements (Mattoo et al., 2017). Moreover, taking into account the legal enforceability of trade provisions, it has been shown that trade provisions promote trade and that deep agreements among North-South country pairs and in the Asian region increase trade in production networks by around 12%

points (Kohl et al., 2016; Orefice and Rocha, 2014). Regarding the role of the effect of individual provisions, agreements with additional chapters on intellectual property rights (IPR) turned out to positively affect trade after a certain time delay and that especially developed countries benefit from IPR clauses (Campi and Dueñas, 2019). A strong impact has also been identified for the inclusion of provisions on services, investments and competition. Accordingly, these provisions account for half of the positive overall impact of economic integration agreements on trade and are most dominant in service providing sectors related to global value chain activities (Dhingra et al., 2018).

3 Theoretical Background

The theoretical background of this chapter is based on the derivation of the gravity model on the sectoral level. The technical derivation follows Anderson and Yotov (2016) and Yotov et al. (2016).[1] While this section focuses on outlining the mechanism between trade agreements, provisions and bilateral trade, a more detailed derivation of the model is provided in the Appendix. In contrast to the original derivation of the structural gravity model at the sectoral level, it is henceforth assumed that products are aggregated to different good's classes according to the economic complexity of products rather than the industry of goods. This aggregation is based on the implicit assumption that products within a certain bandwidth of economic complexity share similar properties within the theoretical framework like e.g. a similar elasticity of substitution between different varieties of goods in a given complexity class. Given the aim of this chapter to trace the economic complexity of exports, this approach allows to precisely group individual products according to their economic complexity and is thus accounting for the heterogeneity of product complexity within industries.

Extending the standard Anderson (1979) assumption, it is hence assumed that there are many, K, goods which can be subdivided into $k \in K$ complexity classes and differentiated by place of origin. The supply side is modeled as endowment economy where countries are endowed with goods of complexity class k. On the demand side it is assumed that there exists constant elasticity of substitution for varieties which are nested in a Cobb-

[1] After the first theoretical economic foundation of the gravity model by Anderson (1979), several authors provided different theoretical micro foundations which are e.g. deriving gravity on the supply side within a Ricardian framework (Eaton and Kortum (2002)) or a demand side approach using the Armington assumption and Constant Elasticity of Substitution (CES) expenditures (Anderson and Yotov (2016)). See Yotov et al. (2016) for an encompassing overview over the evolution of gravity theory over time.

Douglas utility function. Solving the consumer optimization problem leads to the following structural gravity system for different classes of complexity k.

$$X_{ij}^k = \frac{Y_i^k E_j^k}{Y^k} \left(\frac{t_{ij}^k}{\Pi_i^k P_j^k} \right)^{1-\sigma_k} \tag{1}$$

$$(\Pi_i^k)^{1-\sigma_k} = \sum_j \left(\frac{t_{ij}^k}{P_j^k} \right)^{1-\sigma_k} \frac{E_j^k}{Y^k} \tag{2}$$

$$(P_j^k)^{1-\sigma_k} = \sum_i \left(\frac{t_{ij}^k}{\Pi_i^k} \right)^{1-\sigma_k} \frac{Y_i^k}{Y^k} \tag{3}$$

Regarding equation 1, X_{ij}^k represents total trade flows from the exporting country i to country j for goods of complexity class k, Y_i^k captures the income of the exporting country i from goods in complexity class k and E_j^k represents the expenditure of country j in each product complexity class k. $\sigma_k > 1$ describes the elasticity of substitution between different varieties of goods in complexity class k. Both Π_i^k and P_j^k describe the multilateral resistance terms of the exporting country i and the importing country j for goods in complexity class k, respectively. These terms, expressed in greater detail in equations 2 and 3, can be interpreted as general proxy for the ease of international market access of countries i and j. Importantly, t_{ij}^k captures bilateral trade costs of products in complexity class k which are generally modeled as so called iceberg transport cost. Following Melitz (2003) and Anderson (2011), these iceberg transport cost capture both fixed and variable transport cost.

Regarding the research focus of this chapter to investigate the effect from trade agreements between middle and high income countries on the scope and complexity of exports in global value chains, it is important to stress the role of bilateral trade costs in theory. Given the fact that the research question of this chapter emphasizes the *direct* bilateral relation between middle and high income countries, the analysis focuses on the identification of the direct, partial equilibrium effect from trade liberalization between country pairs.[2] As commonly assumed in the literature on the topic, trade agreements are considered to lower

[2]This consideration ignores the issue of trade diversion as raised by Viner (1950). Accordingly, trade agreements have the potential to divert trade from non-members of agreements. This effect would be most accurately captured by a general equilibrium framework. Still, given the finding of Mattoo et al. (2017) that the trade creating effect of deep agreements does not come at the cost of trade with members outside of an agreement, the focus of the present chapter on the direct partial equilibrium effect does not imply a severe limitation to the validity of the results.

trade cost, t_{ij}^k, among trade partners. From a technical point of view given in equation 1, this decline leads to an increase of exports from i to j, X_{ij}^k, for $\sigma_k > 1$. Interpreting this link qualitatively, one might consider a setting in which a country i exports goods of a certain complexity class k to a high income country j. In this context, a trade agreement implies lower bilateral trade costs and thus a higher level of trade compared to a situation without an agreement. Importantly, further contract clauses e.g. on IPRs or competition can be valued as an additional cost reduction compared to an agreement without such specifications.

One limitation of the application of the gravity model in the context of the present chapter consists in the fact that there is no explicit theoretical fundamental to assume particular implications for bilateral trade when there is an income per capita difference between exporting and importing economies. Still, given theoretical and empirical contributions on uncertainty in international trade, one might assume that trade among countries at different income per capita levels is accompanied by higher trade costs arising from uncertainty. Limão and Maggi (2015) and Handley and Limao (2015) show that especially lower income countries seek to sign trade agreements with trade partners to reduce uncertainty and that export related investments are encouraged when there is a lower degree of uncertainty about future trade policies of trade partners. Thus, it is possible to conclude that the income difference among trade partners implies higher bilateral trade costs in the form of uncertainty.

In the context of this paper, one might hence think of two drivers of bilateral trade costs. First and linked to the findings of Limão and Maggi (2015) and Handley and Limao (2015), bilateral trade costs of countries with different income per capita levels are higher due to uncertainty with respect to trade policies of the partner country. Second and related to the nature of traded goods, this uncertainty is particularly high if complex products are considered which require a minimum of intellectual property rights protection or certain standards of supply chain related activities. These assumptions imply $t_{ij}^{k1} < t_{ij}^{k2}$, if more complex products are grouped under k2 and $t_{ij}^k < t_{im}^k$, if exporter i, as a middle income country is exporting to a destination with a similar (j) or higher (m) income level.

One might illustrate this circumstance thinking of a car manufacturer in a high income country who needs to decide on the supplier of a relatively high complex good needed in the production process. Assuming that there exist two middle income countries supplying this product, one might expect that the high income country sources more from the middle

income country with which it has signed a trade agreement. At this point, an additional contract clause on e.g. IPRs is further lowering costs by reducing the uncertainty of the sourcing decision. It can hence be assumed that more manufacturers in j source complex intermediates from i compared to a situation without an additional trade provision or a situation without any agreement at all.
The following section outlines how this theoretical approach is implemented empirically.

4 Empirical Strategy

The empirical strategy of this chapter builds on methodological and technical guidance on structural gravity models provided by Yotov et al. (2016). While the following subsection demonstrates how trade margins are measured and how the concept of complexity is integrated in the empirical approach, subsection 4.2. is devoted to the explanation of technical details regarding the estimation strategy.

4.1 Trade Margins as Proxy for Product Upgrading

As stated in the introduction, the main focus of this chapter is to evaluate to what extent trade agreements help middle income countries upgrading their product basket exported to high income countries. Thereby, the integration in value chains of complex goods is measured as the extensive and intensive margins of high complex goods. Given the approach of the present chapter to consider this research question by exploiting both the time dimension and the cross sectional dimension, trade margins can be interpreted in two ways. Regarding the time dimension, it is considered to what extent the export scope of high complex products increases (the extensive margin) and to what extent trade agreements further boost trade of already traded goods (the intensive margin) *over time*. Regarding the cross sectional dimension, it is considered to what extent the extensive and intensive margin is higher among middle and high income countries, when their trade relation is covered by an agreement compared to trade relations outside of a treaty.
Following Hummels and Klenow (2005) and Baier et al. (2014), the extensive and intensive margins of trade are derived from detailed bilateral trade data and weighted by total imports of the destination country. Based on import flows of country j from the world for a given product m at time t, denoted as X^m_{Wjt}, the extensive margin (EM) and intensive

margin (IM) of trade can be computed as follows.

$$EM_{ijt} = \frac{\sum_{m \in M_{ijt}} X^m_{Wjt}}{\sum_{m \in M_{Wjt}} X^m_{Wjt}} \tag{4}$$

$$IM_{ijt} = \frac{\sum_{m \in M_{ijt}} X^m_{ijt}}{\sum_{m \in M_{ijt}} X^m_{Wjt}} \tag{5}$$

Regarding the *extensive margin*, country j's imports from the world are summed across all goods m which are exported from i to j, M_{ijt}. Subsequently, this sum is divided by the sum across the overall set of products imported by j from the world, M_{Wjt}. Consequently, the extensive margin, EM_{ijt}, captures to what extent the product portfolio country j imports from i coincides with the overall product portfolio j imports from the world.

Regarding the *intensive margin*, the value of goods country j imports from country i is normalized by the total value of goods country j imports from the world for the same set of products, M_{ijt}. Consequently, the intensive margin, IM_{ijt}, measures the market share of country i in j's imports from the world for the set of products, M_{ijt}, which i exports to j.

The choice of this measure proves particularly suitable for three reasons. First, different from the traditional way to calculate the extensive and intensive margin as the number of exported products and the average export value per good, the approach of Hummels and Klenow (2005) normalizes trade by total imports of country j. This measure is hence preferable over the consideration of the extensive margin measured as the total number of exported goods as it accounts for variation in the importing country's import basket over time. In the framework of the present paper, this characteristic is important as the availability of data limits the considered time span to the years from 2001 to 2013. In view of the fact that world trade considerably slowed down by 2008 due to the world financial crisis, the normalization of product flows from i to j by world imports in j accounts for this slowdown of world trade. Second, the normalization of trade flows becomes particularly relevant when coefficients are calculated based on a Poisson-Pseudo-Maximum Likelihood (PPML) estimation method. Following the argument of Sotelo (2017), PPML estimations tend to give higher weights to larger trade flows so that it is preferable to weight flows by the respective imports of country j. Thus, the calculation of trade margins proposed by Hummels and Klenow (2005) controls for this implicit weighting and hence attributes equal importance to different country pairs. Third, as shown by Baier et al. (2014), the

sum of logs of the extensive and intensive margin gives the log of exports from i to j.[3] With respect to the estimation of equation 1, where total exports from i to j are explained based on bilateral trade cost and multilateral resistance to trade of countries, this feature is crucial in order to use the extensive and intensive margin as a left hand side variable.

Given the aim of this paper, to focus on trade margins of *high complex* products, EM_{ijt} and IM_{ijt} are derived based on detailed product level data for commodities ranging in the *highest quartile of complexity*. Importantly, the concept to classify goods according to their complexity is borrowed from the Atlas of Economic Complexity by Hidalgo and Hausmann (2009). In this context, the economic complexity of a product is derived as an indicator based on both the uniqueness of production and the level of sophistication of a product. The main idea is that the economic complexity of a good is reflected by the number of countries producing this good as well as the capacity of these countries to produce complex goods in general. Considering these different dimensions is crucial as it allows to distinguish if the uniqueness of a product stems from the fact that merely a raw material is considered or from the fact that only a few countries have the capacity to construct it. In this case, a typical example consists in the consideration of rare raw materials as products which are very unique due to the fact that they only occur in a few regions of the world. Still, with regard to the comparably less sophisticated product portfolio of the respective exporting countries, it becomes evident that the uniqueness of these goods is not due to a high complex production process but due to the fact that these are scarce commodities.

Applying this concept to rank products according to their level of economic complexity allows to trace the development of high complex goods exports over time. Considering products classified as high complex goods, one considers a total of 1256 products ranging from watch cases over motor vehicle seats to photographic plates and movement of watches.

4.2 Estimation Strategy

In order to identify the effect of trade agreements on the average export value and scope of high complex goods of a country, it is necessary to define an estimation equation based on equation 1. Regarding the framework of this chapter to consider trade margins of middle

[3] With $IM_{ijt} = \sum_{m \in M_{ijt}} X^m_{ijt} / \sum_{m \in M_{ijt}} X^m_{Wjt}$, the product of the extensive and intensive margin equals the ratio of exports from i to j relative to j's total imports. The log decomposition of total trade flows, X_{ijt}, hence reads: $lnX_{ijt} = lnEM_{ijt} + lnIM_{ijt} + lnX_{jt}$. Given the use of importer-time fixed effects in the estimation, X_{jt} is canceled out thus leading to a complete decomposition of bilateral trade into the extensive and intensive margins.

income countries exporting complex goods to high income countries, it is important to stress four features of the estimation strategy.

First and in line with the most recent empirical literature on the topic, coefficients are estimated based on a PPML estimation method proposed by Silva and Tenreyro (2006).[4] A second feature which needs to be taken into account is the question how to capture multilateral resistance of trade. There has been an extensive debate on how to accurately capture the inward and outward multilateral resistance of trade partners.[5] In this context, Baldwin and Taglioni (2006) coined the term of a *gold medal mistake* of empirical studies which do not succeed in accurately accounting for multilateral resistance. In that case, estimations suffer from an omitted variable bias and thus lead to biased estimation results. In this case, Yotov et al. (2016) propose a best practice and recommend to use panel data along with exporter-time and importer-time fixed effects. Moreover, Baier and Bergstrand (2007) highlight the issue of endogeneity of trade policy variables. Accordingly, there might be reverse causality stemming from the fact that country pairs with already high levels of trade sign a trade agreement or that the trade policy of countries is correlated with unobservable country pair characteristics. To address this issue, Baier and Bergstrand (2007) and Yotov et al. (2016) recommend to use pair fixed effects or first differencing to rule out that country pairs with already high levels of trade self-select themselves into trade agreements and to control for any unobserved time invariant country pair characteristic.[6] [7] Following this estimation strategy, it is possible to exploit the time variation of the panel. Still, as argued in the introduction, the fact that the availability of data limits the considered time span of this study to the years from 2001 to 2013, this perspective might

[4] Silva and Tenreyro (2006) stress two reasons why an estimation of model parameters in a multiplicative form like PPML should be preferred over standard log-linearized OLS estimations. Given the fact that trade data often suffers from heteroskedasticity, estimation results of log-linearized OLS specifications loose their reliability to be interpreted as elasticities. Moreover, as log-linearized OLS models can not deal with zero trade flows, the information contained in these flows is lost. To address these two issues, Silva and Tenreyro (2006) propose the estimation of parameters based on PPML as it not only accounts for heteroskedasticity but also keeps the information contained in zero trade flows. As these arguments have widely been acknowledged, the PPML estimation method has become standard in estimations of gravity equations and is also applied in this paper.

[5] See P_j^k and Π_i^k in equation 1 capturing importer j's and exporter i's ease of market access respectively.

[6] To implement such high dimensional fixed effects in Stata, the command *ppml_panel_sg* has been used.

[7] As outlined by Yotov et al. (2016) an ideal extension of the gravity equation would be to include *intra*-national trade flows (value of gross production of a country minus total exports). This approach is not only consistent with the theoretical background of the gravity model that consumers in a country have the choice between domestically produced goods and imports but also controls for the effect of globalization and corrects the bias in estimations of the effect of trade agreements on trade (Bergstrand et al., 2015). Still, as the data to derive intra-national trade is not available at the detailed HS6 product level, which is necessary to identify the complexity of trade flows, the empirical strategy abstains from an inclusion of intra-national trade flows in the regression equation.

be problematic as the majority of trade agreements already exists before 2001. Thus, in order to exploit the cross sectional dimension of the data, an additional alternative specification is considered in which there are separate controls for time invariant country pair characteristics. By following this approach it is possible to identify to what extent trade flows between middle and high income countries differ when they are covered by trade agreements compared to trade flows between middle and high income countries without any contractual framework. Against this background, regressions are run with- and without pair fixed effects. Acknowledging the risk that estimations without pair fixed effects might still suffer from endogeneity, estimated coefficients are rather interpreted qualitatively.

A third characteristic of the estimation strategy pursued in this chapter consists of the consideration of trade relations between middle and high income countries.[8] Given the use of exporter-time and importer-time fixed effects, it is necessary to identify a variable which captures the income discrepancy between a middle income exporter and a high income importer without being canceled out by the fixed effects. One example consists in taking the log of the ratio between the exporter's GDP per capita and the GDP per capita of the importer. Thus, if there is a relatively poorer country exporting to a high income country, this ratio is smaller than 1 and has a negative logarithm. To facilitate the interpretation of this variable, the fraction is multiplied by -1 and inverted to avoid that country pairs with the highest income difference are implicitly weighted most: $income\,gap = -1/ln\left[\frac{GDPpCAP_i}{GDPpCAP_j}\right]$. The baseline regression equation for trade margins and bilateral trade flows of goods with complexity level K can hence be formulated as depicted in equation 6.[9] To implement the regression equation without pair fixed effects, ϕ_{ij} in equation 6 is suppressed and substituted by gravity controls instead. As the *incomegap* variable is closely related to the set of fixed effects, it is not kept in the regression individually but only in the interaction with the agreement. Moreover, the estimation strategy of the present chapter follows Yotov et al. (2016) not to pool data over consecutive years but to use 2-year intervals. This specification tackles the issue that changes of trade flows in response to trade agreements

[8]Countries are classified as high and middle income countries according to the gross national income of countries in 2001 and thresholds of the World Bank. Middle income countries refer to upper- and lower middle income economies. To evaluate to what extent trade flows among middle and high income countries differ from trade flows among low and high income economies, regressions were also implemented for low income countries. Results are briefly discussed in section 6.2 and provided in the Appendix.

[9]Standard errors are clustered by exporter, importer and time thus allowing standard errors to simultaneously correlate across all main dimensions of the panel. This approach follows Larch et al. (2019) and is motivated by Egger and Tarlea (2015) and Cameron et al. (2011).

might not materialize within one year but need more time to take effect (Trefler, 2004).

$$Margin_{ijt}^{K,I} = exp\left[\alpha\, agree_{ijt} + \beta\, agree * income\, gap_{ijt} + \eta\, controls_{ijt} + \gamma_{it} + \delta_{jt} + \phi_{ij}\right] * \epsilon_{ijt} \tag{6}$$

At this point, the *controls* refers to a vector containing variables on average levels of bilateral tariffs and flows of foreign direct investments (FDI). Controlling for tariff changes is important in order to ensure that estimated coefficients of agreement variables are capturing the effect of trade agreements and additional provisions independent from tariff changes of countries. Moreover, it is possible that bilateral trade and hence trade margins are driven by bilateral investment treaties without being codified in the legal text of trade agreements. As there exists no encompassing database for treaties signed independent from trade agreements, FDI flows are added as additional control assuming that bilateral FDI flows reflect the effect of unobserved agreements related to FDI.

To further investigate the role of different contractual clauses of trade agreements on product upgrading, equation 6 is further extended by information on trade provisions. As this information is not only available as dummy variable but also along with more information on provision specifications, more detailed variables for trade provisions are constructed. Regarding for example services, there are 9 additional dummies proxying the presence of certain contract clauses. There is hence a dummy which equals 1 if there is a most favored nation clause, if the movement of natural persons is allowed etc. Thus, by considering additional contract clauses as an indicator for the depth of agreements, it is assumed that the depth of an agreement rises along with the incorporated number of additional clauses of an agreement. In the case of trade provisions on services, it is hence considered how many of the 9 potential contract clauses are contained in agreements so that the indicator ranges between 0 and 1.

This approach offers two core advantages over the mere use of dummy variables. First and in line with the critique of Kohl et al. (2016) that trade agreements and provisions should not be considered as a black box, the outlined method of this chapter accounts for the varying legal strength of provisions in agreements. Second and rather addressing technical concerns as raised by Mattoo et al. (2017), only including provisions as dummies bears the risk that regressions suffer from multicollinearity. To adequately address this issue, provisions are not only captured as variables calculated as explained above but are

also grouped according to their correlations.[10] As, for example, competition, services and investments are highly correlated it would be impossible to identify the individual effect of these provisions. Thus, highly correlated provisions are captured jointly.[11] Similar to the previous specification, the fourth feature of the estimation strategy consists of including these variables on trade provisions as an interaction with the income difference variable.

$$\begin{aligned} Margin_{ijt}^{K,I} = exp\,[&\alpha_1\, agree_{ijt} + \alpha_2\, provisions \\ &+ \beta_1\, agree * income\, gap_{ijt} + \beta_2\, provisions * income\, gap_{ijt} \\ &+ \eta\, controls_{ijt} + \gamma_{it} + \delta_{jt} + \phi_{ij}] * \epsilon_{ijt} \end{aligned} \tag{7}$$

5 Data

To implement the empirical strategy outlined in the previous section, data is taken from six different sources. First, data on bilateral trade flows at the HS6 digit level is taken from the CEPII-Baci database (HS6 rev. 92) for the time span from 2001 to 2013 for a total of 225 countries (Gaulier and Zignago, 2010). Given the presence of both high and middle income countries in the analysis, this database offers a crucial advantage regarding the consistent reporting of trade flows. By using mirror flows to match declared exports of an origin country with declared imports of designated destinations, the Baci database cleans out over- and under-reported trade flows due to reporting inaccuracies. A further advantage is the consistent reporting of trade flows in free on board prices (FOB) so that value flows can be considered regardless their insurance and freight costs (CIF).

A second data source is used to distinguish the degree of complexity of intermediate trade flows. Based on values from the Atlas of Economic complexity by Hidalgo and Hausmann (2009), HS6 products are ranked according to their respective degree of complexity of the year 2000.[12] As the technical approach of Hidalgo and Hausmann (2009) can lead to

[10] An overview over the variance inflation factors of individual regressors (without interaction terms) is provided in the Appendix.

[11] Eventually, three different groups of trade provisions are considered: *i.* competition, services and investments, ii. procurement, iii. intellectual property rights. Moreover, there is an additional control variable grouping technical barriers to trade, sanitary and phytosanitary measures, dispute settlement, defense mechanisms, standards and the announcement to establish a full free trade area without tariffs. A correlation table of different trade provisions is provided in the Appendix.

[12] It should be noted that this approach implicitly assumes that the complexity of goods was constant between 2001 and 2013. An alternative, which was also implemented in earlier versions of this study, used the product complexity of the current year thus allowing the economic complexity of goods to vary over time. Although it is reasonable to take into account that technological progress made production of certain products easier over time while other products were further developed and became more sophisticated, the method applied by Hidalgo and Hausmann (2009) to identify the economic complexity of goods is

negative results for the degree of complexity, values were normalized to range between 0 and 1.

The DESTA database is the third data source used. This database comprises a total of 894 WTO listed and non-WTO listed trade agreements. Moreover, this database provides additional information on the trade provisions of different agreements. In this context, the depth of an agreement is captured in various dimensions. By evaluating the content of agreements, Dür et al. (2014) introduce dummy variables for the presence of contract clauses. Accordingly, trade agreements are screened for information on e.g. product standards, investments, competition, intellectual property rights, services, procurement or technical barriers to trade etc. Importantly, an issue with this database arises from the fact that neither end years nor follow-up contracts of agreements are indicated. In order to diligently trace changes of trade relations between countries, the dataset was hence refined to include the end year or follow up contract of an agreement. Compared to alternative databases, this refinement provides essentially three benefits. First, while alternative databases like the World Bank database on the content of preferential trade agreements used by (Mattoo et al., 2017) also provide details on trade provisions included in agreements, a crucial limitation of their historic informative value consists of the exclusive consideration of trade agreements which are still in place (Hofmann et al., 2017). This limitation is problematic when the time dimension of bilateral trade relations is considered. Regarding e.g. Poland joining the European Union in 2004, the World Bank database not only lacks information on earlier agreements between members of the European Union and Poland but also ignores bilateral treaties of Poland and third parties prior to 2004, which were automatically terminated after Poland's accession to the European Union. At this point the refined version of the DESTA database used in the present study provides a more complete coverage of agreements. Second, alternative data sources like the World Bank database on the content of preferential trade agreements or the Regional Trade Agreement database by Egger and Larch (2008) only include WTO listed trade agreements. Thus, including both WTO listed agreements and other trade agreements outside of the jurisdiction of the WTO allows to analyze more precisely how trade agreements influence bilateral trade flows. Third, by capturing the end year of agreements as well as follow-up contracts between country pairs,

not completely independent from national trade policies. Given that the economic complexity of goods is derived from international trade flows, a good might be less traded over time due to domestic or foreign trade policy constraints for this particular product. In that case, the economic complexity index would increase even though there is no technological advancement in the production of the considered good.

it is possible to diligently trace the development of the content of trade agreements. This refinement is particularly important with respect to the aim of the chapter to identify the potential of trade provisions to enhance exports of high complex products.

Although great care has been taken to refine the DESTA database, there might still be some remaining inaccuracies especially for regions with several overlapping agreements. It can nonetheless be assumed that the refinement improved the coverage and precision of the original DESTA database and its alternatives. In total, 410 of all 894 agreements are relevant for the sample considered in this paper.[13]

Further control variables on geographical and ethnical determinants of trade between country pairs are taken from the gravity dataset of the CEPII (Head et al., 2010). Bilateral tariff data are taken from the CEPII MAcMap database for the years 2001, 2004, 2007, 2010 as well as 2013 and are interpolated for missing years (Guimbard et al., 2012). Data on GDP per capita to compute the income difference among countries are sourced from the World Bank.[14] Moreover, data on bilateral FDI flows are taken from UNCTAD based on bilateral FDI statistics 2014. Information was taken from both inflow and outflow tables and averaged for country pairs in case reported values differed.

Finally, the country sample considered in this chapter is determined by the set of countries available in Baci as well as from the MAcMap database on tariffs.[15]

Applying these criteria allows to study the link between trade agreements and trade margin for a total of 135 countries (plus a rest of the world residual) between 2001 and 2013. 21 countries are considered as high income importers while 114 countries are considered as middle income exporters.[16]

[13]It should be noted that it is possible that there are two agreements at the same time. Still, the variable on the agreement is binary and not differentiating if bilateral trade is covered by one or more agreements. E.g. by 2011, there are two agreements between France and Jamaica *CARIFORUM EC* (WTO listed) and the *Cotonou* Agreement (not WTO listed).

[14]GDP per capita in current US Dollar (NY.GDP.PCAP.CD).

[15]Judgements on the respective income status in 2001 are based on the respective Gross National Income of countries provided by the World Bank.

[16]High income countries in the sample considered in conjunction with middle income countries: Australia, Austria, Belgium-Luxembourg, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Korea (Rep.), the Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, USA. Other high income countries: Greece, Hong Kong, Rep. of Korea, Kuwait, Portugal, Slovenia, United Arab Emirates.
Upper-middle income countries: Argentina, Brazil, Chile, Costa Rica, Croatia, Czech Republic, Dominican Republic, Estonia, Gabon, Hungary, Jamaica, Lebanon, Latvia, Lithuania, Malaysia, Mauritius, Mexico, Oman, Panama, Poland, Saudi Arabia, Slovakia, Trinidad and Tobago, Turkey, Uruguay, Venezuela.
Lower-middle income countries: Albania, Algeria, Bolivia, Bosnia and Herzegovina, Bulgaria, Belarus, Sri Lanka, China, Colombia, Congo (Rep.), Ecuador, Egypt, El Salvador, Georgia, Guatemala, Honduras, Indonesia, Iran, Kazakhstan, Jordan, Morocco, Nicaragua, Paraguay, Peru, Philippines, Romania, Russia, South Africa, Thailand, Tunisia, Turkmenistan, Ukraine, Macedonia.
Low income countries: Angola, Azerbaijan, Armenia, Bangladesh, Burundi, Cambodia, Cameroon, Central

6 Results

This section presents calculation and estimation results based on the empirical strategy presented in section 4. The following subsection visualizes the average complexity of exports for middle income countries and shows how trade margins of high complex products developed between 2001 and 2013. To further investigate the impact of trade agreements beyond geographical and ethnical determinants of bilateral trade, regression results of equations 6 and 7 are presented in subsection 6.2.

6.1 Descriptive Results on Product Upgrading

To take a first glance at the average complexity of exports, figure 1 shows a density plot of the average complexity of exports for trade between middle and high income countries which is covered by a deep trade agreement, a shallow trade agreement and for trade outside of trade agreements.[17]

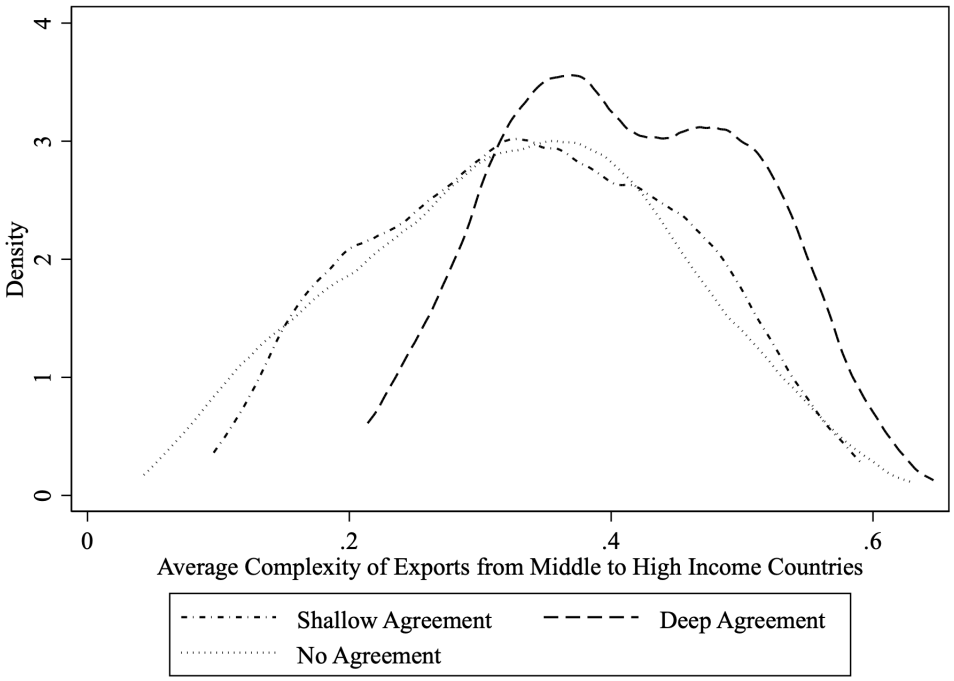

Figure 1: Average Complexity of Exports from Middle to High income Countries

African Rep., Chad, Zaire, Benin, Ethiopia, Eritrea, Gambia, Ghana, Guinea, Haiti, Côte d'Ivoire, Kenya, Kyrgyzstan, Laos, Madagascar, Malawi, Mali, Mauritania, Mongolia, Moldova, Mozambique, Nepal, Niger, Nigeria, Pakistan, Papua New Guinea, Guinea-Bissau, Rwanda, Senegal, Sierra Leone, India, Vietnam, Zimbabwe, Tajikistan, Togo, Uganda, Tanzania, Burkina Faso, Uzbekistan, Yemen, Zambia.

[17] In figure 1, the depth of an agreement is assessed based on the share of legally codified contract clauses in all potential contract clauses. An agreement is classified as *deep* agreement if its provision share is above the median.

It can be seen that exports of middle income countries which are in a deep trade agreement with high income countries not only export more complex products but also substantially less products with a low complexity level. The fact that distributions for middle income countries without an agreement do not differ tremendously from curves for middle income countries with a shallow agreement suggests that trade of complex goods requires a certain framework of legally codified contract clauses e.g. related to competition, services, intellectual property rights or investments.

In order to investigate to what extent the increasing share of high complex products is driven by the extensive or intensive margin, calculation results of trade margins are depicted in figure 2. Observations reflect average values for trade margins of complex goods exported to high income countries. Each point represents a trade margin of a country at two points in time. On the vertical axis, there are margin results for 2013 while results for 2001 are on the horizontal axis. Consequently, points above the 45-degree line imply an increase of the trade margin of a country between 2001 and 2013, while points below the 45-degree line imply a decline. For reasons of clarity, values are only depicted for high and middle income countries. A more detailed figure also including low income countries is provided in the Appendix.

As the scale of the intensive margin differs substantially among high and middle income countries, there are two different graphs for high and middle income countries with different scales.

Considering the intensive margin of middle income countries (the top right graph in figure 2), it can be seen that almost all middle income countries experienced an increase in average exports of high complex goods. It can be seen that this increase is most pronounced for Poland, the Czech Republic, Slovakia and Mexico as well as for China (graph on the left hand side). Importantly, most of these listed countries joined the European Union during the considered time span or are in a trade relation with other high income countries, like e.g. Mexico as a member of the North American Free Trade Agreement with Canada and the United States. On the contrary, there are countries like South Africa, the Congo, Panama and Russia which experienced a decline in their average exports of high complex intermediates.

Regarding high income countries the majority of observations is clustered closer to the 45-degree line. There are only a few high income countries which saw their average exports to other high income countries increase between 2001 and 2013. Among these countries

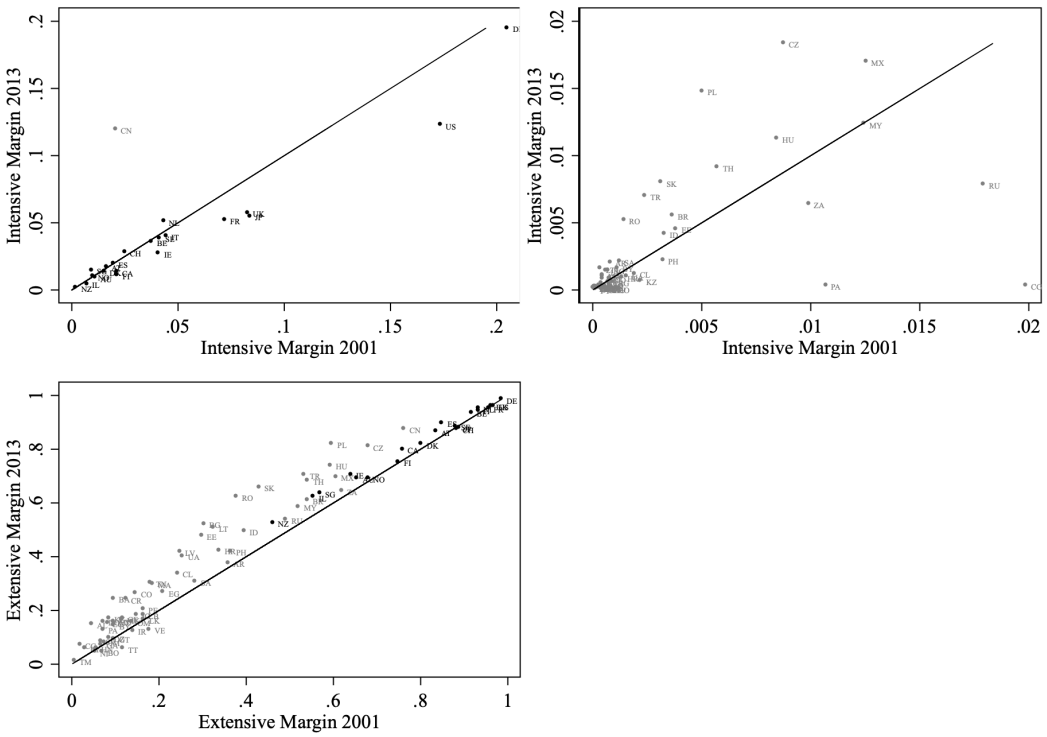

Figure 2: Trade Margins for Complex Products 2001 vs. 2013

are Singapore, Switzerland, the Netherlands, Austria, Spain and Norway. Other high income countries like France, the UK, Japan, the US and Germany experienced a decline. According to the calculation of the intensive margin in the spirit of Hummels and Klenow (2005), this finding indicates that these countries were partially crowded out by other competitors supplying the same high complex goods to high income countries.

With respect to the extensive margin of trade, the majority of both high and middle income countries experienced an increase in the product scope exported to high income countries. The only exceptions are Bolivia, Guatemala, Nicaragua, Sri Lanka, Trinidad and Tobago as well as Venezuela which experienced a slight decline in the scope of complex products exported to high income countries. Importantly, it can be seen that data points of middle income countries are further away from the 45-degree line than points of high income countries. This result indicates that the increase in the extensive margin of middle income countries was stronger than for high income countries. Consequently, middle income countries succeed in providing an increasing share of high income countries' imports of complex products. In this context, the relative smaller increase in the extensive margin of high income countries can be explained by the comparably strong position of high income countries as suppliers of complex goods in 2001. Regarding e.g. high income countries

like France, Germany, the UK and the US, the export product portfolio of these countries coincides to more than 90% with the portfolio of complex goods imported by high income trade partners. Thus, for these countries there is less scope to further expand the export portfolio of complex goods than for their competitors from middle income countries.
In the subsequent section, it will be analyzed to what extent the increase of the extensive and intensive margin of trade between middle and high income countries can be attributed to the impact of trade agreements and provisions.

6.2 Estimation Results

Before considering estimation results for trade margins, table 1 shows regression results for total trade flows. While columns 1 to 5 show results based on estimations using pair fixed effects, columns 6 to 10 show results based on estimations without pair fixed effects but controls for time invariant country pair characteristics. As stressed in section 4.2, the inclusion of pair fixed effects allows to exploit the time dimension of the panel while regressions without pair fixed effects but gravity controls allow to exploit the cross sectional dimension of the data thus assessing differences of middle and high income countries whose trade is covered by trade agreements and provisions compared to middle and high income countries trading without agreements. Consequently, these two different approaches measure the effect of newly signed agreements (in the case of regressions with pair fixed effects) and the effect of existing agreements (in the case of regressions without pair fixed effects). With respect to regressions without pair fixed effects, it should be noted that the magnitude of estimated coefficients should be interpreted with appropriate caution.Even though the set of control variables accounts for many country pair characteristics, the error term might be correlated with unobserved variables. However, the sign and significance level of estimates provide interesting qualitative insights into the variation of effects in the cross sectional dimension. For reasons of clarity, estimation results are only shown for variables of interests concerning trade agreements, respective trade provisions as well as interactions between these variables and the indicator for income discrepancies among exporters and importers. Estimation results for control variables like FDI flows as well as controls for geographical and ethnical characteristics of country pairs show expected signs and are provided in the Appendix.
Starting with the interpretation of results for the regression equation with pair fixed effects in columns 1 to 5, it can be seen that agreements, which have been signed during

	(1) bil.trade	(2) bil.trade	(3) bil.trade	(4) bil.trade non-compl.	(5) bil.trade compl.	(6) bil.trade	(7) bil.trade	(8) bil.trade	(9) bil.trade non-compl.	(10) bil.trade compl.
tariffs	-0.5337	-0.5366	-0.5710	0.1651	-0.3627	-5.4602***	-5.4741***	-4.8531***	-5.2575***	-6.1335**
	(0.526)	(0.524)	(0.540)	(0.831)	(0.573)	(1.845)	(1.842)	(1.357)	(1.767)	(2.770)
agree	0.0216	0.0211	-0.0457	-0.0733	0.0078	0.3135***	0.3109***	0.4205***	0.0832	0.6896***
	(0.032)	(0.031)	(0.135)	(0.237)	(0.093)	(0.105)	(0.105)	(0.145)	(0.234)	(0.161)
inc.diff.*agree		0.0124***	0.1976	0.2350	0.0368		0.0346*	-0.0589	0.6223	-0.5354
		(0.002)	(0.133)	(0.277)	(0.085)		(0.021)	(0.381)	(0.549)	(0.446)
comp/serv/inv			-0.0270	0.1308	0.1575			0.6588**	1.0437	0.3009
			(0.104)	(0.193)	(0.100)			(0.325)	(0.681)	(0.282)
inc.diff.*comp/serv/inv			0.1426	-0.4279	0.4049*			0.3862	0.4229	-0.3319
			(0.135)	(0.314)	(0.228)			(0.656)	(0.909)	(0.764)
procurement			0.0590	0.0948	0.0525			-0.1396	-0.3006	0.0496
			(0.064)	(0.124)	(0.067)			(0.171)	(0.347)	(0.197)
inc.diff.*procurement			0.0532	0.0939	0.0044			0.4100	0.6224	0.6450**
			(0.128)	(0.255)	(0.113)			(0.305)	(0.523)	(0.287)
ipr			0.0897	0.1566	-0.0642			0.0967	0.5255	0.0448
			(0.067)	(0.119)	(0.047)			(0.168)	(0.372)	(0.166)
inc.diff.*ipr			-0.1816	-0.2035	-0.2383			-0.0538	-0.9758	0.8970
			(0.121)	(0.198)	(0.156)			(0.544)	(0.672)	(0.650)
Observations	119,222	119,222	119,222	113,419	106,129	125,550	125,550	125,550	125,550	125,550
R-squared	0.995	0.995	0.995	0.975	0.997	0.883	0.883	0.897	0.705	0.943
Pair-FE	yes	yes	yes	yes	yes	no	no	no	no	no
Gravity Controls	no	no	no	no	no	yes	yes	yes	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses. *** p<0.1, ** p<0.05, * p<0.01.

Table 1: Regression Results - Bilateral Trade

2001 and 2013, did not significantly increase trade among signatories. However, looking at the impact of trade agreements for middle income countries exporting to high income countries, estimation results in column 2 indicate that newly signed agreements between middle and high income countries increases trade for middle income countries. The estimation coefficient of 0.0124 implies that trade among middle and high income countries increased by around 3 % ($e^{0.0124+0.0211} - 1$) after the signing of a trade agreement. This value is far from average estimates presented in a meta-analysis of policy dummies by Head and Mayer (2014). Their reported average value for agreement dummies of 36 % exceeds the estimate in table 1 by ten times.[18] This vast discrepancy has several potential explanations. First, given the very particular framework of the present paper, results in column 2 refer to trade flows between middle and high income countries only. Second, as mentioned in section 5, the sample of this study is limited to consider the time variation between 2001 and 2013. Even though this period captures a period of deep integration of middle income countries in trade agreements with high income countries like e.g. Eastern European countries in the EU, this integration is not captured by the dummy variable for agreements as these countries had an agreement before. Considering the effect on high

[18]This value is based on 108 estimates of papers using some sort of country dummies or ratio type estimation.

complex goods, estimates for the interaction between the income difference variable and the measure for provisions related to competition, services and investments are positive and significant. This finding is in line with Dhingra et al. (2018) who find that provisions related to competition, services and investments significantly increase trade flows among countries especially in supply chain related industries. Consequently, Dhingra et al. (2018) argue that provisions related to competition, services and investments represent an important determinant for the integration of a country in value chains of their trade partners. In light of the theoretical background provided in section 3 this finding implies that additional contract clauses in trade agreements related to competition, services and investments lead to lower trade costs among middle and high income countries so that high income countries increasingly source products from middle income trade partners. Even though it is not possible to empirically disentangle the effect of provisions individually, it is possible to provide the intuition for the theoretical effect of individual provisions on trade costs. While provisions on services can be interpreted in the light of Dhingra et al. (2018) who argue that provisions on services foster the participation in value chains of trade partners by providing an improved framework for supply chain related service industries, the positive link between provisions on competition and an increasing intensive margin of trade between middle and high income countries can be established based on improved transparency. As stressed by UNCTAD (2019), the protection of competition is crucial for lower income countries as it reduces possibilities of corruption, lowers prices and hence creates a more favorable business environment for investments, which might trigger a deeper integration of the implementing country in value chains of countries producing more complex goods. Moreover, trade provisions on investments support the definition of a legal framework within which high income countries can invest in middle income economies thus fostering the trade relation. Thus, in line with the argument provided in section 3 based on Handley and Limao (2015), there is a reduction of trade policy uncertainty which can be interpreted as a reduction of bilateral trade costs so that trade between country pairs is increasing. Against this background, it can be argued that trade provisions on competition, services and investments increase trade among middle and high income countries by reducing trade costs so that high income countries import more high complex products from their middle income trade partners. The fact that the impact of the trade provisions only significantly impacts trade of high complex goods underlines the hypothesis that trade of high complex goods between middle and high income countries is related to higher trade

costs. Consequently, these trade flows are prone to benefit from a precise definition of a legal framework under which complex products are traded.

In order to exploit the variation in the cross section of the data, columns 6 to 10 show regression results without pair fixed effects but country pair specific gravity controls. Similar to the specification with pair fixed effects, results in column 7 indicate that trade among middle and high income countries benefits from trade agreements. The estimate for the agreement dummy interacted with the income difference variable implies an average effect of trade agreements between middle and high income countries by 41 % ($e^{0.3109+0.0346} - 1$). This estimate is much closer and even slightly exceeds the estimate reported in the meta-analysis of Head and Mayer (2014), who find an average value of 36 %.

Regarding the effect of provisions, positive and significant estimates for the interaction terms between the variable capturing income differences of trade partners and variables for the presence of trade provisions on public procurement indicate that middle income countries' exports of high complex goods increase when their trade relation with high income countries is covered by a trade agreement with additional provisions on public procurement. Interpreting this finding against the theoretical background provided in section 3, it appears evident that provisions on public procurement can be considered as a commitment of countries to improved transparency thus mitigating the issue of uncertainty related to trade among countries with different levels of income. Consequently, lower uncertainty through the inclusion of provisions related to public procurement in trade agreements imply lower trade costs for trade flows among middle and high income countries so that high income countries source more complex goods from their middle income trade partners with whom they have a trade agreement.

In order to further investigate to what extent results of table 1 have been driven by developments of trade margins, equations 6 and 7 have been estimated empirically. Results are presented in table 2. Similar to the previous table columns 1 to 3 as well as 6 to 8 show results for regressions with pair fixed effects while columns 4,5,9 and 10 show results for regressions without pair fixed effects.

Considering estimation results for the intensive margin in columns 1 to 3, it can be noted that trade provisions related to competition, services and investments positively and significantly influence the intensive margin of trade between middle and high income countries. Similar to the reasoning provided with respect to results in table 1, this finding can be interpreted in the light of Dhingra et al. (2018) who show that provisions related to com-

	(1) IM	(2) IM non-compl.	(3) IM compl.	(4) IM non-compl.	(5) IM compl.	(6) EM	(7) EM non-compl.	(8) EM compl.	(9) EM non-compl.	(10) EM compl.
tariffs	-0.5819	-0.3184	0.9283	-1.1952	-2.4598**	0.2143	-0.1860	0.1659	-4.7648***	-4.8252***
	(0.877)	(0.762)	(1.059)	(0.774)	(0.975)	(0.242)	(0.304)	(0.305)	(0.795)	(0.864)
agreement	-0.0542	-0.0892	-0.1091	0.1456*	0.1697*	0.0485	0.0477	0.0582	0.2440***	0.2863***
	(0.088)	(0.075)	(0.094)	(0.088)	(0.100)	(0.036)	(0.044)	(0.043)	(0.065)	(0.058)
inc.diff.*agreem.	0.4062	0.2990*	0.3721	-0.2482	-0.6212	0.0038	-0.0591	0.0195	-0.0156	-0.0022
	(0.250)	(0.179)	(0.422)	(0.396)	(0.464)	(0.064)	(0.105)	(0.071)	(0.236)	(0.210)
comp/serv/inv	0.5752***	0.6065***	0.2619	0.0850	-0.5065*	-0.0717	-0.0338	-0.1257**	-0.1275	-0.4564***
	(0.173)	(0.153)	(0.250)	(0.296)	(0.290)	(0.058)	(0.067)	(0.062)	(0.203)	(0.170)
inc.diff.*c/s/i	0.5119**	-0.0043	0.9387**	-0.9421	-0.7744	-0.1313	-0.2654	-0.2221*	0.6862*	0.8419**
	(0.211)	(0.219)	(0.443)	(0.646)	(0.520)	(0.083)	(0.164)	(0.116)	(0.390)	(0.400)
procurement	0.0985	0.1209	-0.0016	0.0685	-0.1322	0.0016	-0.0046	0.0183	-0.1698	-0.1314
	(0.083)	(0.125)	(0.158)	(0.225)	(0.221)	(0.027)	(0.038)	(0.035)	(0.111)	(0.108)
inc.diff.*procur.	0.0881	0.2603	-0.4922*	0.3205	-1.0416*	0.0901	0.1511	0.1340*	0.3649*	0.2308
	(0.250)	(0.237)	(0.258)	(0.399)	(0.597)	(0.062)	(0.093)	(0.071)	(0.209)	(0.210)
ipr	0.0554	0.0897	0.1102	0.3239	0.7476***	0.0075	0.0001	-0.0087	-0.1643*	-0.1746*
	(0.061)	(0.079)	(0.101)	(0.202)	(0.156)	(0.019)	(0.030)	(0.018)	(0.096)	(0.094)
inc.diff.*ipr	-0.0809	-0.1860	-0.1650	0.2956	0.6443	-0.0684	0.0170	-0.0968	-0.2606	-0.3377
	(0.094)	(0.207)	(0.369)	(0.491)	(0.553)	(0.043)	(0.084)	(0.070)	(0.247)	(0.294)
Observations	119,222	113,419	106,129	125,550	125,550	119,222	113,419	106,129	125,550	125,550
R-squared	0.482	0.487	0.569	0.145	0.227	0.970	0.875	0.966	0.627	0.786
Pair-FE	yes	yes	yes	no	no	yes	yes	yes	no	no
Gravity Controls	no	no	no	yes	yes	no	no	no	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses. *** p<0.1, ** p<0.05, * p<0.01.

Table 2: Regression Results - Trade Margins

petition, services and investments supports the participation in value chains of the partner country. With respect to the different complexity of products, column 3 indicates that the positive impact of trade provisions on competition, services and investments is driven by effects on high complex products. This finding supports the argument that uncertainty is particularly penalizing for trade of high complex products. Following the argument provided in the previous paragraph, it can hence be concluded that trade provisions related to competition, services and investments have the potential to lower uncertainty and thus ultimately costs for trade of high complex products.

Considering the impact of trade provisions on competition, services and investments on the extensive margin of trade, estimations show that the scope of trade of complex goods decreases when middle and high income countries deepen their trade agreement through the inclusion of trade provisions on competition, services and investments. This result can be explained based on the role of provisions related to competition. As these provisions favor tight competition at the destination, only a few very competitive firms have the capacity to compete in these markets. The decline of the product scope in response to a more competitive trade environment might hence be driven by two different dynamics. First, it might be driven by between firm dynamics implying that some firms exit from highly competitive markets. Second, the smaller product scope might be determined by

within firm dynamics as firms focus on their core products and export only a reduced number of goods to highly competitive destinations (Mayer et al., 2016; Eckel and Neary, 2010). In both cases, the product scope and hence the extensive margin of trade between a middle and high income country is lower in a more competitive environment induced by provisions related to competition.

Still, considering estimations without pair fixed effects shows that middle income countries whose trade with high income trade partners is covered by an agreement with provisions on competition, services and investments export a wider product scope of both non-complex and high complex products compared to other middle income countries who export to high income trade partners outside such agreements. In view of the argument before, this result implies that trade costs among middle and high income countries are lower when these countries trade within a legal framework which includes contract clauses on competition, services or investments. The fact that the positive and significant estimate of these provisions for the extensive margin of high complex goods is higher than the estimate for the extensive margin of non-complex goods supports the argument that trade of high complex products is accompanied by higher trade costs so that a reduction of these costs through provisions has a greater positive impact for more complex goods.

At this point an interesting extension of the study would have been to consider the heterogeneity of trade agreements by estimating agreement and direction specific effects on trade margins to assess if agreements between countries at different income levels trigger systematically different effects than agreements between countries at a similar income level. For this purpose, the dataset was modified to follow the empirical strategy of Baier et al. (2019). However, as the database of the present chapter considers 135 countries (18,225 directional country pairs) and 410 trade agreements, the number of dummy variables surpasses the computing capacity of the statistical software.

Regarding the estimations for provisions related to public procurement, results differ for the extensive and intensive trade margins. While the extensive margin of high complex products is positively affected by provisions on public procurement, the intensive margin of exports from middle to high income countries is decreasing when a trade agreement with provisions on public procurement is signed. Although the positive impact of such provisions on the extensive margin alines with the intuition that additional contract clauses on public procurement lower uncertainty and thus trade costs through the improvement of transparency, the negative impact on the intensive margin is at odds with this intuition. This

ambiguous result might be related to the coding of provisions on public procurement. As stated in the explanatory notes of public procurement provisions of the DESTA database, public procurement provisions are coded as "NA" when details of procurement are decided by a joint committee. For these cases, the legal codification is underestimated so that opposing developments of the intensive margin and the measure for trade provisions on public procurement might arise.

As a robustness check, effects were re-estimated for an alternative dataset in which agreement and trade provision variables are taken from the World Bank database on the content of preferential trade agreements (Hofmann et al., 2017). Importantly, this robustness check confirms the effect of provisions related to competition, services and investments on trade margins of high complex products for middle income countries exporting to high income countries. However, there is no significant effect from provisions related to public procurement thus suggesting that results in table 2 for public procurement might partially be driven by the coding of provisions. Results of this approach are provided in the Appendix. Moreover, to investigate if trade agreements are specific to trade among middle and high income countries, similar equations have been implemented for low income countries exporting to high income economies. While regression results for estimations of the effect of provisions related to competition, services and investments on the extensive margin have similar signs to the ones in table 2 when estimated without pair fixed effects, it is not possible to derive a distinct pattern in which results vary between middle-high and low-high income pairs. Nonetheless, regression results are provided in the Appendix.

In order to account for the possibility that agreements and trade provisions need time to take effect, it is important to consider the effect of trade agreements over a longer time span. By including time lags, phasing-in effects of agreements can be considered. As the refined version of the DESTA database goes back to the year 1995, 5-year time lags are included in the regression. Results are presented in table 3. A first glance at estimates confirms findings of Baier and Bergstrand (2007), Baier et al. (2014) and Anderson and Yotov (2016) who stress that agreements need time take effect.

Considering the intensive margin of trade in columns 1 to 3, estimation results for the lagged interaction terms show that both trade provisions related to procurement and competition, services and investment need time to take effect. Regarding negative estimates for the instant effect of provisions related to public procurement in the previous table2 (columns 1 to 3), results for lagged variables indicate that provisions on procurement need time to

	(1) IM	(2) IM non-compl.	(3) IM compl.	(4) EM	(5) EM non-compl.	(6) EM compl.
tariffs	-0.6106	-0.3002	1.1202	0.2645	-0.0674	0.2128
	(0.892)	(0.795)	(1.081)	(0.237)	(0.297)	(0.295)
agreement	-0.0428	-0.0929	-0.1387	0.0373	0.0122	0.0479
	(0.090)	(0.073)	(0.105)	(0.031)	(0.036)	(0.037)
inc.diff. *agreement$_{t-5}$	0.2949*	0.2746	0.9130***	0.0091	0.0073	-0.0280
	(0.178)	(0.179)	(0.315)	(0.064)	(0.083)	(0.084)
comp/serv/inv	0.4863***	0.5696***	0.3347	-0.0864*	-0.0609	-0.1510***
	(0.144)	(0.168)	(0.245)	(0.050)	(0.062)	(0.053)
inc.diff. *comp/serv/inv$_{t-5}$	0.6818**	-0.0798	0.6847*	-0.3137***	-0.6151***	-0.3482**
	(0.304)	(0.307)	(0.415)	(0.105)	(0.185)	(0.141)
procurement	0.0971	0.1352	-0.0646	0.0231	0.0089	0.0436
	(0.083)	(0.121)	(0.140)	(0.025)	(0.037)	(0.033)
inc.diff. *procurement$_{t-5}$	0.1978**	0.2339**	-0.0894	0.0432	0.1093*	0.0192
	(0.095)	(0.102)	(0.184)	(0.042)	(0.064)	(0.047)
ipr	0.0630	0.0631	0.1115	-0.0032	0.0124	-0.0214
	(0.052)	(0.087)	(0.098)	(0.018)	(0.026)	(0.017)
inc.diff. *ipr$_{t-5}$	-0.2829	-0.1760	-0.5473*	0.0592	0.2140**	0.0657
	(0.191)	(0.277)	(0.314)	(0.042)	(0.106)	(0.076)
Observations	119,222	113,419	106,129	119,222	113,419	106,129
R-squared	0.482	0.487	0.569	0.970	0.875	0.966
Pair-FE	yes	yes	yes	yes	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses.
*** p<0.1, ** p<0.05, * p<0.01.

Table 3: Regression Results - Trade Margins (lagged variables)

take effect. Following the reasoning provided in section 3, it can hence be assumed that provisions related to public procurement reduce uncertainty for trade between middle and high income countries in the long run.

With respect to provisions related to competition, services and investments, qualitative results for lagged variables are the same as for variables measuring the instant effect. Accordingly, provisions related to competition, services and investments lower uncertainty and hence trade costs for middle and high income countries so that the intensive margin increases and even persists 5 years after these provisions were intensified. Still, for the extensive margin, estimates of provisions related to competition, services and investments have a negative effect even in the longer term. In line with the argument of the previous paragraph, this finding can be explained by tougher competition which forces firms to exit and/or to reduce the product scope exported to more competitive destinations. Against this background, it is possible that the time lag of 5 years is too short to capture the complete phasing-in effect of provisions on the extensive margin.

Interestingly, there are also effects of provisions related to intellectual property rights on margins of trade between middle and high income countries. The positive estimate for provisions related to intellectual property rights on the extensive margin of trade of non-complex products might be explained by the fact that a more favorable environment for intellectual property rights encourages FDI flows (Awokuse and Yin, 2010). Contrarily to this intuition, the negative effect of provisions related to intellectual property rights on the intensive margin is at odds with this mechanism. Still, it might be explained by the nature of classification of products in different complexity categories. Even though, goods are classified at a very granular product level, there might still be different forms of goods within a product and complexity category. Thus, it can be the case that within the category of a complex goods there still exist discrepancies regarding the quality of goods. Against this background, it can be the case that provisions related to intellectual property rights increase the requirement for the quality of goods so that some firms in middle income countries are not able to keep up with these higher requirements and stop exporting to high income trade partners. As this mechanism affects goods within a product category, the intensive margin of trade between middle and high income countries decreases.

7 Conclusion

The present chapter aims at shedding light on trade of high complex products between middle and high income countries. Within a gravity framework, it is investigated if trade agreements and provisions foster the integration of middle income countries in value chains of complex products of high income countries. Using a refined version of the DESTA database on trade agreements along with detailed product level trade data and information on the economic complexity of products, this question is studied for 135 countries from 2001 until 2013.

Results are in line with other empirical contributions on the topic finding mixed effects from trade provisions on bilateral trade. Importantly, considering the effect of trade agreements against the background of different complexity levels of goods and different income levels of trade partners highlights mechanisms which are not present at the aggregated level.

In this context, trade provisions related to competition, services and investments lead to product upgrading in the sense that they have a positive effect on the intensive margin of trade. However, given the negative impact of these provisions on the extensive margin

the overall effect is ambiguous. Similarly, there is no distinct effect of provision on public procurement. Contrary to these effects, provisions on public procurement have a positive impact on the extensive margin of complex goods while negatively influencing the intensive margin.

However, despite these ambiguous results, this chapter shows that trade provisions have the potential to influence trade among contracting parties beyond the average effect of a trade agreement.

References

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American Economic Review*, 69(1):106–116.

Anderson, J. E. (2011). The gravity model. *Annu. Rev. Econ.*, 3(1):133–160.

Anderson, J. E. and Yotov, Y. V. (2016). Terms of trade and global efficiency effects of free trade agreements, 1990–2002. *Journal of International Economics*, 99:279–298.

Awokuse, T. O. and Yin, H. (2010). Intellectual property rights protection and the surge in fdi in china. *Journal of Comparative Economics*, 38(2):217–224.

Baccini, L., Pinto, P. M., and Weymouth, S. (2017). The distributional consequences of preferential trade liberalization: firm-level evidence. *International Organization*, 71(2):373–395.

Baier, S. L. and Bergstrand, J. H. (2007). Do free trade agreements actually increase members' international trade? *Journal of international Economics*, 71(1):72–95.

Baier, S. L. and Bergstrand, J. H. (2009). Estimating the effects of free trade agreements on international trade flows using matching econometrics. *Journal of international Economics*, 77(1):63–76.

Baier, S. L., Bergstrand, J. H., and Feng, M. (2014). Economic integration agreements and the margins of international trade. *Journal of International Economics*, 93(2):339–350.

Baier, S. L., Yotov, Y. V., and Zylkin, T. (2019). On the widely differing effects of free trade agreements: Lessons from twenty years of trade integration. *Journal of International Economics*, 116:206–226.

Baldwin, R. (2011). Trade and industrialisation after globalisation's 2nd unbundling: How building and joining a supply chain are different and why it matters. Technical report, National Bureau of Economic Research.

Baldwin, R. and Taglioni, D. (2006). Gravity for dummies and dummies for gravity equations. Technical report, National bureau of economic research.

Bergstrand, J. H., Larch, M., and Yotov, Y. V. (2015). Economic integration agreements, border effects, and distance elasticities in the gravity equation. *European Economic Review*, 78:307–327.

Cameron, A. C., Gelbach, J. B., and Miller, D. L. (2011). Robust inference with multiway clustering. *Journal of Business & Economic Statistics*, 29(2):238–249.

Campi, M. and Dueñas, M. (2019). Intellectual property rights, trade agreements, and international trade. *Research Policy*, 48(3):531–545.

Chaney, T. (2008). Distorted gravity: the intensive and extensive margins of international trade. *American Economic Review*, 98(4):1707–21.

Dhingra, S., Freeman, R., and Mavroeidi, E. (2018). Beyond tariff reductions: what extra boost from trade agreement provisions? *CEPR Discussion Paper No. DP12795*.

Dür, A., Baccini, L., and Elsig, M. (2014). The design of international trade agreements: Introducing a new dataset. *The Review of International Organizations*, 9(3):353–375.

Dutt, P., Mihov, I., and Van Zandt, T. (2013). The effect of wto on the extensive and the intensive margins of trade. *Journal of international Economics*, 91(2):204–219.

Eaton, J. and Kortum, S. (2002). Technology, geography, and trade. *Econometrica*, 70(5):1741–1779.

Eckel, C. and Neary, J. P. (2010). Multi-product firms and flexible manufacturing in the global economy. *The Review of Economic Studies*, 77(1):188–217.

Egger, P. and Larch, M. (2008). Interdependent preferential trade agreement memberships: An empirical analysis. *Journal of International Economics*, 76(2):384–399.

Egger, P. H. and Tarlea, F. (2015). Multi-way clustering estimation of standard errors in gravity models. *Economics Letters*, 134:144–147.

Felbermayr, G. J. and Kohler, W. (2006). Exploring the intensive and extensive margins of world trade. *Review of World Economics*, 142(4):642–674.

Gaulier, G. and Zignago, S. (2010). Baci: international trade database at the product-level (the 1994-2007 version).

Guimbard, H., Jean, S., Mimouni, M., and Pichot, X. (2012). Macmap-hs6 2007, an exhaustive and consistent measure of applied protection in 2007. *International Economics*, 130:99–121.

Handley, K. and Limao, N. (2015). Trade and investment under policy uncertainty: theory and firm evidence. *American Economic Journal: Economic Policy*, 7(4):189–222.

Hartmann, D., Guevara, M. R., Jara-Figueroa, C., Aristarán, M., and Hidalgo, C. A. (2017). Linking economic complexity, institutions, and income inequality. *World Development*, 93:75–93.

Hausmann, R. and Hidalgo, C. A. (2011). The network structure of economic output. *Journal of Economic Growth*, 16(4):309–342.

Hausmann, R., Hwang, J., and Rodrik, D. (2007). What you export matters. *Journal of economic growth*, 12(1):1–25.

Head, K. and Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. In *Handbook of international economics*, volume 4, pages 131–195. Elsevier.

Head, K., Mayer, T., and Ries, J. (2010). The erosion of colonial trade linkages after independence. *Journal of international Economics*, 81(1):1–14.

Hicks, R. and Kim, S. Y. (2012). Reciprocal trade agreements in asia: credible commitment to trade liberalization or paper tigers? *Journal of East Asian Studies*, 12(1):1–29.

Hidalgo, C. A. and Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the national academy of sciences*, 106(26):10570–10575.

Hillberry, R. H. and McDaniel, C. A. (2002). A decomposition of north american trade growth since nafta. *US International Trade Commission Working Paper*, (2002-12).

Hofmann, C., Osnago, A., and Ruta, M. (2017). *Horizontal depth: a new database on the content of preferential trade agreements*. The World Bank.

Hummels, D. and Klenow, P. J. (2005). The variety and quality of a nation's exports. *American Economic Review*, 95(3):704–723.

Jarreau, J. and Poncet, S. (2012). Export sophistication and economic growth: Evidence from china. *Journal of development Economics*, 97(2):281–292.

Kehoe, T. J. and Ruhl, K. J. (2013). How important is the new goods margin in international trade? *Journal of Political Economy*, 121(2):358–392.

Kohl, T., Brakman, S., and Garretsen, H. (2016). Do trade agreements stimulate international trade differently? evidence from 296 trade agreements. *The World Economy*, 39(1):97–131.

Larch, M., Wanner, J., Yotov, Y. V., and Zylkin, T. (2019). Currency unions and trade: A ppml re-assessment with high-dimensional fixed effects. *Oxford Bulletin of Economics and Statistics*, 81(3):487–510.

Limão, N. and Maggi, G. (2015). Uncertainty and trade agreements. *American Economic Journal: Microeconomics*, 7(4):1–42.

Mattoo, A., Mulabdic, A., and Ruta, M. (2017). *Trade creation and trade diversion in deep agreements*. The World Bank.

Mayer, T., Melitz, M. J., and Ottaviano, G. I. (2016). Product mix and firm productivity responses to trade competition. Technical report, National Bureau of Economic Research.

Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. *econometrica*, 71(6):1695–1725.

Orefice, G. and Rocha, N. (2014). Deep integration and production networks: an empirical analysis. *The World Economy*, 37(1):106–136.

Osgood, I., Tingley, D., Bernauer, T., Kim, I. S., Milner, H. V., and Spilker, G. (2017). The charmed life of superstar exporters: Survey evidence on firms and trade policy. *The Journal of Politics*, 79(1):133–152.

Poncet, S. and de Waldemar, F. S. (2013). Export upgrading and growth: the prerequisite of domestic embeddedness. *World Development*, 51:104–118.

Silva, J. S. and Tenreyro, S. (2006). The log of gravity. *The Review of Economics and statistics*, 88(4):641–658.

Sotelo, S. (2017). Practical aspects of implementing the multinomial pml estimator.

Spilker, G., Bernauer, T., Kim, I. S., Milner, H., Osgood, I., and Tingley, D. (2018). Trade at the margin: Estimating the economic implications of preferential trade agreements. *The Review of International Organizations*, 13(2):189–242.

Taglioni, D. and Winkler, D. (2016). *Making global value chains work for development*. The World Bank.

Trefler, D. (2004). The long and short of the canada-us free trade agreement. *American Economic Review*, 94(4):870–895.

UNCTAD (2019). Why competition and consumer protection matter. *https://unctad.org/en/Pages/DITC/CompetitionLaw/why-competition-matters.aspx*.

Viner, J. (1950). *The customs union issue*. New York: Carnegie Endowment for International Peace.

WorldBank, IDE-JETRO, OECD, UIBE, and WTO (2017). Measuring and analyzing the impact of gvcs on economic development. *Global value chain development report 2017*.

Yarbrough, B. V. and Yarbrough, R. M. (2014). *Cooperation and governance in international trade: The strategic organizational approach*, volume 133. Princeton University Press.

Yotov, Y. V., Piermartini, R., Monteiro, J.-A., and Larch, M. (2016). *An advanced guide to trade policy analysis: The structural gravity model*. World Trade Organization Geneva, Switzerland.

Appendix

A1. Derivation of the Gravity Model

As stated in the main text, the theoretical background of this paper is based on the derivation of the structural gravity model on the sectoral level. Unless stated differently, the following demand-sided derivation of the disaggregated gravity system follows the presentation of Anderson and Yotov (2016) and Yotov et al. (2016). In contrast to the original derivation of the structural gravity model at the sectoral level, it is henceforth assumed that products are aggregated to different good's classes according to the economic complexity of products rather than the sectoral segment of goods.

Extending the standard Anderson (1979) assumption, it is hence assumed that there are many, K, goods which can be subdivided into $k \in K$ complexity classes and are differentiated by place of origin. The supply side is modeled as endowment economy where countries are endowed with goods of complexity class k. Accordingly, the income of country i for goods in complexity class k, Y_i^k, is given by the product of the factory gate price, p_i^k, and the endowment of goods in country i, Q_i^k

$$Y_i^k = p_i^k \, Q_i^k \tag{8}$$

On the demand side, consumers in each importing country j have the following homothetic and identical CES-utility function for goods in complexity class k.

$$U_i^k = \left(\sum_i (\alpha_i^k)^{\frac{1-\sigma_k}{\sigma_k}} (c_{ij}^k)^{\frac{\sigma_k - 1}{\sigma_k}} \right)^{\frac{\sigma_k}{\sigma_k - 1}} \tag{9}$$

In this equation, c_{ij}^k indicates the consumption of a variety in complexity class k stemming from country i, $\sigma_k > 1$ describes the elasticity of substitution between different varieties of goods in complexity class k and $\alpha^k > 0$ serves as exogenous CES preference parameter. Moreover, it holds that total spending across varieties of all countries i in complexity class k equals total expenditure of country j, E_j^k. [19]

[19] In general, expenditure in each complexity class k, E_i^k, corresponds to a constant share of total expenditure, η^k.Furthermore, it holds that $E_i^k = \eta^k E_i = \eta^k \phi_i Y_i$ where the national trade imbalances vary exogenously ($\phi_i \neq 1$).

$$\sum_i p_{ij}^k \, c_{ij}^k = E_j^k \tag{10}$$

Importantly, it holds true that $p_{ij}^k = p_i^k t_{ij}^k$ ensuring that the delivered price of a good's variety of complexity class k, p_{ij}^k, corresponds to the factory gate price, p_i^k plus a markup t_{ij}^k capturing all bilateral trade cost between i and j. As standard in the literature, these trade cost are modeled as iceberg transport cost. Accordingly, it is assumed that a certain fraction of the shipment "melts" on its way from i to j. Hence, $t_{ij}^k > 1$ units must be shipped from i to j to ensure that one unit of a variety produced in i arrives in j. Following Melitz (2003) and Anderson (2011), these iceberg transport cost capture both fixed and variable transport cost. Metaphorically, fixed transport cost can be seen as fraction of the iceberg which "breaks off as it parts from the mother glacier" (Anderson (2011), p. 10).
In this context, the solution to a consumer's utility optimization problem (10) subject to equation 11 leads to the subsequent expression for trade flows from i to j in complexity class k, X_{ij}^k.

$$X_{ij}^k = \left(\frac{\alpha_i^k p_i^k t_{ij}^k}{P_j^k} \right)^{(1-\sigma_k)} E_j^k \tag{11}$$

Here, P_j^k corresponds to the CES consumer price index $P_j^k = [\sum_i (\alpha_i^k p_i^k t_{ij}^k)^{1-\sigma_k}]^{\frac{1}{1-\sigma_k}}$. To obtain the final structural gravity system depending on the complexity class of goods, a market clearance condition is imposed for varieties of complexity class k stemming from all countries i. In line with this equation, total output of country i, Y_i^k, needs to equal the value of total shipments of goods in complexity class k from i to all countries j including country i itself.

$$Y_i^k = \sum_j X_{ij}^k = \sum_j \left[\frac{(\alpha_i^k p_i^k t_{ij}^k)}{P_j^k} \right]^{(1-\sigma_k)} E_j^k \tag{12}$$

Using some algebra and rearranging this expression, leads to $(\alpha_i^k p_i^k)^{(1-\sigma_k} = \frac{Y_i^k / Y^k}{(\Pi_i^k)^{1-\sigma}}$ with $(\Pi_i^k)^{1-\sigma} = \sum_j (t_{ij}^k / P_j^k)^{1-\sigma_k} E_j^k / Y^k$.[20] The former expression can be substituted in equation 13 and leads in conjunction with the expression for $(\Pi_i^k)^{1-\sigma}$ to the following structural gravity system.

[20] It holds for N countries that $Y^k = \sum_i^N Y_i^k$.

$$X_{ij}^k = \frac{Y_i^k E_j^k}{Y^k} \left(\frac{t_{ij}^k}{\Pi_i^k P_j^k} \right)^{1-\sigma_k} \tag{13}$$

$$(\Pi_i^k)^{1-\sigma_k} = \sum_j \left(\frac{t_{ij}^k}{P_j^k} \right)^{1-\sigma_k} \frac{E_j^k}{Y^k} \tag{14}$$

$$(P_j^k)^{1-\sigma_k} = \sum_i \left(\frac{t_{ij}^k}{\Pi_i^k} \right)^{1-\sigma_k} \frac{Y_i^k}{Y^k} \tag{15}$$

$$P_i^k = \left(\frac{Y_i^k}{Y^k} \right)^{\frac{1}{1-\sigma_k}} \frac{1}{\alpha_i^k \Pi_i^k} \tag{16}$$

$$E_i^k = \eta^k \rho_i Y_i \tag{17}$$

$$Y_i = \sum_k Y_i^k = \sum_k p_i^k Q_i^k \tag{18}$$

$$Y^k = \sum_i Y_i^k = \sum_i p_i^k Q_i^k \tag{19}$$

As described in the main text, equation 14 reflects total trade flows from i to j in complexity class k, which positively depend on the expenditure as well as the multilateral resistance of countries i and j and depends negatively on bilateral trade costs, t_{ij}^k. Equations 15 and 16 describe the multilateral resistance terms for the exporting and importing country, i and j respectively. Equations 18 to 20 capture the expenditure share of complexity class k, the total value of output in a country as well as the total value of output of different complexity classes k in the world.

Importantly, at the disaggregated level of different complexity classes, consumers substitute varieties within each class of goods and also substitute goods from different complexity classes with each other. Consequently, a change of bilateral trade costs of goods in complexity class k can lead to price changes in all other complexity classes or countries in the world. This relation is described by the system of market clearing conditions in equation 17. This expression can be re-written based on the definition of income, expenditure and

multilateral resistance terms.

$$\frac{p_i^k Q_i^k}{\sum_i p_i^k Q_i^k} = \sum_j \frac{(\alpha_i^k p_i^k t_{ij}^k)^{1-\sigma_k}}{\sum_i (\alpha_i^k p_i^k t_{ij}^k)^{1-\sigma_k}} * \frac{\eta^k \rho_j \sum_k p_j^k Q_j^k}{\sum_i p_i^k Q_i^k}, for\ all\ i, k. \tag{20}$$

This system of market clearing conditions implies NxK equations (given by the number of countries, N, and the number of complexity classes, K) for the unknown, p_i^k. As this system is homogenous of degree zero in the vector of factory-gate prices, the gravity system can only be solved s.t. a normalization for each complexity class.
Holding world real resources constant, as proposed by Anderson and Yotov (2016) ($\sum_{i,k} p_i^k Q_i^k = \sum_{i,k} p_i^{k0} Q_i^k = \sum_{i,k} Y_i^{k0}$), allows to find a unique vector of changes in factory-gate prices in response to any changes of bilateral trade costs for goods in complexity class k.

A2. Variance Inflation Factors of Individual Regressors

Variable	VIF	1/VIF
agreement	4.42	0.23
tariffs	1.16	0.86
comp/serv/inv	3.79	0.26
procurement	2.36	0.42
IPR	2.20	0.46
other provisions	7.02	0.14
time-diff	5.50	0.18
distance	5.42	0.18
sibling	4.06	0.25
sibling in confl.	1.74	0.57
com. leg. origin (post transformation)	3.33	0.30
com. language (off.)	2.95	0.34
com. language (ethn.)	3.19	0.31
com. leg. origin (pre transformation)	3.00	0.33
com. leg. origin	1.85	0.54
com. currency	1.20	0.83
com. religion	1.15	0.87
contiguity	1.13	0.88
com. colonizer	2.42	0.41
com. colonizer (cur.)	1.11	0.90
Mean VIF	2.95	

Table 4: Variance Inflation Factors

A3. Correlation of Individual Trade Provisions

	Procur.	Comp.	Serv.	Inv.	TBT	SPS	Disp.	Def.	IPR	Stds
Procurement	1.00									
Competition	0.30	1.00								
Services	0.47	0.89	1.00							
Investments	0.16	0.73	0.72	1.00						
TBT	0.34	0.18	0.24	0.11	1.00					
SPS	0.27	0.12	0.14	0.06	0.76	1.00				
Dispute Sett.	0.20	0.35	0.37	0.33	0.58	0.70	1.00			
Defense Mech.	0.25	0.45	0.47	0.41	0.15	0.38	0.77	1.00		
IPR	0.25	0.55	0.62	0.63	0.05	0.02	0.23	0.30	1.00	
Standards	0.28	0.14	0.17	0.06	0.79	0.97	0.72	0.40	0.02	1.00

Table 5: Correlation of Individual Trade Provisions

A4. Detailed Graphs of the Intensive Margin of Trade

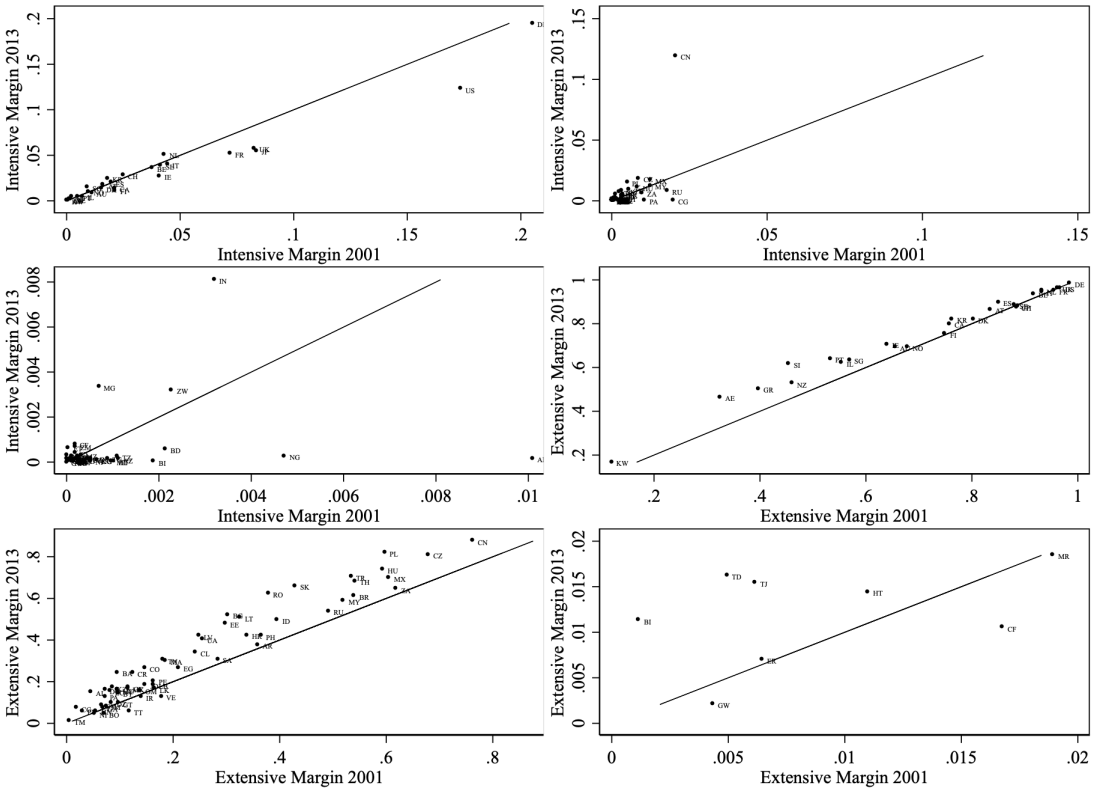

Figure 3: Intensive Margin 2013 vs. 2001 (different Zoom)

Note: Top down, graphs show high, middle and low income countries.

A5. Detailed Regression Tables

	(1) bil.trade	(2) bil.trade	(3) bil.trade	(4) bil.trade non-compl.	(5) bil.trade compl.	(6) bil.trade	(7) bil.trade	(8) bil.trade	(9) bil.trade non-compl.	(10) bil.trade compl.
tariffs	-0.5337	-0.5366	-0.5710	0.1651	-0.3627	-5.4602***	-5.4741***	-4.8531***	-5.2575***	-6.1335**
	(0.526)	(0.524)	(0.540)	(0.831)	(0.573)	(1.845)	(1.842)	(1.357)	(1.767)	(2.770)
FDI	-0.0000**	-0.0000**	-0.0000**	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
agree	0.0216	0.0211	-0.0457	-0.0733	0.0078	0.3135***	0.3109***	0.4205***	0.0832	0.6896***
	(0.032)	(0.031)	(0.135)	(0.237)	(0.093)	(0.105)	(0.105)	(0.145)	(0.234)	(0.161)
inc.diff. *agree		0.0124***	0.1976	0.2350	0.0368		0.0346*	-0.0589	0.6223	-0.5354
		(0.002)	(0.133)	(0.277)	(0.085)		(0.021)	(0.381)	(0.549)	(0.446)
comp/serv/inv			-0.0270	0.1308	0.1575			0.6588**	1.0437	0.3009
			(0.104)	(0.193)	(0.100)			(0.325)	(0.681)	(0.282)
inc.diff. *c/s/i			0.1426	-0.4279	0.4049*			0.3862	0.4229	-0.3319
			(0.135)	(0.314)	(0.228)			(0.656)	(0.909)	(0.764)
procurement			0.0590	0.0948	0.0525			-0.1396	-0.3006	0.0496
			(0.064)	(0.124)	(0.067)			(0.171)	(0.347)	(0.197)
inc.diff. *procurement			0.0532	0.0939	0.0044			0.4100	0.6224	0.6450**
			(0.128)	(0.255)	(0.113)			(0.305)	(0.523)	(0.287)
iprs			0.0897	0.1566	-0.0642			0.0967	0.5255	0.0448
			(0.067)	(0.119)	(0.047)			(0.168)	(0.372)	(0.166)
inc.diff. *ipr			-0.1816	-0.2035	-0.2383			-0.0538	-0.9758	0.8970
			(0.121)	(0.198)	(0.156)			(0.544)	(0.672)	(0.650)
oth. provisions			0.0142	-0.0718	-0.0453			-0.8581***	-0.7589	-1.0349***
			(0.177)	(0.296)	(0.118)			(0.302)	(0.517)	(0.295)
inc.diff. *oth. provis.			-0.3189	-0.3286	-0.0690			0.0954	-1.0192	0.9561
			(0.222)	(0.451)	(0.150)			(0.630)	(0.868)	(0.751)
contiguity						0.6576***	0.6566***	0.6323***	0.7957***	0.4989***
						(0.098)	(0.098)	(0.099)	(0.165)	(0.108)
com. language						-0.1234	-0.1201	-0.0758	-0.1119	-0.0778
						(0.134)	(0.133)	(0.130)	(0.190)	(0.158)
language (9%)						0.1611	0.1605	0.2039	0.3342**	0.1125
						(0.146)	(0.146)	(0.131)	(0.166)	(0.150)
com. col. (p1945)						0.6216***	0.6189***	0.6236***	0.1317	0.6290***
						(0.215)	(0.215)	(0.200)	(0.311)	(0.223)
distance (weighted)						-0.0001***	-0.0001***	-0.0001***	-0.0002***	-0.0001***
						(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
time diff.						0.0028	0.0029	0.0175	0.0831	-0.0022
						(0.035)	(0.035)	(0.036)	(0.052)	(0.043)
col. rel.(ever)						0.2202	0.2184	0.2270*	0.5468***	0.0255
						(0.135)	(0.135)	(0.137)	(0.170)	(0.152)
sibl.rel.(ever)						0.1350	0.1329	0.0552	0.4329*	-0.1214
						(0.165)	(0.165)	(0.158)	(0.236)	(0.156)
sibl.rel.+conflict (ever)						0.1849	0.1862	0.1717	-0.1457	0.2474
						(0.193)	(0.193)	(0.183)	(0.283)	(0.169)
com. currency						0.1337	0.1354	-0.1941*	-0.1605	-0.2453*
						(0.136)	(0.136)	(0.109)	(0.192)	(0.133)
com. religion						-0.0804	-0.0797	-0.1339	-0.4885*	0.1270
						(0.174)	(0.174)	(0.178)	(0.257)	(0.177)
c.leg.orig.(b. trans.)						0.0223	0.0231	0.0857	0.0574	0.0434
						(0.154)	(0.154)	(0.144)	(0.220)	(0.153)
c.leg.orig.(a. trans.)						0.2049	0.2041	0.1720	0.0538	0.3262*
						(0.154)	(0.154)	(0.146)	(0.223)	(0.173)
c.leg.orig.(ch. a.trans.)						-0.1141	-0.1154	-0.1304	-0.0743	-0.2159
						(0.205)	(0.205)	(0.199)	(0.250)	(0.225)
Observations	119,222	119,222	119,222	113,419	106,129	125,550	125,550	125,550	125,550	125,550
R-squared	0.995	0.995	0.995	0.975	0.997	0.883	0.883	0.897	0.705	0.943
Pair-FE	yes	yes	yes	yes	yes	no	no	no	no	no
Gravity Controls	no	no	no	no	no	yes	yes	yes	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses. *** p<0.1, ** p<0.05, * p<0.01.

Table 6: Regression Results - Bilateral Trade (all estimates)

	(1) IM	(2) IM non-compl.	(3) IM compl.	(4) IM non-compl.	(5) IM compl.	(6) EM	(7) EM non-compl.	(8) EM compl.	(9) EM non-compl.	(10) EM compl.
tariffs	-0.5819	-0.3184	0.9283	-1.1952	-2.4598**	0.2143	-0.1860	0.1659	-4.7648***	-4.8252***
	(0.877)	(0.762)	(1.059)	(0.774)	(0.975)	(0.242)	(0.304)	(0.305)	(0.795)	(0.864)
FDI	0.0000	0.0000	0.0000	0.0000***	0.0000***	-0.0000	-0.0000	-0.0000	-0.0000***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
agreement	-0.0542	-0.0892	-0.1091	0.1456*	0.1697*	0.0485	0.0477	0.0582	0.2440***	0.2863***
	(0.088)	(0.075)	(0.094)	(0.088)	(0.100)	(0.036)	(0.044)	(0.043)	(0.065)	(0.058)
inc.diff.*agreement	0.4062	0.2990*	0.3721	-0.2482	-0.6212	0.0038	-0.0591	0.0195	-0.0156	-0.0022
	(0.250)	(0.179)	(0.422)	(0.396)	(0.464)	(0.064)	(0.105)	(0.071)	(0.236)	(0.210)
comp/serv/inv	0.5752***	0.6065***	0.2619	0.0850	-0.5065*	-0.0717	-0.0338	-0.1257**	-0.1275	-0.4564***
	(0.173)	(0.153)	(0.250)	(0.296)	(0.290)	(0.058)	(0.067)	(0.062)	(0.203)	(0.170)
inc.diff.*c/s/i	0.5119**	-0.0043	0.9387**	-0.9421	-0.7744	-0.1313	-0.2654	-0.2221*	0.6862*	0.8419**
	(0.211)	(0.219)	(0.443)	(0.646)	(0.520)	(0.083)	(0.164)	(0.116)	(0.390)	(0.400)
procurement	0.0985	0.1209	-0.0016	0.0685	-0.1322	0.0016	-0.0046	0.0183	-0.1698	-0.1314
	(0.083)	(0.125)	(0.158)	(0.225)	(0.221)	(0.027)	(0.038)	(0.035)	(0.111)	(0.108)
inc.diff.*procur.	0.0881	0.2603	-0.4922*	0.3205	-1.0416*	0.0901	0.1511	0.1340*	0.3649*	0.2308
	(0.250)	(0.237)	(0.258)	(0.399)	(0.597)	(0.062)	(0.093)	(0.071)	(0.209)	(0.210)
ipr	0.0554	0.0897	0.1102	0.3239	0.7476***	0.0075	0.0001	-0.0087	-0.1643*	-0.1746*
	(0.061)	(0.079)	(0.101)	(0.202)	(0.156)	(0.019)	(0.030)	(0.018)	(0.096)	(0.094)
inc.diff.*ipr	-0.0809	-0.1860	-0.1650	0.2956	0.6443	-0.0684	0.0170	-0.0968	-0.2606	-0.3377
	(0.094)	(0.207)	(0.369)	(0.491)	(0.553)	(0.043)	(0.084)	(0.070)	(0.247)	(0.294)
oth. provis.	-0.1567	-0.1705	0.3033	-0.1353	0.2434	-0.0147	-0.0200	-0.0156	-0.1583	-0.0412
	(0.146)	(0.138)	(0.219)	(0.222)	(0.266)	(0.044)	(0.049)	(0.046)	(0.170)	(0.149)
inc.diff. *oth. provis.	-0.6900*	-0.4716	-0.6779	0.4752	1.0746	0.0095	0.1325	-0.0100	-0.0191	-0.0530
	(0.415)	(0.298)	(0.727)	(0.660)	(0.793)	(0.101)	(0.166)	(0.115)	(0.364)	(0.347)
contiguity				0.6037***	0.5819***				0.3012***	0.2479***
				(0.094)	(0.095)				(0.075)	(0.080)
com. language				-0.2186*	-0.2530**				0.0709	0.1440**
				(0.118)	(0.110)				(0.067)	(0.073)
language (9%)				0.1927*	0.2613***				-0.0738	-0.0736
				(0.112)	(0.101)				(0.064)	(0.067)
com. coloniz.(p1945)				0.1839*	0.2349*				0.0655	0.1396
				(0.111)	(0.134)				(0.086)	(0.096)
distance (weighted)				-0.0000	-0.0001***				-0.0001***	-0.0001***
				(0.000)	(0.000)				(0.000)	(0.000)
time diff.				-0.0168	0.0175				0.0376***	0.0200
				(0.024)	(0.020)				(0.014)	(0.013)
colon. rel. (ever)				0.3179**	0.4956***				0.3944***	0.3430***
				(0.147)	(0.135)				(0.065)	(0.069)
sibl. rel. (ever)				0.1690*	-0.0211				0.4377***	0.4399***
				(0.098)	(0.109)				(0.065)	(0.063)
sibl. rel.+confl.(ever)				-0.0167	0.0412				0.0213	0.0254
				(0.118)	(0.136)				(0.069)	(0.077)
com. currency				0.1691	0.2871*				-0.1825	-0.1794*
				(0.152)	(0.164)				(0.116)	(0.101)
com. religion				-0.1837	0.1100				0.1424**	0.0857
				(0.113)	(0.115)				(0.067)	(0.073)
c.leg.orig.(b. trans.)				0.2137*	0.1548				0.2640***	0.2339***
				(0.112)	(0.095)				(0.047)	(0.041)
c.leg.orig.(a. trans.)				-0.2091*	0.0110				-0.2291***	-0.2232***
				(0.107)	(0.100)				(0.051)	(0.045)
c.leg.orig.(ch. a.trans.)				0.1784*	0.0222				0.0948*	0.0342
				(0.102)	(0.105)				(0.056)	(0.053)
Observations	119,222	113,419	106,129	125,550	125,550	119,222	113,419	106,129	125,550	125,550
R-squared	0.482	0.487	0.569	0.145	0.227	0.970	0.875	0.966	0.627	0.786
Pair-FE	yes	yes	yes	no	no	yes	yes	yes	no	no
Gravity Controls	no	no	no	yes	yes	no	no	no	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses. *** p<0.1, ** p<0.05, * p<0.01.

Table 7: Regression Results - Trade Margins (all estimates)

	(1) IM	(2) IM non-compl.	(3) IM compl.	(4) EM	(5) EM non-compl.	(6) EM compl.
tariffs	-0.6106	-0.3002	1.1202	0.2645	-0.0674	0.2128
	(0.892)	(0.795)	(1.081)	(0.237)	(0.297)	(0.295)
FDI	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
agreement	-0.0428	-0.0929	-0.1387	0.0373	0.0122	0.0479
	(0.090)	(0.073)	(0.105)	(0.031)	(0.036)	(0.037)
agreement_{t-5}	-0.0705	0.0064	-0.0465	0.0546**	0.0668**	0.0514
	(0.069)	(0.105)	(0.097)	(0.028)	(0.032)	(0.031)
inc.diff. $*\text{agreement}_{t-5}$	0.2949*	0.2746	0.9130***	0.0091	0.0073	-0.0280
	(0.178)	(0.179)	(0.315)	(0.064)	(0.083)	(0.084)
comp/serv/inv	0.4863***	0.5696***	0.3347	-0.0864*	-0.0609	-0.1510***
	(0.144)	(0.168)	(0.245)	(0.050)	(0.062)	(0.053)
$\text{comp/serv/inv}_{t-5}$	0.2965**	0.1469	-0.0178	0.0100	0.0474	0.0052
	(0.130)	(0.148)	(0.198)	(0.041)	(0.060)	(0.041)
inc.diff. $*\text{comp/serv/inv}_{t-5}$	0.6818**	-0.0798	0.6847*	-0.3137***	-0.6151***	-0.3482**
	(0.304)	(0.307)	(0.415)	(0.105)	(0.185)	(0.141)
procurement	0.0971	0.1352	-0.0646	0.0231	0.0089	0.0436
	(0.083)	(0.121)	(0.140)	(0.025)	(0.037)	(0.033)
procurement_{t-5}	-0.0484	-0.0436	-0.1021	0.0005	-0.0310	0.0187
	(0.095)	(0.093)	(0.120)	(0.023)	(0.035)	(0.033)
inc.diff. $*\text{procurement}_{t-5}$	0.1978**	0.2339**	-0.0894	0.0432	0.1093*	0.0192
	(0.095)	(0.102)	(0.184)	(0.042)	(0.064)	(0.047)
ipr	0.0630	0.0631	0.1115	-0.0032	0.0124	-0.0214
	(0.052)	(0.087)	(0.098)	(0.018)	(0.026)	(0.017)
ipr_{t-5}	0.0171	0.0708	0.1076	-0.0099	-0.0628*	-0.0194
	(0.061)	(0.101)	(0.103)	(0.016)	(0.034)	(0.019)
inc.diff. $*\text{ipr}_{t-5}$	-0.2829	-0.1760	-0.5473*	0.0592	0.2140**	0.0657
	(0.191)	(0.277)	(0.314)	(0.042)	(0.106)	(0.076)
oth. provisions	-0.1525	-0.1803	0.2703	-0.0045	0.0269	0.0016
	(0.144)	(0.138)	(0.203)	(0.040)	(0.050)	(0.043)
oth. provisions_{t-5}	0.0697	0.0540	0.3762**	-0.0477	-0.0072	-0.0691
	(0.118)	(0.203)	(0.158)	(0.044)	(0.056)	(0.047)
inc.diff. $*\text{oth. provisions}_{t-5}$	-0.5780**	-0.2615	-1.4625***	0.0339	0.0991	0.1002
	(0.272)	(0.335)	(0.563)	(0.092)	(0.150)	(0.142)
Observations	119,222	113,419	106,129	119,222	113,419	106,129
R-squared	0.482	0.487	0.569	0.970	0.875	0.966
Pair-FE	yes	yes	yes	yes	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses. *** p<0.1, ** p<0.05, * p<0.01.

Table 8: Regression Results - Trade Margins (lagged variables - all estimates)

	(1) IM	(2) IM non-compl.	(3) IM compl.	(4) EM	(5) EM non-compl.	(6) EM compl.
tariffs	-0.4474	-0.1602	0.7764	0.1138	-0.2463	0.0074
	(0.868)	(0.742)	(1.075)	(0.223)	(0.291)	(0.268)
FDI	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
agreement	0.0509	-0.0603	-0.0174	-0.0414	-0.0014	-0.0881**
	(0.069)	(0.096)	(0.117)	(0.026)	(0.028)	(0.036)
inc. diff*agreement	0.0160**	0.0047	0.0159	0.0007	0.0044*	-0.0002
	(0.008)	(0.008)	(0.010)	(0.003)	(0.002)	(0.003)
comp/serv/inv	0.1439**	0.0616	-0.0368	-0.0210	-0.0316	-0.0304
	(0.063)	(0.084)	(0.098)	(0.019)	(0.036)	(0.026)
inc. diff*comp/serv/inv	-0.0139	0.1224	0.3977***	-0.0931**	-0.1291	-0.1147**
	(0.158)	(0.145)	(0.138)	(0.042)	(0.085)	(0.050)
procurement	0.0636	0.0211	0.1126	0.0434**	0.0714*	0.0426*
	(0.054)	(0.076)	(0.111)	(0.019)	(0.037)	(0.023)
inc. diff*procurement	0.4111**	-0.1886	0.1820	0.0310	0.1179	-0.0470
	(0.175)	(0.123)	(0.113)	(0.059)	(0.136)	(0.052)
ipr	0.0107	0.1713**	0.1083	-0.0307*	-0.0616*	-0.0031
	(0.060)	(0.076)	(0.176)	(0.017)	(0.037)	(0.027)
inc. diff* ipr	-0.0738**	-0.1704	0.0213	-0.1012	-0.1597	-0.0722
	(0.036)	(0.231)	(0.044)	(0.090)	(0.138)	(0.057)
oth. provis.	-0.0896**	-0.0000	-0.0582	0.0073	-0.0023	0.0188
	(0.038)	(0.090)	(0.079)	(0.020)	(0.038)	(0.014)
inc. diff*oth. provis.	-0.0246	0.1814	-0.0260	0.0619	0.0553*	0.0579
	(0.034)	(0.225)	(0.033)	(0.043)	(0.029)	(0.042)
Observations	119,222	113,419	106,129	119,222	113,419	106,129
R-squared	0.482	0.486	0.568	0.970	0.875	0.966
Pair-FE	yes	yes	yes	yes	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses.
*** p<0.1, ** p<0.05, * p<0.01.

Table 9: Robustness check - Replication of Table 2 using Data from the World Bank Database on the Content of PTAs

Variables for provisions similar to tables 1,2 and 3 are constructed based on information on trade provisions in the World Bank Database on the content of PTAs. While names among provisions do not differ substantially for the majority of provisions, some variables were adjusted. The availability of provisions on investments was also coded as 1 if there is a reference to Agreements on Trade-Related Investment Measures (TRIMs), IPR was coded as 1 if there is a reference to Trade-Related Aspects of Intellectual Property Rights (TRIPS), defense (included in "other provisions") was coded as 1 if there is a reference to Countervailing Measures.

	(1) IM non-compl.	(2) IM compl.	(3) IM non-compl.	(4) IM compl.	(5) EM non-compl.	(6) EM compl.	(7) EM non-compl.	(8) EM compl.
tariffs	-0.3163	0.8828	-1.1756	-2.4062**	-0.1560	0.1720	-4.7496***	-4.8248***
	(0.762)	(1.077)	(0.772)	(0.973)	(0.314)	(0.310)	(0.801)	(0.884)
fdi	0.0000	0.0000	0.0000***	0.0000***	-0.0000	-0.0000*	-0.0000***	-0.0000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
agreement	-0.0851	-0.1207	0.1421	0.1657*	0.0443	0.0597	0.2487***	0.2822***
	(0.088)	(0.108)	(0.108)	(0.100)	(0.042)	(0.042)	(0.064)	(0.057)
inc.diff.* agreement	2.3535***	-4.8397	-0.3433	-3.9295***	0.7562	-0.9292	-2.0303**	-0.9887
	(0.906)	(18.764)	(1.174)	(1.291)	(1.459)	(1.374)	(0.931)	(1.101)
comp/serv/inv	0.6098***	0.2998	0.0371	-0.5296*	-0.0557	-0.1707***	-0.0571	-0.3978*
	(0.169)	(0.276)	(0.303)	(0.281)	(0.087)	(0.066)	(0.210)	(0.217)
inc.diff.* comp/serv/inv	-3.3410***	16.5916	2.0456	2.4947	-0.9744	2.6352	4.4193**	7.1453***
	(1.253)	(36.013)	(2.901)	(6.327)	(3.056)	(2.100)	(1.903)	(2.197)
procurement	0.1266	-0.0363	0.0787	-0.2004	0.0404	0.0496	-0.0937	-0.0797
	(0.118)	(0.181)	(0.211)	(0.216)	(0.048)	(0.037)	(0.113)	(0.108)
inc.diff.* procurement	6.4305***	-3.9510	4.0394	0.7471	-1.6824*	0.3190	-5.6753***	-8.0463**
	(0.410)	(13.084)	(4.692)	(7.101)	(0.900)	(0.822)	(2.001)	(3.876)
ipr	0.0851	0.1372	0.3410*	0.7676***	-0.0151	-0.0275	-0.1920*	-0.1826*
	(0.082)	(0.136)	(0.194)	(0.157)	(0.032)	(0.019)	(0.113)	(0.102)
inc.diff.* ipr	1.4017	-6.0505	-1.0837	-4.7949	-0.5823	-0.3562	-0.9171	-2.7583*
	(1.113)	(20.119)	(1.990)	(5.117)	(1.268)	(0.986)	(1.340)	(1.497)
oth.provis.	-0.1729	0.2828	-0.1200	0.2744	-0.0181	0.0029	-0.1890	-0.0562
	(0.140)	(0.231)	(0.244)	(0.268)	(0.049)	(0.047)	(0.195)	(0.218)
inc.diff.* oth.provis.	-5.3036***	7.2818	-1.5355	5.0132	1.0351	-0.2412	3.5912**	2.5665
	(1.511)	(23.150)	(3.102)	(5.370)	(1.414)	(1.218)	(1.601)	(2.143)
contiguity			0.6043***	0.5825***			0.2942***	0.2429***
			(0.095)	(0.095)			(0.075)	(0.080)
com. lang.(off/prim)			-0.2183*	-0.2510**			0.0734	0.1470**
			(0.121)	(0.110)			(0.067)	(0.074)
com. lang.(9%)			0.1931*	0.2624***			-0.0763	-0.0780
			(0.113)	(0.101)			(0.065)	(0.069)
com. col. post 1945			0.1844	0.2300*			0.0867	0.1638*
			(0.113)	(0.133)			(0.084)	(0.097)
distance			-0.0000	-0.0001***			-0.0001***	-0.0001***
			(0.000)	(0.000)			(0.000)	(0.000)
time diff.			-0.0160	0.0166			0.0394***	0.0227
			(0.023)	(0.020)			(0.015)	(0.014)
col.(ever)			0.3156**	0.4892***			0.4029***	0.3515***
			(0.148)	(0.136)			(0.066)	(0.070)
sibl.(ever)			0.1683*	-0.0211			0.4348***	0.4382***
			(0.099)	(0.108)			(0.065)	(0.063)
sibl.+confl.(ever)			-0.0148	0.0414			0.0129	0.0194
			(0.120)	(0.134)			(0.073)	(0.080)
com.currency			0.1791	0.2988*			-0.2022*	-0.1984*
			(0.153)	(0.165)			(0.117)	(0.108)
com.religion			-0.1812	0.1103			0.1467**	0.0942
			(0.113)	(0.116)			(0.067)	(0.073)
c.leg.orig(bef. transition)			0.2151*	0.1634*			0.2513***	0.2135***
			(0.112)	(0.095)			(0.047)	(0.040)
c.leg.orig(aft. transition)			-0.2101**	0.0073			-0.2213***	-0.2105***
			(0.107)	(0.100)			(0.052)	(0.043)
c.leg.orig(change aft.trans.)			0.1773*	0.0229			0.0951*	0.0315
			(0.102)	(0.105)			(0.058)	(0.052)
Observations	113,419	106,129	125,550	125,550	113,419	106,129	125,550	125,550
R-squared	0.487	0.568	0.144	0.227	0.875	0.966	0.626	0.784
Pair-FE	yes	yes	yes	yes	yes	yes	yes	yes
EX-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes
IM-Time-FE	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors, clustered by exporter, importer and time, in parentheses. *** p<0.1, ** p<0.05, * p<0.01.

Table 10: Regression Results - Trade Margins for Trade among Low and High Income Countries