

## Economic integration works

The trade effects of regional trade agreements

2018



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# Foreword

Since the early 1990s, there has been a sharp increase in regional trade agreements. Today, they are a familiar part of the world trading system and all members of the World Trade Organization have signed at least one regional trade agreement.

Given their importance for today's global trade, it is surprising that relatively little solid information is available regarding their effects. In recent years, however, scholars have made significant progress in estimating the trade effects of regional trade agreements. So far, no one has compiled the new evidence in an easily accessible, non-technical format. In an effort to remedy this, the National Board of Trade publishes a review of the most recent research on the trade effects of regional trade agreements. It is our hope that it will serve as support for policy-makers and trade officials negotiating new or updated regional trade agreements. It is also relevant in a context, such as Brexit, where a member of a deep integration agreement is in the process of leaving it. Finally, it can be useful as reference material in the broader political discussion about international trade and trade agreements.

The publication is the third study in a series of publications from the National Board of Trade with the purpose of analysing the effects of regional trade agreements. The first study ("The Use of the EU's Free Trade Agreements") analysed the utilization of EU free trade agreements. A second study ("Free Trade Agreements and third countries") published during 2018 analyses how free trade agreements can be designed to facilitate trade with non-members.

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# Summary

**W**hat are the trade effects of regional trade agreements (RTAs)? Until recently, scholars struggled with this question but methodological improvements have made it possible to answer it with greater precision. The purpose of this report is to summarise the most recent research on the trade effects of RTAs for policymakers.

In the report, “trade effects” mostly refer to trade in goods, but we also discuss RTA effects on trade in services. All results are based on studies that have a solid theoretical foundation and use the latest econometric techniques.

The report is a survey of *empirical studies*. In other words, the focus is on effects that have already occurred rather than model simulations made before an agreement comes into effect. Real-world RTA effects on trade have turned out to be stronger than predicted by computable general equilibrium models. This suggests that when assessing RTAs, it is important to rely, not only on forward-looking models, but also on empirical studies.

## What is the average effect of RTAs on trade in goods?

On average, RTAs double members’ merchandise trade after a phase-in period of ten years. In all surveyed studies, the average trade increase of RTAs after ten years is in the range of 50–170 percent. Eight of twelve surveyed studies report average trade increases in the range of 80–125 percent.

The strong overall RTA effects on trade between members indicate that economic integration works. Negotiating RTAs that liberalise trade is an effective strategy for countries that seek economic improvement through increased trade.

## What types of RTAs stimulate trade in goods the most?

The trade effect of RTAs increases with depth and enforceability. Whereas preferential trade agreements only have modest effects on trade, free trade agreements have substantial trade creating effects. Customs unions and even more ambitious forms of RTAs have the strongest trade effects.

The range of estimated trade effects is 30–110 percent for free trade agreements and 100–250 percent for customs unions and more ambitious forms of economic integration. The trade effects of customs unions, common markets and economic unions are thus at least twice as strong as the trade effects of free trade agreements.

One explanation for the strong customs union effect compared with free trade agreements is that trade within a customs union is simpler and requires less red tape. For instance, rules of origin are not required for a customs union.

If the objective is increased trade, the results presented here indicate that RTAs that are reciprocal and deep (FTAs or CUs) are considerably more effective in achieving that objective, than RTAs that are non-reciprocal and limited in depth. The results also indicate that a customs union is an attractive option for countries that seek closer economic integration.

### **What type of RTA provisions stimulate trade in goods?**

While research has advanced in recent years, it is still not possible to determine exactly how much different types of RTA provisions stimulate trade. It is clear, however, that tariff elimination only explains part of the trade effect of RTAs. Surveyed studies indicate that the elimination of applied tariffs account for 20–40 percent of the total effect on trade in goods. In addition, reduced trade policy uncertainty caused by tariff bindings stimulates trade.

Other factors that explain RTA effects on trade in goods are the inclusion of so called WTO plus provisions, among them commitments related to agriculture, services, state aid, state owned enterprises, trade defence, quantitative restrictions, intellectual property rights, investment, public procurement, SPS and TBT measures. Non-trade policy arrangements, such as the Schengen accords and common currencies, also stimulate trade in deep integration agreements.

### **What are the trade effects of individual RTAs on trade in goods?**

Estimates of trade effects for individual RTAs fluctuate much more in terms of economic magnitude and statistical significance than RTA effects measured at the aggregate level or by RTA category.

The estimated trade effect of EU membership is in the range of 100–130 percent, allowing for a phase-in period of ten years. In other words, the EU has more than doubled trade in goods between members, whether through the original treaty or through different rounds of deepening or enlargement. The results for the EU are more consistent in terms of statistical significance and economic magnitude than for any other individual agreement.

For NAFTA, the trade-increasing effect appears to be strong at 80-90 percent. In two studies, however, the results were not statistically significant.

Accession to a larger trade block boosts trade substantially for the country seeking accession. The effect appears to be particularly strong for small countries acceding to a large RTA.

As a next step, the Board intends to make additional gravity-based empirical analysis of the effects of EU RTAs with other economies.

### **Trade-creation vs. trade-diversion**

According to the surveyed studies, the trade-creation effects of RTAs dominate their trade-diversion effects. In several studies that report strong trade-creation effects of RTAs, the trade-diversion effect is statistically and/or economically non-significant. While some trade diversion is observed, the open-block effects of RTAs appear to be more important.

Shallow RTAs generate more trade-diversion than deep integration agreements, probably because deep integration provisions tend to be less discriminatory. In contrast, the EU is associated with open-block effects, probably because many EU reforms benefit both members and non-members.

The discussion of trade-creation vs. trade-diversion is fundamental to all trade policy considerations related to RTAs. The empirical results reported here suggest that the fear that RTAs divert as much trade as they create is unfounded. At the same time, it is important to continue to make efforts to minimise the trade-diverting effects of RTAs, since trade-diversion reflects a misallocation of resources internationally.

### **What are the effects of RTAs on trade in services?**

RTAs that contain services provisions have a positive effect on trade in services. Average effects in the range of 7–32 percent are recorded across three studies. For internal EU trade in services, the effect is stronger, with a range of 24–45 percent across three studies.

The impact of RTAs on trade in services is less than half their impact on trade in goods. The reason is probably that RTA commitments for services rarely remove any applied barriers to trade in services. Instead, service commitments “cut water”, which reduces trade policy uncertainty. Reforms that reduce trade policy uncertainty have a positive impact on trade even if no actual liberalisation takes place.

As for trade in goods, deeper commitments and broader sector coverage lead to stronger trade effects. Unsurprisingly, agreements without service provisions have no effect on trade in services.

The results indicate that there is a substantial additional trade potential from improving service commitments in RTAs. If trading partners seek depth in a trade agreement, a factor associated with strong effects for trade in goods, ambitious trade in services commitments are essential.

### **What are the trade effects of economic disintegration?**

The trade effect of economic disintegration is the flipside of the effect of economic integration. Reversing deep integration, as in the case of Brexit, means reversing trade agreements that stimulate trade. While counter-factual scenarios are less reliable than empirical estimations, the studies surveyed indicate reduced trade as a result of economic disintegration.

In one important aspect, economic disintegration is not the flipside of economic integration. While analysis of RTAs often weighs the gains of additional trade against the costs of structural adjustment, economic disintegration implies *both* reduced gains from trade *and* (new) structural adjustment costs.

The central conclusion in this report is that economic integration works if the objective is to increase trade. Most importantly, it is when countries make commitments — not when they avoid them by defending their defensive interests — that RTAs help them increase trade. The most surprising findings are the magnitude in the overall empirical effects compared to model estimations, the absence of substantial trade-diversion effects and a large difference between the effects of free trade agreements and customs unions. For the future, more precise estimates of both different types of RTA provisions and individual RTAs would be welcome.

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# 1

## Introduction

Regional trade agreements (RTAs) have been trending upwards during the entire post-World War II period (figure 1). There are currently 287 RTAs in force compared with 37 in 1994, the year before the World Trade Organization (WTO) was established. In other words, since 1995, the number of RTAs has increased by a factor of almost eight. After the 2016 notification of the agreement between Mongolia and Japan, all WTO members now have at least one RTA.

A more recent trend is that large economies such as the EU, Japan and the US have begun to negotiate RTAs between each other. Until the early 2010s, such a development was regarded as off limits since RTAs between major WTO economies represented the final erosion of the WTO's most favoured nation (MFN) clause.

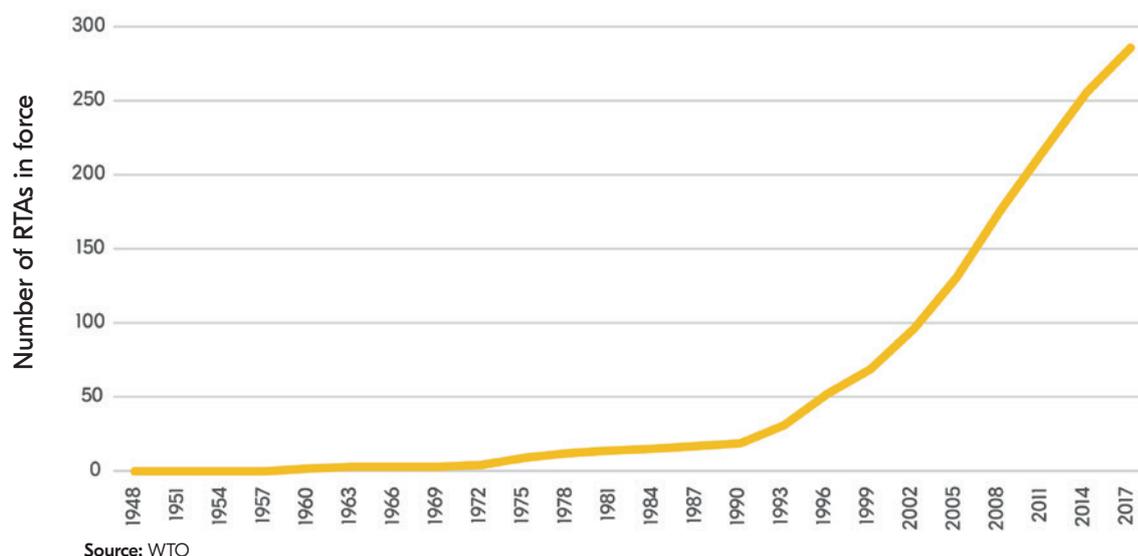
### 1.1 Purpose of the study

In recent years, the academic community has made considerable progress in measuring the trade effects of RTAs. Soete and Van Hove (2017) sum up the development as follows:

*"Not only has the number of [RTAs] exploded in recent years, the economic literature investigating the impact of [RTAs] has grown at an equal rate. This has led to tremendous improvements in methodology. While earlier studies report very mixed results on the trade effects of [RTAs]..., recent studies have found more consistent results."*

Whereas research on the trade effects of RTAs has been widely disseminated in the academic community, no publication has yet compiled, summarised and presented recent results in non-

Figure 1. Evolution of regional trade agreements





technical language. The purpose of this report is therefore to summarise the most recent research on the trade effects of RTAs for policymakers. This knowledge is relevant to a number of current regional trade negotiations, but also when a member of an RTA wants to leave it, as in the case of Brexit. In addition, it is useful in the broader political context, where the effects of trade agreements are often discussed.

The report is the third study in a series of publications from the National Board of Trade with the purpose of analysing the effects of regional trade agreements. The first study (Kommerskollegium, 2018), analyses the utilization of EU free trade agreements. The second study analyses how free trade agreements can be designed to facilitate market access for third countries (Kommerskollegium, forthcoming).

## 1.2 Scope of the study

To evaluate the effects of different RTAs there is a need to classify them according to depth and scope. For the purpose of this report, RTAs refer to the following six categories of trade agreements:

1. **Non-reciprocal preferential trade arrangements** provide one-way tariff preferences. The GSP (general system of preferences) arrangements of WTO members fall into this category.
2. **Reciprocal preferential trade agreements** provide two-way preferences on only part of the trade between members (for instance the Latin American Integration Association).
3. **Free trade agreements (FTAs)** eliminate tariffs and other discriminatory measures on sub-

stantially all the trade among their members (for instance NAFTA). To varying degrees, they also contain a number of deep integration provisions.

4. **Customs unions (CUs)** eliminate trade barriers between members and erect a common external tariff and customs controls (for instance the Caribbean community). Like FTAs, they may also include varying degrees of deep integration provisions.
5. **Common markets (CMs)** are CUs with additional deep integration provisions. EU members that are not part of the EU's economic and monetary union (EMU) belong to this category. There are also examples of countries (Norway) that are part of the EU single market (a CM) without being part of the EU customs union.
6. **Economic unions (EUs)** are CMs with additional monetary and fiscal policy integration. The EMU is the most prominent example.

The categorisation is based on Frankel (1997) and is widely used to classify the depth of RTAs. Since several important studies refer to all six RTA categories, the report uses this broad definition.

It is important to note that the WTO classification of RTAs differs slightly from that of Frankel (1997). According to the WTO, RTAs refer to Frankel's categories 2–6. RTAs that fall into categories 2–6 are therefore covered in the WTO's RTA database. Non-reciprocal preferential trade arrangements (Frankel's category 1), however, are not included in the RTA database. Instead, they are documented in the WTO's preferential

trade arrangement (PTA) database. In addition, the WTO refers to category 2 RTAs as partial scope agreements (PSA). Finally, in WTO terminology RTAs notified under Article V of the General Agreement on Trade in Services (GATS) are called “economic integration agreements”, as opposed to “free trade agreements”, which are RTAs notified under article XXIV of the General Agreement on Tariffs and Trade (GATT).

To complicate matters even further, the academic community regularly uses the term “economic integration agreements (EIAs)” instead of RTAs. Therefore, the acronym “EIAs” will also occur in the text whenever there is a quotation that uses that term instead of “RTAs”.

To guide the reader through this maze of overlapping terms, we will indicate the categories (1–6) to which a particular study refers, whenever that is unclear.

### **The scope of international trade**

Twenty-first century trade represents a wide range of economic transactions related to goods, services, foreign direct investment (FDI), movement of persons and the flow of data, knowledge and technology. From the perspective of firms and consumers, all of these “flows” are part of the process that we commonly think of as international trade (Kommerskollegium, 2016). In this publication, however, the “trade effect” refers to *trade in goods* unless otherwise specified. Trade furthermore mostly refers to imports between country pairs, since import data are more reliable than export data.

In section 2.6, we discuss a more limited number of studies that measure the impact of RTAs on trade in services. The report does not cover the impact of RTAs on FDI, the movement of persons and data flows. The reason for this limited perspective is a practical one. As far as we know, there is little literature on the effects of RTAs on data flows and movement of persons. While there are studies on the effects of RTAs on FDI, they require different theoretical assumptions regarding, for example, the determinants of FDI establishment.

### **Methodological scope**

The report is a survey of empirical studies, most of which are based on the so-called gravity model (see box 1 and the appendix). In other words, the focus is on effects that have already occurred (*ex post*), rather than on simulations made before an agreement comes into effect (*ex ante*). Ex ante studies of trade effects typically use computable general equilibrium (CGE) models. In section 3, we compare and contrast results from the two different approaches (CGE models vs. gravity analysis).

As explained above, statistical tools and econometric methodology have improved in recent years compared to earlier studies. In addition, the gravity model has received a more solid theoretical foundation. Therefore, the survey includes only studies that have been published during the last ten years (since 2007).



### 1.3 Gains from trade

As noted above, the report discusses the trade effects of RTAs. Ultimately, however, policy-makers are interested in the effects on living standards, poverty, employment, development, sustainability etc. Thus, even if RTAs increase trade, the question that remains is: why is this important? Or expressed in more familiar terms, what are the gains from trade?

The literature on the gains from trade is vast and we will not review it here. Instead, we note that there are a number of channels through which increased trade benefits society: greater resource efficiency, higher wages and better working conditions, a greater supply of and lower prices for goods and services (to the disproportionate benefit of poor households), technological diffusion, increased competition, productivity gains, economic development for poor countries etc. (OECD, 2017). However, trade can also exacerbate structural adjustment costs (higher unemployment for certain groups) and have negative external effects (add to environmental problems). Trade and trade liberalisation also impact men and women differently, espe-

cially in the labour market. Thus, carefully designed domestic policies that facilitate labour market adjustments, invest in education, promote gender equality, strengthen competition and address negative external effects are required to fully capture the gains from trade and mitigate adjustment costs.

With these broad considerations in mind, the report is based on the basic view that increased trade is an effective way to help us achieve wider societal objectives. However, the exact magnitude and distribution of those gains are not discussed in this report.

### 1.4 Outline

The report is organised as follows. The next section analyses different questions related to the overarching issue of how RTAs affect trade flows. The answers to each question are summarised at the end of each subsection. Section 3 discusses how results from empirical analysis differ from CGE simulations. Section 4 summarises the results in the report and adds comments and conclusions from the National Board of Trade.

# 2

## What are the effects of RTAs on trade flows?

In this section, we summarise the results from empirical studies that address issues related to the overarching question in this report: “What are the effects of RTAs on trade flows?” A headline that represents a specific policy-related question introduces each section. The following eight questions are discussed:

- What is the average RTA effect on trade in goods?
- What types of RTAs stimulate trade in goods the most?
- Which RTA provisions stimulate trade in goods the most?
- What are the effects of individual RTAs (EU, NAFTA, etc.) on trade in goods?
- How large are trade-creation vs. trade-diversion effects of RTAs?
- What are the effects of RTAs on trade in services?
- Do RTAs mostly stimulate existing trade or new trade?
- What is the effect of economic disintegration, i.e. leaving a CU or an FTA?

The workhorse of empirical trade analysis is the so-called gravity model (see box 1). The appendix discusses its historical origins and crucial recent developments. For readers who choose to skip the appendix, a few things are important to keep in mind. First, the objective of gravity analysis is to *isolate* the trade effect of RTAs (individually or collectively, depending on the purpose of the study) from other determinants of international trade.

Second, surveyed studies typically contain several different gravity estimations. We report

### Box 1

#### The gravity model

The gravity model treats factors such as economic size and geographic distance as basic determinants of bilateral trade flows. The analogy with Newton’s law of gravity derives from the fact that, similar to gravity, bilateral trade increases with economic mass (GDP) and falls with distance. For instance, it has been shown that exports increase proportionally with the economic size of the export destination (Head and Meyer, 2014). To provide an example, Sweden engages in a great deal of trade not only with neighbouring Norway but also with the more distant but economically important US. Together with other known determinants of bilateral trade flows, such as common language, former colonial ties and common borders, this makes it possible “to determine the normal or standard pattern of international trade that would prevail in the absence of trade impediments” (Tinbergen, 1962). This information can then be used in econometric calculations to isolate the impact of trade agreements from other factors that determine trade flows.



estimations that allow for comparisons across studies. For instance, most estimation results presented here and in other sections are lagged results. This means that RTA effects are estimated not only for the same year that an agreement comes into force but also after, for instance, 5, 10 or 15 years. The results we report are mostly based on estimations with a ten-year lag. The reason is that it takes at least ten years to phase in all relevant RTA commitments, and for firms and supply chains to adjust. Some studies also include estimations that allow for anticipation effects. Anticipation effects account for the fact that firms often react in anticipation of lower trade costs or more certain trade conditions associated with an RTA under negotiation. The regression is then set up to account for trade effects that occur *before* the agreement comes into effect.

In addition, we always report estimations that the authors describe as their “preferred regression”, indicating that they believe that this is the most accurate or realistic estimation. Finally, as noted above, we only report results from studies that have a solid theoretical foundation and use the latest econometric techniques. This means that we do not report results from studies published before 2007.

## 2.1 What is the average RTA effect on trade in goods?

Generally, there are two broad categories of studies that estimate RTA effects on trade in goods.

One category estimates the *average* effects of RTAs generally or by RTA type. A second category examines the effects of individual trade agreements. In this section and the next (section 2.1 and 2.2), we report results for the first category.

Baier and Bergstrand (2007) conclude that, “on average, an FTA approximately doubles two members’ bilateral trade after ten years.” More specifically, their two different estimation methods yield an estimated RTA effect of 84 percent and 114 percent, respectively. A 100 percent increase – a doubling of trade in goods over ten years – is an important benchmark figure for the rest of this report. The reader should keep in mind, however, that it is an average figure that does not differentiate between different types of agreements. The Baier and Bergstrand study covers 52 RTAs signed between 1958 and 2000. While the 52 RTAs differ in nature (between categories 2–6), Baier and Bergstrand refer to them collectively as “FTAs”.

Using yet another empirical method, but the same sample of countries and trade agreements, Baier and Bergstrand (2009) arrive at a similar result. This time the RTA effect is estimated at 112 percent, close to the results from their 2007 publication. Again, they conclude that “on average an FTA approximately doubles two members’ real trade”.

Magee (2008) estimates that bilateral trade flows increase by 89 percent if the country-pair is part of an RTA 10+ years after the agreement comes into effect. He finds quite a large (26 percent) anticipation effect that occurs up to four years before the agreement enters into force.

**Table 1: Overview of studies surveyed in section 2.1**

	Percent increase*	Time period analysed	Number of countries and RTAs	Estimation approach**	Phase-in effects?	Anticipation effects?	RTA category
Baier & Bergstrand (2007)	84	1960–2000	96 countries, 52 RTAs	First differencing	10 years	No	2–6
Baier & Bergstrand (2007)	114	1960–2000	96 countries, 52 RTAs	Fixed effects	10 years	No	2–6
Magee (2008)	89	1980–1998	133 countries, all WTO notified RTAs	Fixed effects	Effects up to 11 years	Yes	2–6
Baier & Bergstrand (2009)	112	1960–2000	96 countries, 52 RTAs	Matching	Average effect	No	2–6
Egger et al. (2011)	102	Pre 2005	121 RTAs	Fixed effects	No	No	2–6
Eicher & Henn (2011)	60	1950–2000	177 countries, 79 RTAs	Fixed effects	No	No	2–6
Kohl (2014)	125	1950–2010	150 countries, 166 RTAs	Fixed effects	10 years	No	2–6
Kohl (2014)	48	1950–2010	150 countries, 166 RTAs	First differencing	10 years	No	2–6
Baier, Bergstrand, Egger & McLaughlin (2008)	80	1960–2000	96 countries, 52 RTAs	First differencing	10 years	No	2–6
Baier, Bergstrand, Egger & McLaughlin (2008)	115	1960–2000	96 countries, 52 RTAs	Fixed effects	10 years	No	2–6
Kohl & Trojanowska (2015)	113	1960–2005	187 countries, unclear number of RTAs	Matching	No	No	1–6
Hannan (2016)	80	1983–1995	104 country pairs, 230 RTAs	Synthetic matching	10 years	Yes	2–6
Limão (2016)	82	1965–2010	Information unavailable	Fixed effects	10 years	No	1–6
Anderson & Yotov (2016)	Comparable to Baier & Bergstrand (2007)	1990–2002	64 countries, 40 RTAs	Fixed effects	9 years	No	2–6
WTO (2016)	169	1986–2006	69 countries, All WTO notified RTAs	Fixed effects	12 years	No	1–6
WTO (2016)	61	1986–2006	69 countries, All WTO notified RTAs	Fixed effects	12 years	No	1–6

\* All results are statistically significant, typically at the 1 percent level. All studies report partial effects on trade in goods between RTA members, effects that could be the result of either trade-creation or trade-diversion from non-members. For a discussion of potential trade-diversion effects, see section 2.6.

\*\* For an overview of the different approaches, see box 2 in the appendix.

For all RTAs *but* the EU, EFTA and the European Economic Area (EEA), Baier, Bergstrand, Egger, McLaughlin (2008) find a trade effect of 80–115 percent, depending on the estimation approach, when they allow for a ten-year phase-in period.

Estimates by Eicher and Henn (2011) are more modest compared to the results reported above. They calculate a 60 percent average increase for 79 RTAs.

According to Egger et al. (2011), the average increase of 121 RTAs that were in effect in 2005 or earlier was 102 percent for trade between RTA members. They argue that previous results suffer from problems that exert a downward bias on the results. Among other things, they point out that new trade flows (an increase along the extensive margin in trade economist jargon) need to be calculated separately from increases in existing trade flows (an increase along the intensive margin).

Another interesting study is Kohl (2014). He estimates that, on average, RTAs increase merchandise trade by 125 percent after ten years. A different estimation technique yields lower estimates: 48 percent over ten years. Kohl (2014) furthermore finds that only 44 of 166 agreements (27 percent) had a statistically significant and positive effect on trade.

The study by Hannan (2016) is different from other studies reported in this section both because it is an IMF working paper (i.e. not a study published in an academic journal) and because it uses a relatively unusual empirical estimation approach (synthetic matching, see the appendix). Hannan estimates that RTAs boost exports by 80 percent over ten years. The effect is even higher, he concludes, when the estimation accounts for an anticipation effect.

In a study that covers RTAs formed between 1990 and 2002, Anderson and Yotov (2016) find “large volume effects [of RTAs] comparable to the aggregate estimates of Baier and Bergstrand (2007)”. Since their study is sector-based, however, they do not report aggregate estimations. Anderson and Yotov furthermore conclude that the RTA effect is stronger for country pairs with high initial most-favoured nation (MFN) tariffs than for pairs with low initial MFN tariffs.

Using the same estimation technique as Baier and Bergstrand (2009) but including more years and a larger number of countries and RTAs, Kohl and Trojanowska (2015) calculate that RTAs (cat-

egories 1–6) have increased trade by an average of 113 percent.

In a gravity model specification that resembles Baier and Bergsten (2007), Limão (2016) estimates that the effect of RTAs on trade in goods is 82 percent after ten years.

Finally, the WTO (2016) estimates that on average, RTAs (categories 2–6) increase trade by 169 percent after allowing for a time lag of up to 12 years. When they also control for unobserved “globalisation effects”, such as technology and innovation, the RTA effect is estimated at 61 percent with the same phase-in period.

## Summary and discussion

Our review shows that RTAs stimulate trade in goods between members strongly. On average, RTAs double trade after allowing for a phase-in period and anticipation effects. For all studies, the average trade increase of RTAs after ten years is in the range of 50–170 percent. Eight of twelve surveyed studies report average trade increases in the range of 80–125 percent.

The strong overall RTA effects on trade between members indicate that economic integration works. Negotiating RTAs that liberalise trade is an effective strategy for countries that seek economic advancement through increased international trade.

## 2.2 What types of RTAs stimulate trade in goods the most?

The latest research attempts to open up the “black box” of RTAs to determine not only the trade effects of different types of agreements but also different provisions in those agreements.

Two different approaches are discernible. The most common approach differentiates trade agreements according to their formal status. These studies typically use the classification (categories 1–6) described in section 1.2. Another approach differentiates agreements according to the types of provisions included. According to this approach, both the policy areas covered and their enforceability distinguish a shallow agreement from a deep agreement. Enforceability refers to legal provisions that are clearer, more specific, more imperative, and are easier to invoke successfully in dispute settlement proceedings (Horn, Mavroidis and Sapir, 2010).

Magee (2008) shows that customs unions increase trade by 129 percent, whereas FTAs increase trade between the parties by 66 percent over the full time span that they measure (up to 18 years after the agreement comes into effect). He concludes that the “customs union effect on trade is thus nearly double that of a free trade area”. The effect on trade is very similar in magnitude for CUs and FTAs up until six years after the agreement comes into effect. After that, the CU impact keeps rising, whereas the FTA impact levels off. In other words, CUs appear to have stronger long-term effects. Preferential trade agreements other than CUs and FTAs (category 2 in the classification in section 1.2) have no statistically significant effect on trade, according to Magee.

In line with Magee, Baier, Bergstrand and Feng (2014) show that “deeper EIAs have larger effects on trade than FTAs”, and that FTAs have larger effects than other preferential trade agreements (whether reciprocal or non-reciprocal). In this case, “deeper EIAs” means customs unions, common markets and economic unions (categories 4–6). The results indicate that membership in an FTA increases bilateral trade by 60 percent after 10 years, whereas membership in a deep RTA (here CUs, CMs and EUs) increases trade by 101 percent over the same time-period.

Similarly, Roy (2010) finds that “customs unions have a much larger impact than FTAs” on trade. The difference is a 31 percent increase for FTAs versus a 136 percent increase for customs unions over ten years, including an anticipation effect. When Roy splits the sample for customs unions between the EU and “CUs other than the

EU”, the results are even more striking. The results show that although the EU effects are strong (+117%), the impact on CUs other than the EU is by far the strongest (+366%). One potential explanation for this is the fact that CUs other than the EU, for instance, the Caribbean Community and the Central American Common Market, are RTAs whose membership consists of relatively small economies. They are also agreements between countries where trade barriers are likely to have been high before the agreements went into force. As shown by Anderson and Yotov (2016), the trade effects of RTAs are stronger when initial trade barriers are high.

Eicher and Henn (2011) find negative effects for general system of preferences (GSP) preference arrangements (category 1 RTAs). The effect is minus 21 percent in their preferred regression specification.

Kohl and Trojanowskaja (2015) also compare the effects of the six categories of RTAs. Like Baier, Bergstrand and Feng (2014), they collapse the three deep-end RTA types (customs unions, common markets, economic unions) into one variable. Again, the results indicate a hierarchy of trade effects from shallow to deep integration. Non-reciprocal preferential trade agreements only have a small effect (+8 percent), followed by reciprocal preferential trade agreements (+62 percent) and free trade agreements (+109 percent). Customs unions, common markets and economic unions have the strongest impact on trade between members (+250 percent).

Limão (2016) reaches similar conclusions, estimating the trade effect of FTAs at 70 percent and



**Table 2: Overview of results reported in section 2.2**  
Percent increase in trade within each RTA category

	Non-reciprocal PTAs	Reciprocal PTAs	All (category 1 and 2) PTAs	FTAs	CUs	CUs+CMs+EUs***
Baier, Bergstrand and Feng (2014)	49	20*		60	-	101
Roy (2010)	-	-		31	136	-
Limao (2016)	statistically non-significant	51		70	-	219
Magee (2008)	-	statistically non-significant		66	129	-
Kohl and Trojanowska (2015)	8	62		109	201	250
Eicher and Henn (2011)	-21					
Soete and Van Hove (2017)**	-	-	21	42	77	

\* Only statistically significant with a 10-year lagged effect.

\*\* Only EU RTAs

\*\*\* CUs=customs unions, CMs=common markets, EUs=economic unions.

the trade effect of an RTA category that includes customs unions, common markets and economic unions at 219 percent. He finds no statistically significant effect on trade for non-reciprocal preferential trade agreements.

The only surveyed study that does not find a hierarchy of trade effects from shallow to deep integration is Anderson and Yotov (2016). In an extension of their main analysis, they split the dataset into four groups based on WTO classification: free trade agreements, customs unions, economic integration agreements and partial scope agreements. They then collapse free trade agreements and customs unions into a “deep integration” variable and the other two groups into a “shallow integration” variable. When they run the regression, they do not find stronger effects for deep integration agreements. One potential explanation for this result is that, according to this WTO-based classification, most shallow integration agreements signed during the period under investigation (1990–2002) are economic integration agreements, i.e. RTAs notified under GATS. These agreements tend to overlap with free trade agreements, i.e. RTAs notified under GATT.

Soete and Van Hove (2017) estimate the effects of EU trade agreements with other economies. They find that EU trade agreements classified as customs unions and common markets increase trade by 77 percent over ten years. EU FTAs increase trade between members by 42 percent over the same time-period, while EU preferential trade agreements (category 1 and 2 RTAs) increase trade by 21 percent.<sup>1</sup> Soete and Van Hove conclude that:

*“the size of the effect depends on the degree of integration implied by the agreement. FTAs and CUs clearly generate stronger cumulative trade effects than PTAs. Hence, effective trade integration requires deep integration.”*

Finally, Matoo, Mulabdic and Ruta (2017) estimate the effects of different agreements by classifying them according to the number of legally enforceable provisions included in each agreement. With the EU classified as a deep agreement, the United States-Korea FTA classified as medium-depth and the Peru-Chile FTA classified as shallow, the results indicate that deep agreements create more trade. The Peru-Chile FTA increases bilateral trade between 10 and 30 percent, whereas the trade effect of the US-Korea FTA is between 14 and 40 percent. Finally, the EU has increased intra-EU trade between 44 and 164 percent. The authors conclude that deep agreements lead to more trade-creation than shallow agreements. Specifically, they estimate that deep RTAs boost trade by 44 percent compared with shallow agreements.

### Summary and discussion

The RTA effect on trade in goods increases with depth and enforceability of the agreement. Whereas preferential agreements have modest effects on trade, FTAs have substantial trade-creating effects. CUs or even more ambitious forms of economic integration have the strongest trade effects.

Across five studies that cover a comprehensive set of RTAs, the range of trade effects is 30–110 percent for FTAs and 100–250 percent for CUs

and more ambitious forms of economic integration. The trade effects of customs unions, common markets and economic unions thus appear to be at least twice as strong as the trade effects of FTAs.

One explanation for the strong customs union effect compared with free trade agreements is the fact that trade within a customs union is simpler and requires less red tape. For instance, rules of origin are not required for trade within a customs union.

If the objective is increased trade, the results presented here indicate that RTAs that are reciprocal and deep (FTAs or CUs) are considerably more effective in achieving that objective than RTAs that are of limited scope or are based on one-way preferences.

## 2.3 Which RTA provisions stimulate trade in goods the most?

For policymakers and negotiators with a limited number of negotiating “chips” to spend in trade negotiations, the question posed in this section might be the most important one of all. Few studies have empirically examined the effects of *individual* provisions in RTAs. As mentioned above, however, the current research trend is to open up the black box of RTAs. Below, we report some studies that attempt to do that.

A study by Limão (2016) estimates the RTA effect on trade after controlling for applied tariff reductions and finds that tariff reductions in RTAs account for about one-fifth of the total RTA trade effect. The share is somewhat larger for FTAs (one-third) than for CUs (less than 20 percent). While this calculation does not account for effects associated with increased certainty due to tariffs bindings, it still tells us that tariff elimination only represents a limited share of the total trade effects of RTAs.

Limão furthermore concludes that the trade effect of (1) reducing applied tariffs in RTAs and (2) reducing other bilateral trade costs, including non-tariff barriers (NTBs), is of similar magnitude. However, since the elimination of tariffs only accounted for about one fifth of the total trade effect of RTAs, Limão notes that adding an NTB effect does not fully account for the trade impact of RTAs. A third effect of RTAs that Limão analyses is, therefore, the reduction in trade pol-

icy uncertainty with respect to both tariffs and NTBs. In this context, he also mentions the role of RTAs as insurance against trade wars.

As an example of the effects of reduced trade policy uncertainty, Limão uses the accession of Spain to the EU in 1986. By referring to earlier work (Handley and Limão, 2015), he concludes that tariff elimination accounted for less than 40 percent of the effect of increased Spanish exports to other EU members as a result of EU accession. The certainty that tariffs would not be re-imposed in the future added another 35 percent to that figure, he argues. In total therefore, tariff elimination and reduced trade policy uncertainty accounted for 75 percent of the total (merchandise) trade effect of Spain’s EU accession. Limão concludes:

*“If firms do not believe the current policy changes are credible then their response will be attenuated. Therefore, the depth of PTAs, as measures by the credibility of the provisions and the presence of enforcement mechanisms is critical in generating investment and trade effects.”*

Other studies have examined the effects of behind-the-border provisions and provisions that are typically included in deep-integration RTAs. Dhingra, Freeman and Mavroeidi (2018), for instance, find that RTA provisions related to services, competition and investment contribute 30–35 percent to the overall impact of RTAs on trade in goods.

Kohl et. al. (2016) find that so-called WTO plus provisions in RTAs (RTA provisions that are covered by the WTO but go further in terms of depth/ambition) are trade promoting, particularly when they are legally enforceable. In contrast, so-called WTO extra provisions (RTA provisions that do not have any equivalent in the WTO) did not exert any significant effect on bilateral trade flows. The WTO plus provisions examined covered areas such as agriculture, services, state aid, state trading enterprises, trade defence measures, quantitative restrictions, IPR, investment, public procurement, SPS and TBT. The WTO extra measures concerned capital mobility, competition, environment, and labour standards.

Davis and Gift (2014) report an effect in the range of 10–20 percent on trade in goods between EU members from the Schengen agreement.<sup>2</sup> In other words, the Schengen agreement could explain a non-negligible part of the EU effect on

trade (see section 2.4.1 below). Felbermayr, Gröschl, and Steinwachs (2018) estimate the Schengen effect on bilateral trade at a more modest 3 percent.

Finally, an extensive literature also shows that common currencies stimulate trade, even though the magnitude of the effect is still subject to debate. Head and Meyer (2014) estimate that a common currency doubles trade between members. However, they note that other studies show less significant results. Santos Silva and Tenreyro (2010) find weak or no trade effects from the introduction of the euro, whereas Frankel (2010) estimates that the Euro increased trade by 15 percent after five years. Halvarsson, Kokko and Gustavsson Tingvall (2014) detect no statistically significant EMU effect on trade in goods. Flam and Nordström (2007), however, estimate the trade effect of the Euro at 26 percent, and Glick (2017) finds that the EMU expanded trade by 40 percent between original members. Using a longer time series (1948–2013), Glick and Rose (2016) conclude that “the EMU has thus far boosted bilateral trade by around 50 percent”.

### Summary and discussion

While research has advanced in recent years, it is still not possible to determine exactly the extent to which different types of RTA provisions stimulate trade. It is clear, however, that tariff elimination only explains part of the trade effect of RTAs. Surveyed studies indicate that the elimination of applied tariffs account for 20–40 percent of the total effect on trade in goods. In addition, reduced trade policy uncertainty because of tariff bindings stimulates trade.

Other factors that explain RTA effects on trade in goods are the inclusion of WTO plus provisions, including commitments related to agriculture, services, state aid, state owned enterprises, trade defence, quantitative restrictions, intellectual property rights, investment, public procurement, SPS and TBT measures. The review also shows that non-trade arrangements, such as the Schengen accords and common currencies, stimulate trade in deep integration agreements.

Together with the results presented in section 2.2, the results reported in this section provide support for the view that deep integration agreements are considerably more effective in stimulating trade than shallow agreements.

## 2.4 What are the effects of individual RTAs on trade in goods?

As mentioned in section 2.1 there are two basic categories of studies that estimate the effects of RTAs on trade. One category estimates the average effects of RTAs, whereas another category examines the effects of individual trade agreements. In this section, we report results for the latter category.

It should be noted that results for individual agreements tend to fluctuate more between statistical significance and non-significance and in economic magnitude when regression specifications change. In other words, the results for this category of studies are generally less robust. One important reason for this is that there are less data (less trade and fewer years during which an RTA has been in effect) available to “pick up” relevant variation.

### 2.4.1 Trade effects of the European Union

Earlier studies on the effects of EC/EU integration (since 1958) on trade between members varied greatly. Summarising results for the European Communities, Kohl (2014) reports a span of average effects of RTAs between negative 35 percent and plus 900 percent for studies published before 2003. Again, therefore, we focus on studies published from 2007 and onwards, studies that are theoretically motivated and address key biases in estimation.

According to Baier et al. (2008), “the EEC/EC/EU had an economically and statistically significant effect on trade between members”. Using two different estimation techniques, they report an increase in trade due to EEC/EC/EU membership at 101 percent and 127 percent over ten years. They conclude that “the trade effects of membership in the EEC/EC/EU have been much larger than those suggested by *ex-ante* considerations”.<sup>3</sup>

Using a different method, Baier and Bergstrand (2009) calculate that trade among the original EU-6 members was 116 percent higher than the counterfactual scenario as a result of the formation of the European Communities and subsequent European integration until the year 2000. In other words, EU integration has more than doubled trade among the original EU members.

Compared with other surveyed studies, Eicher and Henn (2011) report a lower trade effect for the EU: a 37 percent trade increase among EU members relative to trade with non-members. They argue that the trade effect of the EU appears to be lower due to the way they measure it. Since the EU is a deep integration agreement that often lowers trade costs for members *and* non-members alike, a smaller difference between the increase in trade between members and the increase in trade between members and non-members might hide an overall strong net trade creating effect. In addition, Eicher and Henn do not allow for any phase-in period in their estimation.

In contrast, Kohl (2014) estimates the trade effect of the European Communities at 116 percent when he accounts for a ten-year phase in period. Similar results are reported by Roy (2011), an increase of 117 percent over ten years and with an anticipation effect.

Along the same lines, Halvarsson, Kokko and Gustavsson Tingvall (2014) conclude that Swedish trade is twice as large as a result of Sweden's EU membership. More specifically, Swedish trade increased by 96 percent after Sweden's EU membership in 1995, compared to the non-membership gravity benchmark. The result is in line with their calculations for the EU as a whole. They estimate a 99 percent average increase for EU member states from their EU membership. It is also of the same magnitude as

for the other countries that were part of the 1995 EU enlargement (Austria and Finland).

The UK government (HM Treasury, 2016) reports trade increases from EU membership that are similar in magnitude to results from studies published in academic journals. They estimate that EU membership boosts intra-EU trade by 115 percent compared to non-membership.

Mayer, Vicard and Zignago (2018) report even stronger results for the EU. They calculate that the EU single market has tripled trade (+224 percent) between members compared with a non-single market scenario between 1992 and 2012. The effect also appears to have increased over time.

Other studies focus on the effects of Europe agreements or EU accession. Magee (2008), for instance, finds that countries that pursue EU integration (the accession of Spain and Portugal to the EC in 1986; Poland and Hungary signing FTAs with the EC in 1992) experience large trade-promoting effects. In the case of Spain and Portugal in 1986, neighbouring France also experienced a substantial trade boost. Similarly, Hannan (2016) estimates that the 1986 EC enlargement with Spain and Portugal generated a 95 percent increase in trade between previous EC members and Spain/Portugal over ten years.

Finally, Glick (2017) concludes that EU membership has increased trade by 68 percent for old (pre-2004) members and by substantially more

**Table 3: Overview of comparable estimates of EU trade effects**

Study	Effects on trade in goods* (percentage increase)	Time period	Estimation method**	Captures phase-in effects?	Captures anticipation effects?
Baier, Bergstrand, Egger & McLaughlin (2008)	101	1960–2000	First differencing	10 years	No
Baier, Bergstrand, Egger & McLaughlin (2008)	127	1960–2000	Fixed effects	10 years	No
Baier & Bergstrand (2009)	116	1960–2000	Matching	No	No
Roy (2010)	117	1960–2000	Fixed effects	10 years	Yes
Eicher & Henn (2011)	37	1950–2000	Fixed effects	No	No
Kohl (2014)	116	1950–2010	Fixed effects	10 years	No
Halvarsson, Kokko & Tingvall (2014)	99	1962–2010	Fixed effects	No	No
UK Treasury (2016)	115	1948–2013	Fixed effects	No	No
Hannan (2016)	95	1983–1995	Synthetic matches	10 years	No
Mayer, Vicard & Zignago (2018)	224	1992–2012	Fixed effects	20 years	No

\* All studies report partial effects on trade (imports or exports), effects that could be the result of either trade-creation or trade-diversion from non-members. For a discussion of potential trade-diversion effects, see section 2.5.

\*\* For an overview of these different methods, see box 2 in the appendix.



(+290 percent) for countries that joined in 2004 and later.

#### **2.4.2 Trade effects of NAFTA**

Among the studies that estimate the trade effects of NAFTA Baier, Bergstrand and Vidal (2007) find no statistically significant effect. They note, however, that their study does not absorb the full effect of NAFTA, since they only have data from the formation of NAFTA in 1994 to the year 2000.

While Eicher and Henn (2011) report non-significant effects for NAFTA, Hannan (2014) finds that on average, NAFTA increased trade between the US, Mexico and Canada by 79 percent over ten years.

Using a different method and more countries in the dataset, Kohl (2014) concludes that NAFTA increased member trade by 88 percent.

As mentioned above, the results tend to fluctuate more between statistical significance and nonsignificance when individual agreements are examined. This could explain why, for instance, NAFTA effects are not consistently statistically significant.

#### **2.4.3 Trade effects of other important RTAs**

##### **EFTA**

Depending on the estimation method, Baier, Bergstrand, Egger and McLaughlin (2008) estimate the impact of EFTA at between 12 and 25 percent after ten years.

According to Eicher and Henn (2011), EFTA has increased trade between members by 22 per-

cent. Compared to other studies, Kohl (2014) reports a stronger trade increase of 66 percent from EFTA.

##### **MERCOSUR**

Baier, Bergstrand and Vidal (2007) estimate a 115 percent trade increase between members of MERCOSUR between 1991 and 2000 – the last year in the dataset.

Similarly, Eicher and Henn (2011) report a 125 percent increase in trade between members as a result of MERCOSUR. In contrast, Kohl (2014) finds no significant effects for MERCOSUR.

##### **The Caribbean community**

Baier, Bergstrand and Vidal (2007) find a strong impact from the Caribbean community on trade between members. The figure, a 530 percent increase over 20 years is the largest effect they record for any (North or South) American trade agreement. It should be noted, however, that only three countries (Jamaica, Trinidad and Tobago and Guyana) out of the current 15 member states were included in the data-set. Consequently, the results may not reflect the effect for a full set of CARICOM member states.

Like Baier et al. (2007), Eicher and Henn (2011) find a very strong 190 percent trade-creation effect between members as a result of CARICOM. In contrast, Kohl (2014) finds no statistically significant effect of CARICOM.

##### **The Central American Common Market**

According to Baier, Bergstrand and Vidal (2007), the Central American Common Market (CACM) has had a significant impact on the trade of its

members. They estimate that it has increased trade between two average members by 90 percent over 15 years. Using a different estimation technique than in their 2007 publication, Baier and Bergstrand (2009) estimate that CACM had roughly tripled members' trade by 2000.

### **The Andean Community**

Baier, Bergstrand and Vidal (2007) record very strong effects for the Andean Community between Bolivia, Colombia, Ecuador and Peru.<sup>4</sup> According to their estimates, trade between members increased by 280 percent between 1995 and 2000. They explain these strong results with the observation that the group had the highest tariffs in Latin America before the agreement came into effect.

Kohl (2014), however, finds no statistically significant effect for the Andean Community after ten years.

Again, we remind the reader that results for individual agreements tend to fluctuate more between statistical significance and nonsignificance. For individual agreements, there are less data available to pick up variation. This makes gravity regression estimations more sensitive, which may, in turn, explain some seemingly contradictory results reported here.

### **The Economic Community of West African States (ECOWAS)**

RTAs do not just stimulate trade in Europe and the Americas. Deme and Ndrianasy (2017) estimate that the Economic Community between West African States (ECOWAS) has increased trade among its members by 101–166 percent over a twenty-year period (1992–2012).

Conversely, Kohl (2014) finds no statistically significant effect for ECOWAS.

### **Australia New Zealand Closer Economic Agreement (ANZCERTA)**

Eicher and Henn (2011) report an 86 percent increase in trade between Australia and New Zealand as a result of ANZCERTA.

According to Kohl (2014), ANZCERTA increases trade between the parties to the agreement by 41 percent after ten years.

### **Summary and discussion**

Empirical estimates of trade effects for individual RTAs fluctuate much more in terms of economic magnitude and statistical significance than RTA

effects measured at the aggregate level or by RTA category (sections 2.1 and 2.2).

Based on the nine studies surveyed here, and not counting two “outliers”, EU trade effects are in the range of 100 to 130 percent. Several studies indicate that the EU has more than doubled trade between members, whether through the original treaty or through different rounds of deepening and enlargement. The results for the EU are more consistent in terms of statistical significance and economic magnitude than for any other agreement.

For NAFTA, the trade-increasing effect appears to be strong at 80–90 percent. In two studies, however, the results were statistically non-significant. As mentioned, the results fluctuate more for studies that attempt to measure the effects of individual agreements. That is probably reflected in the results for NAFTA, an FTA that most trade analysts would regard as effective in stimulating trade.

Finally, the review shows that accession to a larger trade block boosts trade substantially for the country seeking accession. The effect appears to be particularly strong for small countries acceding to a large RTA.

## **2.5 Trade-creation vs. trade-diversion**

One important potential objection to the conclusion that RTAs promote trade strongly is the risk that trade-creation has come at the expense of trade with third countries. In other words, when two or more countries sign an RTA they merely replace imports from countries outside the agreement (third countries) with imports from each other, resulting in little or no net trade-creation. Such trade-diversion effects of free trade agreements and customs unions have been discussed since at least the 1950s (Viner, 1950). Until recently, however, it has been difficult to estimate trade-creation and trade-diversion effects with any degree of certainty. Again, improvements in data and statistical methods have changed this.

Below, we refer to increased trade between members as a result of an RTA, as “trade-creation”, reduced trade with third countries as “trade-diversion” and increased trade with third countries due to an agreement as “open-block effects”.<sup>5</sup> The open-block effects of RTAs are likely to occur

when trade liberalisation between the parties is non-discriminatory, i.e. when a certain RTA-linked reform benefits both members and non-members (Kommerskollegium, forthcoming).

As reported above, Magee (2008) estimates that bilateral trade flows increase by 89 percent if the country pair is part of an RTA. He finds no evidence of trade-diversion:

*“The estimates...provide no statistically significant evidence that regional agreements reduce imports from countries outside the trading bloc.”*

In contrast, Egger et al. (2011) find that trade with RTA non-members decrease by 9 percent on average. Compared with their estimation of trade-creation (+102 percent between members), however, the trade-diversion effect is modest.

Urata and Okabe (2014) conduct a product-level analysis of the effects of RTAs on trade flows. Their results indicate that FTAs display stronger trade-diversion effects than CUs. Trade-diversion is detected in six of twenty product categories for FTAs, compared to only two for CUs. They furthermore find that plurilateral RTAs have stronger trade creating effects than bilateral RTAs, while the trade-diversion effect is about the same.

Finally, they find no trade-diversion effects for any products except for medical and pharmaceutical products for *developed countries*. In contrast, RTAs give rise to trade-diversion for half the products in RTAs that involve *developing countries*. The reason for this result, they suspect, is the fact that developing countries typically have higher external (MFN) tariffs than developed countries. Urata and Okabe therefore conclude that the

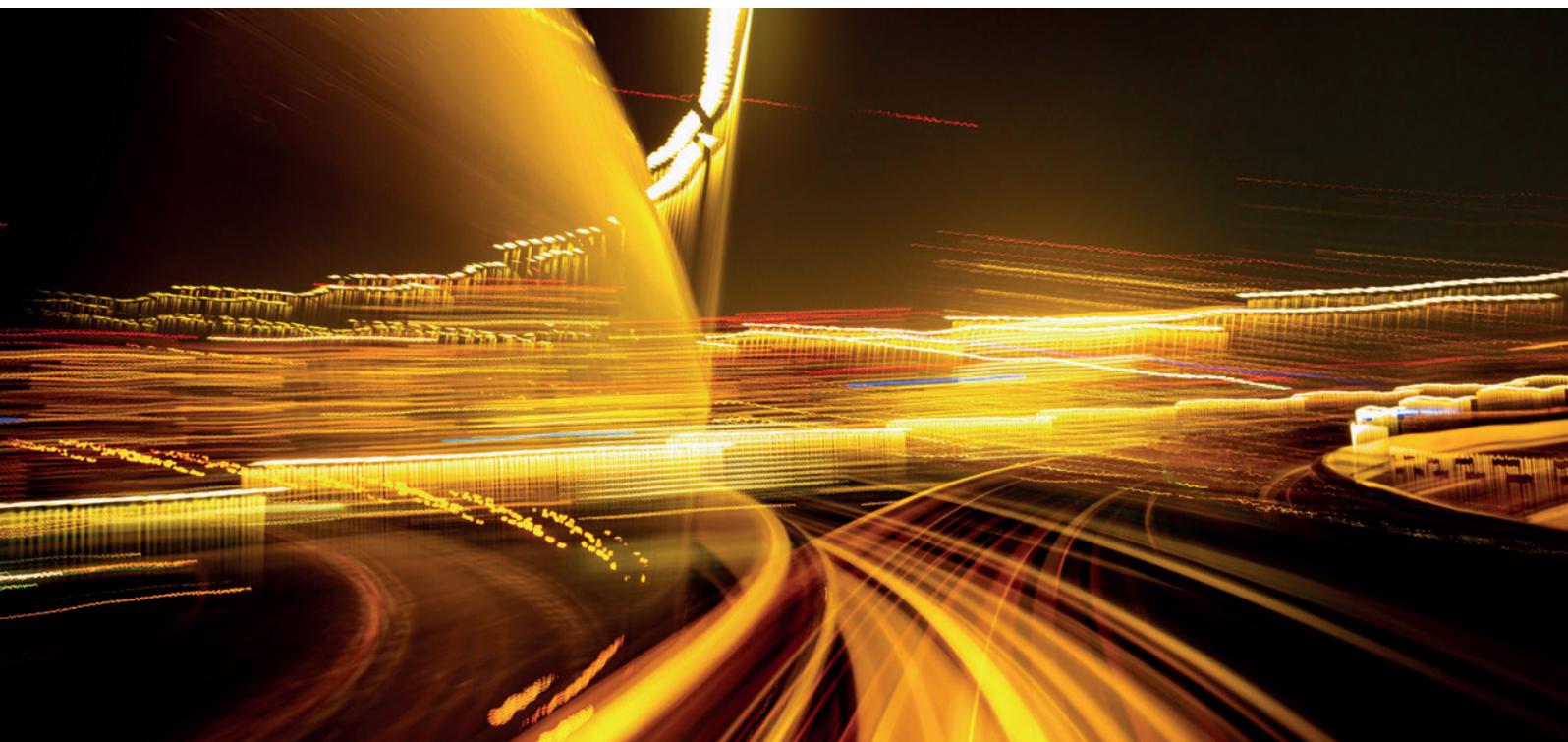
desirable RTAs “is the customs union with a large number of members and low external tariffs”.

The UK government (HM Treasury, 2016) finds no statistically significant EU trade-diversion effects in their gravity estimations of EU membership. As mentioned above, the UK Treasury estimates that EU membership boosts intra EU trade by 115 percent relative to non-membership.

As mentioned in section 2.4.3, Deme and Ndrianasy (2017) assess that ECOWAS has created trade among its members by 101-166 percent over a twenty-year period (1992–2012). Overall, they find no statistically significant effect on imports from third countries, i.e. no trade-diversion or open-block effects. When they differentiate their dataset into three country groups according to income level, however, they find statistically significant open-block effects of ECOWAS for trade with low-income third countries.

Finally, Mattoo et al. (2017) find substantial open-block effects for the EU. According to their calculations, non-member exports to the EU would have been 30 percent lower without the EU. More generally, they find that deep agreements create more trade than shallow agreements, and that deep RTAs have positive spillover effects on trade with third countries when they are non-discriminatory in design or implementation. They conclude as follows:

*“The results indicate that deep agreements lead to more trade creation and less trade diversion than shallow agreements. Furthermore, some provisions of deep agreements have a public good aspect and increase trade also with non-members.”*



## Summary and discussion

According to the surveyed studies, trade-creation effects of RTAs dominate trade-diversion effects. In several studies that report strong trade-creation effects of RTAs, the trade-diversion effect is statistically and/or economically non-significant. While some trade-diversion is observed, the open-block effects of RTAs appear to be more important, at least for the EU.

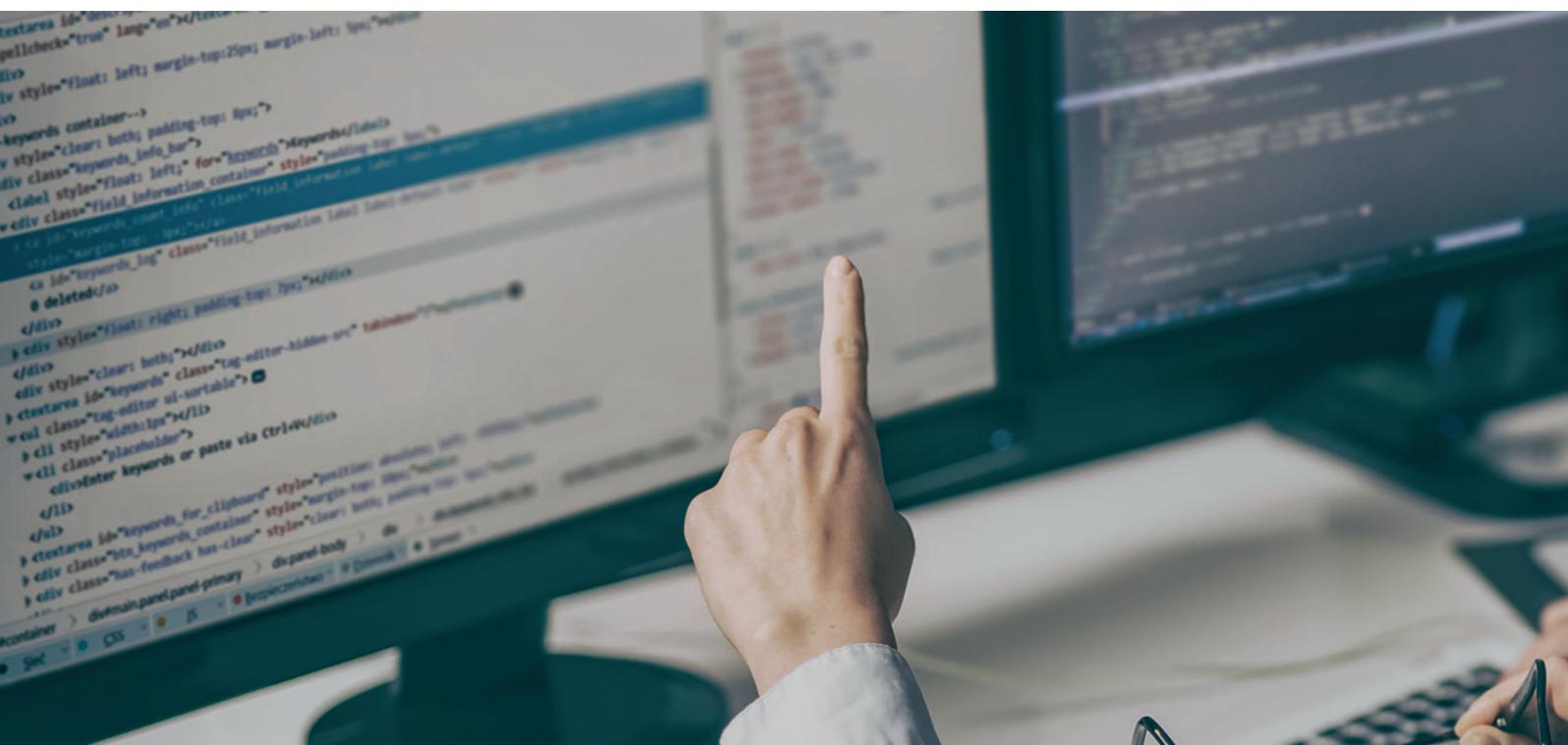
Shallow RTAs are associated with more trade-diversion than deep integration agreements, most likely because deep integration provisions tend to be less discriminatory. The EU is particularly associated with open-block effects, again probably because many EU reforms benefit both members and non-members. Another explanation may be that the EU enlargement process during the 1990s and 2000s required trading partners to align internal rules and regulations with those of the EU before accession. As a consequence, trade may have increased before EU accession, indicating EU open-block effects.

The discussion of trade-creation vs. trade-diversion is fundamental in all trade policy considerations related to bilateral and regional trade agreements. The empirical results reported here suggest that the fear that RTAs divert as much trade as they create is unfounded. At the same time, it is important to continue to make efforts to minimise the trade diverting effects of RTAs, since trade-diversion reflects a misallocation of resources internationally. A discussion of how this can be achieved along with a list of non-discriminatory RTA provisions can be found in Kommerskollegium (forthcoming).

## 2.6 What are the effects of RTAs on trade in services?

So far, all surveyed studies have measured the effects of RTAs on trade in goods. In light of the fact that trade in services is increasing quickly, focussing only on trade in goods provides an inadequate picture of how trade is influenced by RTAs. For instance, in just ten years, from 2006 to 2016, trade in commercial services as a share of merchandise trade rose from 32,5 percent to 44 percent (WTO, 2017).

According to Guillin (2013), RTAs that contain provisions on services increase services trade between members by 18–32 percent on average, compared with trade between country pairs that are not members of the same RTA. Conversely, agreements without service provisions have no significant effect on trade in services. For the EU, trade in services has increased by 36 percent between members (again compared with trade between country pairs that are not both members of the EU), higher than the overall RTA services trade effect. Guillin furthermore finds that agreements with more ambitious services commitments have a greater impact on trade than agreements with a low level of ambition. Indeed, she finds that only agreements with high levels of service commitments have a statistically significant impact on trade in services. A similar conclusion is drawn with respect to sector coverage. As more sectors are included in an agreement, the impact on trade becomes stronger. Finally, Guillin observes that the RTA impact on trade in services is about half of the RTA impact on trade



in goods for comparable specifications (in this case, between her own specifications and those found in Baier and Bergstrand, 2007).

Service commitments in RTAs tend to have a positive impact on exports even if no actual liberalisation takes place. According to Lamprecht and Miroudot (2018), the average level of commitments in RTAs is associated with a positive impact on services trade in the range of 8–12 percent compared to an average GATS level of commitments. They show that in three sectors (professional services, financial services and telecom services), RTA service commitment that “cut water” without reducing applied barriers to trade in services, have a statistically significant effect on trade in services.<sup>6</sup> For computer services and transport services, however, the results are not significant.

Halvarsson, Kokko and Gustavsson Tingvall (2014) estimate the impact of EU membership on trade in services. According to their results, the EU impact on trade in services (plus 45 percent) is approximately half of the effect on trade in goods.

Based on trade data between 2002 and 2011, the UK government (HM Treasury, 2016) estimates that EU membership increases trade in services by 24 percent among members. The effects of RTAs on services trade more generally is weaker – plus seven percent. The difference between the EU effect on trade in services and the general RTA effect can be explained by the fact that the EU single market for services, while far from complete, is more far-reaching in terms of trade liberalisation than RTAs generally.

When Mayer, Vicard and Zignago (2018) make an apples-for-apples comparison between trade in goods and services, they find that the EU effect on trade in services is about half that of trade in goods. In a “general equilibrium” estimation (an ex post gravity calculation that is not quite comparable to most other results reported in sections 2.1–2.5) they furthermore find that the single market “increased trade between EU members by 109 percent on average for goods and 58 percent for tradable services.”

Park (2011) concludes that RTAs have positive effects for both intra and extra RTA trade in services. The sectors for which Park estimates trade effects are business, financial, communication and transportation services. The results show an increase in financial, business and communication services by 86, 125 and 65 percent, respectively. With the exception of transportation services, an increase in both intra- and extra- bloc trade is observed for all sectors. For transportation services, however, they record trade diversion from non-members by 27 percent as a result of RTAs.

### **Summary and discussion**

RTAs that contain services provisions have a positive effect on trade in services. Average effects in the range of 7–32 percent were recorded across three studies. For internal EU trade in services, the effect is stronger, with a range of 24–45 percent across three studies.

The RTA impact on trade in services is less than half the impact on trade in goods. The reason is



probably that RTA commitments for services rarely remove any applied barriers to trade in services. Instead, service commitments “cut water”, which reduces trade policy uncertainty. As discussed both in this section and in section 2.3, reforms that reduce trade policy uncertainty have a positive impact on trade even if no actual liberalisation takes place.

As for trade in goods, deeper commitments and broader sector coverage lead to stronger trade effects. Agreements without service provisions have no significant effect on trade in services.

The results indicate that there is still a great deal of potential from improving service commitments from RTAs. If trading partners seek depth in a trade agreement, a factor associated with strong effects for trade in goods in sections 2.2 and 2.3, ambitious commitments for trade in services are essential.

## 2.7 Do RTAs primarily stimulate existing or new trade?

When economists talk about an increase in trade, they normally discuss two dimensions: (1) increased trade in previously traded goods and services and (2) “new” trade flows. In trade economist jargon, more trade of the same kind is called an increase along the intensive margin. New trade, on the other hand, is referred to as an increase along the extensive margin. An increase along the extensive margin typically means that a firm that did not export before begins to export, but it can also mean that a firm begins to export new products to old markets or “old” products to new markets.

According to Baier, Bergstrand and Feng (2014), “the intensive margin effect [from RTAs] dominates the extensive margin effect.” They calculate that this dominance occurs at a ratio of approximately 2:1 for both FTAs and CUs. For non-reciprocal preferential trade agreements, they only found a statistically significant effect for increase along the intensive margin. In other words, while RTAs also create new trade, RTAs primarily stimulate existing trade, according to Baier and Bergstrand.

Like Baier and Bergstrand, Egger et al. (2011) conclude that the intensive margin dominates the trade effect of RTAs: RTA “membership has an impact on the intensive margin but does not

significantly affect the extensive margin of trade”. They speculate that this result could be explained by high fixed entry costs which are unaffected by RTA formation, whereas marginal trade costs are reduced by membership.

In contrast, Soete and Van Hove (2017) find that the extensive margin, i.e. new trade, dominates when they measure the effects of EU trade agreements with other countries. They only find a statistically significant effect along the extensive margin. In this case, the extensive margin refers to the number of goods traded, i.e. an increase in the variety of goods traded.

## Summary and discussion

Few studies decompose the trade effects of RTAs into existing trade and new trade. The studies that do show contradictory results in terms of which effect is the more dominant.

Since a range of other studies (e.g. Trefler, 2004) have shown that trade liberalisation more generally stimulates both “old” and “new” trade flows, it is clear that both effects are important to consider.

## 2.8 What are the trade effects of economic disintegration?

So far, this report has only covered the effects of further trade integration. What then, about the empirical effects of trade disintegration? How much would the dismantling of an FTA or a customs union reduce trade? Expressed differently, what are the effects of introducing new borders on international trade? With Brexit underway, this question has received increased relevance.

In at least one important way, the effects of economic disintegration differ from the effects of economic integration. For many trade agreements, the welfare effects are double-edged in the sense that they increase the aggregate level of welfare while inducing costs in the shape of structural adjustment. For economic disintegration, there is no such ambiguity. The reason is that economic disintegration means that the economy moves from a higher to a lower level of welfare, while again inducing structural adjustment costs.

Many studies have simulated the effects of Brexit, for instance HM Treasury (2016). However, for obvious reasons there have not yet been any ex post empirical studies of Brexit. Looking

back in time, there are not any relevant cases to rely on either. For more than 70 years, the movement has been towards more, not less, free trade and economic integration in the world. In this sense, Brexit is unique.

However, the gravity literature still provides some guidance. In fact, the question of the border effect is an important one in the literature. In a ground-breaking paper, McCallum (1995) estimated that Canadian provinces traded up to 22 times more with each other than with similar US states. This result created an increased academic interest in gravity estimation modelling and border effects. More recent research has revised this figure downwards, but it remains high. Anderson and Van Wincoop (2003), for instance, estimate that borders reduce trade by 80 percent when they compare trade across a border with trade inside a border. Head and Mayer (2013) report similar figures. In their calculation, trade within borders is 85 percent higher than trade across borders.

Using euro area countries as gravity benchmarks for a scenario in which Scotland leaves the UK but remains in a currency union with England, Wales and Northern Ireland, the UK government (HM Treasury, 2013), estimates that trade between Scotland and the rest of the UK would be 83-86 percent lower if Scotland were to become independent.

Using a gravity model, Mayer, Vicard and Zignago (2018) estimate import penetration ratios (imports/total consumption) with and without the EU for all 28 EU member states. On

average, the import penetration ratio would decrease from 58 percent to 45 percent if the EU were replaced by a regular FTA, according to their calculations. The effect is the strongest for small open economies and central and eastern European countries. Overall, imports are 36 percent higher with the EU than with a counterfactual “normal RTA” scenario.

Finally, HM Treasury (2016) estimates that the EU has increased trade in *both* goods and services between EU members by 76 percent relative to a baseline WTO scenario, +115 percent for trade in goods and +24 percent for trade in services as reported above. They furthermore note that the “symmetric equivalent of a 115 percent increase in intra-EU trade [in goods] from EU membership is a fall in 53 percent from leaving the EU”

## Summary and discussion

The trade effect of economic disintegration is the flipside of the effects of economic integration. Reversing deep integration - as in the case of Brexit - means reversing trade agreements that stimulate trade. While counter-factual scenarios are less reliable than empirical estimations, the studies surveyed here point to reduced trade caused by economic disintegration.

In one important aspect, economic disintegration is not the flipside of economic integration, however. While analysis of RTAs often weighs the gains from additional trade against the costs of structural adjustment, economic disintegration implies both reduced gains from trade and (new) structural adjustment costs.

# 3

## Empirical studies vs. CGE simulations

As mentioned in the introduction, this report only covers empirical studies (ex post studies that measure trade effects after they have occurred) rather than estimations based on computable general equilibrium simulations (ex ante calculations). One interesting comparison, however, is to determine whether the anticipated trade effects were accurate in retrospect. Interestingly, it appears that CGE simulations tend to underestimate the actual trade effects substantially.

Kehoe (2003) compares three ex ante studies of NAFTA with observed outcomes and concludes that the empirical (observed) trade effects of NAFTA outstripped model-based ex ante predictions by a factor of ten.

Baier, Bergstrand and Vidal (2008) discuss the same issue:

*“Traditional ex ante estimates of the trade and economic welfare gains from EIAs have often suggested relatively modest economic benefits. Much anecdotal evidence from policy makers suggests that the anticipated economic gains are much larger than traditional CGE models have implied. However, sufficient time has now passed – and econometric and theoretical developments advanced – such that policy makers can now examine with more precision the ex post effects of EIAs on trade patterns. The evidence in this paper suggests that the trade effects of membership in the EIAs in the Americas have been much larger than those suggested by ex ante considerations and much larger than even earlier empirical estimates using cross-sectional gravity equations suggested.”*

They move on to suggest that the reason for this discrepancy is related to the difficulty of modelling complex and elaborate non-tariff barriers. The paper concludes that current empirical evidence is consistent with the view that “the economic benefits from EIAs are much larger than conventional ex ante economic analyses have previously suggested.”

One potential example of this problem is our own 2012 CGE simulation of the Transatlantic Trade and Investment Partnership (TTIP). According to the simulation, transatlantic trade was expected to grow 20 percent over ten years because of TTIP (Kommerskollegium, 2012). However, we added an important caveat:

*“Because the economic model used in this study does not include direct foreign investments or consider any dynamic effects, the results from the simulated FTA can be expected to be underestimated.”*

In view of the range of empirical trade effects for FTAs reported here (30-110 percent over ten years), our CGE simulated effect of 20 percent undoubtedly sounds modest, particularly since TTIP represented an attempt to create a deep-integration FTA.

In line with this, Hannan (2016) notes that “ex-ante studies have generally found a lower impact of trade agreements [than empirical studies]”. He argues that the results of CGE models are associated with substantial uncertainty and that this is “due to the difficulty of quantifying all the channels responsible for boosting trade due to trade agreements.”



# 4

## Conclusions

This report has reviewed recent studies that estimate the effects of regional trade agreements on trade flows. All reported results are based on studies that have a solid theoretical foundation and use the latest econometric techniques to account for significant sources of bias. Below, we summarise the main results and draw conclusions.

### **What is the average effect of RTAs on trade in goods?**

On average, RTAs double trade after allowing for a phase-in period of ten years. In all surveyed studies, the average trade increase of RTAs is in the range of 50–170 percent after ten years. Eight of twelve surveyed studies report average trade increases in the range of 80–125 percent.

The strong overall RTA effects on trade between members indicate that economic integration works. Negotiating RTAs that liberalise trade is an effective strategy for countries that seek economic improvement through increased international trade.

### **What types of RTAs stimulate trade in goods the most?**

The trade effect of RTAs increases with depth and enforceability. Whereas preferential agreements have modest effects on trade, free trade agreements have substantial trade-creating effects. Customs unions or even more ambitious forms of economic integration have the strongest trade effects.

Across five studies that cover a comprehensive set of RTAs, the range of trade effects is 30–110

percent for free trade agreements and 100–220 percent for customs unions and more ambitious forms of economic integration. The trade effects of customs unions, common markets and economic unions are thus at least twice as strong as the trade effects of free trade agreements.

One explanation for the strong customs union effect compared with free trade agreements is the fact that trade within a customs union is simpler and requires less red tape. For instance, rules of origin are not required for trade within a customs union.

If the objective is increased trade, the results presented here indicate that RTAs that are reciprocal and deep are considerably more effective in achieving that objective, than RTAs that are of limited scope and depth.

The results also indicate that a customs union is an attractive option for countries that seek closer economic integration.

### **What type of RTA provisions stimulate trade in goods?**

While research has advanced in recent years, it is still not possible to determine the exact extent to which different types of RTA provisions stimulate trade. It is clear, however, that tariff elimination only explains part of the trade effect of RTAs. Surveyed studies indicate that the elimination of applied tariffs accounts for 20–40 percent of the total effect on trade in goods. In addition, reduced trade policy uncertainty because of tariff bindings stimulates trade.

Other factors that explain RTA effects on trade in goods are the inclusion of so called WTO plus



provisions, including commitments related to agriculture, services, state aid, state owned enterprises, trade defence, quantitative restrictions, intellectual property rights, investment, public procurement, SPS and TBT measures. Non-trade policy arrangements, such as the Schengen accords and common currencies, also stimulate trade in deep integration agreements.

### **What are the effects of individual RTAs on trade in goods?**

Empirical estimates of trade effects for individual RTAs are often unreliable. They fluctuate much more in terms of both economic magnitude and statistical significance than RTA effects measured at the aggregate level or by RTA category.

The estimated trade effect of EU membership is in the range of 100–130 percent, allowing for a phase-in period of ten years. In other words, the EU has more than doubled trade in goods between members, whether through the original Treaty of Rome or through different rounds of deepening or enlargement. The results for the EU are more consistent in terms of statistical significance and economic magnitude than for any other individual agreement.

Estimations for other RTAs fluctuate more in terms of economic magnitude and statistical significance. Whereas NAFTA's trade-creating effects are 80–90 percent in two studies, the effect was not statistically significant in two other studies. According to two studies, MERCOSUR has increased trade between its members by 115–125 percent. However, one study found no significant effects for MERCOSUR.

Accession to a larger trade block substantially boosts trade for the country seeking accession. The effect appears to be particularly strong for small countries acceding to a large RTA.

As the next step, the Board intends to make additional gravity-based empirical analysis of the effects of EU RTAs with other economies.

### **Trade-creation vs. trade-diversion effects**

According to surveyed studies, the trade-creation effects of RTAs dominate their trade-diversion effects. In several studies that report strong trade-creation effects of RTAs, the trade-diversion effect is statistically and/or economically non-significant. While some trade diversion is observed, the open-block effects of RTAs appear to be more important.

Shallow RTAs are associated with more trade diversion than deep integration agreements, probably because deep integration provisions tend to be less discriminatory. In contrast, the EU is associated with open-block effects, probably because many EU reforms benefit both members and non-members. Another explanation may be that the EU enlargement process during the 1990s and 2000s required trading partners to align internal rules and regulations with EU rules before accession. As a consequence, trade may have increased before EU accession, indicating open block effects of the EU.

The discussion of trade-creation vs. trade-diversion is fundamental for all trade policy considerations related to RTAs. The empirical results reported here suggest that the fear that

RTAs divert as much trade as they create is unfounded. At the same time, it is important to continue to make efforts to minimise trade-diverting effects of RTAs, since trade-diversion reflects a misallocation of resources internationally. A discussion of how this can be achieved along with a list of non-discriminatory RTA provisions can be found in *Kommerskollegium* (2018, forthcoming).

### **What are the effects of RTAs on trade in services?**

RTAs that contain services provisions have a positive effect on trade in services. Average effects in the range of 7–32 percent were recorded across three studies. For internal EU trade in services, the effect is stronger with a range of 24–45 percent across three studies.

The impact of RTAs on trade in services is less than half their impact on trade in goods. The reason is probably that RTA commitments for services rarely remove any applied barriers to trade in services. Instead, service commitments “cut water”, which reduces trade policy uncertainty. However, reforms that reduce trade policy uncertainty also have a positive impact on trade even if no actual liberalisation takes place.

As for trade in goods, deeper commitments and broader sector coverage lead to stronger trade effects. Agreements without service provisions have no significant effect on trade in services.

The results indicate that there is a substantial additional trade potential from improving service commitments in RTAs. If trading partners seek depth in a trade agreement, a factor associated with strong effects for trade in goods, ambitious commitments for trade in services are essential.

### **What are the trade effects of economic disintegration?**

The trade effect of economic disintegration is the flipside of the effect of economic integration. Reversing deep integration – as in the case of

Brexit – means reversing trade agreements that stimulate trade. While counter-factual scenarios are less reliable than empirical estimations, the studies surveyed here point to reduced trade because of economic disintegration.

In one important aspect, economic disintegration is not the flipside of economic integration, however. While analysis of RTAs often weighs the gains from additional trade against costs from structural adjustment, economic disintegration implies both reduced gains from trade and (new) structural adjustment costs.

### **The difference between empirical studies and model-based simulations**

The survey shows that model-based simulations tend to underestimate the real-world trade effects of RTAs. The discrepancy can be explained by the fact that CGE models do not fully account for factors such as dynamic (mostly investment) effects, firm selection effects, “new” trade and increased predictability from RTAs.

The evidence presented here, therefore, suggests that it is important to rely not only on forward-looking models but also on empirical studies when assessing RTAs.

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The central conclusion in this report is that economic integration works if the objective is to increase trade. Most importantly, it is when countries make commitments – not when they avoid them by defending defensive interests – that RTAs help them increase trade. The most surprising findings are the magnitude of the overall effects compared to model estimations, the absence of substantial trade-diversion effects and a large difference between the effects of free trade agreements and customs unions. For the future, more precise estimates of different types of RTA provisions and for individual RTAs would be welcome.

# 5

## Appendix – measuring the trade effects of RTAs

The most commonly applied econometric model used to capture the empirical effects of trade agreements is the so-called gravity model. Nobel laureate Jan Tinbergen (1962) first introduced the model in an attempt to estimate the effects of Britain’s colonial trade preferences.

The gravity model treats factors such as economic size and geographic distance as basic determinants of bilateral trade flows. The analogy with Newton’s law of gravity derives from the fact that, similar to gravity, bilateral trade increases with economic mass (GDP) and falls with distance. For instance, it has been shown that exports increase proportionally with the economic size of the export destination (Head and Meyer, 2014). Together with other known determinants of bilateral trade flows such as common language, former colonial ties and common borders, this makes it possible “to determine the normal or standard pattern of international trade that would prevail in the absence of trade impediments” (Tinbergen, 1962). This information can then be used in econometric calculations to isolate the impact of trade agreements from other factors that determine trade flows.

In its elementary form, the gravity model can be expressed as follows:

$$M_{ij} = T(r) \frac{Y_i Y_j}{d_{ij}^{-\epsilon}}$$

where  $M_{ij}$  are imports from country  $i$  to country  $j$ ,  $Y_i Y_j$  is the joint economic mass of the two countries,  $d_{ij}$  the distance between them, and  $T(r)$  is a proportionality constant. In more recent models,  $T(r)$  is a gravitational non-constant including

bilateral trade costs and multilateral trade resistance.

Until the early 1990s, the theoretical support for the gravity model was weak. In an early version of the Handbook of International Economics, Deardoff (1984) described its theoretical basis as “dubious”. For a long time, the gravity model was a “theoretical orphan” (Soete and Van Hove, 2017).

In addition, earlier studies provided inconsistent results. According to Limão (2016) the “estimates found were heterogeneous across type of agreement examined, the time period, country sample and controls. So much so that the different authors could, and did, cite the same paper for finding either a strong effect or none for the same PTA”.

From the mid-1990s to the late 2000s, a revolution in gravity analysis occurred (Head and Meyer, 2014). First, the impact of geographic distance and borders on trade became more widely recognised. Second, scholars such as Eaton and Kortum (2002), and Anderson and van Wincoop (2003) provided a theoretical foundation for the model. Around the same time, significant sources of bias associated with earlier gravity estimations were addressed (Anderson and Van Wincoop, 2003; Santos, Silva and Tenreyro, 2006; Baier and Bergstrand, 2007).

One important source of bias recognised in the mid-1990s is the fact that the amount of trade predicted by the distance between two countries cannot be viewed in isolation from the geographic location of those two countries in relation to other economies. As Krugman (1995) pointed out, the amount of trade between two

countries will be different if they are located in the middle of Europe than if they are located on the planet Mars, even if the geographic distance between them is the same. In other words, not only does the absolute distance between two countries matter for bilateral trade but also their joint closeness/remoteness to other economies. Put even more succinctly, two countries will trade more with each other the closer they are each other and the more remote they are from the rest of the world. Because of this bias in earlier studies, the trade effects of EU integration were underestimated, whereas the trade effects of an agreement such as ANZCERTA (Australia-New Zealand Closer Economic Trade Agreement) were overestimated. To account for this source of bias, most studies today control for so called multilateral resistance. According to Baldwin and Taglioni (2006), failure to do so represents the “gold medal mistake” in gravity analysis. We recommend pp. 18-19 in WTO (2016) for a list of available solutions to this problem.

Another significant source of bias compared with earlier applications of the gravity model is the recognition that the independent variable (the decision to negotiate a trade agreement with a certain partner) is not necessarily independent from the dependent variable (trade flows with that partner). Magee (2003), for instance, showed that countries often select trade agreement partners with which they already trade quite intensely. While there is agreement in the literature on the fact that this is a significant source of bias, there is no consensus as to the direction of the bias (Soete and Van Hove, 2017).

While Baier and Bergstrand (2007) find that failure to account for so called endogeneity bias leads to underestimation of the effects of FTAs, Magee (2008) concludes the opposite. To address the problem of self-selection into RTAs, one would like to find an instrument that can separate the selection into an RTA from the trade volume effect. However, such variables are difficult to identify. As an alternative way to address the endogeneity problem, first differencing of the trade flows and the inclusion of country-pair fixed effects, have been suggested (see box 2).

A third source of bias that has been addressed more comprehensively during the last 10–15 years are problems associated with the presence of zero trade flows. In essence, gravity estimations based on an ordinary least squares (OLS) regression will become biased if the sample includes zero trade flows. The reason is that an OLS regression sample loses all zero observations when it is transferred to its standard log form. One solution to the zero trade flows is to move from log-linear models such as OLS to a family of multiplicative count data models that naturally allows for the inclusion of zero-valued observations. For details and references, see WTO (2016).

In addition to the issues discussed above, there is a series of other issues, such as how to model bilateral trade costs, for which we have seen rapid progress during the early 2000s. For these reasons – the laying of the theoretical foundation provided in the early 1990s and early 2000s combined with methodological advances – we have chosen to include only studies published since 2007 in the survey.



## Box 2

### Examples of estimation approaches

Over time, a range of estimation approaches for the gravity model has been developed. As seen below, different methods have their different advantages and weaknesses. Therefore, it is difficult to find an estimation approach that always outperforms competing alternatives. Below, we list different estimation approaches, and the econometrical problem they primarily address.

#### Methods that address multilateral resistance

- Double demeaning
  - Gives results close to true values but is (very) sensitive to missing values.
- Tetrads (using ratio of exporter & importer towards a 3rd country)
  - Solves the multilateral trade resistance problem but complicates the interpretation of the results and is sensitive to choice of reference country.
- Fixed effect estimation
  - The most common approach in applied research today. This approach is well designed to address the multilateral trade resistance problem. However, exactly how many fixed effects that should be included is still a matter of debate, and with many fixed effects the model can be computationally cumbersome.
- First differencing
  - An estimation approach that is similar to fixed effects. It also addresses the multilateral trade resistance problem.

#### Methods that address trade policy endogeneity

- Instrumental variables
  - Instrumental variables are typically used in econometrics to solve endogeneity problems (correlation between the independent variable and the error term). In practice, however, it has proven hard to find reliable instruments for RTAs. For this reason, few studies use this approach.
- Country-pair fixed effects
  - While country-pair fixed effects do not eliminate all bias, it reduces it considerably.
- First differencing
  - First differencing bilateral trade flows also addresses the endogeneity issue.

#### Methods that address zero trade flows

- Heckman selection model
  - Sensitive to heteroscedasticity (when the variance is different in different parts of the population), and relies on an exclusion restriction.
- Pseudo Poisson Maximum Likelihood estimator (PPML).
  - Not sensitive to heteroscedasticity and it does not rely on an exclusion restriction. It is fairly robust with respect to the inclusion of dummy variables.
- Zero Inflated Poisson estimator (ZIP)
  - Works well if the Poisson distribution assumption is met, which seldom is the case in gravity models.
- Zero Inflated Negative binomial (ZINB) estimator
  - Not sensitive to heteroscedasticity, fairly robust with respect to the inclusion of dummy variables, does not rely on an exclusion restriction.

#### Other (non-gravity) methods used to estimate the trade effects of RTAs empirically

- Matching econometrics and synthetic control groups

The basic idea behind both these methods is to identify a control group of country pairs that is similar to the country pairs that enter into an RTA. Once the control group is identified, trade flows between countries in the treatment group (bilateral pairs of countries that share an RTA) and countries in the control group (country pairs that do not share an RTA) is used to identify the impact of the RTA.

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# Notes

- 1 The EU only has customs union agreements with Turkey, San Marino and Andorra. While the EES agreement with Norway, Iceland and Liechtenstein means that these three countries are inside the single market (a CM in the typology in section 1.2), neither Norway nor Iceland or Liechtenstein are inside the EU customs area (a CU in the typology on page 3). In addition, the EU – Turkey customs union is not a full-fledged CU in the original sense of the term. EU agreements classified as PTAs in the study are primarily earlier agreements with Euromed and ACP partners.
- 2 The EU Schengen agreement grants free movement of persons within the EU. It currently includes 22 EU member states and four non-members (Norway, Iceland, Switzerland and Liechtenstein).
- 3 “Ex ante” means model-based (computable general equilibrium) estimations of the trade effects before a trade agreement comes into effect, whereas “ex post” means empirical estimations of actual trade flows after the agreement has entered into force. See section 4 below for elaboration.
- 4 The Andean Community is a hybrid between an FTA and a CU. It does not yet have a common external tariff, but a common tariff policy and several legal instruments harmonising customs regulation.
- 5 Open-block effects are sometimes also referred to as “reverse trade diversion”.
- 6 “Cutting water” refers to legal commitments that bind countries to a level of trade restrictiveness that is higher or on the same level as the current level of applied restrictions.

