A evolução dos Acordos Comerciais Aprofundados

The Evolution of Deep Trade Agreements

Aaditya Mattoo, Nadia Rocha, Michele Ruta
World Bank, Washington DC, United States

Abstract—Este artigo faz uma primeira análise dos novos dados sobre o conteúdo dos Acordos Comerciais Preferenciais (PTAs). Os dados contêm informação detalhada sobre as dezoito áreas políticas mais frequentemente cobertas pelos PTAs, concentrando-se nos objectivos declarados, compromissos substantivos, e outros aspectos tais como transparência, procedimentos e aplicação. Surgem uma série de novos factos estilizados: (i) os PTAs reduziram as tarifas médias ponderadas pelo comércio para menos de 5% para mais de dois terços dos países; (ii) o número de compromissos nos PTAs aumentou ao longo do tempo, particularmente desde os anos 2000 e em áreas destinadas a facilitar os fluxos de serviços, bens e capital; (iii) o aprofundamento dos compromissos tem sido acompanhado por um aumento dos requisitos regulamentares, nomeadamente em matéria de aplicação; (iv) os países em desenvolvimento tendem a ter menos compromissos nos PTAs, com maiores lacunas em áreas como o trabalho e o ambiente; (v) os PTAs são mais semelhantes dentro dos blocos, mas a semelhança pode ser significativa mesmo entre blocos. O artigo também discute os desafios da quantificação da "profundidade" da PTA e dos seus efeitos e propõe uma agenda de investigação para futuros trabalhos sobre acordos comerciais.

Palavras-Chave — Acordos comerciais preferenciais; Integração profunda.

Abstract—This paper takes a first look at new data on the content of Preferential Trade Agreements (PTAs). The data contain detailed information on the eighteen policy areas most frequently covered in PTAs, focusing on the stated objectives, substantive commitments, and other aspects such as transparency, procedures and enforcement. A number of new stylized facts emerge: (i) PTAs have reduced trade-weighted average tariff rates to less than 5 percent for more than two-thirds of countries; (ii) the number of commitments in PTAs has increased over time, particularly since the 2000s and in areas aiming at facilitating flows of services, goods and capital; (iii) deepening commitments have been accompanied by an increase in regulatory requirements, namely on enforcement; (iv) developing countries tend to have fewer commitments in PTAs, with larger gaps in areas such as labor and environment; (v) PTAs are more similar within blocs, but similarity can be significant even across blocs. The paper also discusses the challenges of quantification of PTA "depth" and its effects and proposes a research agenda for future work on trade agreements.

Keywords — Preferential Trade Agreements; Deep Integration.

● *Aaditya Mattoo, Nadia Rocha, Michele Ruta*

1 Introduction

THis paper takes a first look at new data on the content of all Preferential Trade Agreements (PTAs) that have been notified to the World Trade Organization (WTO), and highlights the emergence of Deep Trade Agreement (DTA).[1] The detailed description of the data and the methodology used to collect them are discussed in the Handbook of Deep Trade Agreements (Mattoo, Rocha and Ruta, 2020).

DTAs are reciprocal agreements between countries that cover not just trade but additional policy areas, such as international flows of investment and labor, and the protection of intellectual property rights and the environment, amongst others. While these legal arrangements are still referred to as trade agreements, their goal is integration beyond trade or deep integration. DTAs aim at establishing five "economic integration" rights: free (or freer) movement of goods, services, capital, people and ideas. DTAs also include enforcement provisions that limit the discretion of importing governments in these areas, as well as provisions that regulate the behavior of exporters.

Preferential trade agreements have always been a feature of the world trading system but have become more prominent in recent years. The number of PTAs has increased from 50 in the early 1990s to roughly 300 in 2019. All WTO members are currently party to one, and often several,

---

1. In the international economics and law literature, PTA is an umbrella term encompassing several types of reciprocal agreements between trading partners: Regional Trade Agreements (RTAs), Free Trade Agreements (FTAs), and Customs Unions (CUs). This definition differs from that of the World Trade Organization (WTO), which defines PTAs as agreements that grant unilateral (i.e., non-reciprocal) trade preferences such as the Generalized System of Preferences schemes, under which developed countries grant preferential tariffs to imports from developing countries. This study, following the definition from international economics and law, uses the term PTA to refer to all types of trade agreements, both within and across regions, and uses DTA to refer to PTAs that contain provisions aimed at deepening economic integration between trading partners.

PTAs. While WTO rules still form the basis of most trade agreements, PTAs have in some sense run away with the trade agenda. Traditional trade policy areas, such as tariff reduction or services liberalization, are now more frequently negotiated in regional contexts rather than at the WTO, with PTAs often going beyond what countries have committed to at the WTO. The result is that PTAs have expanded their scope. While the average PTA in the 1950s covered 8 policy areas, in recent years they have averaged 17. In other words, there is some preliminary evidence that PTAs are becoming DTAs, both on the intensive margin (specific commitments within a policy area) and the extensive margin (number of policy areas covered). In this paper, we do not draw a sharp distinction between DTAs and other PTAs. Rather, the aim is to demonstrate the progressive deepening of PTAs.

Deep trade agreements matter for economic development. The rules embedded in DTAs, along with the multilateral trade rules and other elements of international economic law such as International Investment Agreements, influence how countries (and, hence, the people and firms that live and operate within them) transact, invest, work, and, ultimately, develop. Trade and investment regimes determine the extent of economic integration, competition rules affect economic efficiency, intellectual property rights matter for innovation, environmental and labor rules contribute to social and environmental outcomes. It is, therefore, vital that rules and commitments in DTAs are informed by evidence and shaped more by development priorities than by international power dynamics or domestic politics. An impediment to this goal is that data and analysis on trade agreements have not captured the new dimensions of integration, which makes it difficult to identify the content and consequences of DTAs.

The new data collected by the World Bank (Mattoo, Rocha and Ruta, 2020) take a first step towards filling this important gap in our understanding of international economic law and policy. It presents detailed information on the content of the eighteen policy areas most frequently covered in PTAs, focusing on the stated objectives, substantive commitments, and other aspects such as transparency, procedures and enforcement. In

terms of the coverage of policy areas and the granularity of information within each area, this is the most comprehensive effort up to date.

The primary goal of this paper is to take a first look at the new data. This allows to establish a set of new stylized facts on the deepening of trade agreements: (i) PTAs have reduced trade-weighted average tariff rates to less than 5 percent for more than two-thirds of countries; (ii) the number of commitments in PTAs has increased over time, particularly since the 2000s and in areas aiming at facilitating flows of services, goods and capital; (iii) deepening commitments have been accompanied by an increase in regulatory requirements, namely on enforcement; (iv) developing countries tend to have fewer commitments in PTAs, with larger gaps in areas such as labor and environment; (v) PTAs are more similar within blocs, but similarity can be significant even across blocs.

The new data build on previous research by the World Bank and others. A first database on the content of deep trade agreements was published in 2017 with the goal of documenting how the policy areas covered by PTAs had increased over time (Hofmann et al. 2019). This dataset allowed researchers to construct a first series of indicators which capture the scope of trade agreements; i.e., what policy areas they cover. We refer to this as the *extensive margin* of PTA depth. Based on this first dataset, several research papers then looked, respectively, at the impact of deep trade agreements on trade, global value chains, foreign direct investment, and the effect of breaking up such agreements.[2]

The new data that we briefly review in this paper offer insights into a different dimension of PTAs depth. They capture the detailed commitments to establish and preserve the rights to economic integration, and the procedures, institutions and enforcement mechanisms that countries set up to make deep integration work. The focus is therefore not on the extensive margin of integration (number of policy areas that are covered by the agreement), but on its *extensive margin* (the specific commitments within a policy area).

2. Mattoo et al. 2017, Mulabdic et al. 2017, Laget et al. 2018, Laget et al. 2019.

While there are a number of individual studies that have documented the deepening of PTAs in specific areas, two major data collection projectsDür et al. (2014) and Acharya (2016)also aimed at documenting the specific commitments for a group of policy areas covered in PTAs. Both efforts have important merits. Dür et al. (2014) covered a large set of PTAs, including those that have been notified to the WTO but are no longer in force. Acharya (2016) provided a series of databases on the content of PTAs that go beyond specific policy areas and cover emerging issues such as e-commerce or the rules on dispute settlement in PTAs. Relative to these data collection projects, the new dataset is more comprehensive, both in terms of the number of policy areas covered and in terms of the information on detailed disciplines in each area.

The paper is organized as follows. Section 2 describes the scope and methodology underlying the research agenda on deep trade agreements. Section 3 highlights a novel set of stylized facts that can be inferred from a first look at the new data, while Section 4 offers some insights into future applications and areas for analysis. Concluding remarks follow.

2 Scope and methodology

The number of policy areas covered by PTAs has increased in the last two decades. Up until the late 1990s, when the number of PTAs started increasing, the majority of new agreements covered fewer than 10 policy areas. Since the 2000s, most new PTAs have covered between 10 and 20 policy areas, with some having even more than 20 (Figure 1). In a study of 28 trade agreements signed by the US and the EU, Horn et al. (2010) identify up to 52 policy areas that have been covered by at least one of the agreements. The inclusion of new policy areas in PTAs is not random. As shown in Mattoo et al. (2017), trade agreements covering few policy areas generally focus on traditional trade policy, such as tariff liberalization or customs (Table 1). Agreements with broader coverage (between 10 and 20 policy areas) tend to include trade-related regulatory issues, such as subsidies or technical barriers to trade. Finally, agreements with more

than 20 provisions often include policy areas that are not directly related to trade, such as labor, environment and movement of people.

Figure 1: Number of policy areas covered in PTAs, 1970-2017
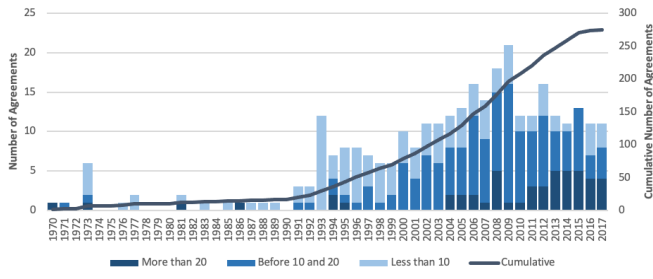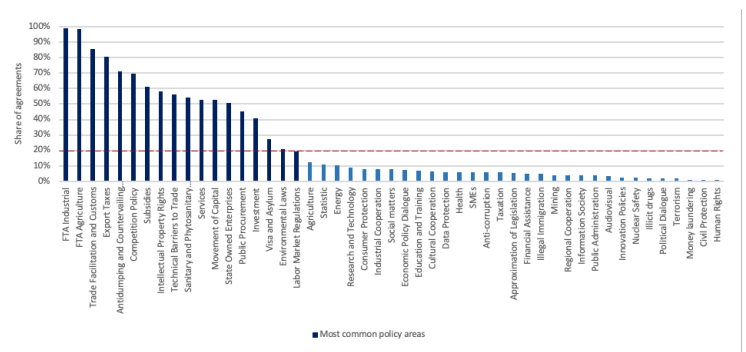

Source: Authors' calculations based on Hofmann et al. 2019

Table 1: Share of policy areas for different PTAs

No. Provisions	Less than 10	Between 10 and 20	More than 20
Tariffs on manufacturing goods	97%	100%	100%
Tariffs on agricultural goods	96%	100%	100%
Export taxes	73%	81%	95%
Customs	67%	95%	100%
Competition policy	58%	73%	88%
State aid	39%	69%	88%
Anti-dumping	35%	88%	98%
Countervailing measures	22%	77%	98%
Statistics	20%	0%	23%
TRIPS	18%	75%	98%
STE	18%	69%	68%
TBT	17%	73%	95%
Movement of capital	15%	68%	93%
GATS	14%	67%	98%
SPS	12%	72%	98%
Public procurement	12%	59%	80%
IPR	6%	56%	75%
Environmental laws	3%	14%	83%
Labor market regulations	3%	13%	75%
Investment	2%	58%	75%
TRIMS	2%	42%	73%
Visa and asylum	2%	37%	57%
Industrial cooperation	2%	5%	33%
Social matters	2%	5%	30%
Agriculture	1%	10%	45%
Energy	1%	8%	40%
Data protection	1%	5%	20%
Anticorruption	1%	5%	18%
SME	1%	4%	25%
Regional cooperation	1%	3%	15%
Taxation	1%	2%	30%
Approximation of legislation	1%	2%	25%
Political dialogue	1%	1%	8%
Research and technology	0%	6%	38%
Public administration	0%	6%	5%
Consumer protection	0%	5%	38%
Mining	0%	5%	13%
Education and training	0%	4%	33%
Information society	0%	4%	15%
Innovation policies	0%	4%	5%
Illegal immigration	0%	3%	23%
Illicit drugs	0%	3%	3%
Economic policy dialogue	0%	2%	43%
Cultural cooperation	0%	2%	38%
Financial assistance	0%	2%	25%
Audiovisual	0%	2%	18%
Terrorism	0%	2%	8%
Money laundering	0%	2%	3%
Health	0%	1%	38%
Human rights	0%	1%	3%
Nuclear safety	0%	0%	15%
Civil protection	0%	0%	5%

Source: Mattoo et at. 2017.

The policy areas under analysis are those that appear most frequently in trade agreements. They include (a) a set of 18 policy areas that are covered in 20 percent or more of trade agreements notified to the WTO (Figure 2): (b) tariffs on industrial and agricultural goods, which are covered by all trade agreements; (c) customs and export taxes, which are regulated in more than 80 percent of PTAs; (d) services and movements of capital, which are regulated in roughly half of the PTAs; and (e) environmental and labor issues, which are covered by around 20 percent of all trade agreements. The focus on individual areas helps us to identify specific policies that are the object of negotiation but may obscure cross-cutting issuessuch as electronic commercethat may be disciplined under multiple policy areas.

Figure 2: Number of policy areas covered in PTAs, by policy

Source: Authors' calculations based on Hofmann et al. 2019.

The classification of policy areas used in Figure 2 deviates slightly from the one of Horn et al. (2010).[3] Specifically, we decided to include rules of origin, a policy area that was absent from the Horn et al. (2010) classification, and to treat as a single policy area: (a) trade remedies, which include anti-dumping and countervailing measures; (b) investment, which includes the areas covered under the WTO's Trade Related Investment Measures, or TRIMs; and (c) intellectual property rights (IPR), which include the areas covered under the WTOs Trade Related Intellectual Property Rights, or TRIPs.

---

3. The Horn et al. 2010 classification was used to collect data on the extensive margin of PTA depth.

Trade agreements are generally assessed in terms of the market access they create. Given the complexity of policy areas that are covered by DTAs, the metric of market accesswhile still importantappears inadequate. In this paper, we propose to define deep trade agreements as international arrangements that aim to regulate three (partially overlapping) sets of policy areas (Figure 3).

- First, the core policy areas included in DTAs aim to establish five economic integration rights: free (or freer) movement of goods, services, capital, people and ideas.[4] The policy areas that directly impact these flows include: (a) tariffs and export taxes, which affect the movement of goods; (b) services, which regulate services trade flows; (c) investment and movement of capital, which affect the movement of capital; (d) visa and asylum, which regulate the movement of people; and (e) intellectual property rights, which influence the flows of ideas.

- Second, DTAs also include policy areas that aim to support these economic integration rights by limiting government discretion. Actions by importing governments that limit international flows can be taken at the border and behind the border and are often of a regulatory nature. The policy areas that fall in this category are: (a) customs; (b) rules of origin; (c) trade remedies; (d) public procurement; (e) technical barriers to trade (TBT); (f) sanitary and phytosanitary measures (SPS); (g) state-owned enterprises (SOEs); (h) subsidies; and (i) competition policy.[5]

- Third, DTAs cover policy areas that aim to enhance social or consumer welfare by

regulating the behavior of exporters. Policy areas such as environment and labor impose obligations on exporters to further consumer or social interests in importing countries. Rules in areas such as competition, SOEs, and subsidies can have a dual aspect: in addition to regulating action that undermines economic integration rights, they can aim to address distortionary actions that lower economic efficiency thus hurting consumer or social welfare.

Figure 3: A classification of policy areas in DTAs

In Mattoo et al (2020), the experts followed a uniform approach to coding for all policy areas.[6] The coding templates encompass several common headings such as objectives and definitions, institutional framework, enforcement mechanism, plus a series of discipline-specific questions. Under each heading, questions on specific provisions in the agreement are formulated so that they can be answered with Yes/No. For some policy areas, additional information is provided at the provision level, including (a) the relationship between the coverage of the disciplines on and the corresponding regulation in the WTO; (b) the level of

---

4. We use the words "aim to establish" rather than "establish" for two main reasons. First, DTAs may cover only a subset of integration rights. Second, provisions may not be justiciable. A contribution of the new data is to identify the extent to which integration rights are established in PTAs.

5. Some of these provisions apply only to cross-border trade in goods (e.g., customs, TBT and SPS). Others can also apply to cross-border trade in services (e.g., public procurement and competition policy). In some cases, services-related provisions are included separately in a services agreement.

6. One exception is preferential tariffs. Differently from the other policy areas, tariff commitments apply at the product level. The information for this area is therefore collected at the country-pair-product level. For rules of origin a sub-sample of agreements in Latin America and East Asia, the dataset on regime-wide provisions is accompanied by a mapping of the rules of origin that apply at the product level.

enforceability of each provision;[7] (c) whether the specific commitment can be applied discriminatorily or whether it is de facto non-discriminatory. Finally, when applicable, for example in services and government procurement, the coders included information at the sectoral level on exclusion of certain sectors from an agreement, or the applicability of an agreement to a specific industry.

The analysis covers the realm of PTAs that are in force and notified to the WTO as of end-2017. The basis of the coding analysis is the legal text of the trade agreements and the relevant annexes that accompany the agreement (and have been notified to the WTO). This approach comes with two main limitations that should be clear to the user of the database. First, the focus on the legal text of the agreement implies that secondary law (the body of law that derives from the principles and objectives of the treaties) has not been coded. This is a concern particularly when assessing the depth of integration of the EU, since in most policy areas EU institutions have used secondary law such as regulations, directives, and other legal instruments to pursue integration.[8] Second, the focus on the legal text also excludes from consideration issues of implementation of the trade agreement into national laws and regulations or subsequent annexes that the parties might agree on which are not reported to the WTO. These are important areas for future research.

Despite the similarity in the coding approach, policy areas differ widely from each other. First, some policy areas are inherently more complex than others and their description requires a larger number of questions to reflect the more detailed provisions. IPR has the highest number of provisions (120), while labor has the lowest (18). Second, some policy areas focus primarily on substantive provisions: specific commitments on integration, such as market access commitments, and specific obligations such as harmonization of standards. Others tend to have a larger number of procedural provisions, such as transparency provisions and procedural requirements. Table 2 provides an overview, showing the heterogeneity across policy areas in these different dimensions and identifying the set of "substantive" provisions as those that require specific integration/liberalization commitments and obligations.

Tabel 2: A classification of policy areas in DTAs

Category \ Discipline	Export Taxes	Services	Investment	Movement of Capital	Intellectual Property Rights	Visa and Asylum	Trade Facilitation and Customs	Anti-dumping and Countervailing Duties	Technical Barriers to Trade	Sanitary and Phytosanitary Measures	Public Procurement	Subsidies	State Owned Enterprises	Competition Policy	Environmental Laws	Rules of Origin	Labor Market Regulations	Total provisions
Objectives				1	1			8	1	2		2	2	2	2		2	23
Scope and definitions	1	16	11	7		2		17	2	4	2	1	10	8	10			91
Transparency	4	9	3		13	3	8	6	3	10	7	4	5	1				76
Substantive commitments	17	19	13		59	3	6	2	19	20	4	3	8	11	27	20	12	243
Liberalization/Integration	14	8	11		19		4	1	3	4	3					13		80
Conditions/Obligations	3	11	2		40	3	2	1	16	16	1	3	8	11	27	7	12	163
Procedural requirements	17	8	5		11	5	28	10	7	5	28			2	2	2		130
Enforcement mechanism		1	3	8	22	1		2		4	5	7	5		4	1		63
Sectoral coverage	2	1	2		5						33		9	8				60
Specific coverage		2	1	13		9					8	2	8		1			44
Exceptions	5	6	2	35	4	4							3	1	3			63
Safeguards		1	10	31		1												43
Special and differentiated treatment												7	2	2				11
Institutional framework		1	1		2	2	2	6	2	11				2	1		2	32
Cooperation			2		3	1	8			3	3	1	1	1	5	4	1	33
Miscellaneous			9								6	5	2	2			1	25
Total provisions	46	64	57	95	120	30	52	51	34	59	100	36	54	35	48	38	18	937

Source: Authors calculations based on Mattoo et al. (2020).

We also make an effort to identify the set of provisions within each policy area that are essential to achieve the objectives of the agreement. The provisions we refer to as "essential" comprise the set of substantive provisions plus the disciplines among procedures, transparency, enforcement or objectives, which are viewed as indispensable and complementary to achieving the substantive commitments. Non-essential provisions are referred to as "corollary". A caveat is that this exercise is based on judgment on the relative importance of different provisions and is thus subjective. However, this approach has the advantage of limiting the dimensionality of the data in an informed way.[9]

3 Stylized facts

A number of new stylized facts emerge from a preliminary analysis of the data. Given the differences among policy areas and among provisions

---

within each policy area, this approach presents many quantification challenges, which are discussed below. In this section, we rely on simple counts of the provisions and on coverage ratios[10] to investigate the evolution of the content of deep trade agreements. The underlying assumption in this approach is that deeper trade agreements imply a larger number of provisions.

As shown in Espitia et al. (2019), liberalization in PTAs has reduced trade-weighted average tariff rates to less than 5 percent for more than two-thirds of countries (Figure 4). While there are still pockets of high protection in some countries, most notably lower-income economies, PTAs have been broadly successful in committing national governments to maintaining low tariffs. Trade-weighted applied tariffs are, on average, 2.3 percentage points lower than average most-favored nation (MFN) rates, with gaps of greater than 6 percentage points for countries like Tunisia, Morocco, Bosnia and Herzegovina, Namibia and Lao PDR. So, while from an efficiency perspective, preferential tariff liberalization is inferior to non-preferential liberalization, the commitments countries have taken in the network of preferential trade agreements may provide a safety net at a time when trade tensions are escalating and some countries are disregarding their multilateral commitments.

Figure 4: Tariffs in PTAs and MFN tariffs
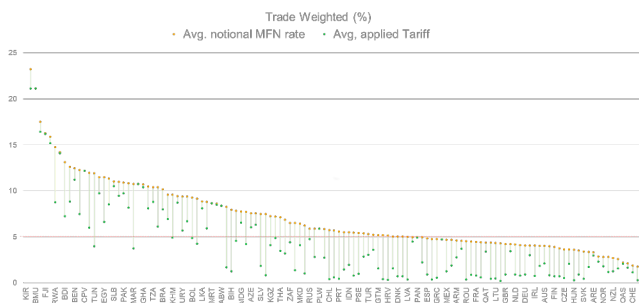
Source: Espitia et al. 2019.

The number of commitments that governments have taken in trade agreements, partic-

ularly since the early 2000s, has increased over time. Figure 5 shows how the coverage ratio has changed over time for the 17 policy areas analyzed (all but tariffs) in aggregate. With only few exceptions, the majority of new PTAs signed after 2000 have a coverage ratio higher than 25 percent. This stands in sharp contrast to the trade agreements signed in the 1980s and 1990s, when coverage ratios were below 15 percent and, in many cases, even below 5 percent. The reduction in tariffs accomplished through preferential trade liberalization, together with the increased depth of agreements over time, suggests that countries that are willing to cut tariffs reciprocally may also be willing to accept deeper mutual commitments in other areas.

Figure 5: Number of agreements over time vs average coverage ratio
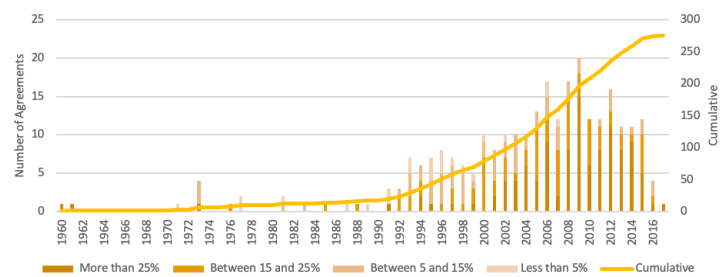
Note: Coverage ratio refers to the share of provisions contained in a given agreement relative to the maximum number of provisions. European Union agreement and enlargements excluded.
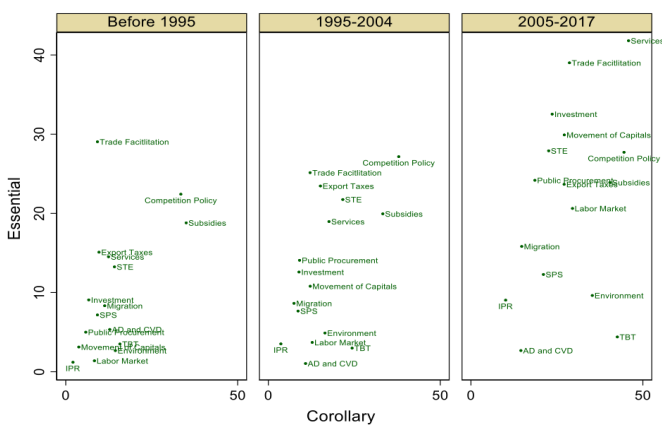*Source: Authors calculations based on Mattoo et al. (2020).*

While the overall number of provisions is suggestive, it can hide important elements of the evolution of deep trade agreements. First, as discussed above, some provisions imply substantive commitments while others concern broad objectives, definitions or procedural matters. Second, deep trade agreements do not only concern themselves with market access in goods, but also aim to establish freedom of mobility for services, capital, ideas and people, as well as regulating policy areas that have an impact on consumer and/or social welfare, such as labor and the environment. To gain a better understanding of how the commitments in PTAs have changed over time, we look at the evolution of coverage ratios by policy area.

---

10. The coverage ratio is defined as the share of provisions for a policy area contained in a given agreement relative to the maximum number of provisions in that policy area or agreement.

Figure 6 shows that the coverage of essential disciplines in PTAs has increased over time across all policy areas. This is most clearly the case for the policy areas aimed at facilitating the flows of goods (customs and trade facilitation), capital (investment and movement of capital) and services. IPR and movement of people (visa and asylum) also saw a steady by less remarkable increase in essential commitments over time. Along with economic integration rights, PTAs increasingly include essential commitments in policy areas that support these rights or impose obligations on exporters. The ones that appear to stand out are subsidies, competition and SOEs, areas that are either excluded from the WTO or for which reform of multilateral rules is considered difficult. Interestingly, while essential commitments in labor have largely increased in recent years, this happened to a lesser extent for provisions on the environment.

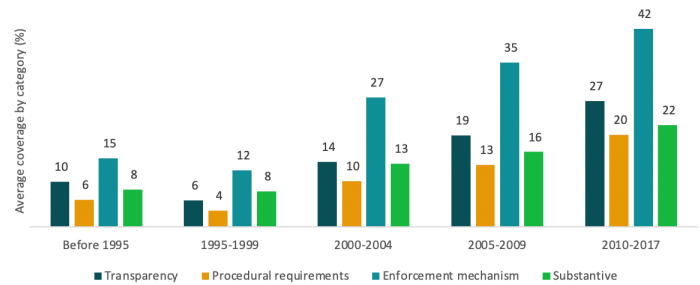**Figure 6:** Coverage ratios by policy area, over time

Note: Coverage ratio by policy area refers to the share of provisions for a policy area contained in a given agreement relative to the maximum number of provisions in that policy area. Years refer to entry into force date. European Union agreement and enlargements excluded.
Source: Authors calculations based on Mattoo et al. (2020).

The presumption is that the increase in the essential disciplines in deep PTAs has been driven by countries taking on more substantive commitments over time. Indeed, Figure 7 shows that this is the case, but it also uncovers interesting insights about the evolution of non-substantive commitments. We focus on the three (numerically) most

relevant non-substantive provisions: procedural rules, transparency and enforcement provisions. The deepening of substantive commitments has been accompanied by an increase in the number of corollary provisions, suggesting that achieving deeper commitments may require more procedural rules for implementation, transparency, and enforcement. A second insight is that, while these disciplines are all necessary to render substantive commitments in trade agreements effective, they have evolved differently in recent years. Starting in the early 2000s, the relevance of enforcement provisions in DTAs has increased disproportionally relative to procedural and transparency provisions. The growing enforcement capacity of DTAs may help explain the success of these institutional arrangements as tools for deep integration.

Figure 7: Substantive provisions and a breakdown of non-substantive provisions in PTAs, over time
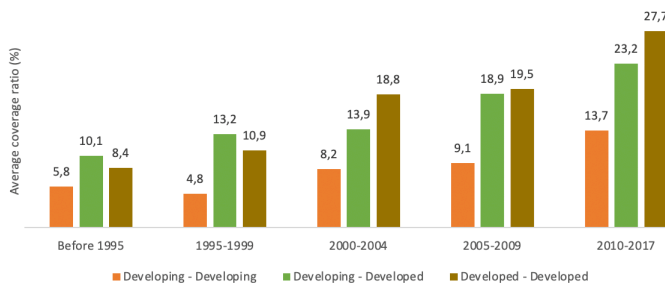

Note: Coverage ratio refers to the share of provisions for a policy area contained in a given agreement relative to the maximum number of provisions in that policy area. Years refer to entry into force date. European Union agreement and enlargements excluded.

When we break down the trade agreements by level of development of the signatories, we observe two facts. First, the deepest PTAs are those involving developed economies, followed by PTAs between developed and developing economies. PTAs between developing countries are the shallowest. Indeed, there is a sizeable gap between average coverage ratios for the latter group of PTAs relative to the first two (Figure 8). This could reflect a focus of negotiations on tariffs and traditional trade barriers, which are still high for several low-income economies. Second, in terms of composition, PTAs between developed coun-

tries and those between developed and developing economies include similar shares of provisions establishing economic integration rights, supporting these rights and aiming to regulate exporters (Figure 9). PTAs between developing countries are shallower across the board, with a stronger gap in areas such as environment and labor that aim at improving social welfare.

Figure 8: Inclusion of substantive commitments in PTAs, by level of development

Note: Coverage ratio refers to the share of provisions for a policy area contained in a given agreement relative to the maximum number of provisions in that policy area. Years refer to entry into force date. European Union agreement and enlargements excluded.

Figure 9: Inclusion of substantive commitments in PTAs, by level of development
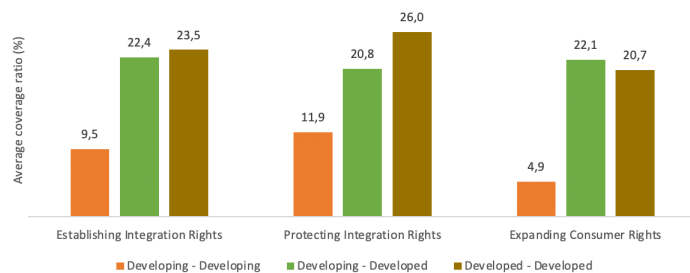

Note: Coverage ratio refers to the share of provisions for a policy area contained in a given agreement relative to the maximum number of provisions in that policy area. Years refer to entry into force date. European Union agreement and enlargements excluded.

We next analyze the depth of trade agreements by country. Here, we focus on the substantive commitments. As several countries have multiple agreements with different levels of depth, we present the average number of substantive commitments per country in panel a of Figure 10 and

the maximum number in panel b of Figure 10. The main takeaway is that developing countries in Sub-Saharan Africa, Middle East and North Africa, South America, South Asia and, to a lesser extent, East Asia tend to have fewer substantive commitments in trade agreements relative to advanced economies. The few exceptions include countries in South America that are signatories of the Pacific Alliance and other developing economies that have signed deep trade agreements with an advanced trade partner, such as Mongolia with Japan and Caribbean countries with the EU. In terms of depth as measured here, North America and Europe are the most integrated regions, through NAFTA and its successor agreement, and through the agreements the EU has signed with neighboring countries. East Asia is a region with a mixed profile: the network of ASEAN agreements includes most countries but tends to have fewer substantive commitments relative to North America and Europe, except for some countries such as Vietnam, which have signed onto the Comprehensive Agreement for the Trans-Pacific Partnership (with a coverage ratio of 61 percent).

Figure 10: Substantive provisions in PTAs by country
Panel a. Average number of provisions
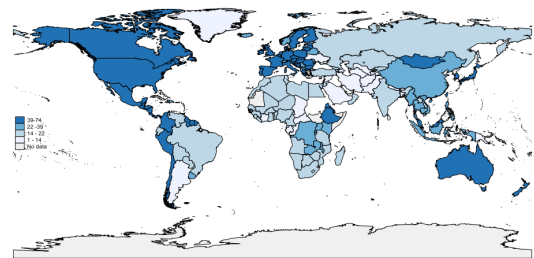
**Panel b:** Maximum number of provisions
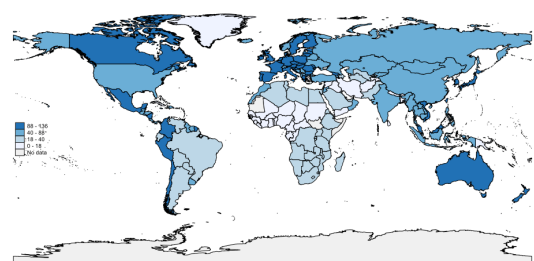
With the increasing depth and complexity of trade agreements, both similarities and dissimilarities between PTAs could potentially increase. Older agreements that covered only preferential tariff liberalization and other aspects of market access tended to be very similar. As PTAs now cover more ground, there can be provisions that are included in two agreements, making them more similar, or there can be provisions that are covered by one PTA but not by another, making them more dissimilar. To capture this information, we construct a similarity index for DTAs, calculated as the ratio between the number of provisions for which two agreements have a "yes" (a measure of similarity) and the total number of provisions covered by the agreements, independently of whether they have the same answer or not. The closer the similarity index is to one (or zero), the more (or less) similar are the two DTAs; i.e., include the same type(s) of provisions.

Figure 11 plots the degree of similarity for the PTAs signed by the three major trading blocs: the European Union, United States, and Japan. Each color represents a DTA signed by a third country with the US (dark blue), EU (light blue) or Japan (red). The size of the bubbles represents the depth of the agreements, measured as the number of provisions covered. Each agreement is connected to the one which is most similar within a trading bloc. The figure also links the three trading blocs, by connecting the pair of agreements that are the most similar between two blocs.

As expected, within each bloc, DTAs are highly similar: up to 0.89 for the US (US-Peru; US-Colombia), up to 0.80 for the EU (EU-Republic of Moldova; EU-Ukraine), and up to 0.75 for Japan (Japan-Indonesia; Japan-Mongolia). This fact often reflects a "template effect", where the EU, US and Japan tend to negotiate based on a template offered to third countries. Interestingly, the similarity of DTAs is relatively high even across blocs, although lower than within blocs. For example, the EU-Korea agreement shares more than 50 percent of the provisions with the Japan-Switzerland agreement (similarity index of 0.54) and with the US-Peru agreement (similarity index of 0.51). These results indicate that concerns about the fragmentation of the global trade system have some foundation (i.e., they do not share

almost half of provisions), but also point to substantial similaritiesbased on which multilateral rules can be agreed upon.

Figure 11: Similarity of agreements
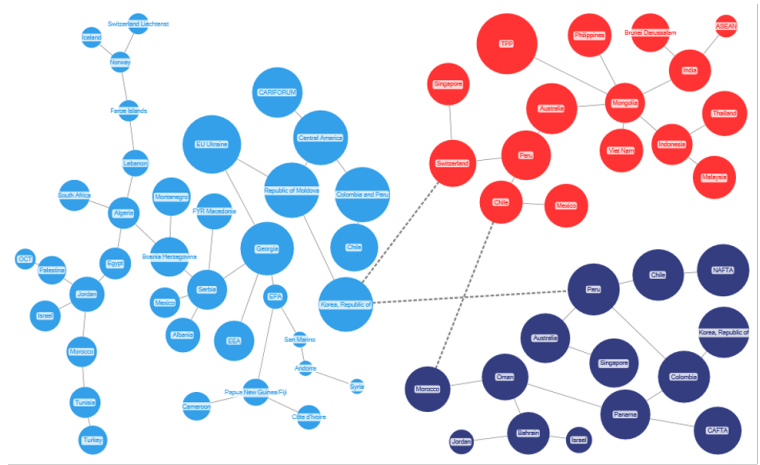
Note: The size of the bubbles represents the depth of a trade agreement, as captured by the number of provisions included in the agreement. Each edge connects an agreement with one that is most similar. Light blue bubbles represent EU agreements with non-EU countries, dark blue represent US agreements, and red represent Japan agreements.

4 The challenge of quantifying the effects of DTAs

Quantification of the effects of DTAs poses a serious challenge. DTAs cover heterogeneous areas: tariffs, contingent protection, export taxes, customs procedures, technical barriers in goods; a wide range of restrictions across modes in services; investment measures, subsidies, procurement, state enterprises, competition policy affecting both trade and investment in goods and services, visas and asylum, and a range of regulatory requirements affecting labor mobility; and a variety of policies affecting the protection of intellectual policy rights and the environment. How can the diversity of policies be quantified and aggregated within separate areas? How can we aggregate across the different areas? We briefly discuss here two approaches to quantificationdirectly constructed indices and indirectly estimated measuresand some analytical issues going forward.

Directly constructed indices

The count variables and coverage ratios presented in the previous section are the simplest directly constructed indices of depth. They provide an immediate view of how commitments in PTAs have changed over time, across countries and for subsets of provisions. Still, aggregate indicators based on some form of counting disregard the fact that DTAs cover multiple policy areas and sectors and that the "value" of each provision is unlikely to be the same even within the same policy area.

In some cases, it may be possible to construct a hierarchy of measures. For example, in the areas of services and government procurement, provisions could be divided into three tiers. Tier 1 would comprise provisions ensuring market access and national treatment at entry. Tier 2 would comprise provisions on post-entry operation; e.g., preferences or offsets. Tier 3 would comprise procedural rules limiting discretion in licenses and awards. The construction of an index could then be lexicographic, in that we would consider first only differences between countries or sectors in Tier 1 and move to subsequent tiers only to break ties. Such an approach is ideally suited to the construction of an ordinal rather than cardinal (i.e., qualitative rather than quantitative) measure.

Indirectly estimated measures

These measures are obtained by estimating the impact of the provisions on a variable of interest. For example, we could infer the value of individual provisions by estimating their impact on bilateral trade, controlling for other influences. In principle, each binary element in the relevant DTA areas could be included in a country-product import regression as a right-hand variable while controlling for applied policies, including tariffs and non-tariff measures. Similar methods have been used to estimate the Overall Trade Restrictiveness Index.[11] However, even for trade in goods we have limited degrees of freedom, and in other areas (such as services), we do not have sufficiently fine outcome data. In these areas, it may be necessary to take a hybrid approach, based on first constructing more aggregated indices.

Another approach is to quantify the effects of DTAs and build indicators of depth is to use new statistical methods. As a first example, we employ machine learning techniques to detect the influential variables/provisions in DTAs for trade.[12] Machine learning is a generic term referring to a wide variety of algorithms which detect a certain pattern from a large dataset, often referred to as "Big Data", and make predictions based on that pattern. In this case, we use a method called Random Forest (RF) to calculate the importance of each variable/provision for international trade flows.[13] Specifically, we run as a first step a structural gravity model with the standard set of fixed effects and then use the residuals as the left-hand variable in the RF.

Figure 12 shows the boxplot of scores calculated by the RF of variables/provisions in PTAs belonging to the 17 (non-tariff) policy areas analyzed in this paper.[14] The areas are colored according to their categorization into the three main groups illustrated in Figure 3; red indicates policies that establish economic integration rights, blue is assigned to those supporting these rights, and green to those that promote welfare. Each box shows the range of the first (25 percent) and third (75 percent) quartiles, and the black line in the box shows the median of the scores. The vertical lines extending from the box indicate the variability outside the above quartiles, and the dots outside of the line are regarded as outliers. Boxplots are ordered according to the magnitude of the median.

Focusing on the entire set of PTAs, we find that provisions such as investment, subsidies, and services, and to a lesser extent, rules of origin and movement of capital have a median score above

---

11. Kee, Nicita and Olarreaga, 2009.

12. This exercise has been carried out in collaboration with Kazusa Yoshimura and Edith Laget. Parallel work by Breinlich et al. (2020) also uses machine learning techniques to precisely quantify the impact of individual provisions in trade agreements on trade flows.

13. RF is a frequently used machine learning algorithm that predicts a Y variable by combining the results from hundreds of regression/classification trees. It has the merit of not imposing a linear relationship between the Y and X variables, which is an advantage when analyzing the impact of a highly heterogenous set of variables, such as the provisions in PTAs.

14. A score should not be interpreted as a coefficient in a regression analysis. It measures how much the accuracy of the prediction for Y gets worse if the particular X variable is randomly permuted.

the overall score average, suggesting that these policy areas are good predictors of bilateral trade, after controlling for the usual gravity determinants of trade flows. Provisions in policy areas such as SPS, environmental laws, and visa and asylum are located at the other extreme of the distribution of median scores, suggesting a more limited role in predicting bilateral trade flows. The size of the boxes and the vertical lines also indicate that there are policy areas such as movement of capital and IPR for which the contribution to trade is more or less uniform across provisions. For other policy areas such as competition policy and SOEs, there is more heterogeneity within provisions in terms of their contribution to trade.

Figure 12: Boxplot of scores calculated by the RF of variables/provisions in PTAs
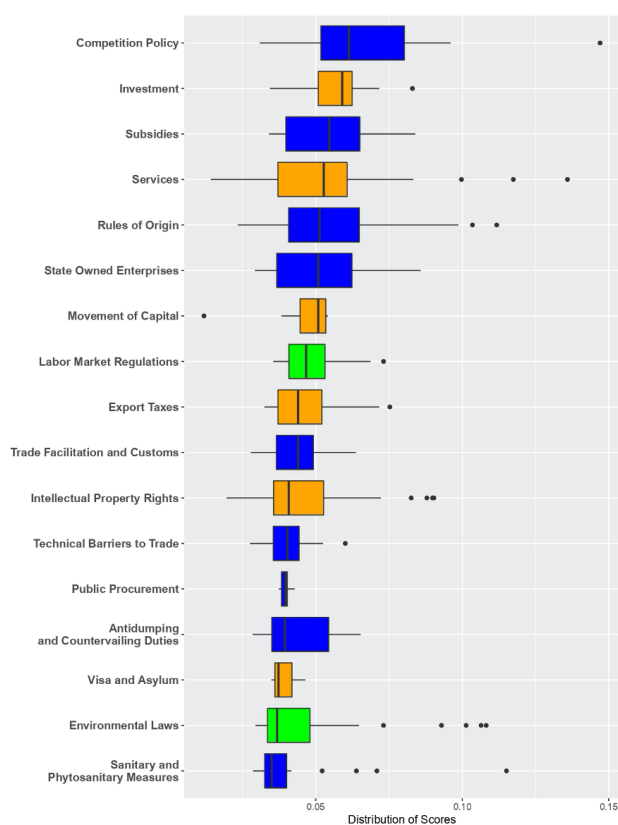
Quantification challenges: some analytical issues going forward

Looking ahead, there is a need for stronger analytical underpinnings for any quantification exercise. Ideally, the "value" of a commitment must be evaluated in light of the objective that the provision or the deep trade agreement is trying to achieve. In other words, depth indicators could use different weights depending on whether the outcome variable is market access, welfare or another metric. For trade policy, market access may seem to be the most obvious metric, but for intellectual property rights, welfare may be the more relevant. In still other areas, such as competition policy, both might be relevant: the market access measure would include only provisions restricting barriers to foreign entry and operation while the welfare measure would include provisions requiring action against anti-competitive behavior affecting consumers.

One indicator cannot provide a measure of both the trade distortions a country imposes on its trading partners (market access) and the trade distortions a country imposes on itself (welfare). For a market access-based measure in the goods context, the relevant question could be: what is the uniform tariff that if imposed on home imports instead of the existing structure of protection would leave aggregate imports at their current level? And for a welfare-based measure: what is the uniform tariff that if applied to imports instead of the current structure of protection would leave home welfare at its current level? The relationship between the two measures is likely to vary across policy areas: positive correlation for tariffs; perhaps negative for environmental standards; and ambiguous for intellectual property rights.

A further issue relates to whether we should be interested in what legal commitments do to the level of a policy or to its variance. Provisions such as the elimination of tariffs, or of a national treatment rule in services or government procurement, fix the level of protection at zero. Provisions which legally bind policy (e.g., the permissible levels of fees, subsidies or preferences) truncate the distribution of possible policy outcomes by reducing the variance and hence the expected level of protection. Provisions which reduce discretion, such as rules on customs valuation, licensing or procurement procedures, narrow the distribution of possible policy outcomes.

Finally, we also need to consider whether we should assess agreements per se or agreements relative to applied policies. If we have the relevant data, the mean and variance shift would ideally

be assessed relative to the prevailing policy (and not just the law or policy on paper but how it is implemented). For example, a legal binding tariff at 10 percent might have a different value depending on whether the existing tariff was 5, 10 or 20 percent. The creation of new databases on applied policies in goods and services trade may facilitate such analysis.

5   Conclusions

The World Development Report 2009 made the case that "thicker" borders between countries hurt economic growth, especially in developing countries. Policies that directly or indirectly restrain the international mobility of goods, services, capital, people and ideas limit, among other things, the scale of the market, which is vital for development.[15] Deep trade agreements aim at establishing the rights of economic integration, protecting these rights from importing governments' actions that could undo them, and regulating actions of exporters that can have negative welfare effects. These agreements have developed over time into a key institutional mechanism for countries to overcome the constraints to economic development created by the thick borders that fragment markets.

Of course, deep integration is not an end in itself. First, countries at different levels of development may have different institutional needs, and trade agreements still need to strike the right balance between rules in PTAs and the needed discretion at the national level to pursue desirable social objectives. Second, while many deep provisions may be de facto non-discriminatory and apply to members and non-members alike, there is still a tension between the proliferation of regional approaches and multilateral rules enshrined in the WTO. Therefore, from the perspective of both economic development and global governance, the efficient set of rules in DTAs is an empirical question.

The wealth of information on the content of the policy areas commonly included in PTAs could provide new impetus to the analysis on the determinants and impact of deep trade agreements. Such analysis would also provide the necessary tools to further understand the opportunities and challenges that countries face in terms of negotiation and implementation of deep trade agreements.

We suggest three areas of work going forward. A first step is to improve the measurement of the depth of trade agreements and quantification of its effects. Beyond simple count variables and coverage ratios, more work will be needed to develop new analytic methods to overcome the challenges discussed in the previous section. As shown, machine learning techniques may provide a useful innovative approach. Second, the detailed information at the level of individual policy areas could inform a series of studies to assess how specific provisions impact trade and other relevant economic variables. As trade policy experts well understand, the devil is often in the details. Finally, the new data and analysis could provide essential information to policymakers on priorities for the negotiation and implementation of trade agreements: finding what potential partners include in their trade deals, identifying best practices in DTAs and areas where practices diverge or overlap across different players, and assessing gaps between international commitments and domestic legislation.

---

15. World Bank 2009.

References

[1] Acharya, R. (ed.) (2016). Regional Trade Agreements and the Multilateral Trading System. Cambridge, UK: Cambridge University Press.

[2] Baldwin, R. (2010). 21st century regionalism: filling the gap between 21st century trade and 20th century trade rules. Geneva Graduate Institute, *Working Paper* No. 2010-31.

[3] Breinlich, H., V. Corradi, N. Rocha, M. Ruta, J. Santos Silva, T. Zylkin. (2020). Machine learning in international trade research: Evaluating the impact of trade agreements. Mimeo, University of Surrey and World Bank.

[4] Dür, A., L. Baccini and M. Elsig. (2014). The design of international trade agreements: introducing a new dataset. The Review of International Organizations 9(3), 353-375.

[5] Espitia, A., A. Mattoo, M. Mimouni, X. Pichot and N. Rocha. (2019). Preferential tariffs. Chapter 1 in A. Mattoo, N. Rocha and M. Ruta (eds.). Handbook of Deep Trade Agreements. World Bank.

[6] Freund, C. and Ornelas, E. (2010). Regional trade agreements. *Annual Review of Economics* 2, 139-166.

[7] Hofmann, C., A. Osnago and M. Ruta. 2019. The Content of Preferential Trade Agreements. *World Trade Review*, 18(3), 365-398.

[8] Horn, H., P.C. Mavroidis and A. Sapir. (2010). Beyond the WTO? An anatomy of EU and US preferential trade agreements. *World Economy* 33: 1565-1588.

[9] Kee, Hiau Looi, Alessandro Nicita and Marcelo Olarreaga. (2009). Estimating trade restrictiveness indices. *Economic Journal* 119: 534, pp. 172-199.

[10] Laget, E., A. Osnago, N. Rocha and M. Ruta. (2018). Deep trade agreements and global value chains. *Policy Research Working Paper* 8491. World Bank.

[11] Laget, E., N. Rocha and G. Varela. (2019). Deep trade agreements and foreign direct investments. Mimeo, World Bank.

[12] Limao, N. (2016). Preferential trade agreements. In K. Bagwell and R. Staiger (eds.), *Handbook of Commercial Policy* Vol. 1, pp. 279-367.

[13] Mattoo, A., A. Mulabdic and M. Ruta. (2017). Trade creation and trade diversion in deep agreements. *Policy Research Working Paper* 8206. World Bank. Paper funded by the World Banks Strategic Research Program.

[14] Mattoo, A., N. Rocha and M. Ruta (eds.). (2020). *Handbook of Deep Trade Agreements*. Washington DC. World Bank.

[15] Mulabdic, A., A. Osnago and M. Ruta. 2017. Deep integration and UK-EU trade relations. *Policy Research Working Paper* 7947. World Bank.

[16] Viner, J. (1950). The Customs Union Issue. New York: Carnegie Endowment for International Peace.

[17] World Bank. (2009). *World Development Report 2009: Reshaping Economic Geography.* Washington DC. World Bank.

[18] World Bank. (2019). World Development Report 2020: *Trading for Development in the Age of Global Value Chains.* Washington DC. World Bank.

[19] World Trade Organization. (2011). *World Trade Report 2011: The WTO and Preferential Trade Agreements: From Co-Existence to Coherence.* Geneva.

Aaditya Mattoo is Chief Economist of the East Asia and Pacific Region of the World Bank. He specializes in development, trade and international cooperation, and provides policy advice to governments. He is also Co-Director of the World Development Report 2020 on Global Value Chains. Prior to this he was the Research Manager, Trade and Integration, at the World Bank. Before he joined the Bank, Mr. Mattoo was Economic Counsellor at the World Trade Organization and taught economics at the University of Sussex and Churchill College, Cambridge University. He holds a Ph.D. in Economics from the University of Cambridge, and an M.Phil in Economics from the University of Oxford. He has published on development, trade, trade in services, and international trade agreements in academic and other journals and his work has been cited in the Economist, Financial Times, New York Times, and Time Magazine. ORCID: https://orcid.org/0000-0002-1584-8544

Nadia Rocha is a Lead Economist in the Macroeconomics, Trade and Investment Global Practice at the World Bank. Prior to joining the Bank she worked at the WTO and she also served as a Senior Advisor on trade to the Colombian Ministry of Trade. She holds a PhD in International Economics from the Graduate Institute of Geneva, an MA in Economics from Pompeu Fabra University of Barcelona and a BA in Economics from Bocconi University in Milan. Nadias work focuses on trade policy, regional integration, global value chains and trade and gender.
ORCID: https://orcid.org/0000-0003-0045-7492

Michele Ruta is Deputy Chief in the Strategy and Policy Review Department of the International Monetary Fund, where he oversees the work on trade and trade policy. He had previous appointments at the World Bank, the World Trade Organization and the European University Institute, and holds a PhD in economics from Columbia University and an undergraduate degree from the University of Rome La Sapienza. Micheles research focuses on international and regional integration and has been published, among others, in the *Journal of International Economics, the Journal of Development Economics and the Journal of the European Economic Association.* His books and edited volumes include *The Impact of the War in Ukraine on Global Trade*, the Handbook of Deep Trade Agreements and Belt and Road Economics. Personal website: https://sites.google.com/site/michelerutasite/.
ORCID: https://orcid.org/0000-0003-1070-2279