Chapter 2

The Trend of Deep Regional Integration

2.1 Introduction

The last quarter century until around 2016 has witnessed “unprecedented trade integration” (Baier et al. 2019) in the world. There has been a rapid proliferation of regional trade agreements (RTAs). Figure 2.1 shows the evolution of RTAs in the world since the World War II. The red bar indicates the number of RTAs in force notified to the General Agreement on Tariffs and Trade (GATT)/the World Trade Organization (WTO) in each year and the gray bar indicates the number of inactive RTAs notified to the GATT/WTO in each year. Moreover, the gray line indicates the cumulative notifications of RTAs in force and inactive RTAs, the red line the cumulative notifications of RTAs in force, and the black line the cumulative number of RTAs in force. For any of these indexes to show the evolution of RTAs, it is evident that a proliferation of RTAs started around 1992. More than 15 new RTAs were notified to the WTO each year. More than 35 new RTAs were notified to the WTO in 2009 when their number peaked. The high level of the proliferation had been maintained until 2015, but the momentum seemed to be paused from 2016 to 2020. The main causes of the momentary pause are the anti-globalization sentiment in many countries and the implementation of protectionism policies by the Trump Administration in the United States and other countries (Jinji 2021). Moreover, since 2020 the COVID-19 pandemic may have affected the momentum of globalization.

The unprecedented trade integration over the last quarter century involved not only a rapid increase in the number of RTAs but also the “deepened” and “widened” nature of trade integration (World Trade Organization (WTO) 2011). As one of the stylized facts about RTAs, WTO (2011) points out that the coverage of RTAs in terms of policy areas has been deepened and widened over time. That is, many of the recent RTAs go beyond traditional tariff-cutting and include a wide array of non-tariff policy areas, both at the border and behind-the-border, such as services trade, investment, labor market regulation, intellectual property rights (IPR) protection, and technical

Fig. 2.1 Evolution of RTAs in the World, 1948–2021. *Notes:* Notifications of RTAs: goods, services and accessions to an RTA are counted separately. The cumulative lines show the number of RTAs/notifications that were in force for a given year. The notifications of RTAs in force are shown by year of entry into force and the notifications of inactive RTAs are shown by inactive year. *Source:* RTA Section, World Trade Organization Secretariat

barriers to trade. For example, according to WTO (2011), about one third of RTAs in force in the 2000s contain services commitments, compared to less than a tenth in 1990.

The main purpose of this chapter is to illustrate the current trend of regional integration in terms of the contents of RTAs by distinguishing between shallow and deep integration and to shed light on the causes and impacts of recent deep regional integration.

In Sect. 2.2 we explain what shallow and deep RTAs mean and why countries have recently pursued deep integration. In Sects. 2.3 and 2.4 we argue how we can measure the degree of deep RTAs and what data are available to analyze the content and effects of deep RTAs. In Sect. 2.5 we examine the state of deep RTAs in the world and in the Asia-Pacific region using the measurement and data introduced in Sect. 2.3. In Sect. 2.6 we review existing studies on the effects of deep regional integration on global firms and technology spillovers. Finally, in Sect. 2.7 we provide the concluding remarks of this chapter.

2.2 Shallow and Deep Regional Integration

2.2.1 The Concept of Shallow and Deep Regional Trade Agreements

The concept of shallow and deep integration is originally proposed by Lawrence (1996). Shallow integration is simply trade liberalization, which involves the removal of trade barriers. By contrast, deep integration “moves beyond the removal of border barriers” (Lawrence 1996, p. 8). Deep RTAs contain a variety of provisions including on investment, labor, the environment, and IPR.

It is said that recent RTAs tend to be deeper than old ones. A good comparison of an old RTA with a recent RTA in terms of the degree of the depth is provided by Rodrik (2018). He compares two RTAs signed by the United States: the United States–Israel Free Trade Agreement (FTA) and the United States–Singapore FTA. Both Israel and Singapore are small nations. The United States–Israel FTA, which entered into force in 1985, was the first bilateral trade agreement that the United States signed in the postwar period. The legal text of the United States–Israel FTA contains only 22 articles and three annexes, and consists of fewer than 8,000 words. Thus, it is “quite a short agreement” (Rodrik 2018, p. 75). By contrast, the United States–Singapore FTA entered into force in 2004. Its legal text is much longer than that of the United States–Israel FTA. It contains 20 chapters with many articles in each and more than a dozen annexes. The total length is about 70,000 words. These two agreements are distinct in the coverage of policy areas. Most of the articles in the United States–Israel FTA are devoted to trade liberalization issues, such as the elimination of duties and other restrictive regulations, free of import licensing requirements, and rules of origin (RoO). On the contrary, only the first seven chapters in the United States–Singapore FTA cover trade issues, and the remaining 13 chapters address a variety of policy areas including financial services, anti-competitive business conduct, e-commerce, investment, IPR, labor, and the environment. Based on the coverage of the policy areas, the United States–Singapore FTA can be considered to be “deeper” than the United States–Israel FTA.

2.2.2 Countries’ Motivation for Deepening Regional Trade Agreements

Given the fact that recent RTAs tend to be deeper than older ones, one may ask why countries have recently pursued deep integration. Lawrence (1996) argues that the development of regional production systems and the promotion of service investment became important in the 1990s. Deeper forms of economic integration such as the elimination of differences in national production and product standards that make

regionally integrated production costly are required in order to facilitate international investment and the operation of multinational enterprises (MNEs).

Baldwin (2011, 2016a) explains in detail why countries have been pursuing deep regional economic integration. He calls the second phase of globalization initiated by the information and communication technology (ICT) revolution in the 1990s the “second unbundling,” which is the geographic separation of factories. The fragmentation of production processes and offshoring occur in the second unbundling. The ICT revolution enabled know-how in rich (North) countries to be combined with low-wage labor in poor (South) countries. Baldwin (2016a) calls this combination the *high-tech/low wage mix*. In this era of the second unbundling, the so-called *trade–investment–services–intellectual property nexus* (Baldwin 2016a) emerged because of this mix. That is, MNEs from rich countries bring their intangible property to the factories built in poor countries and conduct part of the production process there. Parts and components are traded between parent firms and their foreign affiliates. Thus, the trade of goods, the movement of capital, services that connect unbundled factories, and intellectual property are all involved in the production of branded goods under the above nexus. Baldwin (2016a) argues that this nexus thus requires a new package of disciplines, which can be provided by deep RTAs.

Another motivation for countries to pursue deep regional integration is to address a number of important issues that have been debated in the international community, but that have been difficult for countries to agree to include in the GATT/WTO rules. Those issues include IPR protection, the environment, and labor market regulation.¹ Those countries that are active in addressing those issues try to construct international regulatory rules on these issues by including them in RTAs.

2.3 Measurement of Deep Regional Integration

2.3.1 WTO-Plus and WTO-Extra Policy Areas

We need some measurement of the depth of RTAs in order to know how deep each RTA is.

Horn et al. (2010) propose a systematic method to measure the depth and nature of the economic integration of RTAs, which examines the policy areas covered by their provisions and legal enforceability of these obligations. They identify 52 policy areas covered by RTAs of which either the United States or the European Community is a member, classifying them into two groups: WTO-plus (WTO+) and WTO-extra (WTO-X). The WTO+ group includes provisions that fall under the current mandate of the WTO, but go beyond commitments at the multilateral level. By contrast, WTO-X policy areas include issues that fall outside the current WTO mandate. The WTO+

¹ With regard to studies on trade and the environment, see, for example, Cherniwchan et al. (2017) and Copeland and Taylor (2003, 2004).

Table 2.1 List of WTO+ and WTO–X areas in RTAs

WTO+ Areas (14)	WTO–X Areas (38)	
FTA Industrial Goods	Anti-Corruption	Health
FTA Agricultural Goods	Competition Policy	Human Rights
Customs Administration	Environmental Laws	Illegal Immigration
Export Taxes	IPR	Illicit Drugs
SPS	Investment	Industrial Cooperation
TBT	Labor Market Regulation	Information Society
State Trading Enterprises	Movement of Capital	Mining
Anti-dumping	Consumer Protection	Money Laundering
Countervailing Measures	Data Protection	Nuclear Safety
State Aid	Agriculture	Political Dialogue
Public Procurement	Approximation of Legislation	Public Administration
TRIMs	Audio Visual	Regional Cooperation
GATS	Civil Protection	Research and Technology
TRIPS	Innovation Policies	SME
	Cultural Cooperation	Social Matters
	Economic Policy Dialogue	Statistics
	Education and Training	Taxation
	Energy	Terrorism
	Financial Assistance	Visa and Asylum

Source: Horn et al. (2010)

group includes 14 policy areas and WTO–X group includes 38 policy areas, as shown in Table 2.1.

The method developed by Horn et al. (2010) evaluates the coverage and legal enforceability of each policy area in RTAs using two indexes: the area-covered (AC) and legally-enforceable (LE) indexes. The AC index simply indicates whether a policy area is covered by an RTA. It takes the value 1 if a policy area is mentioned and 0 otherwise. On the contrary, the LE index evaluates the legal enforceability of each policy area on a three-point scale: 0 for not mentioned in the agreement or not legally enforceable, 1 for legally enforceable but explicitly excluded by a dispute settlement provision, and 2 for legally enforceable.

2.3.2 Depth and Breadth

Limão (2016) proposes recategorizing the WTO+ and WTO–X policy areas from the viewpoints of the *depth* and *breadth* of RTAs (see Table 2.2). The depth measures the level of bilateral economic cooperation. In general, the lower the applied tariffs are the deeper is the level of bilateral economic cooperation. Moreover, various non-tariff

Table 2.2 Depth and breadth of RTAs

Depth		Breadth	
Field	Policy area	Field	Policy area
(a) Import tariffs	FTA industrial goods FTA agricultural goods	(a) Services	General Agreement on Trade in Services
(b) Non-tariff barriers	Customs administration Export taxes Sanitary and phytosanitary measures Technical barriers to trade Anti-dumping Countervailing measures	(b) Technology	TRIPS IPR Innovation policies Economic policy dialogue Information society Research and technology
(c) Behind the border policies	State trading enterprises State aid Public procurement Anti-corruption Competition policy	(c) Investment/capital	Trade-related investment measures Investment Movement of capital
(d) Other policies	Consumer protection Data protection Agriculture Approximation of legislation Civil protection Education and training Energy Financial assistance Industrial cooperation Mining Nuclear safety Public administration Regional cooperation Small and medium enterprises Statistics Taxation	(d) Labor	Labor market regulation Illegal immigration Social matters Visa and asylum
		(e) Non-economic policies	Environmental laws Audio visual Cultural cooperation Health Human rights Illicit drugs Money laundering Political dialogue Terrorism

Source: Limão (2016)

measures and the behind-the-border policies (BBPs) affect market access and hence are the factors to characterize the depth of cooperation. Other policies (OPs), such as regional, industrial, and agricultural cooperation and financial assistance, may also affect market access. Limão (2016) proposes that the depth of RTAs is measured by four categories of fields in the WTO+ and WTO-X groups: (a) import tariffs, (b) non-tariff barriers (NTBs), (c) BBPs, and (d) OPs. Field (a) comprises two policy areas, field (b) consists of six policy areas, field (c) consists of five policy areas, and field (d) comprises 16 policy areas (see Table 2.2).

Alternatively, the breadth of RTAs measures how wide the coverage of policy areas is. The classification is made by (i) the type of trade (goods/services), (ii) technology (innovation/spillovers/IPR), and (iii) factors of production (capital/labor).

Then, Limão (2016) proposes that the breadth of RTAs is measured by five fields: (a) services, (b) technology, (c) investment/capital, (d) labor, and (e) non-economic policies (NEPs). Field (a) comprises one policy area, field (b) six policy areas, field (c) three policy areas, field (d) four policy areas, and field (e) nine policy areas (see Table 2.2).

In Sect. 2.5, we use the depth and breadth measures to illustrate the current state of deep RTAs in the world and in the Asia-Pacific region.

2.4 Data on the Content of Deep Trade Agreements

In this section, we explain the data that enable us to analyze deep RTAs.

2.4.1 *Content of the Deep Trade Agreements Database*

The first dataset on deep RTAs was provided by Horn et al. (2010). The coverage of their dataset was restricted to RTAs signed by the United States and those by European countries. The number of covered RTAs was 100.

Hofmann et al. (2019) substantially extend the coverage of RTAs in the dataset presented by Horn et al. (2010) to 279. The extended dataset, which covers 1958–2015, is called “Deep Trade Agreements database 1.0 (horizontal depth).” It is provided on the World Bank’s website.²

This dataset includes information on 14 WTO+ policy areas and 38 WTO-X policy areas for agreement and country-pair levels. The dataset consists of the AC and LE indexes for each policy area. We can use the dataset to measure the depth and breadth of RTAs.

2.4.2 *Deep Trade Agreements Database 2.0*

A new dataset of the content of deep trade agreements, which is called the “Deep Trade Agreements database 2.0 (vertical depth)”, was released by the World Bank in 2020 (Mattoo et al. 2020). This dataset includes more detailed information on the provisions in each policy area.³ The policy areas covered by this new dataset include (1) preferential tariffs, (2) export restrictions, (3) services, (4) investment, (5) movement of capital, (6) IPR, (7) visa and asylum, (8) rules of origin, (9) trade facilitation and customs, (10) anti-dumping, (11) countervailing duties, (12) technical barriers to trade (TBT), (13) sanitary and phytosanitary (SPS) measures, (14) public

² <https://datacatalog.worldbank.org/dataset/content-deep-trade-agreements>.

³ <https://datacatalog.worldbank.org/dataset/content-deep-trade-agreements>.

procurement, (15) subsidies, (16) state-owned enterprises, (17) competition policy, (18) environmental laws, and (19) labor market regulations. In each of these policy areas, many indexes are constructed to measure the degree of coverage in detail.

The detailed information on this dataset is provided by Mattoo et al. (2020). This dataset is the outcome of a collaborative project of the World Bank's team with a number of academic researchers and other international organizations such as the International Trade Centre, the Organization for Economic Co-operation and Development (OECD), and the World Trade Organization (WTO).

2.4.3 DESTA Dataset

An alternative database of the contents of RTAs called DESTA (Design of Trade Agreements) was created by Dür et al. (2014). It originally covered 587 trade agreements for 1945–2009. This database has now been updated and extended to more than 710 trade agreements.⁴ The period has also been extended to 2019. Although only 22 policy areas (15 trade and seven non-trade areas) are covered by the DESTA, each policy area is evaluated in detail by multiple variables.

Its trade-related areas include (1) market access, (2) services, (3) global value chains, (4) investments, (5) temporary entry of business persons, (6) IPRs, (7) public procurement, (8) competition, (9) TBT, (10) SPS measures, (11) regulatory co-operation and transparency, (12) trade defense instruments, (13) e-commerce, (14) data flows, and (15) capital movement and exchange rates. Non-trade areas include (i) corruption, (ii) labor standards, (iii) environmental protection, (iv) human rights, (v) democracy, (vi) security, and (vii) others.

The DESTA project is ongoing. The latest version of the DESTA is likely to include more data.

2.5 The State of Deep Regional Integration

2.5.1 The State of Deep RTAs in the World

Using the Content of Trade Agreement (TA) dataset by the World Bank, which was described in the previous section, Jinji (2021) illustrates the state of deep RTAs in the world.

Figures 2.2a, b show the average number of WTO+ and WTO-X policy areas included in RTAs by signatory group and their year of entry, respectively. The signatory groups are the United States, European countries, Association of South-East Asian Nations (ASEAN) members, Japan, China, Russia, and other countries. The

⁴ The DESTA dataset can be found at www.designoftradeagreements.org/.

Fig. 2.2 Average number of WTO+ and WTO-X LE policy areas by RTA signatory group and year of entry. *Note:* Abbreviations in the figure: US = United States, EU = European countries, ASE = ASEAN countries, JPN = Japan, CHN = China, RUS = Russia, and OTH = other countries. Numbers in the graph indicate the number of RTAs entered into force by signatory group and period. *Source:* Fig. 1 in Jinji (2021)

observation period is divided into three: until 1999, from 2000 to 2009, and from 2010 to 2015. For example, as shown in Fig. 2.2a, the RTAs signed by the United States before 2000 include, on average, 12 WTO+ policy areas (of the 14 WTO+ policy areas) with the LE index being either 1 or 2; those in 2000–2009 include, on average, 12.1 WTO+ policy areas with $LE \geq 1$; and those in 2010–2015 include, on average, 12.7 WTO+ policy areas with $LE \geq 1$. The numbers placed above the bars indicate the number of RTAs signed by the signatory country/group that entered into force in each period. For example, the United States signed two RTAs before 2000, nine RTAs during 2000–2009, and three RTAs during 2010–2015.

This figure indicates that the RTAs signed by the United States cover most of the WTO+ policy areas with at least some legal enforceability even before 2000. On average, more than 12 out of the 14 policy areas are covered and legally enforceable. The RTAs signed by the EU include fewer than 10 WTO+ policy areas, on average, until 2009 but more (11.6 on average) in 2010–2015. Although the RTAs formed by ASEAN countries and Russia before 2000 include a small number of WTO+ policy areas (2.4 and 4.9 on average, respectively), those in the 2000s include more WTO+ policy areas (about 10 policy areas on average). As for Japan and China, the number of legally enforceable WTO+ policy areas in RTAs increased in 2010–2015: 12 (Japan) and 11.6 (China) policy areas on average.⁵ The number of legally enforceable WTO+ policy areas included in the RTAs signed by other countries has steadily increased.

By contrast, panel (b) of Fig. 2.2 shows the average number of WTO-X policy areas included in RTAs with the LE index taking the value of $LE \geq 1$. There are 38 WTO-X policy areas, but the average number included in RTAs with at least some legal enforceability is fewer than nine for all countries, even in 2010–2015. In general, recent RTAs include more legally enforceable WTO-X policy areas for all countries; however, the highest average is still around eight policy areas in the 2010s (8.3 for the United States, 8.4 for the EU, and 8.0 for Japan).

⁵ Neither Japan nor China signed RTAs before 2000.

Fig. 2.3 Depth of RTAs by signatory group and period. *Note:* Each bar indicates the shares of $LE = 1$ (light color) and $LE = 2$ (dark color) policy areas included in each field in all the RTAs signed by each country/group that entered into force in each period. *Source:* Fig. 2 in Jinji (2021)

Jinji (2021) also illustrates the state of world RTAs in terms of depth and breadth, as explained in Sect. 2.3.2.

Figure 2.3 shows the depth of RTAs by signatory group and year of entry. Each bar indicates the shares of $LE = 1$ (light color) and $LE = 2$ (dark color) policy areas included in each category in all the RTAs signed by each country/group that entered into force in each period. As shown in panel (a) of Fig. 2.3, most RTAs, particularly those that entered into force in the 2000s, fully cover both policy areas in the category of import tariffs with $LE = 2$. The coverage of policy areas in the NTBs category is relatively high. More than 80% of the RTAs signed by the United States before 2000 cover the policy areas of NTBs with $LE = 2$. In 2010–2015, about 90% of the RTAs signed by the United States cover those policy areas, but about 40% are with $LE = 1$. The RTAs signed by the EU, Japan, and Russia in 2010–15 cover about 90% of the policy areas in this category. The coverage of the RTAs signed by China in 2010–2015 is much higher and close to 1. The coverage of the policy areas in the BBPs category is rather low. Even the highest level of coverage is about 0.7 for the RTAs signed by the United States and the EU in 2010–2015. The coverage of the policy areas in this category by the RTAs signed by ASEAN countries, China, and Russia is less than 0.5. Moreover, the coverage of the policy areas in the category of OPs is much lower. The coverage is below 0.2 for all RTAs in all periods.

Fig. 2.4 Breadth of RTAs by signatory group and period. *Note:* Each bar indicates the shares of $LE = 1$ (light color) and $LE = 2$ (dark color) policy areas included in each field in all the RTAs signed by each country/group that entered into force in each period. *Source:* Fig. 3 in Jinji (2021)

Figure 2.4 shows the breadth of RTAs by signatory country/group and year of entry. As in Fig. 2.3, each bar indicates the shares of $LE = 1$ (light color) and $LE = 2$ (dark color) policy areas included in each category in all the RTAs signed by each country/group that entered into force in each period.

The fields for which the coverage of policy areas is relatively high are (a) services and (c) investment/capital. However, the coverage depends on the signatory country. The RTAs signed by the United States, Japan, and ASEAN countries in the 2000s cover fields (a) and (c) at relatively high shares. The coverage of the service area in the RTAs signed by China in 2010–2015 is 100%. By contrast, the RTAs signed by the EU and Russia only cover policy areas in fields (a) and (c) at low shares. The coverage of other fields ((b), (d), and (e)) tends to be low for all RTAs. In particular, the coverage of (e) (NEPs) is less than 0.2 for all RTAs.

2.5.2 The State of Deep RTAs in the Asia-Pacific Region

We next examine the state of deep RTAs in the Asia-Pacific region using the depth and breadth indexes.

We create the following index for each field of the depth measure by signatory group. Let $N^c(LE \geq 1)_{ikt}$ be the number of policy areas with the LE index taking the value of one or two in field c of the depth measure included in RTA k signed by country i and entered into force in period t . The depth measure consists of fields $c \in \{Tariff, NTB, BBP, OP\}$. We set $t = \{1, 2, 3\}$, where $t = 1$ indicates years

until 1999, $t = 2$ indicates years from 2000 to 2009, and $t = 3$ indicates years from 2010 to 2015. Then, we calculate the following index:

$$Av_Depth_index_{it}^c = \frac{1}{L_{it}} \sum_{k \in S_{it}} \frac{N^c(LE \geq 1)_{ikt}}{M^c}, \quad (2.1)$$

where L_{it} is the number of RTAs signed by country i and entered into force in period t , S_{it} is the set of RTAs signed by country i and entered into force in period t , and M^c is the number of policy areas in field c of the depth measure. For each field of the depth measure, M^c is two for *Tariff*, six for *NTB*, five for *BBP*, and 16 for *OP*. Thus, $Av_Depth_index_{it}^c$ is the average share of the policy areas with $LE \geq 1$ in all policy areas in field c of the depth measure of RTAs signed by country i and entered into force in period t .

Figure 2.5 shows the values of $Av_Depth_index_{it}^c$ for ASEAN, Japan, and China. As a reference, we also show $Av_Depth_index_{it}^c$ for the United States and the members of the EU.

As is seen in the figure, all countries have the value of the index in the tariff field almost one. However, deep RTAs should include policy areas in the fields of NTBs, BBPs, and OPs. RTAs signed by ASEAN countries show an improvement in the NTB index in 2000–2009 and a further improvement in 2010–2015. However, an improvement in the BBP and OP indexes in the 2000s is small or almost negligible. RTAs signed by Japan in 2010–2015 show almost the same level of the NTB and BBP indexes as those by the United States and European countries. However, the value of

Fig. 2.5 Depth indexes of RTAs by signatory group. *Note:* The average share of $LE \geq 1$ policy areas included in each field in the RTAs signed by each country/group that entered into force in each period is calculated. *Source:* Authors' creation from the World Bank's database

the BBP index in 2010–2015 is still lower than 0.8 for all of Japan, the United States, and European countries. With regard to the RTAs signed by China, an improvement in the NTB and BBP indexes from 2000–2009 to 2010–2015 is large, but the level of the BBP index is still low even in 2010–2015, compared with Japan, the United States, and European countries. Moreover, progress in the inclusion of legally enforceable OP policy areas gets very slow even in 2010–2015 for all countries shown in this figure.

Next, similar to the depth measure, we create the following index for each field of the breadth measure by signatory group:

$$Av_Breadth_index_{it}^c = \frac{1}{L_{it}} \sum_{k \in S_{it}} \frac{N^c(LE \geq 1)_{ikt}}{M^c}, \quad (2.2)$$

where the notations are the same as those in Eq. (2.1). Thus, $Av_Breadth_index_{it}^c$ is the average share of the policy areas with $LE \geq 1$ in all policy areas in field c of the breadth measure of RTAs signed by country i and entered into force in period t . The breadth measure consists of fields $c \in \{GATS \text{ (Services)}, Tech \text{ (Technology)}, Inv/Cap \text{ (Investment/capital)}, Lab \text{ (Labor)}, NEP \text{ (NEPs)}\}$. For each field of the breadth measure, M^c is one for *GATS*, six for *Tech*, three for *Inv/Cap*, four for *Lab*, and nine for *NEP*.

The values of $Av_Breadth_index_{it}^c$ for ASEAN, Japan, China, the United States, and the members of the EU are shown in Fig. 2.6.

In Fig. 2.6 there are interesting differences in the patterns of the breadth indexes across countries. RTAs signed by ASEAN countries and Japan demonstrate the pat-

Fig. 2.6 Breadth indexes of RTAs by signatory group. *Note:* The average share of $LE \geq 1$ policy areas included in each field in the RTAs signed by each country/group that entered into force in each period is calculated. *Source:* Authors' creation from the World Bank's database

tern that is similar to that of the RTAs signed by the United States: the value of the GATS index is very high (close to one) and that of the Inv/Cap index is also high. Although the Tech index is lower than the GATS and Inv/Cap indexes, it is relatively higher than the Lab and NEP indexes. By contrast, RTAs signed by China indicate a quite different pattern, compared with other countries. That is, only the GATS index in 2010–2015 is high. Although the level of the Tech index in 2010–2015 is comparable to that of ASEAN and Japan, the level of the Inv/Cap index is much lower than ASEAN and Japan even in 2010–2015. With regard to the Lab index, the level is almost the same among these three signatory groups (i.e., ASEAN, China, and Japan) in 2000–2009, but the Lab index becomes higher for Japan, compared with ASEAN and China, in 2010–2015. RTAs signed by European countries also show distinct patterns. The levels of the breadth indexes are generally low. In particular, the levels of the GATS index and the Inv/Cap index are much lower than those of Japan and the United States.

In summary, the content of RTAs signed by ASEAN countries, China, and Japan is quite different in the depth and breadth measures. Specifically, the differences are significant in the NTB and BBP policy areas in the depth measure and Investment/Capital and Labor policy areas in the breadth measure. The shares of including legally enforceable OP policy areas and NEP policy areas are very low for all of ASEAN countries, China, and Japan. Thus, the degree of deep RTAs in the Asia-Pacific region is still not so high both in the OPs in the depth measure and in the NEPs in the breadth measure.

2.6 The Impact of Deep Regional Integration

Lawrence (1996) points out that deep integration could be better or worse than shallow integration. He argues that deep integration could “take the form of imposing measures on countries that are inappropriate for their stage of development, such as excessively stringent environmental standards, or which reduce economic efficiency” (p. 8). Therefore, we cannot expect a priori that deep integration ensures higher economic welfare than shallow integration. It is important to consider the effects of deep integration on various economic activities and economic welfare of RTA’s signatories and non-signatories.

2.6.1 *Deep Regional Integration and Global Firms*

As argued above, the main driving force for countries to sign deep RTAs is, in the terminology of Baldwin (2016a), the trade–investment–services–intellectual property nexus for global production and supply of goods and services by MNEs. Thus, it is important and interesting to examine how deep regional integration actually affects global activities of firms.

Osnago et al. (2017, 2019) analyze the relationship between deep RTAs and vertical FDI. Osnago et al. (2019) use a simplified version of the model developed by Antràs and Helpman (2004, 2008) and examine theoretically how differences in contractibility across production processes and across countries affect a final good producer's choice over the location (either North or South) of sourcing components and over engaging in vertical FDI or FO. Based on the theoretical analysis, they predict that deep RTAs with provisions improving the contractibility of components (e.g., TBT provision) increase the share of firms engaging in vertical FDI, whereas deep RTAs with those improving the contractibility of headquarters services (e.g., IPR and investment provisions) decrease the share of firms engaging in vertical FDI and raise the share of firms engaging in FO. Using firm-level data, Osnago et al. (2017, 2019) measure vertical FDI from country i to country j in sector k by the aggregate revenue of all the subsidiaries owned by firms in country i that produce inputs for sector k in country j . Osnago et al. (2017) address the endogeneity issue of deep RTAs using the instrumental variable approach and find that deep RTAs have significantly positive effects on vertical FDI. Moreover, Osnago et al. (2019) conduct empirical tests of their theoretical predictions and provide evidence to support both theoretical predictions.

A number of studies have investigated the impact of deep RTAs on global value chains (GVCs) and production networks (Boffa et al. 2019; Laget et al. 2020; Orefice and Rocha 2014). Augmented structural gravity models are extensively employed in the empirical analysis of this issue. Boffa et al. (2019) focus on the different impacts of deep RTAs and bilateral investment treaties (BITs) on various trade in value added indicators, or GVC trade. They find that although both deep RTAs and BITs increase GVC trade, their transmission channels differ. Specifically, backward linkages are stimulated through both deep RTAs and BITs, but only deep RTAs affect forward linkages. Based on this finding, they argue that negotiating a deep RTA with investment provisions has a larger impact on value-added trade than signing a shallow RTA and a separate BIT.

Laget et al. (2020) analyze the impact of deep RTAs on GVC participation. They find that deep RTAs increase the domestic and foreign value-added content of exports. According to their estimates, each additional policy area increases the domestic value-added of intermediate goods and services exports by 0.48% through forward GVC linkages, whereas an additional provision increases the foreign value-added of those exports by 0.38% through backward GVC linkages.

Orefice and Rocha (2014) estimate the relationship between deep RTAs and production networks trade. They capture production networks trade by import values in parts and components. Their finding is that signing deep RTAs increases production networks trade among members by about 12% points. Furthermore, they analyze whether higher levels of production networks trade increase the likelihood of forming deep RTAs. After taking other RTA determinants into account, a 10% point increase in the share of production networks trade over total trade increases the depth of an agreement by about 6% points.

Apart from GVCs and production networks, Jinji et al. (2021) investigate the impact of shallow and deep RTAs on cross-border licensing. They first derive a

micro-founded gravity equation for cross-border licensing from the heterogeneous firm trade model by Helpman et al. (2004). Jinji et al. (2021) add licensing as a supply mode to the foreign market, so that firms choose licensing, export, or FDI. Under certain assumptions, low productivity firms engage in cross-border licensing, while high productivity firms serve the foreign market either by export or FDI. Based on comparative statics analyses, they show that deep RTAs as a whole and deep RTAs with IPR provisions in particular increase cross-border licensing. By contrast, shallow RTAs may not enhance cross-border licensing. These theoretical predictions are fairly supported by the empirical evidence obtained through estimating a structural gravity model.

2.6.2 *Deep Regional Integration and Technology Spillovers*

We turn to the studies on the impact of deep regional integration on knowledge diffusion or technology spillovers. Nowadays, it is an important issue whether signing deep RTAs facilitates knowledge diffusion and enhance technology spillovers among countries. However, compared with the studies on the relationship between deep RTAs and global activities of firms, research on this issue is much scarcer.

To the best of our knowledge, Peri (2005) is the first study to investigate the effects of RTAs on technology spillovers. He uses patent citation data as a proxy of technology spillovers. This approach was pioneered by Jaffe et al. (1993) and has been employed in a number of studies (e.g., Hall et al. 2001; Jaffe and Trajtenberg 1999; Maurseth and Verspagen 2002).⁶ Peri (2005) uses a sample of 18 countries with 147 subnational regions in Western Europe and North America from 1975 to 1996. He estimates a gravity-like model to examine the effects of several resistance factors, such as trade blocs as well as regional, national, and linguistic borders, on technology spillovers measured by patent citations. “Trade blocs” correspond to RTAs. The estimated results indicate that while regional, national, and linguistic borders have a negative effect on technology spillovers, the impact of the trade blocs is insignificant, which implies that RTAs do not enhance technology spillovers. Only the European Economic Community (EEC)/the European Community (EC)/the European Union (EU) and North American Free Trade Agreement (NAFTA) are included as RTAs, so that the estimation of the impact of RTAs in his study is quite limited.

Jinji et al. (2013) extend the previous analysis to a sample of 103 countries for the period 1990–1999 using patent citation data. Unlike Peri (2005), they find a positive and significant effect of RTAs on technology spillovers. Their study is also limited because only nine RTAs are included in the analysis. Moreover, neither Peri (2005) nor Jinji et al. (2013) take the depth nature of RTAs into account.

⁶ Patent citations are references to existing patents included in patent documents. The advantage of using patent citations as a proxy of technology spillovers is that it is a direct measure of knowledge flows (Hall et al. 2001).

Jinji et al. (2019a) is the first study to examine whether deep RTAs enhance international technology spillovers. They measure international technology spillovers by cross-country patent citations and employ panel data on 114 countries/regions for the period 1991–2007. They argue that since international trade in goods is a major channel of technology spillovers and trade liberalization by RTAs increases trade among members, both shallow and deep RTAs facilitate international technology spillovers. However, RTAs and technology spillovers are linked more directly through the inclusion of provisions that stimulate technology spillovers. For example, some RTAs actually include provisions to encourage collaborative research projects and transfer of technology between firms in member countries. As a result, it is expected that deep RTAs enhance technology spillovers more strongly than shallow RTAs. Jinji et al. (2019a) actually find that deep RTAs enhance technology spillovers. Moreover, they analyze which provisions increase technology spillovers more. Interestingly, they find that a deep integration in a broad sense has a greater impact on technology spillovers than RTAs with provisions that are more directly related to technology.

Chapter 7 extends the analysis of Jinji et al. (2019a) and further investigates the issue of the impact of deep RTAs on international technology spillovers.

2.7 Conclusion

It is said that recent RTAs tend to be deeper than old RTAs. In this chapter, we discussed how we can distinguish shallow and deep regional integration. Then, using the classification of the policy areas included in RTAs by the WTO+ and WTO-X groups and the depth and breadth measures, we examined in what sense RTAs that have recently entered into force are actually deeper than those signed before 2000. We also explored the state of deep regional integration in the Asia-Pacific region. After that, we reviewed existing studies on deep regional integration. Our focus was on the effects of deep regional integration on global activities of firms and on the impact of deep regional integration on technology spillovers. In this way, we looked at how deep regional integration, global firms, and technology spillovers are related with each other.

Global firms are the main topic of Chaps. 3 and 4. Chapters 5 and 6 address the issue of technology spillovers. In particular, Chap. 5 focuses on the relationship between international trade and technology spillovers, and Chap. 6 examines how foreign direct investment affects technology spillovers. Then, in Chap. 7, we investigate the impact of deep regional integration on technology spillovers.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.