

ENCYCLOPEDIA OF INTERNATIONAL ECONOMICS AND GLOBAL TRADE

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Volume 3: International Trade and Commercial Policy



 World Scientific

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Acknowledgments

The editors of this volume are thankful to Jiang Yulin and Zvi Ruder at World Scientific for their assistance and patience in the completion of this manuscript. They are also thankful to the European Central Bank (ECB) for the use of a speech delivered by the Hon. Benoît Coeuré in his official function as a member of the Executive Board of the European Central Bank, and to the Bank of Canada for the use of a speech delivered by the Hon. Timothy Lane in his official function as Deputy Governor of the Bank of Canada. Both speeches are freely available from the corresponding institutions' websites.

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Introduction

Can Erbil and Francisco L. Rivera-Batiz

Economists have a long history of analyzing foreign trade transactions and policies, progressively adding complexity and nuances to their discourse. From the dangers of mercantilist trade policies back in the 16th, 17th and 18th centuries, to the benefits of trade liberalization and globalization in the 20th century, and finally to the recent threats of protectionism and trade wars in the 21st century, international trade theory and evidence have been crucial in the rigorous analysis of global economic events and policy decisions.

The 10 chapters in this volume provide an up-to-date discussion and analysis of the key issues in trade theory and policy currently facing the global economy. The topics examined include — among many others — a dissection of the current myths surrounding trade and protectionism; the effects of foreign trade on economic growth, employment, and income distribution; the theory and evidence on the causes and consequences of trade liberalization; the recent renegotiation of the North American Free Trade Agreement (NAFTA) into the US–Mexico–Canada Agreement (USMCA) and the implications for Canada, Mexico, and the US; the current negotiations of the Transatlantic Trade and Investment Partnership (T-TIP) and the potential regional impacts in Europe; the benefits of diversification in the expansion of exports and income in developing countries; and the effects of foreign trade facilitation policies worldwide and on emerging markets. The chapters encompass diverse approaches to the field, including basic surveys of classical and recent research (both theory and policy), applied simulations using various policy analysis techniques (such as Computable General Equilibrium modeling), and empirical analyses of the impacts of trade agreements (including NAFTA, T-TIP, etc.).

Contributors to the volume include a wide cross-section of authors, among them prominent academics at universities worldwide and policymakers and research analysts at international organizations such as the European Central Bank, the Bank of Canada, and the International Monetary Fund. They cover some of the key concepts in the field using the latest methods and evidence, including the Stolper–Samuelson theorem, the Ricardian and Heckscher–Ohlin–Vanek (H–O–V) models of trade, the gravity model, the Brown–Deardorff–Stern (BDS) and GTAP models, the Leontief paradox, and intra-industry and intra-firm trade, among others.

This introduction summarizes the chapters in this volume.

Current Challenges to the World Trading System

By any measure, the growth of international trade in goods and services over the last 40 years has been enormous, spearheading the globalization phenomenon. Indeed, the growth of exports and imports in almost any country has far surpassed that of national income during this time period. Table 1 shows the sum of the

Table 1. International trade index, 1978–2018.

Region/Country	Index 1978 (%)	Index 2018 (%)
World	34	58
Developing countries	24	51
East Asia and Pacific	18	57
Eastern Europe and Central Asia	47	84
Latin America and Caribbean	25	47
Middle East and North Africa	57	78
South Asia	20	42
Sub-Saharan Africa	53	51
Argentina	14	31
Bangladesh	23	38
Canada	49	66
China	10	38
India	12	43
Japan	20	35
Mexico	22	80
Russian Federation	26 (1991)	52
South Korea	54	83
Turkey	11	60
United States	17	27

Note: International trade index: Exports and imports of goods and services as a percent of gross domestic product.

Source: World Bank, World Development Indicators (2019).

absolute value of exports and imports of goods and services, as a percentage of gross domestic product (GDP), in a sample of regions and countries, for 1978 and 2018. As can be seen, this trade index rose from 34% to 58% at a global level and even more for developing countries, where it increased from 24% in 1978 to 51% in 2018. The expansion was the greatest in the East Asia and Pacific region, where it grew from 18% in 1978 to 57% in 2018. Only one region of the world failed to see overall growth of trade: sub-Saharan Africa, where the trade index actually dropped from 53% in 1978 to 51% in 2018.

The overall expansion of international trade in goods and services over the last 40 years is due to a variety of factors. High transportation costs had been a deterrent for the growth of international trade in the past. But these have dropped sharply in recent years, stimulated both by technological developments (bigger airplanes, larger cargo vessels) but also investments in infrastructure (ports, bridges, roads, warehouses, etc.).

Beginning in the 80s, world production has been revolutionized by the computer and information technology revolutions that have made possible a growing fragmentation or unbundling of production. In manufacturing industries — such as the automobile, electronics, airline, and clothing industries, among many others — there is a rising tendency to subdivide the production of final goods into separate components — or activities — that can then be produced in various countries, with the final assembly also occurring in a different country. The new Boeing 787 airliners, for example, are assembled in the US but the parts and components are produced mainly outside the United States. The center fuselage is made by Alenia (a company in Italy); the flight deck seats by Ipeco (United Kingdom); the tires by Bridgestone (Japan); the landing gear by Messier-Bugatti-Dowty (France); and the cargo doors by Saab (Sweden). These global value chains (GVCs) or multi-country manufacturing mean that all over the world final products — from automobiles and cell phones to pharmaceuticals and medical devices — are produced in one country using imported inputs from many others, organized mostly by large multinational companies. According to UN–WTO data, close to 80% of global exports of goods and services now occur through GVCs.

But the major reason why trade has risen over the last 40 years is the reduction in government barriers to international commerce. Both tariffs (customs duties) and non-tariff barriers to trade (import quotas, subsidies given to domestic import-competing firms, import licenses, etc.) have dropped sharply over time, at least in the manufacturing sector. These have occurred through multilateral trade agreements, sponsored by the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO) or by means of regional or bilateral accords, such as free trade agreements (NAFTA, the African Continental Free Trade agreement, AfCFTA, etc.) or customs unions (the EU or Mercosur).

Despite the substantial growth of international trade in goods and services in the last 40 years, the last decade has generally witnessed a sudden stop in this trend. Table 2 shows how the trade index — the sum of exports and imports as a percent of GDP — has indeed stopped rising since 2006 and has actually declined for developing countries. For China, the trade index dropped precipitously from 64.5% in 2006 to 38% in 2018. What has caused this turnaround?

The source of the trade slowdown is not rising transportation and communication costs since these continue to drop and are likely to continue their downward spiral due to greater internet connectivity and innovations connected to artificial intelligence (AI). For instance, the supply of some medical services, such as diagnostic radiology, are increasingly made internationally, with patients or technicians sending X-rays, laboratory results, etc., over the internet, for evaluation by doctors located far away. American radiology units can send their images to India (Mumbai or Bangalore), for a careful analysis by an Indian radiologist. The cost of transmission is decreasing over time and the analysis by the Indian radiologists can cost one-tenth of the price of a radiologist in the United States. Indeed, radiology companies in India do this now for clients not only in the US but also in the United Kingdom, Singapore, and other countries.

The culprits behind the slump in trade are the global financial crisis (GFC), which caused a substantial drop of both production and consumption at a world-wide level, and the recent resurgence of protectionism in high-income countries. With respect to the latter, in the US, the administration of President Donald Trump not only stopped negotiating some major free trade initiatives but also proceeded to impose tariffs on a wide variety of products from other countries, including Canada, China, and the European Union. For China, the Trump administration imposed a 25% tariff on products ranging from silk, cotton, textiles, electronics, and machinery to aluminum and steel, as well as some agricultural

Table 2. International trade index, 2006–2018.

Year	World	Developing countries	China
2006	58.6	61.5	64.5
2008	60.9	60.2	57.5
2010	56.9	53.5	48.9
2012	60.6	55.1	48.1
2014	59.8	52.6	44.9
2016	56.2	48.0	37.0
2018	58.0	51.0	38.0

Source: World Bank, World Development Indicators (2019).

products. The value of the imports from China taxed in May 2019 was worth about \$250 billion. And this has generated retaliatory tariffs from the affected countries. But the US government is not alone in its anti-trade stance. In Europe, Brexit and the rise of nationalist anti-globalization parties in several countries — including France and Italy — threaten to derail European unification and to reintroduce protectionist measures against imports.

Tackling directly the issues raised by the protectionist movements in recent years, Chapter 1 authored by Jagdish N. Bhagwati, Pravin Krishna, and Francisco L. Rivera-Batiz carefully examines the key myths expounded by these populist anti-trade campaigns.

The first myth dissected by these authors is that trade openness harms the economy. A simple fact contradicts this view: the period of increased trade in the last four decades has been accompanied by sustained long-run economic growth. Per capita GDP in the world — adjusted for inflation, in constant PPP-adjusted dollars — grew an average of 3% a year from 1991 to 2018. And for both the US and the European Union (EU), the average growth rate was 2% a year for the same time period. For developing countries, overall, it was 2.2% per year. The region that grew much slower than the average was sub-Saharan Africa, where average growth was only 1.3% a year, precisely the region where — according to the trade index discussed earlier — the growth of trade was the least significant.

Of course, the last 40 years have seen many major economic changes that are not connected to trade liberalization and, furthermore, the correlation between trade and growth may just imply that increased standards of living lead to greater trade instead of the opposite causality. So, the authors proceed to examine both the theory and the empirical evidence pointing to a causal effect of trade on economic growth.

The classical theories of the gains from trade — the Ricardian and H–O–V theories — show that trade liberalization raises real income by means of the greater productivity generated by countries specializing according to their comparative advantage. But more recent research has emphasized how the greater product variety and economies of scale associated with access to world markets can provide domestic consumers, producers, and factors of production with substantial gains. Other authors have examined how increased competition from abroad forces some domestic producers to grow, innovate, and raise their productivity in order to sustain or increase their international competitiveness.

Bhagwati, Krishna, and Rivera-Batiz discuss the empirical evidence showing that the causality leads from trade to growth, not the other way around. Studies using instrumental variables — such as geographical closeness — and other

econometric tools to distil the impact of trade on growth find substantial causal effects of trade on income. Other studies have established causal effects by showing that trade liberalization events in a country cause an increase of economic growth in the time period after the liberalization when compared to the situation before, holding other things constant. For example, the Indian experience shows that, once India embarked in 1991 on reforms which included reducing trade barriers, the growth rate accelerated and this, in turn, reduced poverty.

A second myth discussed in Chapter 1 is that free trade may increase prosperity but is bad for the working class in high-income countries. The authors do agree that wage growth has slowed down significantly in the US and other high-income countries in recent decades. But they show that trade is not the main cause of the stagnation of rich-country wages. Instead, the principal culprit is a downward trend of labor productivity growth. In the US, between 1948 and 1973, productivity growth averaged 3.3% per year, but this dropped to 1.6% between 1973 and 1995 and further to less than 1.3% since 2005. The most popular view is that technological change and innovation — what economists call total factor productivity growth — has stagnated. This is the point of view of Robert Gordon in his 2016 book *The Rise and Fall of American Economic Growth*, which suggests that US innovation is faltering due to a lack of business dynamism, low investment rates and a set of socioeconomic headwinds that are handcuffing the process of innovation, such as the slowdown of educational attainment and school quality, and the relative shift of the population to older age groups. Other explanations for the American wage growth slowdown focus on the decline of unions and the drop of the real minimum wage. If anything, the authors argue in this chapter, the evidence supports the view that international trade may have acted to counteract the effects of the productivity growth deceleration on wages and the living standard of the working class.

The third myth examined by Bhagwati, Krishna, and Rivera-Batiz is that trade openness adversely affects poverty and income distribution in developing countries. But a simple look at the global changes in poverty shows that the period of trade globalization has been accompanied by lower — not greater — poverty in the developing world. Indeed, the absolute poverty rate in developing countries — measured by the World Bank at \$1.90 per day (in constant 2011 international dollars) — dropped from 44.4% in 1990 to 11.8% in 2015. This negative link between trade and poverty is confirmed by detailed micro-studies from a wide range of countries, including Argentina, China, Mexico, and Poland, among others. Consider the cases of China and India, two economies that have adopted strong trade-oriented development policies. Using the \$1.90 measure, poverty in China dropped from 66.2% in 1990 to 0.7% in 2015. In India, poverty declined from 48.9% in 1990 to 21.2% in 2011. By contrast, in sub-Saharan Africa, where

protectionism remains rampant, poverty rates have dropped at a significantly slower pace, from 54.7% in 1990 to 41.9% in 2015.

In terms of income distribution, critics of trade liberalization argue that trade has increased inequality worldwide. They point out that in, contrast to poverty, inequality has indeed risen sharply in a number of countries over the last 30 years, a period that coincides with the growth of trade. But this ignores the fact that inequality has declined in a number of developing countries as well, such as Argentina, Brazil, Colombia, and Turkey, countries that embraced trade during this time period. Furthermore, as Bhagwati, Krishna, and Rivera-Batiz document, the evidence points to skilled-biased technological change — not increased trade — as the main factor behind rising inequality in both high-income and developing countries. The introduction of computers in the 1980s, the information and technology revolutions in the 1990s, the automation and robotics innovations of the 2000s, and the current AI breakthroughs have all altered the labor market in favor of more-educated, more skilled workers, reducing the demand for less-educated workers in routine, production tasks causing greater inequality.

Another myth discussed in Chapter 1, popular in American political circles, is that the growth of trade since the 1980s has destroyed US manufacturing by causing factories to move in recent years to countries with cheap labor or other unfairly created advantages. But this belief is in error. The decline of manufacturing employment in the US is a phenomenon that has occurred in most high-income countries, from Germany to Japan, and reflects a long-term, structural shift from manufacturing to services that has been ongoing for over a half century, long before international trade took off. This is evidenced by the steady decline in the share of manufacturing workers in overall non-farm employment in the US, from a high of over 30% in the 1950s to 25% in 1970, 20% in 1980, 16% in 1990 and 10% in 2010.

The vitriol against trade has been particularly directed at China, which is blamed for millions of American manufacturing jobs lost since the 1990s. This view has been fed by academic studies that correlate Chinese imports with adverse impacts on manufacturing employment in different parts of the US. But Bhagwati, Krishna, and Rivera-Batiz seriously question the conclusions of these studies. First of all, the studies assume that trade only involves imports, but in reality it involves both imports and exports. Just as US imports from China have increased so have American exports to that country and the research shows that the positive, job-creation effects of exports largely counterbalance the negative effects of import competition. Furthermore, the decline of US manufacturing employment itself is partly connected to a statistical miscalculation. During the period involved, manufacturing production was reshaped, as many of its activities were unbundled and

separated into various parts that could be undertaken anywhere in the world as part of GVCs. Many of these activities — such as product design, R&D, distribution, and sales — which were considered in the past to be part of internal manufacturing production were reclassified as services. As the employees were cataloged as being part of the service sector (such as the wholesale and trade sector, for example), there was a statistically-manufactured drop in manufacturing employment.

Another myth discussed in Chapter 1 is that there is nothing more to be gained from further trade liberalization. But the fact is that there is still substantial room for trade liberalization. In agriculture, for instance, the GATT negotiations that culminated with the Uruguay Round and the creation of the WTO in 1995 left a wide range of protectionist measures in agriculture. The protection is in the form of a wide array of instruments, including import tariffs, quotas, production and input subsidies, export subsidies, and direct payments to agricultural producers. The degree, and type, of protection varies among various countries. In the United States, for example, the protectionism has been mostly in the form of producer subsidies but in Japan and the EU tariffs and price-based protectionism is much more significant.

Developing countries have loudly complained about the agricultural protectionism in the rich countries. But they are guilty of the same crime. For instance, the weighted average tariff rate on agricultural imports in India is 33%, in Egypt it is 61%, in Thailand it is 31%, and in Sudan it is 30%. The presence of agricultural trade protectionism in both rich and poor countries indicates that there is still much room for trade liberalization.

The authors in Chapter 1 recognize that the reorganization of global manufacturing production spurred by the technological revolutions of the last 30 years — referred to as factory-less production — has meant that the strictly production-related activities of the firm have been heavily automated, resulting in a reduction of blue-collar operators and production workers. The repercussions can be serious. Geographically, the manufacturing-related service sector jobs that have been generated by the factory-less manufacturing revolution have been in urban areas while the shedding of production workers and operators has occurred in non-urban areas. Furthermore, much of the increased employment in service-related activities are in high-skill professions such as design and engineering.

These adjustments require social safety nets, retraining, and geographical mobility policies that allow workers — particularly semi-skilled workers — to adjust to the social and economic changes they suffer. But Bhagwati, Krishna, and Rivera-Batiz emphasize that by no means would anti-trade policies help on this matter and instead they would impose greater pain on the displaced.

Chapter 2 by Benoît Coeuré examines the slowdown of international trade after the GFC and its recent recovery. While global trade grew at about twice the rate of GDP before the crisis, it has slowed down considerably since then. However, since 2017 trade has rebounded, with trade once again outpacing world GDP growth. The euro area is benefiting from this recovery, with export growth being the highest in many years.

Coeuré argues that the rebound in trade reflects mostly cyclical forces associated with the recuperation of the global economy. Key among these is investment, which has a relatively high-import intensity and is essential for export growth. The recovery in trade has been led by exports of capital goods and intermediate products, both key inputs to investment.

On the other hand, Coeuré believes that structural changes in the world economy are generating strong headwinds in the road to trade growth. The international outsourcing of production through GVCs which had provided a strong boost to trade in the past appears to be waning. GVCs involve production processes being split into a number of intermediate steps, mainly in order to exploit international factor income differences. As a result, production has become dispersed across countries, and this has mechanically increased the amount of trade that takes place for a given final output. The global integration of China, for example, not only increased its exports to developed economies, but it also increased its imports of raw materials and intermediate goods from neighboring emerging economies. This boosted overall world trade relative to output.

However, after the GFC, there has been a levelling-off of participation rates in GVCs: the share of GVC-related exports and imports in total trade has stabilized. This means that the support for world trade from GVCs has recently faded. Coeuré presents the results of European Central Bank research signaling three key factors explaining the slowdown in GVC formation.

The first factor relates to supply-chain risks. Recent disruptions in global trade, from both natural causes — such as the 2011 earthquake and tsunami in Japan — as well as from policy interventions, such as those caused by trade and currency wars, have made companies realize the risks involved in complex value chains. This has led to shorter and more transparent value chains. Cyber risks and risks to data integrity are likely to amplify further the risks involved in GVCs.

The second factor relates to shifts in comparative advantages. In the past, wage differentials for unskilled labor made the international fragmentation of production highly profitable. But some of those wage differentials are now less marked as emerging economies continue to develop. In China, for example, real wages have increased by a factor of 10 since 1995.

The third force is the increase in automation and the use of AI. The increased use of robots has the potential to modify the relative factor intensities in the

production of certain goods and services and may thereby sever the link between, say, cheap labor and the location of unskilled manufacturing activities. If robots can deliver the same output more cheaply, more efficiently and closer to the consumer, then firms may have fewer reasons to spread production across countries.

The chapter concludes with some policy recommendations. The first is that automation implies that protectionist policies aimed at preventing — and reversing — job losses among low-skilled workers in manufacturing are unlikely to achieve their aim. This is because reshoring is likely to be more capital- and skill-intensive and therefore unlikely to create many new jobs for low-skilled workers. Higher tariffs are also less effective than they were in the past, given that intra-firm trade has grown substantially. As a result, higher tariffs may well reduce domestic profitability.

The second implication is that policymakers need to help new sectors to grow and develop. This is particularly important for services, which already account for two-thirds of global GDP and employment, and represent many of the potential growth sectors in the age of digitalization and automation. For the EU, this means completing the Single Market for services.

But according to Coeuré, policy actions must go beyond trade initiatives. In Europe, there is a need for comprehensive policy action, at both EU and national level, to support workers who have lost their jobs due to technological shifts and facilitate employment in emerging industries. Certainly, this involves ensuring adequate education and retraining programs to help smoothen the transition to new employment. But it also means continuing to address structural rigidities in labor markets that may prolong and amplify secular shifts in labor demand. This includes fostering labor mobility across EU countries. Freedom of movement of workers is undoubtedly an engine of growth. Continued high structural unemployment in some European countries shows that this is an area where policymakers have not been successful in the past.

In Chapter 3, Timothy Lane examines recent changes in trade patterns and the challenges they impose, particularly in Canada. As in the case of the EU discussed by Coeuré, Lane observes that various global economic forces, including the sharp movement of commodity prices, the Great Recession and the lackluster global economy in its aftermath, as well as a strong Canadian dollar, have led to a slow-down of Canadian trade. At the same time, he sees encouraging signs that exports and business investments are broadening and strengthening. He sees this recovery as essential, given the importance that trade has provided to the Canadian economy. He discusses the mechanisms through which this occurs.

Traditionally, trade emerged through a specialization process in which countries exported different products based on their comparative advantage: Switzerland

exported watches, France wine, and Canada exported what it had in abundance — raw materials such as fur, fish, and timber — and imported manufactured goods. This inter-industry trade continues today, particularly between rich and poor nations.

But Lane observes that the biggest increase in world trade in recent decades has been intra-industry — that is, two-way trade within a given industry. Some of that simply reflects product differentiation: Canada exports rye whisky and imports scotch and bourbon. But, even more importantly, the expansion of intra-industry trade has been enabled by the unbundling of different stages of the production process through GVCs.

Consider the automobile industry: Canada both exports and imports auto parts at different stages of production as well as the finished product. The potential for this kind of unbundling was unleashed by technological innovations, particularly advances in ICT, which enabled the logistics needed to manage a supply chain that crisscrosses international borders. But although innovation drives trade, the reverse is also true: trade openness drives innovation, too. This happens for two reasons. First, access to foreign markets exposes firms to new technologies and provides incentives for them to invest in producing more efficiently. And second, competition from trade encourages firms to innovate and invent new products to maintain market share. Trade is also an important channel for knowledge to spill over across borders: an operation in one country can become competitive by combining its home advantages with the best techniques developed elsewhere.

Historically, Lane concludes, these processes have created many more job opportunities than they have eliminated: openness to international trade has been and remains an important determinant of Canada's economic growth potential. That growth could be substantial if businesses find new ways to engage with GVCs and develop new products and processes to make them more productive and competitive. As in the past, further expanding Canadian firms' access to world markets and to imported inputs could unlock those opportunities. An example is the Canada–EU Comprehensive Economic and Trade Agreement, which eliminated most tariffs between Canada and the EU and entered into effect on September 2017.

But, as Lane observes, both trade expansion and innovation are by their nature disruptive for firms and individuals. They spur growth by enabling more advanced and efficient activities and encouraging producers to expand, displacing less efficient activities and producers. This is an integral part of the whole process. The economist Joseph Schumpeter referred to it as creative destruction. It does mean that some workers are left behind. And the rewards for innovation, particularly, in the digital economy, often accrue to the few who own the related intellectual property. Lane suggests that public policy can smooth the disruptions created by trade

and technological change. It requires investments in retraining and lifelong learning as well as social safety nets. Another priority is to make sure that profits, including those derived from intellectual property, cannot be shifted to avoid taxation. This includes stronger international cooperation.

Chapter 3 concludes by noting that the rise of protectionist sentiment in some parts of the world have led to a heightened uncertainty about the rules of the game on international trade. If trading rules are changed in a way that undermines the benefits generated by trade, the result would be both lost external demand for exports and lower potential growth, for Canada as well as for the United States and other trading partners.

International Trade Theory and Applications

This section of the volume surveys the main theories developed over the years to explain the causes of international trade and its consequences. It also describes the methods that trade economists utilize to provide estimates of the effects of trade policies, including applications to two recent case studies of actual and proposed trade reforms, including the renegotiation of the North American Free Trade Agreement (NAFTA) into the US–Mexico–Canada (USMCA) trade agreement, and the Transatlantic Trade and Investment Partnership (T-TIP) between the EU and the US.

Chapter 4 by Francisco L. Rivera-Batiz, Can Erbil, and Alexandra Opanasets presents a survey of the key theories examining the causes and consequences of international trade and the evidence supporting them. The chapter starts with a discussion of the classical theory of trade, as presented by Adam Smith and David Ricardo. Adam Smith's theory of absolute advantage proposed that countries could gain from trade if they specialized in producing and exporting those products which they could produce at a higher productivity than other countries. But this theory concluded that trade between two countries can exist only if each country has an absolute productivity advantage in producing some products but not if one country is less productive than the other in every activity.

By contrast, Ricardo argued that a country can still gain from trade even if its productivity in every sector is lower than that in another country. Ricardo showed that if two countries are considering trade in two products and they specialize in producing and exporting the product in which they have their highest relative productivity — in which they have a comparative advantage — then trade will lead to gains for both countries no matter whether one country has greater productivity than another in all activities.

Early empirical evidence on the Ricardian framework generally supported it. But the difficulties of extending the theory to a multi-country, multi-product world complicated the empirical work. There is also the fact that, if countries specialize in producing some products and do not produce others as a result, as predicted by the Ricardian framework, then no data can be observed on the productivities of sectors that do not exist and the theory cannot, therefore, be tested. These problems forced both the theory and the empirical testing of the Ricardian framework to dwindle.

As analysis using the Ricardian framework declined, a new approach gained attention: the Heckscher–Ohlin (H–O) theory. The Ricardian theory focused on how relative differences in technology (relative productivity) generate trade. The H–O theory, instead, assumed that technologies across countries are identical but proposed instead that differences in relative factor endowments — in labor and capital specifically — determine patterns of comparative advantage across countries. The H–O theorem stated that under free trade countries with relative abundance of a factor of production would tend to specialize and export products that use that factor intensively.

The H–O theory was challenged by a number of empirical studies that found the data was inconsistent with the conclusions of the theory. Key among these studies is what came to be known as the Leontief paradox. In his test of the H–O theory using data for the US, Wassily Leontief found US exports were relatively labor-abundant, even though the country is relatively abundant in capital. Despite a rash of studies proposing explanations for the Leontief paradox, both at the theory level and in terms of the empirical data, much skepticism was raised over the years about the theory.

But although both the Ricardian theory and the H–O model have been declared dead by economists over the last 50 years, the reality is that these theories follow well the dictum of Mark Twain who, after hearing the rumors that he had died — including a newspaper that printed his obituary — was heard to have said: “The reports of my death are greatly exaggerated.”

Both theories remain standing and have been resurrected by recent empirical evidence that supports their insights, once they are extended to incorporate the existence of many factors of production, goods and countries, inter-country variations in production functions, and hold constant other factors that can also explain trade patterns. Empirical evidence on these modified or “hybrid” models, has grown over the years. As noted in Chapter 4, the research generally supports the idea that both technology differences and relative factor endowments — of physical and human capital, unskilled labor, etc. — affect trade patterns, particularly between high-income and developing countries.

The chapter also discusses the more recent theories on the causes and consequences of trade, referred to as the “new international trade theory.” These theories recognize that the traditional models do not easily explain a large share of global trade called intra-industry trade. The latter refers to exports and imports of different varieties of products within the same industry, as opposed to the inter-industry trade exclusively discussed by both the Ricardian and the traditional and extended H–O models. Intra-industry trade is an essential part of global trade, particularly among high-income countries.

The new trade theory seeks to explain intra-industry trade within the context of imperfect competition, including models of oligopolies and monopolistic competition. It also examines how economies of scale affect trade. The nature of the economies of scale facing a country can vary. They can be in the form of internal economies of scale, through which specific firms in an industry achieve lower average costs as they raise their production. The economies in this case may arise because the increased firm size allows more productive technological and organizational structures, such as increased division of labor within the enterprise. Or the productivity advantages can be in the form of external economies of scale, in which the growth of an industry allows producers within the industry to face lower average costs. The origins of economies of scale may also be linked to historical circumstances or connected to geography.

The effects of geography on trade are most starkly revealed when one considers the influence of transportation costs. The chapter discusses the best-known theory on the role of transportation costs on trade, the so-called gravity model. As the name suggests, the theory was based on Newton’s theory of gravitation and suggests that the bilateral trade flow — exports and/or imports — between two countries is proportional to the economic size of the two economies (their “mass”) and inversely proportional to the distance between them. As discussed in Chapter 4, empirical evidence on the gravity model overwhelmingly supports it. The model has also been found to be consistent with a variety of theoretical frameworks.

The assumption of traditional international trade theory is that countries produce, consume, and trade final products, from shoes and computers, to wine and cloth. But in reality, only about 30% of all goods and services traded globally represents final goods. Close to 70% of world trade consists of intermediate goods and services, that is, goods and services that are produced but then need to be added to or assembled into final products, which are then sold to consumers. Chapter 4 discusses the theory and evidence on trade in intermediate products and the GVCs that integrate their use into the production of final goods. Related to this issue, connected to the many transactions that GVCs must engage in, is the role played by public sector governance in fostering trade and in influencing the comparative advantage of a country in international trade.

Chapter 4 also surveys recent literature examining trade within the context of heterogeneous firms, presenting what some have called the “new new theory of international trade” and the empirical evidence on it. In terms of the impact that trade has on the economy, both the Ricardian and H–O–V theories emphasize the reallocation of production among industries in the economy. But the recent evidence shows that much of the observed reallocation of production in the aftermath of trade liberalization is found to occur among firms within industries. The focus on firm heterogeneity introduces a new source of the gains from trade: Trade liberalizations are often accompanied by the exit of low-productivity firms and the expansion of high-productivity ones, which raises domestic aggregate productivity and national income. The recent literature surveyed in the chapter builds on earlier literature that also focused on the strategic interactions among a few firms involved in trade, often using game-theoretic frameworks. This analysis suggests that in oligopolistic markets, governments may have a strong incentive to engage in strategic trade policies, such as production subsidies, that protect their firms at the expense of those in other countries.

Chapter 4 concludes with recent developments in the field examining the notion of dynamic comparative advantage, the idea that countries should specialize in — or at least diversity into — producing and exporting goods that have greater potential in terms of innovation instead of those that can be produced at a lower relative cost in a static context. The case of South Korea is often mentioned, as the government in that country adopted policies of supporting — through subsidies and short-term protection — investments in industrial sectors which from a static viewpoint looked unsustainable but in the long-run displayed substantial cost-reductions and international competitiveness. The use of government policies to support industries that have potentially large future productivity or innovation advantages is controversial but has received support from some empirical evidence.

Trade economists, especially those working in governments, international organizations, and think tanks are often called upon to estimate the effects of various trade policy changes, such as those involved in international trade agreements. Typically, this analysis has to be performed before a trade policy change is actually implemented and before its effects occur. Chapter 5 by Alan K. Fox, Serge Shikher, and Marinos Tsigas discusses one of the most commonly used methods: Computable General Equilibrium (CGE) models. A CGE model analyzes how changes in trade policies affect various economic variables — such as output, employment, and trade — in multiple industries and countries. It also takes into account the fact that all economic variables are interconnected so that, for example, a slowdown in the auto manufacturing industry has a negative

impact on steel and other related industries, and both of these have a negative effect on employment and therefore consumption, and so on.

Given the prevalence of CGE models in policy analysis, it is important to know how well these models do in predicting the effects of policy changes. The policy-makers that read the estimates would like to know that these estimates are credible. They also want to know the limitations of the models and estimates. This chapter discusses the methods that can be used to evaluate CGE models of trade and presents evaluations of several popular models.

The chapter begins with a brief overview and history of CGE models. The starting point of CGE models is as an application of the general equilibrium (GE) trade models discussed in Chapter 4, such as the H–O–V model. But CGE models usually describe in greater detail the inter-industry linkages in an economy, utilizing input–output (I–O) accounts. I–O models of an economy were first introduced by Wassily Leontief in the early 1930s. They focus on inter-industry linkages and compute the required resources to satisfy the final demand. For example, the I–O accounts can tell us how much of the output of the steel industry is used by the automobile manufacturing industry.

Building on the work of Leontief and others, CGE models appeared in the 1960s and became popular in the 1980s and 1990s. There are now many different types of CGE models in existence, including a new class of CGE models called GE gravity models. The building blocks of a CGE model include one or more households per region, one or more goods, one or more producers per region, and at least two regions. For example, a simple model might include one household per region, two factors of production (capital and labor) two regions (home and foreign), and two goods. Modern computable trade models feature many more sectors of the economy and regions, with production, consumption, and trade modeled in each region and sector of the global economy.

In their evaluation of CGE models, Fox, Shikher, and Tsigas focus on three popular CGE models: the Brown–Deardorff–Stern (BDS) model, the Global Trade Analysis Project (GTAP) model, and the GE gravity model of Eaton and Kortum. They describe the key features of these models and then analyze their performance.

The BDS model has its roots in the work of Alan Deardorff and Robert Stern of the University of Michigan, who developed one of the earliest computable models of trade, the Michigan Model of World Production and Trade, in the mid-1970s. The model continued to be developed and refined over the next decade, with substantial additional features introduced by Drusilla Brown, in particular monopolistic competition in production. This innovation became known as the BDS model. The BDS model features 29 industries and 34 countries/regions to describe world production and trade. The various incarnations of the BDS model

have been used to model the effects of a number of trade policies from the 1970s through the 1990s, including the Tokyo Round of the GATT, the US–Canada FTA, the NAFTA, the Western Hemisphere Free Trade Agreement (WHFTA), and the Uruguay Round.

The GTAP model is based on the original work of Thomas Hertel and the Center for Global Trade Analysis at Purdue University in the late 1980s and early 1990s. In GTAP Data Base version 9, the world is divided into 140 economies. Each economy is specified with demand and production structures for 57 groups of goods and services. Over the years, the GTAP model has been used to examine a wide range of policy issues, from the impact of the Uruguay Round of multilateral trade negotiations, to global climate change mitigation analysis.

Recently, the GTAP model has been used to analyze the effects of the US–Mexico–Canada (USMCA) trade agreement. Formal negotiations to replace NAFTA with USMCA started in May 2017 and the leaders of all three countries signed the agreement at the end of November 2018. The agreement will take effect after ratification from all three states through the passage of enabling legislation. USMCA is unlike many previous trade agreements for which the primary impacts were assessed by analyzing changes in tariffs and non-tariff measures like quotas. Because these changes were by and large already accomplished under NAFTA, analyses of USMCA focused on provisions applicable to non-tariff issues, such as international data transfers, rules of origin, labor regulations, tariff-rate quota (TRQ) allocations, investment regulations, and intellectual property rights. The US International Trade Commission has provided a comprehensive analysis of the USMCA. The USITC's approach used a combination of industry- and provision-specific analyses which were then integrated into an economy-wide CGE model. The CGE model provided estimates on the combined impact of the USMCA on the US economy, including key economic indicators such as GDP, trade, employment, and wages, as well as on broad sectors of the economy. The CGE model was based on the GTAP model, which was modified to reflect the unique characteristics of the new provisions.

The third CGE model evaluated in Chapter 5 is the Eaton and Kortum model, first built by Jonathan Eaton and Samuel Kortum in 2002 to incorporate the role of geography in a Ricardian model of trade. It belongs to a class of CGE models called GE gravity models because the equation that describes trade in the model is a version of the gravity equation. In the Eaton–Kortum model, industries consist of many producers, each producing its own good. Producers differ in their productivity: some are very productive, others less so. Exporting is done by the more productive producers. Markets are (perfectly) competitive, as in many other CGE models, so producers charge prices equal to costs. The costs in turn consist of costs of production and costs of delivery. Therefore, trade costs play an important role in the Eaton–Kortum model, just as they do in the gravity model.

Chapter 5 emphasizes that CGE models are different from many other economic models due to their complexity and high number of parameters. This dictates that they need to be evaluated by matching the results from the models to data examining their out-of-sample performance. This is called historical forecasting.

The authors use NAFTA as a large-scale historical experiment to compare the performance of the three models of trade described earlier. All three models are parametrized using pre-NAFTA data and simulate tariff removal scheduled under NAFTA. The model predictions are then compared with post-NAFTA observations. They find significant differences in the gap between the model predictions and actual data among the models. The model that does best is the EK model, with a correlation between predicted and actual trade changes equal to 0.95. The BDS model has the lowest correlation, 0.31. These gaps in performance can come from differences existing in the model assumptions or parameter values.

Chapter 6 by James J. Fetzer and Aimee Larsen examines the effects of international trade on employment. Among academic economists, the debate on the employment effects of trade has been raging for some time. For instance, a paper published in 2016 by Daron Acemoglu, David Autor, D. Dorn, Gordon H. Hanson, and B. Price concludes that the surge of imports from China after 2000 was a major force behind both recent reductions in US manufacturing employment and — through I–O linkages and other GE channels — weak overall US job growth. But other economists find different results. The debate has spilled-over into the policy and political sphere. Trade agreements, in particular, have generated heated concerns about their impact on domestic employment. Indeed, in the US, public opinion has been shifting recently toward the view that trade agreements, such as the NAFTA and others, have caused a decline of American manufacturing employment, leading to the demise of the T-TIP, the broad trade agreement that was being negotiated by President Barack Obama during his administration.

This chapter provides a roadmap in how to examine the sector-specific employment effects of trade. It focuses on four specific strategies or rules of thumb for estimating the impact on industry level employment from a change in the volume of output. The rules specify the underlying assumptions about the markets for labor and capital, focusing on the price elasticity of factor supply and the type of technology used. The range of estimates obtained from these rules provides a simple and straightforward analysis of the impact that trade policies can have on employment and wages in specific industries.

The first rule is the *proportional returns* rule, which assumes that either the technology of production is Leontief or that both the wage rate and rental rate of capital are fixed and technology is homothetic and exhibits constant returns to scale. If technology is Leontief, production is based on fixed proportions of

value added (capital and labor) and intermediate goods (such as raw materials), and employment increases at the same rate as output. Employment will also change in proportion to output if factor supply is perfectly elastic and technology is homothetic and exhibits constant returns to scale. Homothetic technology implies that the capital labor ratio depends only on relative factor prices, and not their level. Constant returns to scale are needed for capital and labor to change in the same proportion. Perfectly elastic factor supply implies that product supply is also perfectly elastic. This scenario would be appropriate for instances where there is unemployed capital (such as unused capacity) and unemployed labor that is mobile enough to use the unemployed capital.

The second rule considered in the chapter is the *diminishing returns* rule, which assumes that capital and the wage rate are fixed and labor supply is perfectly elastic. Employment increases at a higher rate than production because of the diminishing returns to labor when capital is fixed. The increase in employment depends on the increase in production and the share of labor in value added if one assumes Cobb–Douglas production for value added. The smaller labor's share of value added, the more employment increases. For example, this scenario would apply when there is unemployed skilled labor in producing the product, but little or no unused capacity.

The third rule, the *marginal product* rule, assumes that the supply of both capital and labor are fixed, but the wage rate can change. Any increase in demand for production will raise the wage rate. Profit maximizing firms will pay higher wages in proportion to the change in the price as a multiple of marginal labor productivity. Product supply will also be perfectly inelastic because the factors of production are fixed. This assumption is appropriate when there is no unemployed skilled labor or any available skilled labor is not able or willing to move to where it can be employed.

The fourth rule, the *returns to scale* rule, assumes that wages and the rental rate of capital are fixed so the capital labor ratio is unchanged as output changes and there are either increasing or decreasing returns to scale (and technology is homothetic). If there are increasing returns to scale, employment increases by a smaller proportion than output, depending on the degree of the returns to scale. With decreasing returns to scale, employment rises in a greater proportion than output. This rule would be appropriate when there is unemployed labor and capital and changing the scale of industry will either increase or decrease the degree to which production responds to changes in labor and capital.

As an application, the rules are used by Fetzer and Larsen to estimate the employment effects of a safeguard import duty. Global safeguard actions, which act as a temporary restriction on imports, are allowed by the WTO if the imports are causing or threatening to cause serious injury to a specific domestic sector or

Table 3. Canada–Mexico–United States trade, 2018.

Country of origin	Country of destination	Exports of goods and services	Imports of goods and services
Canada	World (US\$, billions)	450.3	459.9
	Mexico (%)	1.4	6.2
	United States (%)	75.0	51.1
Mexico	World (US\$, billions)	450.5	464.3
	Canada (%)	3.1	2.3
	United States (%)	76.5	46.6
US	World (US\$, billions)	1,669.3	2,611.4
	Canada (%)	18.0	12.5
	Mexico (%)	15.9	13.4

Source: United Nations, COMTRADE (2019).

industry. The WTO also allows country-specific safeguards in some circumstances. For example, China’s WTO accession agreement allowed WTO members to use safeguard actions to restrain increasing Chinese imports that were found to disrupt the WTO member’s market. This mechanism was available for 12 years after China’s accession in late 2001. The specific action examined in Chapter 6 involves a 35% China-specific safeguard duty placed by the United States on tires imported from China in September 2009. The duty was reduced 5 percentage points in September 2010 and September 2011, and then eliminated in September 2012. The range of estimates of the impact on employment using the four rules delineated above range from 3–6% using the proportional returns rule to 2–3% using the returns to scale rule.

Regional and Multilateral Trade Agreements

Chapter 7 by Patrick Georges assesses in a comprehensive way a number of key issues relating to Canadian trade, especially from the perspective of its links with Mexico and the US. The chapter begins by recognizing the strong integration existing between the three countries. Table 3 shows the exports and imports of goods and services among these three nations in 2018. For Canada, 76.4% of all its exports of goods and services go to the US and Mexico, while 57.2% of its imports come from these two countries. For Mexico, 80% of its exports go to Canada and the US, while close to 50% of its imports come from North America. And for the US, 33.9% of its exports of goods and services go to Canada and Mexico and 25.8% of its imports come from these two countries. For all three countries, the rest of North America constitutes their greatest trading partner. For the US, for example,

other trading partners like the EU (including all 28 countries) only account for 18.8% of US exports and 18.1% of US imports, and China accounts for 7.2% of US exports and 21.6% of US imports.

In his chapter, Georges discusses the benefits of diversifying Canada's trade geographically in a world where North America has become a smaller share of the global pie. Using numerical simulations to specify the impact of a shift in Canadian trade from the US to the EU, first, and then to a group of emerging markets, he finds that Canada might benefit from a shift in trade from the US to emerging markets but not from a shift to the EU or Japan. And, in any case, the proximity of the North American market makes it a fundamental feature of Canadian trade.

As noted earlier, the NAFTA was renegotiated in 2017 and a new agreement, the USMCA trade agreement was signed by the leaders of all three countries in November 2018. The agreement would go into effect in 2020. One of its provisions is that to qualify for zero tariffs, a car or truck imported into the US must have 75% of its components manufactured in Canada, Mexico, or the United States, a significant increase from the current NAFTA requirement of 62.5% requirement. The requirement that a large portion of the components or content of a product exported to the US by Canada and Mexico originate within North America is part of the rules of origin of any free trade agreement. These establish where a product or its components are produced in order to qualify for the preferential tariff treatment embodied by the free trade agreement. It prevents the situation where exports from countries outside the free-trade zone, say country Z, are imported into a country within the zone (a country with a low external tariff barrier to country Z, say Mexico) and then exported into another country within the free-trade zone, say the US, now at zero tariffs because of the preferential trade agreement. If the latter country, the US, has high tariffs against the external country, country Z, then the latter country can in effect avoid the high tariffs it would face if it exported the product directly into the US. This strategy is called trade deflection. Georges observes that the strict rules of origin sought by the US in the new trade agreement reflect the outcome of intense lobbying by interest groups. But by disrupting global value chains with countries outside North America, they may in effect lower North America's international competitiveness, raising prices of products such as automobiles while providing little benefit to workers.

Trade deflection is a significant issue among members of a free-trade zone because they do not have a common external tariff against non-members. Customs unions, on the other hand, by definition, are countries that do establish a free-trade agreement among themselves but also place common tariffs or trade policies against non-members. As a result, customs unions do not need to establish rules of origin among member countries. In Chapter 7, Georges asks the question of whether it would be better for Canada to join the US and Mexico in a customs

union, or to maintain a free-trade agreement (NAFTA or USMCA) and move into an eventual CU. Gauging the impact of moving from a FTA to a CU requires estimating the joint effects of adopting a common external tariff and eliminating the rules of origin. This necessitates an analysis of the complex interconnections between the use of primary factors of production, intermediaries, and final goods and examining their impact on economic welfare or GDP. Given these complexities, Georges uses a CGE model. He finds that any benefits in shifting from a FTA to a CU appear to have dissipated significantly over the years.

Chapter 7 provides a discussion of President Trump's approach to trade policy and its potential consequences. Georges argues that the US administration's attacks on bilateral, regional, or multilateral trade agreements such as NAFTA, the T-TIP, or the WTO on the basis that negotiated trade rules are "biased" against the US or "unfair" to the US are groundless. First, he notes the fact that it was precisely the US that largely shaped these rules. Second, any negative consequences for some local producers or workers from the free-trade agreements were part of a negotiation process — often a protracted and complex one — whose main purpose was to provide benefits for all the trading partners, not just the US. In fact, the same complaints voiced by Trump about the "unfairness" of free-trade agreements have been voiced as well in the partner countries, where complaints have been raised by specific industry associations, workers, organizations, and others that the agreements with the US have been "unfair". Finally, he observes that the argument that trade agreements are the basis for the rising US trade deficit does not consider the fact that those deficits are the result of macro-economic forces involving lower savings relative to investment in the US and are unconnected to trade policy.

Finally, Georges discusses the issue of trade wars. The tit-for-tat wars that the US has entered into with China, he argues, remind many economic historians of the tit-for-tat trade war that followed the Smoot–Hawley Act of 1930 and that many argue acted to accentuate the effects of the Great Depression. The Tariff Act of 1930 was sponsored by Senator Reed Smoot and Representative Willis C. Hawley and signed into law by President Herbert Hoover on June 17, 1930. Now known as the Smoot–Haley Act, it increased US tariffs on a wide range of imports and caused American trading partners to retaliate swiftly, including Canada, which imposed tariffs on US exports to Canada worth 30% of that country's imports from the US. The tariffs imposed under the Smoot–Hawley Act undermined confidence, generated uncertainty worldwide, and deepened the economic slump at the time. Georges warns that although the WTO and its rules governing global trade exert a counterbalance to protectionist threats that did not exist at the time of the Smoot–Hawley Act of 1930, the undermining of the WTO by the Trump administration could be dangerous for the global trading system.

Chapter 8 by Mário Fortuna and Francisco Jose Ferreira Silva examines the impact of the Transatlantic Trade and Investment Partnership (T-TIP). This free-trade agreement between the EU and US began to be discussed during the administration of President Barack Obama and had as an objective the elimination of custom duties and trade barriers. The negotiations, however, came to a standstill at the beginning of the Trump administration because of the perception of the new American President that the US was not achieving a good deal in this process. In July 2018, however, the Trump administration restarted negotiations, which continued into 2019.

To assess the potential impact of T-TIP, a wide set of studies has been undertaken at different levels of aggregation — global, trade blocks, EU, US, EU member states, and regional. Chapter 8 exemplifies the importance of looking not only at national but also at subnational regional trade in detail. This is carried out by the authors by focusing on the case of Portugal and of one of its regions, the Azores. Even though the analysis presented in the chapter pertains to a specific country and a specific region, the approach can be applied to any country and any region. The same can be said of the specific type of model used — which is a regional CGE model called AZORMOD. It offers a modeling platform of the Azores economy, represented by a dynamic, multi-sector CGE model that incorporates the behavior of six economic agents: enterprises, families, the regional government, the central government, the European Commission, and the rest of the world.

The research presented in this chapter concludes that, by 2030, depending on the scenario that is chosen: GDP in the Azores will rise between 0.4% and 0.77% as a result of T-TIP. In fact, all scenarios, for all periods, point to positive GDP impacts that become larger with time. Private consumption is estimated to increase between 3.70% and 5.92%, and foreign trade balances are anticipated to rise, with both imports and exports increasing. Employment is anticipated to increase between 1.05% and 1.67%, and with the increasing jobs created, the unemployment rate is expected to fall by as much as 1.56%. With greater output, the simulations indicate that government revenues can rise by as much as 5.5%.

One major concern of the T-TIP agreement is whether it may have a negative impact on some of the sectors of the local economy. For the Azores, the concern is with three major sectors: the milk value chain, the fish value chain, and the tourism value chain. This issue was analyzed as part of this study and the main conclusion is that the overall positive impact of the T-TIP would be unevenly distributed in the economy, with some sectors gaining and some losing. None of the major economic activities in the Azores is anticipated to be negatively affected in a substantial way. The main negative impact, although estimated to be small, is in the fisheries and fish processing sector. The results for agriculture are ambiguous (positive in some scenarios and negative in others). The main gainers are the dairy

industry and all the activities associated with tourism. These sectoral results, in conjunction with the aggregate results mentioned earlier, suggest the conclusion that although the T-TIP will be generally of great economic value, public policies should be considered in assisting those areas where the impacts will most likely be negative.

Another concern that has been raised with respect to trade agreements is their distributional impact. To assess the distributional impact of the T-TIP on the Azores, equivalent variation measures were used, distributed by six household income categories. The conclusion of the simulations in this chapter indicates that the overall impact of the trade reform on household income is positive and would amount to a value equivalent to between 75 and 119 million euros per year, by 2030. But the distribution of the gains is uneven.

Finally, the study broke down the aggregate trade impacts by sectors. Imports, as it turns out, under the chapter's simulations, are expected to increase in all sectors, for all trading partners. Exports, however, will be impacted differently depending on the sector. Some export industries will gain but some will decline.

Given the overall results of the simulations, this study provides support for the decision to subscribe to the T-TIP agreement, as far as the Azores region is concerned. It appears clear that the trade reform will stimulate overall economic growth in the region. Care should be taken, however, to design adequate policies to mitigate the potentially negative impacts in some sectors such as fisheries and agriculture. Given these conclusions, the results presented in this chapter suggest the need for more detailed regional trade impact studies. Looking at the global or the national trade impact picture is important but a lot of local impacts might be ignored by such an approach. Looking at regional impacts is an important step toward a better identification of gainers and losers and provides a better view of the necessary mitigation, compensation, or associated development policies.

International Trade and Economic Development

Conventional trade theory and the H–O–V model of international trade emphasize the benefits of specialization due to comparative advantage. However, Chapter 9 authored by Chris Papageorgiou, Sidra Rehman, and Ke Wang makes the argument and provides empirical evidence suggesting that diversification may provide significant economic gains, particularly in the early stages of the development process.

Chapter 9 analyzes the role of diversification — not just in external trade but also in the broader domestic economy — on the process of economic development. The authors point to a number of theoretical reasons why diversification can

positively affect growth and development. First, there is a long-standing literature that associates more diversified production structures with lower volatility of output and greater macroeconomic stability. More recently, the endogenous growth literature — spearheaded by Paul M. Romer — suggests that economic growth is caused by technical change and innovation operating through the creation of new products and industries, that is, a more diversified economy. Other authors, such as Ricardo Hausmann and Dani Rodrik, show how increased diversification of economic activities connects to entrepreneurship and innovation. The chapter also discusses empirical evidence showing that until a country reaches advanced economy status, diversification in output and employment is associated with higher income per capita. This is also in line with the “natural-resource curse” literature, which suggests that lack of diversification is associated not only with low levels of growth but that this strong dependence on primary commodities may also be a source of growth-inhibiting volatility.

Given the theoretical and empirical evidence supporting the desirability of diversification, the chapter seeks to examine which aspects of diversification are important, under what conditions it is desirable, and how best to promote it. The importance of diversification in promoting growth and the nonlinearity in the diversification process suggests that it is imperative to not only examine the process as a whole, but to also consider separately low-income countries (LICs), middle-income countries (MICs), and high-income countries (HICs). The work presented in the chapter is based on cross-country analysis as well as country case-studies to illustrate that diversification in production, exports, and trading partners typically plays an important role in accompanying growth.

Diversification is examined at two levels, *Trade diversification* and *domestic diversification*, which are in principle interlinked, the former reflecting diversification in the external sector, and the latter capturing diversification in the domestic production process across sectors. Therefore, the two dimensions of diversification are evaluated simultaneously, filling a gap in the existing literature, which has treated them independently. Trade diversification can be achieved along several dimensions. First, diversification may occur across either products or trading partners. Second, product diversification may occur through the introduction of new product lines (the *extensive* margin), or a more balanced mix of existing exports (*intensive* margin).

At a practical level, diversification is measured by the authors using the Theil index, which has the advantage of being decomposable into diversification along the extensive and intensive margins. Lower values of the index indicate *greater* diversification. To determine the specific, causal effect of diversification on economic growth, given other growth determinants, the authors utilize the Instrumental Variable Bayesian Model Averaging (IVBMA) method which is

specifically designed to allow for a large set of potential growth determinants when causality is in question. The IVBMA produces the *posterior inclusion probability* (PIP) that provides a probability statement regarding the importance of a particular growth determinant. The research includes analysis of a cross-country sample of countries all over the world as well as case studies from Tanzania, Vietnam, Malaysia, and South Korea.

The results suggest that diversification in both exports and output is among the main factors driving growth, but this result is limited to LICs. The posterior inclusion probabilities indicate that export diversification is among the most effective determinants of growth in LICs. Results are similar using diversification measured at the extensive or intensive margin, implying that LICs can boost growth by diversifying into new products or attaining a more balanced mix of existing products. This conclusion also carries over to the more general concept of output diversification. The results indicate that growth boost is significantly associated with diversification: specifically, a one standard deviation increase in LICs' export product diversification increases their growth rate by about 0.8 percentage points. Similarly, a one standard deviation increase in output diversification in LICs increases their average annual growth rate by about 1.4 percentage points.

The chapter examines several policy questions and concludes that: (i) development strategies in LICs should place further emphasis on diversification, given its critical role in increasing economic growth and reducing output volatility; (ii) while recognizing that there is no one-size-fits-all approach to increasing diversification, in general, authorities in LICs can help promote diversification by improving infrastructure and trade networks and reducing barriers to entry for new products. Improvements in governance, financial deepening, increases in human capital, and agricultural reforms all facilitate diversification. At the same time, the chapter's case studies illustrate the heterogeneity in the experiences of countries: while South Korea, Malaysia, and Vietnam have been successful in their diversification strategy, Tanzania has not been so successful.

One key message from this chapter is that economic development critically involves diversification and structural transformation — that is, the continued, dynamic reallocation of resources from less productive to more productive sectors and activities. This process involves not just external trade, but the broader economy. Success in this transformation will reduce volatility and accelerate growth. Examples include the East Asian Tigers and Tiger Cubs in the 1970s and 1980s, as they transformed from agrarian economies to manufacturing powerhouses. Today's LICs remain relatively undiversified and are typically specialized in agriculture and/or mining activities.

Chapter 10 by Ricardo A. Lopez and Kathleen McQueeney examines how trade facilitation in international markets affects export performance in developing countries. Trade facilitation includes policies that simplify, streamline, and harmonize government requirements for the export and import of goods and services. It has become a key issue recently, as the proliferation of trade rules and regulations — as embodied in domestic laws as well as those in bilateral, regional, and multilateral agreements — means that the cost and time involved in obtaining the needed documentation and complying with the required procedures to export and import have become a significant barrier to international trade activities. Given the growing interconnectedness of markets through GVCs and the need to accelerate the time-sensitive flow of intermediate goods that form part of in-time production networks, trade facilitation has become a necessity for developing countries seeking greater access to the world trading system.

Trade facilitation is part of the quality of public sector governance, which has long been identified as a potential force in both international trade flows and economic growth. At a macroeconomic level, high-quality governments that design and implement adequately-designed policies have been found to boost trade flows. For example, the export promotion policies of East Asian countries — from South Korea to Singapore — which fostered the creation, investment, and financing of export firms or subsidized the cost of infrastructure (energy, ports, etc.) have been connected to the great success of these countries in exploiting trade for economic development purposes. Second, at a microeconomic level, greater bureaucratic agility and the reduction of “red tape” reduces trade costs and stimulates the flow of goods and services across borders. This chapter focuses on this second set of factors.

As Lopez and McQueeney emphasize, trade facilitation has been at the center of global economic policymaking in recent years. For the WTO, trade facilitation has constituted one of its most successful recent attempts at multilateral, global trade negotiations. The WTO’s Trade Facilitation Agreement (TFA), which is in force since February 2017, includes a wide array of provisions intended to (1) expedite the flow of goods among members of the organization, (2) enhance cooperation among customs and other government authorities with the goal of accelerating compliance of exporters and importers with governments’ international trade regulations, and (3) provide technical assistance for customs and border trade management. The TFA initiative began as part of the organization’s Doha development agenda, started in 2001, whose goal was to link trade more closely to the process of economic development. Although the Doha initiative’s most popular negotiations — such as the reform of agricultural

trade policies — have not resulted in any comprehensive agreement, the trade facilitation discussions were more successful and negotiations were concluded in 2013 and implemented since 2017.

The chapter constructs sector-level measures of trade facilitation in international markets to show that reductions in the costs required to import in foreign countries can significantly increase the probability of exporting to that country. The empirical analysis uses plant-level data from the manufacturing sector of Chile for the period 2005–2007. Chile is a unique case study given its relatively rapid economic growth during the last decades, thanks to its reliance on international trade. The research focuses on three costs associated with importing a product in international markets: the monetary cost (excluding tariffs), in US dollars, required to import a 20-foot container, the number of documents required to import, and the time, in days (not including transport time), required to import.

The econometric analysis carried out in Chapter 10 examines the effects of foreign trade facilitation on the probability of exporting using a probit model for the export status of various plants in Chile as a function of measures of trade facilitation in addition to other control variables. One key econometric issue is dealing with the potential role of unobserved characteristics and omitted variables that may be correlated with both trade facilitation and exporting activity in Chile. The chapter addresses this issue by using a full set of fixed effects at the sector-region level, year level, and by adding a set of control variables at the sector level that may be correlated with foreign trade facilitation measures and export activity in Chile. The omission of these fixed effects and control variables could create a spurious correlation between trade facilitation abroad and exporting activity.

The results presented in Chapter 10 clearly show that trade facilitation increases exports. The empirical analysis does find that a decrease in the number of documents required to import and the number of days required to import increases the probability of exporting of Chilean plants. The study also finds that the effect of improvements in trade facilitation is more important in sectors that face relatively low tariff rates in international markets. It is also found that a decrease in the number of documents required to import in international markets increases the export intensity of Chilean plants.

Lopez and McQueeney discuss several implications for policy. First of all, if foreign trade facilitation helps to increase export activity of domestic firms, then governments may want to include issues related to how to improve trade facilitation in addition to tariff reductions when negotiating trade agreements with other countries. Second, from the importing country's point of view, the results suggest

that if imported machinery, equipment, and intermediates are important for productivity growth and economic growth, then policies that reduce the costs of importing may have important positive effects on economic growth. Finally, the result that trade liberalization has a larger impact on sectors with lower tariffs suggests that trade liberalization may not be completely effective if not accompanied with policies that reduce the costs of trade related to business regulations and procedures.